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School nonattendance and child labor in Mexico: North-South, Gender, and Rural Divides

Inasistencia escolar y trabajo infantil en México: brechas Norte-Sur, Género y Rurales

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ABSTRACT

This study addresses individual, household and contextual characteristics of children 12 to 17 years of age that determine nonattendance at school (*naesc*) and their integration to the labor market (*pea*) nationwide, the border states in the North and the South, including the Yucatan peninsula. The Infant Labor Module 2017 data was used to build probit models to estimate *naesc* and *pea* probabilities to assess marginal effects of observable characteristics while nonlinear decomposition was used to evaluate geographical, gender, and rural gaps. The differences in the probability of *naesc* and *pea* are not larger than .9 percent between the North and South. Although the differences between females and males are not larger than .2 percent for *naesc*, they are as large as 12 percent for *pea*. Moreover, the differences between nonrural vs rural were consistently large: 9-14 percent for *naesc*, and 8-10 percent for *pea*. Government support in encouraging school attendance and reduction of children in the labor market showed significant marginal effects throughout.
Keywords: probit decomposition; youth; borders; rural.
JEL Classification: C35; F24; I25; J21; R10.

RESUMEN

Este estudio investiga características individuales, familiares y contextuales de niños entre 12 y 17 años que determinan la inasistencia escolar (*naesc)* y su integración al mercado laboral (*pea*) a nivel nacional, y en los estados fronterizos del norte y del sur, incluyendo a la península de Yucatán. Con datos del Módulo de Trabajo Infantil 2017, se construyeron modelos probit

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para estimar las probabilidades de *naesc* y *pea* y evaluar los efectos marginales de características observables mientras que la descomposición no lineal se usó para evaluar diferencias geográficas, género y rurales. Las diferencias en la probabilidad de *naesc* y *pea* son menores a .9 por ciento entre el Norte y el Sur. Aunque las diferencias entre géneros no son mayores a .2 por ciento para *naesc,* son hasta de 12 por ciento para *pea*. Las diferencias entre localidades no-rurales y rurales es consistentemente grande, 9-14 por ciento para *naesc*, y 8-10 por ciento para *pea.* El apoyo gubernamental para la educación mostró efectos marginales significativos en todo el país, el norte y el sur.
Palabras clave: descomposición probit; juventud; fronteras; rural.
Clasificación JEL: C35; F24; I25; J21; R10.

INTRODUCTION

Child labor is a multidimensional phenomenon in which many children are immersed around the world. When minors work, the consequences are not immediate; rather, they will manifest at an adult age. Many children interrupt their education, and this limits their development opportunities. Also, they access low-skill and low-wage employment, contributing to the reproduction of poverty (National Institute of Statistics and Geography [INEGI], 2018a). Despite the efforts to reduce child labor since the last decade of the twentieth century, Mexico is still far away from the eradication of child labor. Numerous researchers have addressed the effectiveness of programs to mitigate this phenomenon (Skoufia and Parker, 2001; Levinson, Moe, and Knaul, 2001; Alcaraz, Chiquiar, and Salcedo, 2010; Doran, 2013; Murrieta, 2016; Miranda-Juárez, 2019). The Education, Health, and Well-being Program (Progresa, acronym in Spanish) was a government program of conditional cash transfers targeting households to keep children in school and visit health clinics regularly; this program started in 1997 and ended in 2018 (Diario Oficial de la Federacion [DOF], 2018) [1]. Prospera has come to an end and most, if not all, of its educational portfolio related to children has been transferred to a new program —Benito Juárez Scholarships (Gobierno de Mexico [GOM], 2020). Under this program, households with children under 15 years of age (regardless of the number) are eligible to receive 8000 MXP per household per year. Children 15 to 17 years of age attending high school are each eligible to receive 8000 MXP per year each for up to three school years. The requirement is to be duly registered in public schools.

Access to education, as a policy, has been suggested to prevent or eliminate child labor. Increasing quality of school education is perceived to contribute to improving human capital that can match the demand for higher-paying jobs (INEGI, 2018a). Child labor is generally underpaid and, in some instances, can be dangerous

[1] The Program Progresa initiated in 1997, followed by Oportunidades in 2002 and renamed Prospera in 2014 (Acevedo, Ortega, and Székely, 2019).

or risky. The Infant Labor Module (MTI) 2017 (INEGI, 2018b), estimates that 2.3 million girls and boys ages 5 to 17 are occupied in economic activities, and out of them, 2.1 million work in non-permitted jobs. According to INEGI (2018c), non-permitted jobs include activities that affect children's development, or activities occupied by workers under the legal working age.

Mexico is a large country with many geographical differences, limitations and opportunities. All border states in the North have benefited from intense trade and employment generation. Meanwhile states in the South sharing borders with Guatemala and Belize, plus the Yucatan peninsula, despite tourism development in the Mexican Caribbean, have less promising trade and employment conditions. Díaz Dapena, Fernández Vázquez, Garduño Rivera, and Rubiera Morollón (2017) demonstrate that Mexican municipalities close to the U.S. market have benefitted from integration by increasing convergence, production, and incomes. Trade liberalization has not reduced territorial disparities domestically. On the contrary, it has led to a greater polarization within Mexico; regions further away from the U.S. border, the South, have not become integrated into world markets and have been weakened by the North American Free Trade Agreement (NAFTA) (Díaz Dapena et al., 2017). A revised new Trade Agreement, the United States-Mexico-Canada Agreement (USMCA) is scheduled for implementation in the summer 2020, replacing NAFTA. The changed regulations of labor markets (among many others), including child labor in compliance with international agreements, are linked to domestic and international trade (Congressional Research Service [CRS], 2020).

This paper is a contribution towards identifying factors that affect children who are economically active and/or not attending school while contrasting geographic location, rural condition, and gender. Through statistical modeling, probit models and nonlinear decomposition, this study builds the platform to compare the probabilities of being a child 12-17 years old[22] who is economically active and/or not attending school as a function of individual, household or family, and contextual characteristics gathered in the Infant Labor Module (MTI) 2017 (INEGI, 2018a).

The following section highlights research done in the last twenty years on schooling and labor among children in Mexico. Then, the rationale for the regionalization of the study and the underlying hypotheses are stated. A probit model is delineated and the data and procedures to predict probabilities of school nonattendance and those of being an economically active child are described. The results are separated into two blocks outlining the probability of school nonattendance, being economically active and the marginal effects of the observable characteristics. Also included are nonlinear decompositions of the contributions of

[2] For simplicity, we will use "child" and "children" to refer to individuals in this age group unless other age groups are specified or when citing the work of other researchers.

observable characteristics to explain differences due to geographic location, gender, and the rural condition. The discussion integrates regression and decomposition results in light of key characteristics. Finally, some conclusions and policy recommendations are offered.

