Remittances, Child Labor, and Schooling:
Evidence from Colombia[*]

Andres Cuadros-Menaca[†]
Universidad Icesi

Arya Gaduh[‡]
University of Arkansas

May 2018

Abstract

We estimate the causal impact of remittances on child labor and school participation in Colombia using data from its main metropolitan areas. We develop an instrumental variable (IV) strategy that leverages the unemployment shocks in the main destination countries of Colombian migrants arising from the 2008 financial crisis. Our IV combines these shocks with the historical migration rates from Colombian regions to these countries. We find that remittances reduce both labor participation and hours worked, but the impact on the latter is imprecisely estimated. We do not find an effect of remittances on schooling. Relative to their mean participation shares, these impacts are larger for younger children and girls. However, the negative impact for girls is associated with an even larger positive impact on their participation in household work. Finally, we study how remittances affect the overall household labor supply. We find that remittances reduce the labor supply of female adults, but their percent-change impact on adults is smaller than that on children.

Keywords: Child Labor, Schooling, Remittances, Colombia
JEL Classification: F24, J22, O15

[†]Universidad Icesi, Calle 18 No. 122-135 Pance, Cali, Colombia Email: afcuadros@icesi.edu.co.

[‡]Corresponding author. Sam M. Walton College of Business. Department of Economics. Business Building 402, Fayetteville, AR 72701-1201. Email: agaduh@walton.uark.edu.

1 Introduction

An estimated 168 million, or about 11 percent of children worldwide are child laborers (ILO, 2013).[1] Many of these children, given household budget constraints, often work out of necessity (IPEC, 2013). Yet, their need to fulfill current consumption may have negative intertemporal consequences. Work may harm the human capital accumulation (Baland and Robinson, 2000), learning outcomes (Emerson et al., 2017), health (O'Donnell et al., 2005), and future labor market outcomes (Emerson and Souza, 2011) of these children.

Interventions that relax budget constraints can reduce child labor. Standard labor theory suggests that the income effect from the shift in the budget constraint could induce parents to take their children out of the labor market. Policy makers often use public resources to undertake such interventions, often through unconditional and conditional cash transfer programs (Fiszbein et al., 2009). However, in countries that send international migrants, private remittance income can play a similar function for households with emigrating members. Similar to cash transfers, remittance income relaxes the budget constraints of those left behind and can reduce child labor in economies with a significant share of international migrants.

In this paper, we study the impact of remittances on child labor in Colombia. According to the *Gran Encuesta Integrada de Hogares* (GEIH) 2008–2010 data, about 12 percent of children aged 12 to 18 years old living in Colombia's major metropolitan areas participate in market work. At the same time, international migrants are important contributors to the Colombian economy. In absolute terms, Colombia is the fourth largest recipient of remittance income in Latin America and among the top 30 largest recipients in the world (Yang, 2011). Yet, despite its importance, little is known about the effect of remittances on child labor. We develop a strategy to identify the causal effect of remittances on child labor.

Our analysis uses repeated cross-sections of GEIH, which is the national household survey of Colombia. We focus on the thirteen major Colombian cities and their metropolitan areas (which we will refer to as *regions* hereafter) from which 3 out of 4 international migrants from Colombia originate. With information on labor participation and working hours, we can estimate the impact of remittances at the extensive and intensive margins. Moreover, its inclusion of detailed information for all household members allows for the analysis of intra-household reallocation of labor supply between children and adults.

To identify the causal impact of remittances, we estimate an instrumental variable (IV) model that focuses on the 2008–2010 period. Our empirical strategy leverages the macroeconomic shocks affecting the unemployment rates in Colombia's most important migrant destinations that arose from the 2008 financial crisis. We introduce a novel variation on the use of macroeconomic shocks to identify remittance impact by using an IV that combines shocks with historical migration

---

[1] There are estimated to be around 78 million child workers in Asia and the Pacific, 59 million in Sub-Saharan Africa, and 13 million in Latin America and the Caribbean.

rates.[2] We focus on the immediate years after the crisis to minimize the effect of the households' endogenous adjustments that would have occurred over a longer time horizon (Yang, 2008).

To construct the IV, we first define a destination country's monthly unemployment shock as the deviation of its mean unemployment rate in the previous 12 months from its pre-crisis unemployment rate. We calculate these monthly shocks for Colombian migrants' main destination countries, namely, the United States, Spain, Venezuela, and Ecuador. Then for every region, we weight these monthly, destination-country-specific unemployment shocks with the historical share of migrants from each migrant-sending region to these countries. To address concerns over regional confounders, we include region fixed effects (FE) and a set of regional control variables that vary over time.

We argue that this variable is an appropriate IV for remittances received by Colombian households. Macroeconomic shocks in a destination country affect the incomes of its immigrants, which in turn affect the remittances received by the households left behind. Indeed, our regression finds a negative correlation between the migrant-share-weighted average of the unemployment shocks in the destination countries and the remittance receipts of Colombian households. In the short term, these are unanticipated shocks for recipient households. Hence, conditional on the regional control variables and the region fixed effects, these unemployment shocks in the destination countries should be excludable from the (second-stage) child labor regression. Moreover, we show that our estimates are robust to potential direct channels from shocks to household-level outcomes that can lead to the violation of the exclusion restriction.

We find that remittances reduce child labor primarily at the extensive margin by increasing children's likelihood to exit the labor market. Our preferred estimate shows that a (PPP-adjusted, which hereafter is implied) US$1 increase in the remittance income received by households decreases the incidence of child labor by 0.022 percentage points (p.p.). Therefore, a 10-percent increase at the mean remittance value of US$ 3,728 leads to an 8.2 p.p. reduction in the probability of child labor. At the intensive margin, we find a consistent negative effect on hours worked, albeit one that is imprecisely estimated. We therefore focus on the impact at the extensive margin.

We also investigate whether remittances increase school participation. A key policy issue related to child labor is its potential negative impact on schooling. For instance, work is cited as one of the main reasons for school drop-outs in the Caribbean and Pacific regions of Colombia (MEN, 2012). If child schooling and labor were perfect substitutes, remittances would impact the former in a similar (albeit opposite) way to the latter. However, we do not find that remittances affect school participation in Colombia. This result complements the finding of Attanasio et al. (2010), who find that an education-focused intervention does not lead to the reduction in child labor in Colombia. They both support the notion that child labor and school participation are imperfect substitutes (Ravallion and Wodon, 2000; Edmonds and Pavcnik, 2005).