I. THE NEXUS BETWEEN CHILD LABOR AND SCHOOL ATTENDANCE

Child labor is a factor in the perpetuation of poverty. Working children who do not attend or leave school are likely as adults to earn low wages, and their children are also likely to remain poor. The hypothesis of "luxury axiom" (Basu and Van, 1998) considers the interaction between parental income and children's work; children in households below a minimum level of wealth will work. On the other hand, the "substitution axiom" considers that child and adult work are substitutes in production in bimodal equilibrium. When salaries are low, children work and when salaries are high, children go to school. James Heckman (2000) states that preschool education is key in early child development to improving psychomotor and cognitive skills. This could help overcome the perpetuation of poverty because returns to investment are higher for early education than for the upper levels. However, Heckman has been criticized for not addressing the causes of inequality and poverty (Panico, 2016). Conditional cash transfers have been widely used since the 90s as a development approach to integrate education, health, nutrition, and infrastructure in Latin America (Orazem, Sedlacek, and Tzannatos, 2009) and elsewhere.

Skoufia and Parker (2001) mention that conditional cash transfers such as those carried out by Progresa show significant increases in school attendance among boys and girls as well as significant reductions in participation in work activities. Also, the program has a lower impact on the incidence of work among girls relative to boys. Levinson et al. (2001), using data for children aged 12 to 17 in urban environments, demonstrate that the traditional definition of work (active in the marketplace) masks the degree to which Mexican girls' household responsibilities interfere with their education. They mention that education policymakers should, in addition to child labor legislation, aim for more flexible school schedules to reduce interference with domestic activities with inflexible schedules in order to allow girls to combine household work with schooling.

López-Villavicencio (2005) analyzes data from the Income and Household Expenditure Surveys for children ages 6 to 17 between 1992 and 2000, using an ordered probit model to assess multiple time investment alternatives with simultaneous choices, as opposed to sequential choices. The dependent multinomial variable is full-time school, part-time, and full-time work while age and sex are individual characteristics, in addition to thirteen household characteristics, and five dummy variables for year. Also, two regional characteristics are included: south

location relative to Mexico City, and rural locations with less than 2500 inhabitants as well as larger populations. The author´s investigation suggests that access to education in Mexico is highly influenced by both the economic and the educational status of the household, and this is consistent with the hypothesis that income, as well as capital endowments, have a positive influence on school attendance and labor force patterns in Mexico. The author argues that, in order to eradicate child labor and to foster investment in human capital through education, these policies should be particularly directed at large, rural, and poor households.

Alcaraz et al. (2010) assess the effects of the U.S. recession 2008-9 on unemployment rates among Mexican immigrants, through remittance receipts to a considerable number of households in Mexico. They determine whether these households responded to the decrease in remittances by taking their children aged 12 to 16 years out of school and sending them to work. As remittances increase, parents send their children to school; as remittances decrease, parents take them out of school and send them to work. The authors mention that low perceived returns to education mean the children are likely to migrate to the U.S., and the endogeneity of migration decisions complicates the analysis even further. Both migration and child labor/schooling decisions could be simultaneously driven by community or household level factors (in agreement with the findings of López-Villavicencio, 2005) that may be unobservable to the researcher. Migration tends to reduce child labor and promote school retention; Alcaraz et al. mention evidence from Asia and Latin America. But in Mexico, existing evidence on the relationship between migration and schooling is generally inconclusive, and in some instances, it contradicts the results from other countries.

Acevedo-González, Quejada-Pérez, and Yánez-Contreras (2011) note that policies aimed at eliminating or diminishing the problem of child labor must take into account the regional differences and specific attributes in the study areas. Also, while improving quality of schools helps reduce child labor, such schools need to be located close to the workplace or close to the neighborhood of residence. They highlight that research has been focused on the determinants of child labor supply or those factors that push children to work rather than research focused on child labor demand or those factors that induce firms to seek child labor.

Doran (2013) used data from Progresa to assess the decrease in child farm work accompanied by an increase in adult demand labor and found that declining child supply caused an increase in adult demand; employers substituted adults for children. When employers substituted adults for children, a decrease in child labor led to an increase in adult wages and hours, partially offsetting the short-term welfare loss that families faced when some of their children were not working (Basu & Van, 1998, cited by Doran, p. 703). For environments such as corn-based agriculture, the programs to reduce child labor may mainly require funds for better schools, better

enforcement of labor laws, and better transfers within communities, rather than large injections of cash outside communities to make up for the lost child and adult wages (Doran, 2013).

Murrieta (2016) uses MTI 2013 data to address the role of individual, family, and contextual characteristics under different definitions of child labor. While children may leave school because they have to work, it is more likely that families need children's work more than their income; this is especially true for girls. The occupation rate is higher in the less urbanized areas where the income of children is lower, and the economic need is greater. The proportion of girls working in the less urbanized areas and not attending school is higher than in urban settings. In urban areas, children are more frequently working in unsuitable places, facing more risks, and bearing the longest workday. According to Murrieta (2016), rural domestic work has a greater toll on children while more minors have the longest working hours in agriculture, and fewer of them attend school. Murrieta examines the extent to which the association between income and child labor is affected by the fact that household heads with more education tend to prevent young children from working, especially in economic activities.

Child labor is significantly correlated with well-being and income, and influenced by the perceived cost of schooling, which, in turn, is correlated with parents' education and place of residence (Murrieta, 2016, p. 49). Most policies to combat child labor in Mexico have focused on the minimum age for employment. Murrieta argues that setting a minimum age for employment results in failure to shield children from working and increases the number of children who work triple shifts: work (economically active), domestic work, and attending school. Policies to foster school attendance can have a positive effect on reducing child labor if not implemented in isolation. Specific needs of children living in the countryside as well as the risks of working within the city must be addressed. Policies to reduce child labor require the analysis of different scenarios to implement suitable alternatives.

The study carried out by Miranda-Juárez and Navarrete (2016) to assess the probability of being occupied as a function of individual, family, and contextual factors suggests that the family as an institution has been losing ground against other individual factors such as gender and age. Location and household size have been losing relevance, as well. A jobless head of household does not rely on children working to overcome unemployment; it did not occur in 2007 and still less so in 2013. Individual conditions of children such as age and sex are fundamental for labor insertion; in general, there are more boys employed than girls, and this is accentuated as they get older. They remark that children who do not attend school have a greater tendency to enter the labor market or, on the contrary, school attendance determines a lower rate of economic employment. The authors also assert that child labor is more prominent in rural environments.

Miranda-Juárez (2019) characterizes rural infant labor in Mexico using MTI 2015 data. Thirty-eight percent of the occupied children live in towns of less than 2500 inhabitants, or rural areas as defined by INEGI. Out of these employed children, 28 percent are involved in the agricultural and livestock sector. She argues that infant labor in Mexico continues to be associated with rural locations in the agricultural sector. She uses binomial logistic regression to assess the role of three types of characteristics of the infants and youths (ages 5-17), individual, household and labor market, and contextual. She concludes that age and school nonattendance increase the probability that the child will work; furthermore, being a boy increases the probability of employment. School nonattendance increases the probability of being occupied (or vice versa), an issue that public policymakers need to consider in preventing or mitigating child labor in agriculture. Scholarships and government support have a negative effect on the probability of working, leading the author to conclude that there is need for government intervention in social policy and education.

Boltvinick, Damián, and Jaramillo Molina (2019) question the theory sustaining that poverty can be overcome by improving human capital. Instead, they propose that the only way to modernize the country, to develop and simultaneously eradicate poverty, is through universal citizen income (ICU, in Spanish). Also, they argue, the conditional cash transfers of Progresa-Opportunities-Prospera ought to be replaced with the ICU, which should be universal, unconditional, and enough to live with dignity (Boltvinick, et al., p. 150).

II. RATIONALE FOR THE STUDY

This is a follow-up examination of previous research carried out on infant labor in Mexico using observable individual, household, and contextual characteristics (Murrieta, 2016; Miranda-Juárez and Navarrete, 2016; Miranda-Juárez, 2019). The study looks at three levels: nationwide, North (Baja California, Chihuahua, Coahuila, Nuevo Leon, Sonora, and Tamaulipas) and South (Campeche, Chiapas, Quintana Roo, Tabasco, and Yucatan) states, including remittances as a contextual characteristic that may influence school attendance and being economically active. The emphasis on the southern border and states in the Yucatan peninsula is aimed at exploring impacts by migrants from other parts of Mexico and abroad (see CEPAL, 2019). A comparison with the northern border states is important, as this region receives returnees from the U.S., including non-Mexican nationals.

The underlying hypothesis is that school attainment of the household head, per capita income, government support to education, and per capita remittances contribute to decreasing both the probability of school nonattendance and the probability of participating in the formal labor market for children 12-17 years of age. Bivariate probit models are used to assess the probabilities of being an economically

active child and/or not attending school in light of marginal effects of observable characteristics, and through the nonlinear decomposition the contributions of the individual, household, and contextual characteristics between groupings, North and South states, boys and girls, and rural and nonrural locations are quantified. These decompositions add to existing knowledge about the factors hindering or fostering school attendance and incorporation of children to the labor economy. The emphasis of this study is on the factors that affect child labor supply rather than on the factors inducing firms to hire child labor.

III. Model specification, data and procedures

A response variable Y is binary, having two possible outcomes, denoted as 1 and 0. Y represents presence or absence of a certain condition, not attending or attending school and economically active or not active. A vector of regressors *X* is assumed to influence the outcome according to the probit model

$$\Pr(Y=1|X) = F(X^T \beta) + e$$

The probability (Pr) of Y to take the value 1 for a given observation in X is equal to the cumulative distribution function of the standard normal distribution F of the product of vector X^T and parameters in β, and e is the random error term. The parameters in β are estimated by maximum likelihood. Three types of characteristics are included in β, Individual: sex and age; Household: type 1 (female/male head with children), type 2 (couple with or without children) and type 3 (non-nuclear), six levels of school attainment of the head of household, household total population, per capita monthly income (Mexican pesos (MXP) per month), and government support to education (*gse*); Contextual: per capita monthly remittances (MXP per month), rural vs nonrural environment, and, work in the primary, secondary, or tertiary sector.

Data from the MTI 2017 (INEGI, 2018b), was used to create a platform of models: National, North, and South to assess individual, household, and contextual characteristics determining the probability for school nonattendance and incorporation into the labor market of children.

The minimum daily wage (MDW) of 90 Mexican Pesos (MXP) in the last quarter of 2007 was used to estimate the discrete income levels in MTI 207: less than one MDW (.75 MDW), between one and two MDW (1.75 MDW), between two and three MDW (2.5 MDW), four MDW, and six MDW, for an average monthly income 2,371 MXP. These levels of income divided by the total number of people in the household (*ptot*) determined per capita monthly income (*pcinc*) in MPX. Government support, or scholarship, for child education (*gse*) was included as a binary household characteristic from the pre-codified MTI 2017 data. Other types of pre-codified support include other government programs, support from a relative living in another

location, other, and no support.

Quarterly remittances in USD for the last quarter of 2017 reported in each of the 31 states and Mexico City (Banxico, 2019) were divided by the number people in each political entity and by three months, then multiplied by the exchange rate of 18.15 MXP per USD, to estimate per capita monthly remittances in Mexican pesos. This variable was added to each observation in the MTI data for the 31 states and Mexico City. This variable is contextual and replaces the need for a large set of state dummy variables for states. Data was aggregated for the North states (Baja California, Chihuahua, Coahuila, Nuevo León, Sonora, and Tamaulipas) and for the South states (Campeche, Chiapas, Quintana Roo, Tabasco, and Yucatán) to perform comparisons. While the figures represent averages across the sample regardless of whether or not each individual in the sample received a remittance, they are part of the context for each state, related to the transfers from migrants abroad. Thus, *pcrem* is a contextual variable related to each state that is applied to each observation. Both *pcinc* and *pcrem* are continuous variables or characteristics. While *pcinc* is an observable characteristic from the MTI, *pcrem* was assigned as a contextual variable based on remittances by entity. Probit regressions, marginal effects, and decompositions were estimated with STATA (ver. 13.1); the decomposition method utilizes parameters from probit (or logit) regressions (Fairlie, 2005).

IV. Results

Summary statistics from MTI 2017, for children between 12 and 17 years of age include 42,216 observations nationwide, 7592 for the North, and 6273 for the South (Table 1). These numbers are, respectively, subsamples of 29.345, 1.244 and .738 million children between 5 and 17 years of age nationwide, in the North and in the South (INEGI, 2018b).

Dependent variables. The probability of a child not attending school (*naesc*) and the probability of being a child economically active (*pea*) are binary variables, 1 denoting the presence of a characteristic and 0 for its absence; for a given population it reflects the probability of having that characteristic. There is a .006 higher probability of children who do not attend school in the North compared to the South and .013 higher probability of children who are economically active in the North compared to the South. Both North and South have lower probabilities of children not attending school or being economically active than those children nationwide.

Independent variables or observable characteristics are assembled in three clusters of characteristics: individual, household and contextual.

- *Age* and *sex* are individual characteristics. *Age* is a continuous variable and *sex* is a binary variable, with female as a reference (*sex*=0). Age is very similar for the three groups, 14.5 years of age; likewise, the male/female ratio is in

the range of 1.02 in the South and 1.04 in the North.