---

[2]A number of studies used macroeconomic shocks to identify the impact of remittances (such as Yang, 2008; Amuedo-Dorantes and Pozo, 2010; Alcaraz et al., 2012; Bargain and Boutin, 2015).

To understand the heterogeneous impact of remittances, we disaggregate the sample by age group, gender, and economic status. Since labor participation rates differ between subgroups, in making comparisons, we need to not only consider the *percentage-point* impact from the estimated coefficient but also its importance relative to the mean participation share of each subgroup (i.e., the *percent-change* impact). Age groups are defined based on the legal minimum working age (of 15 years old). Meanwhile, to define economic status, we construct a household asset-based wealth index and define as poor (non-poor) households with below (above) median-asset index.

The set of results from this analysis helps us better understand the heterogeneity in reservations wages between the different subgroups. First, remittances lead to a larger percent change decrease in child labor among the younger cohort. This is consistent with the notion that parents and policymakers put a higher value on the home time of younger children. Second, we also find that parents put a higher value on the home time of girls, partly because of their role in household work. Finally, we find evidence for the "luxury axiom" (Basu and Van, 1998). Poor households whose children are below the legal working age are more likely to let them work. However, remittances are very effective in inducing them to pull their children out of the labor market.

In the last section, we weigh in on the question of whether remittance income leads to a stronger disincentive to work on *adult* household members. If the work-disincentive impact of private transfers like remittances is much stronger among adults, it may strengthen the case for targeted interventions designed to reduce child labor with minimum impact on adult labor (see, e.g., Alzúa et al., 2013). However, we find that remittances lead to a smaller percent reduction in adult labor compared to child labor. Furthermore, this work-disincentive effect only affects female adults and is only precisely estimated for non-poor households.

To our knowledge, this is the first study of the causal impact of *remittances* on child labor and schooling in Colombia. A related work by Arango et al. (2015) uses a difference-in-differences (DD) estimator to estimate the impact of the 2008 financial crisis in the United States and Spain on the remittance receipts and labor supply of households residing in the high emigration regions of Colombia. Although they similarly leverage the crisis-induced unemployment fluctuations in destination countries and historical migration rates as sources of identification, our paper is distinct from theirs in significant ways. First, and most importantly, our objective is to identify the causal impact of *remittances* (instead of a destination-country-specific *financial crisis*). Thus, our IV strategy directly addresses the endogeneity of remittances.[3] Second, instead of separately estimating the impact of unemployment-*rate* fluctuation by each destination country, we construct a single aggregate measure of destination-country unemployment *shocks* across Colombian migrants' main destinations to instrument for remittances. Both aspects of our empirical strategy enable us to quantify the impact of remittances. Finally, in contrast to their emphasis on adult labor supply,

---

[3]Separately estimating of the causal impact of the crisis on remittances and labor supply can, at most, offer suggestive evidence on how remittances affect labor supply that may not survive further scrutiny. For instance, Arango et al. (2015) find that the crisis led to a reduction in remittance inflows and an increase in the labor supply of adult males. However, as we show in Section 7, we find no evidence for the causal impact of remittances on their labor supply.

we primarily focus on child outcomes.

Our paper contributes to the literature identifying the causal impact of remittances in three ways. First, we develop an IV strategy that exploits both spatial and temporal variations to identify this causal impact under relatively undemanding data requirements. The study whose identification strategy is most similar to ours is that of Amuedo-Dorantes and Pozo (2010). They use labor market conditions in the different states in the United States as an IV for whether households receive remittances. Unlike their approach, however, our strategy does not rely on specialized household-level migration questions to identify where emigrant members resided abroad. Instead, we use publicly available data that are relatively easy to acquire.

Second, we also shed light on the causal impact of remittances on intra-household time reallocations, both in terms of (i) how household work, but not schooling, is (gender-differentially) reallocated to children; and (ii) who among the adults also reduces their labor supply. Understanding how remittance income reallocates activities across actors within the household is necessary for a complete picture of its welfare impact on children. A number of papers look at how remittances reallocate different activities to children (e.g., Calero et al., 2009), as well as their impact on the labor supply of both children and adults (e.g., Acosta, 2006). To our knowledge, Yang (2008) is the only other study to comprehensively estimate *all* of these outcomes, albeit with a different identification strategy.

Finally, we study the impact on child labor at both the extensive and intensive margins. Previous studies, with some rare exceptions (e.g., Dimova et al., 2015, in *rural* Tanzania), tend to focus on the former.[4] In doing so, these studies may overlook the impacts on households whose primary response to an income shock is to adjust children's working hours instead of their labor market participation.

The rest of the paper is organized as follows. Section 2 describes the institutional contexts related to migration, child labor, and schooling in Colombia. We then describe the data, sample construction, and the variables used (Section 3) followed by the empirical strategy (Section 4). Sections 5 and 6 report our main results on labor participation and school attendance, and the heterogeneous impact analysis. Section 7 studies the broader work-disincentive effect of remittances by comparing its impact on children and adults. Section 8 concludes.

2   International Migration and Child Labor in Colombia

This section provides the institutional context for the analysis. We describe the historical pattern of international migration from Colombia and its effects on remittance flows. We then discuss the regulatory framework on child labor and present evidence of its enforcement in Colombia.

---

[4]Other related papers with hours worked as the outcome use migration status (e.g., Antman, 2011; Mansuri, 2006) or exchange rate shocks (which provides an exogenous source of variation in remittances) (Yang, 2008) as variables of interest.

Finally, we describe the Colombian education system and its potential interaction with child labor.

2.1 Migration and Remittances

International migration has played an important role in Colombia's economic development in the last few decades. The Colombian statistical agency, *Departamento Administrativo Nacional de Estadística* (DANE), estimated that, by 2005, around 8 percent of the total population lived outside the country, and a bulk of this migration was motivated by the desire to look for better economic and job opportunities (ENMIR, 2009). Historically, the main destinations included the United States, Spain, Venezuela, and Ecuador (Ramírez Herrera et al., 2010).[5] Over time, the United States and Spain increasingly became the most preferred destinations: Between 2000 and 2010, the number of migrants to the United States almost doubled (from 471 to 909 thousand) while that to Spain increased more than tenfold (from 36 to 373 thousand) (Texidó and Gurrieri, 2012).