- Household characteristics. The type of household can be a single head of household with children (*clh1*), a couple with children (*clh2*), and a non-nuclear household (*clh3*); school attainment of the household head (no schooling, *hhsch1*; incomplete primary, *hhsch2*; completed primary *hhsch3*; incomplete secondary, *hhsch4*; completed secondary, *hhsch5*; and some high

Table 1
Infant labor in Mexico and its North and South regions: descriptive statistics

		Mexico	North*	South**
	Total population	123,956,753	22,357,156	12,649,341
	Children 5-17 years of age	29,344,545	1,244,430	737,778
	MIT 2017 sample (12-17 years)	42,216	7,592	6,273
Variable	**Description**	**Mean and (standard deviation)**		
Dependent				
naesc	school nonattendance	.1310	.1286	.1224
		(.3374)	(.3347)	(.3278)
pea	economically active	.1480	.1417	.1290
		(.3551)	(.3488)	(.3352)
Individual characteristics				
age	age (years)	14.533	14.5453	14.5503
		(1.7124)	(1.7201)	(1.7026)
sex	male/female	.5097	.5108	.5055
		(.4999)	(.4999)	(.5000)
Household characteristics				
clh1	hh head w/out children	.1293	.1342	.1154
		(.3356)	(.3409)	(.3195)
clh2	couple w/out children	.5770	.5869	.5793
		(.4940)	(.4924)	(.4937)
clh3	non-nuclear	.2926	.2770	.3048
		(.4550)	(.4475)	(.4603)
hhsch1	hh no schooling	.0507	.0493	.0413
		(.2187)	(.2164)	(.1990)
hhsch2	hh incomplete primary	.0994	.0943	.0976
		(.2992)	(.2923)	(.2967)
hhsch3	hh completed primary	.2123	.1874	.1776
		(.4090)	(.3903)	(.3822)
hhsch4	hh incomplete secondary	.3234	.3224	.3478
		(.4678)	(.4674)	(.4763)
hhsch5	hh completed secondary	.3139	.3463	.3349
		(.4641)	(.4758)	(.4720)
hhsch6	hh some high school or more	.0007	.0003	.0008
		(.0257)	(.0162)	(.0282)

tdom	Unpaid domestic work	.0941	.0857	.0795
		(.2920)	(.2800)	(.2706)
ptot	total members in the HH	4.9682	4.8440	4.9150
		(1.70)	(1.64)	(1.64)
pcinc	per capita monthly income (MXP)	477.20	495.90	470.63
		(379.00)	(415.15)	(354.47)
gse	gov. support to education	.2462	.2156	.2751
		(.4308)	(.4113)	(.4466)
Contextual characteristics				
pcrem	per capita monthly remittances (MXP)	523.08	552.99	151.80
		(435.81)	(575.43)	(26.38)
rural	locations with less than 2500 people	.1823	.1291	.1513
		(.3861)	(.3353)	(.3585)
pri	primary sector	.0314	.0230	.0250
		(.1744)	(.1503)	(.1563)
sec	secondary sector	.0303	.0240	.0233
		(.1714)	(.1529)	(.1509)
ter	tertiary sector	.0763	.0813	.0716
		(.2655)	(.2733)	(.2579)

*North: states of Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas.
**South: states of Chiapas, Tabasco, Campeche, Quintana Roo, and Yucatan.
Age, *ptot*, *pcinc*, and *pcrem* are continuous variables, the rest are categorical.
Source: elaboration by the author with MTI 2017 data (INEGI, 2018b).

school or more, *hhsch6*); total number of household members (*ptot*); per capita monthly income in MXP (*pcinc*); and government support to education (*gse*), assumed to be part of the conditional cash transfer program (Prospera in 2017). The most frequent type of household is that of couples with children, varying from .577 in Mexico to .587 in the North, while non-nuclear households vary from .277 in the North to .305 in the South, and households led by a single parent vary from .115 in the South to .134 in the North. Nationwide, the school attainment of the household head, nationwide, up to primary school (.212) is higher than that of the North (.187) and the South (.178). In contrast, the schooling of the household head nationwide up to secondary school (.314) is slightly lower than that for the North (.346) and the South (.335). Number of household members varies from 4.8 in the North to 5.0 nationwide. Per capita income ranges from 470.6 MXP in the South to 495.9 MXP in the North. Government support to education (gse), is included as a bivariate characteristic. This support is lowest in the North (.216) with .142 probability of children in the labor market and support is highest in the South (.275) with corresponding .129 probability of children in the labor

market.

- Contextual characteristics include per capita monthly remittances in MXP (*pcrem*), locations with less than 2500 people (*rural*), and three sectors of activity: primary, secondary, and tertiary. Per capita remittances range from 151.8 MXP in the South to 553.0 MXP in the North. The North has the lowest proportion of rural population, with the lowest proportion working in the primary sector but with the highest proportion working in the tertiary sector. In contrast, the South has the lowest proportion working in both the secondary and tertiary sectors. This corresponds to the scenario described by Díaz Dapena et al. (2017).

Age, total number of members in the household, per capita income, and per capita remittances are continuous variables. All others are binary variables denoting presence or absence of a particular characteristic. Average monthly per capita income in the South is five percent below that in the North, but the proportion of children benefiting from government scholarships is 28 percent higher in the South relative to the North (.2751/.2156, Table 1). The snapshot as of the last quarter of 2017 shows more coverage of government support to education in the South compared to the North, vis-a-vis, a 5 percent lower per capita income in the South. The North, with the highest per capita remittances shows a slightly lower probability of children not attending school or being in the labor market compared to the nationwide figures. However, the lowest probabilities of school nonattendance or being economically active are those in the South, with only 27 percent of the per capita monthly remittances in the North. The probit models integrate individual, household, and contextual observable characteristics and allow estimation of marginal effects to both continuous and discrete characteristics.

Probability of school nonattendance

Coefficients of the probit models estimating the probability children 12-17 years of age not attending school (*naesc*) and their marginal effects (dy/dx) are shown in Table 2 for Mexico, North and South states for the three types of observable characteristics.

Individual characteristics. Age and sex are highly significant nationwide and in both regions. For each year of age there is .022 to .025 higher probability of not attending school. A negative coefficient and marginal effect for sex implies that male children have higher probability of attending school compared to their female counterparts. Female children are less likely to attend school, .014 nationwide and .021 in the South, than their male counterparts.

Household characteristics. None of the three variables for type of household is significant for North, South, or nationwide. School attainment of the household

head is significant nationwide for those household heads with both incomplete and complete secondary school, with negative marginal effect (-.050) in agreement with the hypothesis that higher school attainment of the household head encourage more school attendance (López-Villavicencio, 2005), down to -.089 lower probability of not attending school or completing high school. In contrast, in both the North and the South, primary and secondary schooling of the household head have positive marginal effects, ranging from .276 and .335 with no schooling in the North and South, respectively to .055 and .084 with incomplete secondary school in the North and South, respectively. The sign is counterintuitive, as higher school attainment of the household head is likely to encourage school attendance; however, the trend supports

Table 2
Probability of school nonattendance (*naesc*) and marginal effects

	Mexico		**North**		**South**	
	Coeff.	**dy/dx**	**Coeff.**	**dy/dx**	**Coeff.**	**dy/dx**
Individual characteristics						
age	.2731***	.0251	.2778***	.0253	.2788***	.0217
sex	-.1552***	-.0143	-.1953***	-.0179	-.2676***	-.0210
Household characteristics						
clh1	.2777	.0304	-.0526	.0050	2.7048	.7036
clh2	.1442	.0130	-.0331	-.0300	2.7048	.2501
clh3	.2205	.0220	.0345	.0032	2.7528	.5389
hhsch1	.0861	.0084	1.2952***	.2758	1.5287***	.3353
hhsch2	-.0944	-.0084	1.0778***	.1947	1.3232***	.2432
hhsch3	-.3111	-.0246	.9121***	.1349	1.0709***	.1540
hhsch4	-.6375**	-.0498	.5070***	.0547	.8261***	.0840
hhsch5	-1.269***	-.0894	omitted			
hhsch6	omitted		omitted			
tdom	.0712	.0069	.1596	.0163	.1189	.0101
ptot	.1114***	.0102	.0156***	.0087	.1211***	.0094
pcinc	.0004***	.00004	.0005***	.0001	.0006***	.0000
Gse	-1.8813***	-.1048	-2.0513***	-.1007	-1.8728***	-.0973
Contextual characteristics						
pcrem	-.00004*	-.0000	-.0002***	-.0000	.0006	.0000
rural	.4441***	.0521	.5706***	.0744	.5965***	.0676
pri	1.0545***	.2040	1.2301***	.2624	1.0113***	.1721
sec	1.0689***	.2087	.6354***	.0946	.9583***	.1579
ter	.5644***	.0771	.2462**	.0268	.7052***	.0928
Knst	-5.5734***		-6.4909***		-9.7658	
Obs.	42,102		7,553		6,261	
PR2	.3790		.3674		.4029	

*p≤.05, **p≤.01, ***p≤.001
North: states of Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas. South: states of Chiapas, Tabasco, Campeche, Quintana Roo, and Yucatan. Variable name

key: age, *sex*, *clh1* (household head with children), *clh2* (couple with or without children), *clh3* (non-nuclear), *hhsch1* (no schooling of household head), *hhsch2* (incomplete primary of household head), *hhsch3* (primary complete of household head), *hhsch4* (incomplete secondary of household head), *hhsch5* (complete secondary of household head), *hhsch6* (some high school or more of household head), *ptot* (total number of household members), *pcinc* (per capita income), *gse* (government support to education), *pcrem* (per capita remittances), *rural* (living in population ≤2500 people), *pri* (primary sector), *sec* (secondary sector), and *ter* (tertiary sector). *Age, ptot, pcinc*, and *pcrem* are continuous variables, the rest are categorical. Source: elaboration from the author with MTI 2017 data (INEGI, 2018b).

the idea that greater educational attainment encourages more school attendance. Domestic work is not significant nationwide, the North, or the South. Total number of people in the household and per capita monthly income are highly significant nationwide and in both regions. For each additional person in the household the probability of not attending school increases by .009 in the North to .010 nationwide. The marginal effect for per capita income is very small (.0001 or less) but when multiplied by the nationwide per capita income, for example, the probability for not attending school is increased by .019. Higher per capita income increases the probability for school nonattendance; this seems to be contrary to the findings of López-Villavicencio (2005) where higher income families appreciate the value of education more than lower income families. The marginal effects for government support to education support are highly significant and very similar among regions, varying from -.097 in the South to -.105 nationwide, supporting the argument that government scholarships diminish non-attendance (Skoufia and Parker, 2001; López-Villavicencio, 2005; Miranda-Juárez, 2019; Cardoso and Souza, 2004; Ray, 2011).

Contextual characteristics. Data from MTI reveal that per capita remittances are highly significant nationwide and in the North; a marginal effect less than -.00004 times 553 MXP represents about -.022 lower probability of not attending school[3]. Rural location is highly significant in all areas, with marginal effects ranging from .052 nationwide to .074 in the North. All coefficients for the occupied population show that for those working in the primary sector (agriculture and livestock production, and mining) the marginal effect ranges from .172 in the South to .262 in the North, while those involved in the secondary sector (construction and manufacturing) the marginal effect ranges from .095 in the South to .209 nationwide, and for those individuals involved in the tertiary sector (services and trade) the marginal effect ranges from .077 nationwide to .093 in the South. Pseudo R square estimates of the probit models vary from .367 in the North to .403 in the South.

[3] In contrast, per capita remittances are negatively correlated with *naesc* nationwide and in the North (-.001 and -.035, respectively).

Probability of being economically active

Coefficients of the probit models to estimate the probability of children being economically active (Pr *pea*) and their marginal effects are shown in Table 3 for Mexico, North, and South for the different observable characteristics. Unpaid domestic work and the three economic sectors are omitted because of collinearity with pea.

Individual characteristics. Both *sex* and *age* are highly significant in predicting the probability of a child being an economically active child. For each additional year, children in the South increase their probability of working for remuneration by .012 and by .018 in the North. Male children in the North have .040 higher probability of working for remuneration compared to females. In contrast, male children in the South have .051 higher probability of working in the economy compared to female children. While *pea* increases for both males and females, it is lower for females.

Table 3
Probability of being economically active (*pea*) and marginal effect

	Mexico		**North**		**South**	
	Coeff.	**dy/dx**	**Coeff.**	**dy/dx**	**Coeff.**	**dy/dx**
Individual characteristics						
age	.1621***	.0152	.2050***	.0182	.1473***	.0120
sex	.4844***	.0466	.4388***	.0397	.5971***	.0508
Household characteristics						
clh1	-.6265**	-.0401	-.4814	-.0318	3.0567	.8062
clh2	-.5425*	-.0561	-.4667	-.0454	3.0964	.3058
clh3	-.6426**	-.0493	-.4947	-.0368	2.9476	.6083
hhsch1	.2549	.0290	.4908***	.0633	.5537***	.0699
hhsch2	.3560	.0426	.5226***	.0668	.5550***	.0670
hhsch3	.1893	.0196	.2419***	.0246	.3238***	.0319
hhsch4	.1079	.0105	.2482***	.0237	.2850***	.0252
hhsch5	-.1357	-.0122	omitted			
hhsch6	omitted		omitted			
ptot	.0513***	.0048	.0647***	.0057	.0644***	.0052
pcinc	.0005***	.0001	.0006***	.0001	.0003***	.00003
gse	-.1053**	-.0094	-.1654***	-.0136	-.1492**	-.0115
Contextual characteristics						
pcrem	-.0001***	-.00001	-.0003***	-.00003	-.0020	-.0002
rural	.2949***	.0325	-.3477***	-.0387	.3625***	.0371
Knst	-4.188***		-5.0293***		-7.6359	
Obs.	38,244		6,939		5,769	
PR2	.1036		.1340		.1152	

*p≤.1, **p≤.05, ***p≤.01

North: states of Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas. South: states of Chiapas, Tabasco, Campeche, Quintana Roo, and Yucatan. Variable name key: age, *sex*, *clh1* (household head with children), *clh2* (couple with or without children), *clh3* (non-nuclear), *hhsch1* (no schooling of household head), *hhsch2* (incomplete primary of household head), *hhsch3* (primary complete of household head), *hhsch4* (incomplete secondary of household head), *hhsch5* (complete secondary of household head), *hhsch6* (some high school or more of household head), *ptot* (total number of household members), *pcinc* (per capita income), *gse* (government support to education), *pcrem* (per capita remittances), *rural* (living in population $\leq$2500 people). *Age*, *ptot*, *pcinc*, and *pcrem* are continuous variables, the rest are categorical.
Source: elaboration from the author with MTI 2017 data (INEGI, 2018b).