Figure 1 shows the historical migration rate across the different regions where the metropolitan areas are located in Colombia. It illustrates the wide spatial distribution of migrants hailing from these regions. Over time, they developed migrant networks in their destination countries, and migrants from a particular region often have specific ties to networks in a particular country. We can see this in the historical migration data from the 2005 Census (Appendix Table A2). For example, migrants from the coffee regions at the center of the country prefer to go to Spain over other destinations. Those from the main cities — Bogotá, Medellín, and Cali — prefer the United States as their main destination. Meanwhile, migrants from the northeast region and the southwest region prefer their neighboring country of Venezuela and Ecuador respectively.

The rapid growth of outmigration brought a significant inflow of remittances into Colombia. According to the Colombian central bank, remittance flows increased from US$1,578 millions in 2000 to US$3,313 millions in 2005 and reached a peak of US$4,427 millions in 2008. In 2008, an overwhelming 73 percent of the remittances came from two countries: the United States (37 percent) and Spain (36 percent). However, the 2008 financial crisis that began in the United States and spread to the Eurozone led to the slowing down of remittance receipts. It was only by 2015 that the remittance inflow returned to the pre-crisis level.

For the households left behind, about 59 percent of the remittance income is used for recurrent household expenditure (Garay and Rodríguez, 2005). Moreover, only 4 percent of this income goes into household savings. Hence, remittances function as a means to relax household immediate budget constraints and have an important role in the survival of many poor households.[6] Since

---

[5]Based on the 2005 census, DANE estimated that the majority of Colombia's international migrants reside in four countries: the United States (34.6 percent), Spain (23.1 percent), Venezuela (20 percent), and Ecuador (3.1 percent) (Ramírez Herrera and Mendoza S., 2013). By 2010, these countries still account for more than 80 percent of these migrants (World Bank, 2011).

[6]From the total 24,291 recipients in the GEIH 2008–2010, 3.87 percent report being in the poorest income quartile of the metropolitan area where they reside. People at the poorest quartile roughly correspond to the poor in official statistics, since metropolitan-area poverty rate hovered around 25 percent during the period.

helping out with household expenses account is an important reason why children work in Colombia, remittance income may reduce child labor through its effect on the household budget constraint.

2.2 Child Labor

According to the 2008–2010 GEIH data, around 12 percent of children in Colombia's main metropolitan areas work, and there are important differences in the types of work they undertake by gender. Table 1 shows total participation by main economic activity. The main sectors that employ children are wholesale and retail, followed by hotels and restaurants, manufacturing (mainly of food and beverage products), and storage and transportation (which includes mail delivery and communications). Across gender, the wholesale and retail sector is the primary employer. However, for certain sectors, employment is very gender-specific. For instance, the construction sector employs 8.9 percent of working boys (and is their second-most important employer), compared to 0.3 percent for girls. In contrast, the domestic service sector employs almost 6 percent of working girls, but hardly employs working boys.[7]

The Government of Colombia regulates the allowed working hours and sectors for working children of different ages. According to Law 1098 of 2006, the minimum working age is 15 years old. Children younger than 15 can only work in artistic, cultural, recreational or sports activities with official authorization and for a maximum of 14 hours per week. Meanwhile, children between 15 and 16 years old require authorization to work a maximum of 30 hours during the week. Those between 17 and 18 years old can work without restriction but for no more than 40 hours in a week.

However, this regulation has not been strictly enforced in practice. Table 1 shows hours worked by age groups (as stipulated in the law) and gender. We find, for example, that the *other services* sector (which includes artistic, cultural, and recreational activities) only employs 2.5 percent of children aged 12–14, even though the law only allows them to work in these activities. Moreover, these children also report working more hours than the legal limit. Children aged 12–14 years old work more than 20 hours during the week, with boys reporting more working hours than girls (23 and 19 hours respectively). Importantly, the average number of working hours *for boys* exceeds the legal limits, i.e, 32.7 hours among 15–16 year-old boys and 41.2 hours for 17–18 year-olds. These numbers are consistent with qualitative evidence suggesting a stronger expectation for boys to be self sufficient (Pinzón-Rondón et al., 2008).

2.3 Education in Colombia

The General Law of Education (Law 115 of 1994) states that education is compulsory for children between 5 and 15 years old. Children must attend one year of kindergarten, and nine years of basic education that comprises five years of primary schools and four years of basic-secondary

---

[7]Domestic service refers only to *paid* household work, and not unpaid domestic chores.

school. Afterward, there are the additional two years of upper-secondary school that, until 2014, were not compulsory. Children must complete upper-secondary school to access university-level education. The 12–18 year-old children in our sample represent those who should be attending basic- and upper-secondary education.

Two key education policy objectives in Colombia are to guarantee universal access to basic education and keep students in school. As such, the government introduced a number of targeted conditional transfers programs such as *Familias en Acción* and *Red Juntos*, as well as campaigns to persuade children to stay in school (e.g., *Ni Uno Ni Menos*). Despite these efforts, dropout rates remain a problem, especially among those 11–16 years old. In parts of Colombia, child labor was cited as one of the main reasons for primary and secondary school dropouts (MEN, 2012). At the same time, for half of the children 12–18 years old in our sample, working and attending school do not appear to be mutually exclusive (Table 1).

3   Data and Measurements

The main data source for our analysis is the Colombian household survey, *Gran Encuesta Integrada de Hogares* (GEIH), that is produced annually by DANE since 2006. The survey includes socio-economic characteristics of the population such as labor, gender, age, and income sources. We focus on our analysis of Colombia's thirteen main cities and metropolitan areas, which are the country's most dense regions where more than half of the Colombian population reside. Importantly, according to the 2005 Census, about 75 percent of individuals who reside abroad five years prior to the census hail from these regions. Figure 1 illustrates the coverage of the GEIH survey, where the thick borders encapsulate the included municipalities. For each year, data were collected over a 12-month period, and the dataset provides information on the month the survey was conducted. Our analysis pools the cross-section data for the 2008–2010 period.

3.1   Sample Construction and Household Definition

To build our analytical sample, we first limit our observations to relatives of the household heads. For each household, GEIH interviews all members of the households, including domestic workers and other household employees. In addition, GEIH collects information on individual relationship to the household head, categorized as "spouse", "child", "grandchild", "other relative", or different types of employees. We limit our sample to household heads and their relatives, and exclude household employees. For the 2008–2010 period, we obtain 143,655 observations of children between 12 and 18 years old.[8]

We then assign to each individual the household she or he belongs. This assignment process differs depending on whether the individual lives in a nuclear- or an extended-family household.[9]

---

[8]They include 48,104 children in 2008, 47,916 in 2009, and 47,635 in 2010.

[9]Out of 345,344 households in the dataset, there are 62,231 extended-family households.

In a nuclear-family household, everyone is assigned to the same household. In an extended-family household, we first define the nuclear family of the household head as one household unit. We then group the remaining members as part of a second (economic) household unit.[10] We use this definition to assign household-level variables (including total remittances) to the individual. Conceptually, this process is grounded in the rich evidence on limited altruism toward extended families (Altonji et al., 1992; Cox and Fafchamps, 2007), including in remittance decisions (Rapoport and Docquier, 2006). Empirically, it strengthens the first stage.

3.2 Labor Supply and Remittances

We estimate the effect of remittances on labor participation in market work for children aged 12–18 years old. We use two variables to capture labor participation at the extensive and intensive margins. First, we use a binary variable of whether the child reports participating in any type of economic activities as the dependent variable.[11] The list of economic activities includes wage labor, family labor, domestic work, and unpaid work. Then, we use the question on the typical number of hours the child works to estimate the impact at the intensive margin.

Our main regressor is the total amount of international remittances received by the household in the last twelve months. GEIH asked each household member for the amount of remittances received from persons residing outside of the country. To account for variations in living costs over time, we convert this variable to the PPP-adjusted US dollar equivalent.[12] As such, all references to US$ in our analysis are PPP-adjusted. Once adjusted, we aggregate by summing these individual remittances for each economic household as defined above.

3.3 Other Observables

We include two sets of control variables at the household and regional levels. First, we include a set of control variables that capture characteristics of the child, her household, and her household heads. Child characteristics include gender, age, and an indicator of whether the child is either a household head or a spouse. Household characteristics include its size and number of children. In extended-family households, these variables are calculated for each economic household (see Section 3.1). Household-head characteristics include his or her education, gender, and marital status. Members of the extended family are assigned the characteristics of the main household head.

---

[10]An ideal assignment would link each individual who is not part of the household head's nuclear family into her own nuclear household. However, since GEIH anchors an individual's relationship to the household head, this is not possible.

[11]To collect labor market participation information, GEIH asks each respondent his primary activity in the previous week. If his primary activity is not working (full time), GEIH also inquires whether he performs paid work for at least one hour or is employed but not currently performing work activities. Finally, it also asks if he works without receiving pay. In our analysis, a respondent who answers yes to any of these questions is considered working.

[12]We use the PPP conversion factor for private consumption from the World Bank's World Development Indicators (WDI) database (World Bank, 2016).

Meanwhile, we use household assets instead of current income as a proxy of living standard, to address concerns over the potential endogeneity of income (McKenzie, 2005). We use the principal component analysis to construct this asset index. The variables used to construct this index include: home ownership; the availability of electricity, telephone, and internet services; sources of water supply; sanitation facility; and the types of flooring material. Table A1 in the Appendix provides the full list of the variables used to construct this index. All members of an extended-family household are assigned the same value.

Table 2 displays the summary statistics of children and household characteristics. Of the 143,655 children, 4,013 live in remittance-receiving households. The proportion of children working and the number of hours worked are higher in non-recipient households. Furthermore, recipient households have a higher proportion of female household head, which may be related to migration patterns, and a lower proportion of married household head. At the same time, the asset index and the share of children at the bottom per-capita income quartile in their metropolitan area (which proxies for their poverty status) indicate that overall recipient households are better off than non-recipient households.

The asset index also allows us to explore the variation in child labor participation in households with different socio-economic status. While the proportion of children from the richest quartile in the labor force is 7 percent, in the poorest quartile this proportion reaches almost 16 percent. In terms of hours worked, children living in the richest-quartile households also report working fewer hours. For the poorest quartile, the average number of hours worked is 36 hours during the week, while those children from households at the richest quartile report working an average of 27 hours during the week.

At the region level, we include each region's Gini coefficient and unemployment rate for each year. We also include the GDP growth of the regions where each metropolitan area is located. These variables control for time-varying regional income inequality, labor market equilibrium, and broad economic performance. All regional-level variables are obtained from DANE.

4   Empirical Strategy

We first estimate the impact of remittances on (labor and school) participation and hours worked. For the participation variables, we estimate the following linear probability model:

$$Y_{iht} = \gamma.R_{ht} + \mathbf{X_{it}}.\boldsymbol{\beta} + \psi_r + \varepsilon_{it}$$

where Y_{iht} is an indicator variable that equals one if child i during month t is either working or in school. R_{ht} is the variable of interest, the total amount of remittances that household h received in the twelve months prior to time t. $\mathbf{X_{it}}$ is a vector of child, household, and region characteristics. ψ_r are the region fixed effects (FE). The coefficient of interest, γ, is the estimated effect of an

additional unit of remittances on the likelihood of participation.

Meanwhile, to estimate the remittance impact on work hours, we begin by addressing the censored nature of working hours. We use the standard approach by estimating the Tobit regression of work hours on remittances:

$$Y_{iht}^* = \alpha.R_{ht} + \mathbf{X_{it}}.\boldsymbol{\delta} + \psi_r + \varepsilon_{it}$$

$$\varepsilon_{it} \sim Normal(0, \sigma^2)$$

$$Y_{iht} = Max(0, Y_{iht}^*)$$

where R_{ht} is our main independent variable, and $\mathbf{X_{it}}$ and ψ_r are as before.[13]

Remittance income is potentially endogenous to child labor outcomes and may bias our standard estimates. In theory, this bias can go in either direction. Consider, for instance, how (i) the relationship between wealth and child labor; and (ii) emigrant selection can interact to sign of the bias. Empirical evidence suggests that the link between child labor and household wealth can be negative (the "luxury axiom", Basu and Van, 1998) or positive (the "wealth paradox", Bhalotra, 2003).[14] When interacted with the self-selection of remitting emigrants, this relationship can introduce either a positive or negative bias. For instance, under the luxury axiom, positive (negative) selection of emigrants implies richer (poorer) households receive more remittances, which leads to a negative (positive) bias. Including an index of household assets helps ameliorate this bias. Moreover, conditional on household assets, there may be persistent, unobservable shocks to certain household types (e.g., vulnerable households) that leads to the comovement of remittances and child labor and introduce a positive bias. Empirical studies provide evidence for both a positive bias (Alcaraz et al., 2012; Acosta, 2011) and a negative bias (Bargain and Boutin, 2015).