Household characteristics. The type of household—a single head of household with children, couples with or without children, or a non-nuclear household—is significant in determining the probability of being economically active nationwide, but not in the North or South. The marginal effect is as low for single parent households (-.040) and high for couples with children (-.056). The more stable households have children with .016 percent lower probability of engaging in economic activities. School attainment of the household head is highly significant and positive in the North and in the South. The positive sign is contrary to what Murrieta (2016, p. 45) reported for household head school attainment using a pre-coded continuous variable. The marginal effect is lower with higher school attainment: .063 in the North and .070 in the South for household heads with no schooling and it is .024 in the North and .025 in the South with household heads with incomplete secondary school. Reduction in Pr *pea* has a trend consistent with the hypothesis of the higher school attainment of the household head being associated with the lower Pr *pea*. Total size of the household is significant in all groups, .005 higher probability of having a child economically active nationwide and .006 in the North. Per capita income has highly significant coefficients in all regions; the marginal effect is highest in the North (.0001) and lowest in the South (.00003), these marginal effects, when multiplied by their corresponding per capita income, reveal higher probabilities of working with remuneration: .050 in the North and .014 in the South. Government support to education (*gse*) has a negative effect on the probability of a child being incorporated into the formal labor market; the largest marginal effect occurs in the North, -.014 and lowest nationwide, -.009. This shows that the educational scholarships contribute to reducing the number of children in the formal labor market, as suggested by Skoufia and Parker (2001), López-Villavicencio (2005), and Parker and Vogl (2018). While Cardoso and Souza (2004) found a positive impact of cash transfers on school attendance in Brazil, they did not find the same impact on reducing child labor; the program increases the chance of a poor child going to school but does not reduce her/his labor activity, possibly because she/he prefers to combine school and labor.

Contextual characteristics. Per capita monthly remittances (*pcrem*), a continuous variable, has highly significant coefficients nationwide and in the North. The marginal effect nationwide is -.00001 or -.005. lower probability of having a child economically active with an average monthly per capita remittance (523 x -.00001). Likewise, the marginal effect in the North has a -.00003 or -.016 lower probability of having an economically active child with an average monthly per capita remittance (553 x -.00003). The rural or nonrural population has a significant and positive effect on higher probability nationwide (.032) and in the South (.037) of having a child in the formal labor market, and a lower probability in the North (-.039). While rurality is related to higher Pr *pea* nationwide and in the South (López-Villavicencio, 2005; Murrieta, 2016), in the North the opposite holds, with similar magnitude as in the South (-.039 and .037, respectively). Dissection of the data by geographic or rural location and gender may reveal discrepancies using national data or sections of age categories.

Pseudo R square estimates range from .104 in Mexico to .134 in the North. These R square values for *pea* are considerably lower than those for *naesc*, implying that the models for *pea* are less accurate in predicting the outcome. The models for economically active children excluded four variables: *tdom* and the three economic sectors due to collinearity. The six probit models (three for *naesc* and three for *pea*) are a reference to assess differences between males and females, and nonrural and rural locations for Mexico, North, and South regions.

Probit decompositions

Nonlinear decomposition groupings of Pr *naesc* and Pr *pea* allow the following comparisons: i) Mexico, females vs males; ii) Mexico, nonrural vs rural; iii) North vs South; iv) North, females vs males; v) North, nonrural vs rural; vi) South, females vs males; and vii) South, nonrural vs rural. The decomposition evaluates the contribution of observable characteristics to explain differences in the probability of school nonattendance, Pr *naesc* or being economically active, Pr *pea*, for the different groupings.

School nonattendance

The contributions of groups of characteristics to explain differences in the predicted probability of school nonattendance (Pr naesc) are assessed with nonlinear decomposition. Table 4 summarizes the results in seven columns, 1) the decomposition groupings, 2) the number of observations involved in each decomposition, 3) the estimated difference in Pr *naesc*, 4) the percentage of the difference explained by the observable characteristics in the groupings, and the sign

of the coefficient that represents the positive or negative contribution to explain the difference in predicted Pr *naesc* by the specific characteristics in each of the three groups, namely, 5) individual, 6) household, and 7) contextual.

The differences in Pr *naesc* are noteworthy in the nonrural vs rural comparisons for Mexico, North, and South, ranging from -.087 in the South to -.141 in the North. Negative differences imply that the second group has a higher probability of *naesc* than the first group. If the opposite occurs, it is because the probability of the first group is larger than that of the second group. Differences in Pr *naesc* are much smaller comparing females and males in Mexico, North, and South, ranging from -.002 in the North to -.015 nationwide. Also, the difference in Pr *naesc* in the North and South (iii) is -.005. Results of the decomposition explained more than 100 percent of the difference in Pr *naesc* between females and males nationwide and, in both North and South. These percentages are relative to the size of the difference in each grouping. For example, out of a difference of -.002, the nonlinear decomposition (iv) predicted a 12-fold difference when the parameters of the female profit model used the characteristics of their male counterparts. In contrast, where the differences in the probabilities were relatively high, for example, -.141 in the comparison North nonrural vs rural (v), the decomposition accounted for 41 percent of such differences, or in the South nonrural vs rural comparison, the decomposition only explained 5 percent of -.087 difference.

The differences in Pr *naesc* nationwide, comparing females and males show that (i), 205 percent of the explained difference (-.015) comes from household (*tdom* and *pcinc*) and contextual characteristics such as economic sectors. However, comparing nonrural vs rural (ii), 41 percent of the difference (-.097) is explained by individual (*sex*), household (*hhsch5*, *ptot*, *pcinc*, and *gse*), and contextual characteristics (*pcrem* and economic sectors). In the comparison between the North and the South (iii), 71 percent of the difference (-.005) is explained by household (*pcinc* and *gse*) and contextual characteristics (*pcrem* and *sec*). In the South, neither comparisons, females vs males (vi) nor nonrural vs rural (vii), have significant contribution of individual characteristics; however, household (*pcinc*) and contextual characteristics (*rural*, *sec*, and *ter*) contribute to explaining four-fold the predicted difference between females and males (-.008) and 5 percent of the difference between nonrural and rural (-.087) is significant for type of household (*clh1* and *clh2*), school attainment of the household head (*hhsch4* and *hhsch5*), *ptot*, *pcinc*, and *gse*. While sex as an individual characteristic helps explain the difference between nonrural and rural locations in Mexico, it is not a significant variable in any of the other comparisons nationwide, the South, or the North.

Table 4
Decomposition results of the probability of a school nonattendance (Pr *naesc*).