We address this problem by estimating an instrumental variable (IV) model. To identify the causal impact of remittances, we leverage the sharp unemployment shocks experienced by a number of Colombia's main migration destination countries arising from the 2008 financial crisis in the United States and the Eurozone. The crisis led to an economic recession and a sharp increase in unemployment in both the United States and Spain and reduced remittance flows into Colombia (Arango et al., 2015).[15] We use the deviation from the average pre-crisis unemployment

---

[13]The inclusion of fixed effects in non-linear Tobit models can potentially introduce the incidental-parameters problem that will bias estimates of the coefficients and the standard errors (Greene, 2004). However, this problem arises when the length of the panel is fixed and small. With only 13 regions, this is not true for our region fixed effects.

[14]Basu and Van (1998, p. 416) introduce the luxury axiom, to wit, "A family will send the children to the labor market only if the family's income from non-child-labor sources drops very low". However, in the context of rural Pakistan and Ghana, Bhalotra (2003) show that child labor was higher among households with more productive assets, creating a "wealth paradox". In the Colombian context, even though we observe a higher rate of child labor among poor households, these rates do not decrease monotonically by income levels. In particular, it is common to find households with family business using child labor across income quartiles (Bernal and Cárdenas, 2006).

[15]Between November of 2007 and June 2009, the United States economy contracted by 5 percentage points and once

rate as a component of our IV. Figure 2 shows the link between unemployment rates in destination countries and remittances from those countries: an increase in unemployment at each destination is associated with a lower remittance flow from that country.

We interact the unemployment shocks with the historical rate of migration from each region to the four main destination countries, to wit, the United States, Spain, Venezuela, and Ecuador. Empirical evidence suggests that regional migration patterns indicate the strength of migration networks and are positively correlated with the amount of remittances received (Borraz, 2005; Acosta, 2011; Salas, 2014). These migration networks provide the mechanism to transmit the effects of the unemployment shocks from these destination countries to the recipient households. More importantly for identification, this interaction allows for the introduction of the region FE to address potential time-invariant unobservables at the regional level. We also include regional GDP growth, Gini coefficient, and unemployment rates for each year in the analysis to control for any region-specific trend not captured by the region FE.[16]

The IV can therefore be expressed as:

$$RegionUnempShock_{rt} = \sum_{j=1}^{J} s_{rj} \times DestUnempShock_{jt}$$

where $DestUnempShock_{jt}$ is the deviation of the 12-month average unemployment rate (that ended at time t) from the pre-crisis (2007) average unemployment rate in destination country j.[17] This destination country unemployment shock is then weighted with the historical share of Colombian migrants from region r that went to country j, s_{rj}. Data for the unemployment rates were obtained from *Eurostat* for Spain, the *Bureau of Labor Statistics* for the United States, the *National Institute of Statistics* (INES) for Venezuela, and the *Economic Commission for Latin America and the Caribbean* (ECLAC) for Ecuador. Meanwhile, the historical share of Colombian migrants by region was calculated based on the IPUMS sample of the 2005 Census data.

To illustrate the relevance of this IV, we regress unemployment shocks on household receipts of international remittances for regions with high, moderate, and low shares of historical migrants to the four main migrant destination countries and compare them with the remittance receipts of those living in regions with very low shares of historical migrants to these countries. We therefore estimate:

$$Remittances_{ht} = \alpha_0 + \gamma.(treat_I \times RegionUnempShock_{rt}) + \mathbf{X_{it}}.\beta + \psi_r + \varepsilon_{it}$$

the crisis spread to the Eurozone, the Spanish economy contracted by 3.6 percentage points between 2008 and 2010. Unemployment rates increased by 86 percent and 125 percent in the United States and Spain respectively between 2008 and 2010. During this period, the unemployment rate in Venezuela fluctuated between 7 and 10 percent, while in Ecuador, it fluctuated between 7 and 9 percent.

[16]For example, these regional control variables address the potential threat to identification from the direct effect of shocks at a destination country to specific regions with stronger ties to that country through the regional labor market.

[17]This regional unemployment shock variable is analogous to that in Yang (2008), but unlike his, our data only allow for a region-level measure (instead of a household-level one).

11

where $I \in (H, M, L)$ and H, M, and L respectively indicate regions with high, moderate, and low shares of historical migrants – corresponding to regions at the top, second, and third quartiles of historical migrant shares to these countries. They are compared with those in the fourth quartile, which have less than 4 percent migrant share to these countries. ψ_r indicates the region FE. As we show in Table 3, the shocks are correlated with remittances in regions with high shares of historical migrants.

Our identification relies on the assumption that first, these destination-country unemployment shocks were unexpected for Colombian households, and second, conditional on the set of controls, they affect household-level outcomes only through remittances. For the former, the main concern is that given sufficient time, households would employ multiple strategies to adjust to the unexpected decline in the remittance amount (Yang, 2008; Arango et al., 2015). To limit the impact of the medium- and long-term endogenous adjustments at the household level, we focus our analysis on the 2008–2010 period.[18] Meanwhile, for the latter, Section 5.3 discusses potential direct channels from these shocks to household-level outcomes that might remain conditional on the control variables, and shows that our results are not affected by them.

Therefore, for our preferred specification, we use the IV to estimate a two-stage least square (2SLS) LPM and an IV-Tobit model of participation and working hours respectively. For the latter, the IV-Tobit is estimated using the Newey (1987) two-step estimator. With an IV that introduces both regional and temporal exogenous variations, we control for the potential effects of any time-invariant unobserved region characteristic using the region FE. As described above, we also control for potential child- and household-level confounders, as well as time-varying regional controls. We cluster our standard errors at the level of the interaction between region and the (interview) month-year in all estimates.[19]

5 Do Remittances Reduce Child Labor or Increase Schooling?

This section presents our baseline results. First, we show the impact of remittances on child labor at both the extensive and intensive margins. We then report the impact of remittances on schooling. Finally, we briefly discuss the robustness of our estimates to potential threats to identification.

---

[18]Arguably, we would have liked to include data from 2007 to capture the pre-crisis economic decline in the United States and Spain. However, some researchers expressed concerns that there may be issues with the income module from the 2007 wave (see IICA, 2014, p.25). We therefore exclude the 2007 wave from our main analysis, even though including it does not qualitatively affect our results. These additional results are available upon request.