Decomposition groupings	Number of Observations	Difference	% explained	Significant characteristics [#]		
				Individual	Household	Contextual
(i)Mexico, female vs male	20,673/21,429	-.0152	205		*tdom*(-)** *pcinc*(-)***	*pri*(-)*** *sec*(-)*** *ter*(-)***
(ii)Mexico, nonrural vs rural	34,438/7,664	-.0966	41	*sex*(-)***	*hhsch5*(-)** *ptot*(+)*** *pcinc*(+)*** *gse*(-)***	*pcrem*(-)* *pri*(+)+++ *sec*(+)*** *ter*(+)***
(iii)North vs South	7,553/6,266	-.0051	71		*pcinc*(+)*** *gse*(+)***	*pcrem*(-)*** sec(+)**
(iv)North, female vs male	3,706/3,847	-.0019	1179		*pcinc*(-***)	*pcrem*(+)** *rural*(+)** *pri*(-)** *ter*(-)*
(v)North, nonrural vs rural	6,612/980	-.1406	41		*hhsch4*(-)*** *hhsch5*(-)*** *ptot*(-)*** *pcinc*(+)***	*pri*(-)***
(vi)South, female vs male	3,100/3,166	-.0080	444		*pcinc*(-)***	*rural*(-)*** *sec*(-)*** *ter*(-)***

(vii)South, nonrural vs rural	5,324/949	-.0867	5	*clh1*(+)*** *clh2*(-)*** *hhsch4*(-)*** *hhsch5*(-)*** *ptot*(-)*** *pcinc*(+)*** *gse*(+)***

Significance: *p≤.1, **p≤.05, ***p≤.01.
#the addition of the three group coefficients is the proportion of the difference explained, only significant coefficients are included.
Group characteristics: Individual= *age* and *sex*. Household= *clh1, clh2, clh3, hhsch1, hhsch2, hhsch3, hhsch4, hhsch5, tdom, ptot, pcinc,* and *gse*. Contextual= *pcrem* and *rural*. See variable name key in Table 2.
Estimated after Fairlie (2005) using Stata ver. 13.1, with 100 randomly ordered replications in the grouping decomposition utilizing MTI 2017 data (INEGI, 2018b).

Within the three groups, the contributions of different characteristics to explaining the difference in Pr *naesc* may be positive or negative; each characteristic, including the non-significant ones, has a coefficient and a contribution. However, space limits the detailed presentation of decomposition results.

Being economically active

Nonlinear decomposition quantifies the contributions of groups of characteristics to explain differences in the predicted probability of being an economically active child (Pr *pea*) in each of the seven decomposition groupings (Table 5). The smallest difference in Pr pea occurs in the comparison North and South (.009) and the largest in the South, comparing females and males (-.123), the positive difference in the North vs South implies that nonrural Pr *pea* is larger in the North.

In general, differences between females and males are larger than those differences between nonrural and rural locations. Percentages of contributions that explain the differences between sexes is only 2 percent nationwide, but it is 30 percent in the North and 20 percent in the South. Individual characteristics are significant in the nonrural and rural comparisons for all locations. Household characteristics contribute to explaining the differences in Pr *pea* followed by pcrem, a contextual characteristic. The percentage of contributions to explaining differences between nonrural and rural locations is only 11 percent nationwide, 41 percent in the North, and only 18 percent in the South. Thirty-seven percent of the difference between North and South is significantly explained by monthly per capita remittances. In the North, 30 percent of the difference between females and males is significantly explained by monthly per capita income.

To address the difference in Pr *pea* between nonrural and rural locations, in the South, North and nationwide, actions related to individual, household, and contextual characteristics are required. Likewise, addressing the difference in Pr *pea* between females and males nationwide, in the North or the South requires both household and contextual characteristics. Details of the contributions of each independent variable in the seven decompositions of differences in Pr pea can be useful to design specific policies.

V. DISCUSSION

The data from MTI 2017 captures a differential impact of government support to education on Pr *naesc* and Pr *pea*. Government support to education nationwide, in the North and in the South show highly significant marginal effects to increase school attendance (.105, .101, and.097, respectively, Table 2—signs are negative because school nonattendance is the opposite of attending school) and reduce incorporation of children in the labor market (-.001, -.014, and -.012, respectively, Table 3). These results are a snapshot of the last quarter of 2017 and not a comparison of *gse* marginal effects on both Pr *naesc* and Pr *pea* over a period of time. Per capita monthly remittances imputed to each observation from a specific state suggest that remittances

tend to decrease *naesc* and *pea* nationwide and in the North (in agreement with Alcaraz et al., 2010), but in the South, the marginal effects are not significant.

Parker and Volg (2018) ascertain the positive impact of cohorts of beneficiaries of Progresa and Oportunidades tracked from 1997 to 2010. Determination of the effectiveness of conditional cash transfers for education, or *gse* used here, as an instrument to increasing children's capacity or human capital, under current labor and educational policies is beyond the scope of this assessment. This study is limited to regional, gender and rural location comparisons for three groups of characteristics affecting children not attending school and those who are economically active.

Decomposition results reveal the following. School nonattendance—Individual, household, and contextual observable characteristics explain 5 to 41 percent of the differences in Pr *naesc* for nonrural vs rural comparisons in Mexico (ii), North (v), and South (vii). The comparisons between females and males in Mexico (i), North (iv), and South (vi) show that at the national level the addition of both significant and non-significant coefficients, either positive or negative, total 205 percent of the difference is explained[4], implying that if the observable characteristics of females replaced those of males in the probit model, the negative difference would increase in the same direction as the difference between the two groups (Stewart-Williams, 2009). Comparisons between females and males in both North (iv) and South (vi), show an over prediction explained by the decomposition, 12 times, and four times the predicted difference in the North and South, respectively. The smaller the difference in Pr *naesc* between sexes, the larger the over-explanation of the differences[5]. Nonlinear decomposition on non-significant differences in Pr *naesc* appear to be related to over-explanation relying on household and contextual characteristics.

[4] Variables with non-significant coefficients are not included in the table for the sake of brevity.

[5] Differences in Table 4 smaller or equal to .008 are not significantly different (t-test), cases (iii), (iv), and (vi).