[19]With an instrument that is constructed at the region level, the natural choice would be to cluster the standard errors at that level. However, with only 13 regions, the concern is that standard cluster-robust estimates of the variance matrix can be downward-biased (Cameron and Miller, 2015). Indeed, we find in our case that the estimates of standard errors that are clustered at the household level are more conservative than those clustered at the region level.

5.1 Remittances and Child Labor

Standard neoclassical labor model provides the predictions for our results. Remittances supplement households' non-labor income and relax household budget constraints. The income effect leads to a reduction in household labor supply. If the household head is the sole arbiter of children's labor market participation decision and poor households only send children to work out of necessity, relaxing the household budget constraint would reduce child labor. The reductions can happen at the intensive margin (working hours) or extensive margin (participation). Our baseline results provide support for these predictions.

Table 4 reports our results for the impact of remittances on child labor. We will first focus on Columns 1 and 2 which report extensive margin estimates. Panel A reports the standard, non-instrumented LPM estimates. Column 1 reports estimates with the region FE, while Column 2 adds the child, household, and region characteristics as control variables. The estimates are statistically significant and indicate a negative relationship between remittances and child labor.

The first-stage estimates reported in Panel C in Table 4 provide evidence for the validity and relevance of our IV. As expected, all columns indicate a negative correlation between the instrument and the remittances: an *unemployment* shock (i.e., a negative *employment* shock) on migrants' destination is associated with receiving fewer remittances as expected. Moreover, with a first-stage Kleibergen-Papp F-statistic of 10.3 for our preferred specification, our estimates are unlikely to be biased by a weak instrument. Nonetheless, we also report here (as in the subsequent tables) the Anderson-Rubin (AR) 90-percent confidence interval as a test for the robustness of our estimates in the presence of a weak instrument (Dufour and Taamouti, 2005).[20]

The 2SLS estimates, reported in Columns 1–2 of Panel B, show that remittances reduce children's likelihood of working. Comparisons of the LPM and 2SLS estimates suggest a positive omitted variable bias. Column 2 reports the results from our preferred specification with the full set of controls. We find that a US$1 increase in remittances decreases the incidence of child labor by 0.022 p.p. This suggests that a 10-percent increase at the mean remittance value of US$ 3,728 leads to an 8.2 p.p. reduction in the probability of child labor.[21]

Columns 3 and 4 of Table 4 report the marginal effects of remittance on children's working hours. Panel A reports the non-instrumented Tobit estimates. Consistent with theory, we find negative and statistically significant associations between remittances and hours worked by children. Panel B shows that, as in the case of the extensive margin, instrumenting increases the magnitudes of the estimates. However, in this case, the IV estimates are not statistically significant.

---

[20]Dufour and Taamouti (2005) show that the confidence region reported by the AR confidence interval is robust to the presence of weak instruments and seems to have the correct size under a wide variety of violations of the standard assumptions of an IV regression.

[21]The magnitude of this effect on child labor is smaller compared to the effect estimated in Calero et al. (2009) for Ecuador. However, in their study, the effect of remittances on child labor is not statistically significant.

5.2 Remittances and Schooling

In many developing countries, one of the main opportunity costs from going to school is the labor market return (Rosenzweig, 1990). By reducing labor market participation, remittance can theoretically increase school attendance, in particular if school attendance and work are substitutes. There is evidence from some other countries in Latin America that remittances can also increase schooling (Calero et al., 2009; Amuedo-Dorantes and Pozo, 2010; Alcaraz et al., 2012), although the effect is by no means universal (see e.g., Acosta, 2011).

We do not find evidence that remittances increase schooling in Colombia. GEIH collects school attendance information from the children of the households. Columns 5 and 6 of Panel A in Table 4 report standard LPM estimates of school attendance without and with the control variables. Despite the positive and statistically-significant correlation between remittance and schooling in Column 5, the correlation disappears with the full set of controls in Column 6. Our IV estimates in Panel B also cannot reject the null hypothesis of a zero coefficient.[22]

This result highlights two policy-relevant insights. First, it provides additional evidence for the imperfect substitutability of child labor and schooling in response to transfers. Ravallion and Wodon (2000) show that targeted education subsidies in rural Bangladesh only had a very small impact in reducing child labor. Similarly, Attanasio et al. (2010) show that while the CCT *Familias en Acción* increases school enrollment in Colombia, its (indirect) impact on reducing children's market work is very limited. Our evidence complements theirs by showing no indirect impact in the other direction, to wit, through market work to schooling. These results are also consistent with the fact that in Colombia, a large share of working children also attend school (see Table 1).

Second, it shows that the mechanisms through which remittances influence the welfare of children left behind are heterogeneous even among relatively similar countries in Latin America. On the one hand, our finding contrasts with that of Calero et al. (2009), who found a statistically significant effect of remittances on school attendance, but not on child labor in Ecuador (which borders with Colombia). On the other hand, Acosta (2011) similarly finds that remittance does not affect schooling in El Salvador.

5.3 Threats to Identification

Identification in our empirical strategy relies on the assumption that unemployment shocks affect child labor through its effects on remittances. By controlling for regional GDP growth, Gini coefficient, and unemployment, we address potential direct or general equilibrium effects from these shocks to the regional economies. However, the exclusion restriction may be violated if destination-country shocks have direct economic impacts on households through channels other than remittances or the regional economic environment. In this section, we address two potential

---

[22]Heterogeneous analysis by gender and age groups yield similar non-rejections of the null hypothesis. Results are available upon request.

channels, to wit, direct household-level economic relationship to destination countries through trade and selective return migration.

Share of Export-Related Income. — Remittance-receiving households may be directly affected by destination-country shocks if they receive a large share of income from sectors in which the region has significant trading relations with destination countries. For these households, destination-country shocks affect child labor above and beyond their effects on remittance inflows and the regional economy. For instance, suppose a household's main income share comes from agriculture and it resides in a region with a significant agricultural export to Spain. A large enough shock to Spain can affect the household through its direct impact on the household members' income.

To address this issue, we show that our result is robust to the inclusion of the share of the household's labor income from activities related to the region's main exports.[23] Column 2 of Table 5 shows that including this variable hardly affects our extensive margin estimate. Although this variable may be affected by remittances — which, from an identification perspective, makes it a "bad control" (Angrist and Pischke, 2009) — the robustness of our results to its inclusion should mitigate concerns about the potential bias from this channel.

Differential Return-Migration Patterns. — Selective return migration in response to destination-country shocks may change the composition of adults in the remittance-receiving households, which can affect child labor directly instead of through remittances: if shocks induce return migration, the returning adults migrants can be substitutes for child labor. However, using a difference-in-differences (DD) estimator and employing family size as the outcome variable, Arango et al. (2015) show that the Great Recession did not lead to return migration to Colombia during the 2006–2011 period. Employing a similar DD strategy with the household share of adults as the outcome variable, we came to a similar conclusion.[24]

We further check the robustness of our results by including the share of adults in the household as a control variable (along with the household size that is part of the baseline specification). Column 3 of Table 5 presents our result. We find that the coefficient on remittances is robust to the inclusion of this variable. As before, even though this variable is plausibly endogenous and

---

[23]To construct the share of export-related income, we use information on each region's main export sectors that are coded based on the 2-digit International Standard Industrial Classification (ISIC). Since GEIH coded each individual's sector of employment using ISIC, we can therefore calculate for each household the share of its labor income that comes from these sectors.

[24]Arango et al. (2015) use unemployment shocks in the US and Spain as the treatment intensity variables. These variables are interacted with an indicator variable of whether the household resides in a region with either a high or medium-high share of historical migrants. We use a similar approach, but use (i) our weighted unemployment shock as the treatment intensity variable; and (ii) an indicator of whether the household resides in a region that historically has an above-median share of migrants. We estimate:

$$Y_{irt} = \alpha_1 + \alpha_2.RegionUnempShock_{rt} + \alpha_3.HighRegion_r + \gamma.(RegionUnempShock_{rt} \times HighRegion_r)$$
$$+ \mathbf{X_{it}}\beta + \psi_r + \mu_{it}$$

where $\mathbf{X_{it}}$ and ψ_r are the control variables and region FE respectively. Our DD estimate γ, like theirs, is not statistically significant.

therefore a bad control, the robustness of our result to its inclusion (along with the aforementioned DD estimates) should mitigate concerns over the potential bias from selective migration. Finally, Column 4 shows the robustness of our estimate to controlling for both channels.

6 Heterogeneous Impacts: Demographic and Economic Factors

In this section, we study the heterogeneous impact of remittances by demographic and economic factors. We estimate the impacts by subgroup and compare between them. In making comparisons, we consider not only the coefficient estimate (which captures the *percentage-point* impact), but also its magnitude relative to the mean participation rate in that subgroup (i.e., the *percent-change* impact). For two subgroups with an identical *percentage-point* impact, the subgroup with a smaller mean participation rate will experience a larger *percent-change* impact. We explore these heterogeneous effects by gender, age, and wealth to unravel interesting patterns that shed light on how these factors interact to influence children's reservation wages.

6.1 Demographic Heterogeneity: Age and Gender

Economic and institutional factors can lead to the heterogeneous treatment impacts by age and gender. The minimum working age law, for instance, reflects policymakers' (and to a certain extent, parents') higher valuation of younger children's home time, increasing their reservation wages relative to older children. Moreover, higher labor market returns for older children will also increase the relative reservation wage of younger children. On the other hand, with participation that increases in age, there is a greater margin for improvement among older children. In terms of gender, traditional gender roles in economic activities imply that children's reservation wages may also differ by gender (Edmonds, 2007).

Table 6 presents the results of our analysis of the treatment effects that are disaggregated by age and gender. Panel A examines the heterogeneous impacts by age groups and by gender, while Panel B further disaggregates the sample to examine how these factors interact. At the bottom of each panel, we include the statistics on the children's participation rate for each subgroup to benchmark its parameter estimate.

Age Effects. — We use the legal minimum working age of 15 years old to divide the sample into two age groups. The first group are children aged 12–14 years old who are not allowed to work, except under very restrictive circumstances. The second group, to wit, those between 15–18 years old, are allowed to work with much fewer restrictions.

Columns 1–2 of Table 6 report the heterogeneous treatment effects by age groups. The point estimate for the older cohort is larger than that for the younger cohort: in terms of percentage-point impact, the magnitude for the older cohort is close to two-and-a-half times larger than that for the younger cohort. This result appears counterintuitive, given parental and governmental

preference to keep younger children out of the labor market. However, note that the share of the older cohort who work is more than three-and-a-half times that of the younger cohort (16.9 v. 4.8 percent). As such, although the percentage-point impact of remittances on child labor is larger for the older cohort, its percent-change impact is actually smaller.

This finding is consistent with the interpretation of a higher reservation wage assigned by parents and policymakers to younger children. It is also consistent with the existing literature that remittances tend to reduce child labor among younger children (Acosta, 2011; Bargain and Boutin, 2015). Our finding contrasts with the evidence on the impact of conditional cash transfers on child labor, which finds little age-differential impact (De Hoop and Rosati, 2014).

Gender Effects. — Columns 3–4 of Table 6 report the effects of remittances by gender. They show that the impact on the likelihood of participation in the labor force is stronger for girls than boys. The point estimate (or the percentage-point impact) for girls is almost double that for boys and its impact on the percent change is even larger given the lower likelihood of working girls (9.4 percent) compared to boys (14.1 percent). The impact on boys is imprecisely estimated. These estimates are unlikely driven by biases from weak instruments given the reasonably strong first stage and their robustness under weak instruments.

Panel B1 examines whether these gender-differential impacts also differ by age groups. Columns 5–6 report the results among the younger cohort. We find no gender-differential percentage-point impact. Since girls in this cohort are less likely to do market work, the coefficient similarity translates into a slightly larger percent-change impact for girls. However, we find a starker difference among older cohorts in Columns 7–8. The coefficient estimates are much larger for girls, despite their lower likelihood of working. However, with a relatively weak instrument for boys in the older cohort, we need to interpret this result with caution.

A number of factors may explain why remittances lead a greater labor market exit for girls. First, there is a greater social acceptability of market work for boys compared to girls in Latin America (Brown et al., 2003; Duryea and Arends-Kuenning, 2003). The idea that boys are expected to work more than girls would increase the reservation wage for girls and may explain this gender-differential impact. Second, all else the same, the gender wage gap, especially among low-skilled workers, will further exacerbate the gender differentials among the older cohort (Angel-Urdinola and Wodon, 2006).