Table 5
Decomposition results of the probability of a child being economically active (Pr *pea*)

Decomposition groupings	Number of Observations	Difference	% explained	Significant characteristic(s) #		
				Individual	Household	Contextual
(i)Mexico, female vs male	20,699/21,517	-.1129	2		*clh1*(-)*** *clh3*(+)*** *pcinc*(-)**	
(ii)Mexico, nonrural vs rural	34,520/7,696	-.0885	11	*age*(+)** *sex*(-)**	*hhsch2*(-)* *hhsch5*(-)*** *ptot*(-)*** *pcinc*(+)***	*pcrem*(+)***
(iii)North vs South	7,553/6,266	.0093	37			*pcrem*(-)*
(iv)North, female vs male	3,714/3,878	-.0982	30		*pcinc*(-)***	
(v)North, nonrural vs rural	6,612/980	-.0786	41	*age*(+)*** *sex*(+)***	*hhsch3*(+)* *hhsch4*(-)*** *hsch5*(-)*** *ptot*(-)*** *pcinc*(+)***	*pcrem*(-)***
(vi)South, female vs male	3,102/3,166	-.1231	20		*clh1*(-)*** *clh2*(-)*** *clh3*(+)*** *pcinc*(-)***	

(vii)South, nonrural vs rural	5,324/949	-.1038	18	*sex*(-)***	*clh1(+)*** *clh2*(-)*** *clh3*(+)*** *hhsch5*(-)*** *ptot*(-)*** *pcinc*(+)*** gse(+)**	*pcrem*(-)**

Significance: *p≤.1, **p≤.05, ***p≤.01.
#the addition of the three group coefficients is the proportion of the difference explained, only significant coefficients are included.
Group characteristics: Individual= *age* and *sex*. Household= *clh1, clh2, clh3, hhsch1, hhsch2, hhsch3, hhsch4, hhsch5, tdom, ptot, pcinc,* and *gse*. Contextual= *pcrem* and *rural*. See variable name key in Table 3.
Estimated after Fairlie (2005) using Stata ver. 13.1, with 100 randomly ordered replications in the grouping decomposition utilizing MTI 2017 data (INEGI, 2018b).

Population economically active—Observable characteristics explain between 2 and 41 percent of the differences between the Pr *pea*. In three nonrural vs rural comparisons, individual characteristics are significant in explaining the differences, Mexico (ii), North (v), and South (vii). Household characteristics are significant in all but one comparison, North vs South. Per capita remittances are significant in Mexico nonrural vs rural (ii), North vs South (iii), North and South nonrural vs rural (v and vii, respectively).

Three contrasting results are worth mentioning. First, for the probability of school nonattendance (Pr *naesc*, Table 4) the comparisons nonrural vs rural show larger differences than the gender comparisons in Mexico, North, and South. In contrast, for the probability of a child being economically active (Pr *pea*, Table 5) the comparisons between females and males show larger differences than the comparisons between rural locations for Mexico, North, and South. School nonattendance is more dependent on location than gender; however, being economically active is more dependent on gender than location.

Second, the differences in Pr *naesc*, in female vs male comparisons in Mexico (-.015), North (-.002), and South (-.008), household and contextual characteristics were significantly over-explained by 205, 1179, and 444 percent of the difference, respectively (Table 4). The smaller the difference, the larger the overprediction. In contrast, the differences in Pr *pea*, in female vs male comparisons in Mexico (-.113), North (-.098), and South (-.123), only household characteristics were significantly explained 2, 30 and 20 percent of the difference, respectively (Table 5).

Third, the comparison of North vs South for Pr *naesc* shows that 71 percent of the difference (-.005) is explained by household (*pcinc* and *gse*) and contextual characteristics (*pcrem* and *sec*) (Table 4). In contrast, the comparison for Pr *pea* shows that 37 percent of the difference (-.009), is explained by per capita monthly remittances, a contextual characteristic (Table 5). The association and possible causality of school nonattendance and being economically active with per capita monthly income, government support to education, per capita monthly remittances, and work in the secondary sector between the North and South should be further investigated.

CONCLUSIONS

This study is a contribution towards identifying individual, household, and contextual characteristics that affect children aged 12-17 in Mexico who are economically active and/or not attending school through contrasting location, gender, and rural conditions. The gap between Pr *naesc* of children in the North and South states is -.5 percent, and 71 percent of the difference is largely explained by household and contextual characteristics. The gap between Pr *pea* of children in the North and South states is .9

percent while 37 percent of the difference is explained by one contextual characteristic, per capita monthly remittances. Further investigation regarding the factors that affect school attendance and being economically active in the North and South states is warranted, specifically considering income, remittances, and economic sectors in which children work. Other regions in the country could be compared, and monitoring child work in different sectors and schooling will likely be in-demand under USMCA.

The gap between the Pr *naesc* of females and males ranges from -.2 to 0 percent. Household and contextual characteristics are significant over-explaining the small differences in Pr *naesc*. The gap between Pr *pea* of females and males ranges from -10 to -12 percent. In none of the comparisons is age significant to explain the differences. Household characteristics are significant for the comparisons nationwide, North, and South. The size of the gap and its negative sign implies that 10 to 12 percent more young males than young females are in the labor force.

The gap between the Pr *naesc* of nonrural and rural locations ranges from -9 to -14 percent. Individual, household, and contextual characteristics are significant nationwide; household and contextual characteristics are significant in the North, but only household characteristics are significant in the South. The gap between the Pr *pea* of nonrural and rural locations ranges from -8 to -10 percent. Individual, household, and contextual characteristics are significant nationwide as well as in both the North and the South. Lower school attendance and more incorporation of children into the labor force in the rural areas compared to the nonrural areas deserves attention and is in agreement with previous findings at the national level (Murrieta, 2016; Lopez-Villavicencio, 2005).

Possible policy actions to reduce the school nonattendance could be to enforce the law on minimum age limits in the workplace and to increase the quality of education. Better education opportunities could increase school retention of children in rural areas. Policy actions need to be integrated with household needs for children performing domestic work with emphasis in rural areas as suggested by Murrieta (2016) and Miranda-Juárez (2019).

Likewise, possible policy actions to reduce the number of children in the labor market could include developing mechanisms to keep children in school and improve quality of education geared to higher paying jobs, as well as creation of better paid sources of adult employment in both rural and nonrural areas. Research is warranted to identify policies and possible incentives that could curtail the demand for child labor in subsectors or sectors of the economy that rely heavily on this type of labor while adapting approaches to the local needs.

Government support to education (*gse*) contributed to keeping children in school and away from their incorporation in the labor market as of the last quarter of 2017. This is reflected in the significant marginal effects nationwide, as well as for

both the North and South states. Further research is warranted to address the issues in specific states either due to the level of poverty, the incidence of underage child labor, or risky situations in the workplace. The clustered states of Guerrero, Oaxaca, and Chiapas deserve an assessment of children in the labor market and school nonattendance in light of individual, household, and contextual characteristics. A comprehensive assessment of government support to education is warranted with the complete set of biannual MTI data, 2007 to 2017. There is likely to be a period of transition from the end of Progresa to the new Benito Juarez Scholarships Program, with its insertion, evidence gathering, and performance and impact evaluations comparing the development approach with conditional cash transfers vs the unconditional and possibly universal cash transfers.

The future of child labor in Mexico under USMCA, with greater surveillance of child labor in different sectors could be beneficial in the long run, though it may cause discomfort in sectors that rely on underage or risky child labor. Cocoa, coffee, tobacco, and sugar cane cultivation in some states, along with other labor-intensive crops and labor-intensive employment in secondary and tertiary sectors, will all have to comply with the child labor law. As a consequence, higher school attendance and less participation in the labor market could have an impact on building children's human capital provided there are improvements in quality of education and local adaptation to the household conditions in rural and urban environments, and continuous government support to child education. However, these possible benefits under USMCA are subject to the strength of the regulatory framework of the new treaty.

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