However, this gender-differentiated impact does not necessarily imply larger welfare gains for girls, if in response to market-work exit, households simply reallocate household works to girls. We find suggestive evidence that this is indeed the case. Panel B2 examines the question using participation in household work as the outcome. We find that remittances increase the likelihood of participation in household chores across all age and gender subgroups. However, it is worth noting that unlike the case for boys, the percentage-point increases in participation in household chores for girls in both age groups exceed the reductions in their labor market participation. Without time-use data to track detailed changes in hours worked (in market and household work),

it is nonetheless difficult to establish the heterogeneous welfare impacts of remittances.

6.2 Wealth Heterogeneity

The households' economic status will also determine children's reservation wage. Children work when the market wage is higher than their reservation wage. For poor households, remittances may not be enough to offset their children's income. With higher reservation wages among richer households, the negative effect of remittances on the children-labor supply of richer households will be larger. This is more likely to hold among older children, whose income usually comprises a larger share of the household income.

To study the role of household economic status, we use the constructed wealth index to split the sample into poor and non-poor households. We define as poor (non-poor) households whose wealth index is below (above) the median wealth index. Columns 1 and 2 in Table 7 examine the heterogeneous impacts of remittances between poor and non-poor households. The statistics on the share of working children suggests that those in poor households are more likely to work compared to those in non-poor households (14.1 v. 9 percent).

We find that the impact of remittances on the children's likelihood of working is negative for both household types. Remittances have larger impacts on poor households, both in terms of percentage-point and percent decline. However, the impact is only precisely estimated for children in non-poor households. The instruments are weaker for the subsample of poor households, although the AR tests suggest these results are robust to the presence of weak instruments.

Further disaggregating by age groups clarifies the underlying mechanism behind both wealth- and age-heterogeneity results. Columns 3–4 present the results for the younger cohort by economic status. We find evidence for the luxury axiom. First, the mean values of the outcomes in Columns 3 and 4 show that poor households are twice more likely to send younger children who are below the legal working age to work. Second, the percentage-point impact of remittances on younger children in poor households is more than four times that in non-poor households. Even accounting for the higher likelihood of working among children in poor households, the percent-change impact of remittances is still larger among poor households.

These results also help explain the imprecise estimates for the subsample of poor households. Columns 5–6 present the results for the older cohort by economic status. Column 5 shows that the IV has very little relevance in explaining the remittances received by poor households with older cohort, which explains the imprecise overall estimates for poor households. In contrast, Column 6 shows that for the older cohort in non-poor households (whose reservation wages are likely to be higher), the effect is economically and statistically significant.

7 Remittances and Adult Labor Supply

Income transfers can create a general disincentive to work. From a policy perspective, this is a central concern in the design of (publicly-funded) anti-poverty transfer programs. Developed-country evidence suggests that transfer programs can negatively affect labor supply (Moffitt, 2002), although randomized-controlled trial (RCT) evidence from developing countries shows otherwise (Banerjee et al., 2017; Alzúa et al., 2013). This section investigates this concern for *private* transfers like remittances by examining their relative impact on the labor supply of children and adults.

We find that remittances lead to a smaller percent decline in adult labor supply compared to children (despite the larger percentage-point impact). Columns 2–6 of Table 8 present 2SLS estimates for adults (who are relatives of the household head) living in the same households as our estimating sample of children.[25] Column 2 shows a percentage-point impact among adults that is almost twice that of children. However, since adults are almost six times more likely to participate in the labor market, this implies a smaller percent-change impact among adults.

Furthermore, we also find that among adults, remittances primarily reduce female labor supply. Column 3 essentially shows no impact of remittances on male labor supply, while Column 4 shows a statistically significant negative impact on female labor supply. Based on the AR 90-percent confidence intervals, these results are robust to the potential bias from weak instruments. These results are consistent with global evidence of reductions in female labor participation in response to remittances or emigration of a male household member (see, e.g., Amuedo-Dorantes and Pozo, 2006; Lokshin and Glinskaya, 2009; Mendola and Carletto, 2012). We also observe negative impacts both in below- and above-median-wealth-index households (Columns 5 and 6 respectively), although inferences on the former may suffer from a weak instrument.

It is important to note, however, that the reduction in female labor supply may not be an undesirable outcome from the policy perspective. Parental time investment in children has been shown to play a significant role in their outcome as adults (Haveman and Wolfe, 1995; Cunha et al., 2006; Del Boca et al., 2017). However, increased home time does not always lead to either greater engagement with children or an improvement in the quality of their human capital. Further research, perhaps utilizing time-use information, can shed light on the ultimate impact of transfers such as remittances on the quality of children's human capital.

8 Conclusion

We provide new evidence on the causal impact of remittances on child labor and schooling in Colombia. Using data on Colombia's main metropolitan areas, we implemented an IV strategy that leverages the unemployment shocks in migrant destination countries. Our findings suggest

---

[25]We conducted a similar analysis of the full sample of adults, but are unable to make inferences given the very weak first-stage (F=0.26).

that remittances induce children to exit from market work, but have no impact on their schooling participation. The impact is stronger for younger children and girls, although the stronger impact for the latter is associated with a larger increase in household work. Among younger children, the impact is also stronger among households with below-median wealth index. Since parental absence from migration can increase pressure for children to work to compensate for lost income (Antman, 2012; Giannelli and Mangiavacchi, 2010), we show that remittances can mitigate the potential negative impacts of migration on the welfare of children who are left behind.

Our findings also illustrate the potential complementarity of private and public transfers in improving children outcomes. The Colombian government has introduced a number of CCTs to foster human capital accumulation of poor households. A prominent example is *Familias en Acción*, whose largest component is a grant that is conditional on having children attend 80 percent of school classes. Attanasio et al. (2010) show that the program increases children's enrollment rate and reduces their participation in domestic chores, but has no effect on their participation in market work, except among urban teens aged 14–17. We find the opposite for remittances. At the same time, in contrast to our finding of a work-disincentive effect of remittances on female adults, Barrientos and Villa (2015) found that the CCT has no negative effect on adult labor supply. Further research is still needed to understand the impact of these intra-household time reallocations on children's short- and long-term outcomes.

We propose two avenues for future research. First, there is the question of the role of intra-household bargaining as a mechanism that can help explain the heterogeneous results found in this paper. The absence of a household member and the imperfect monitoring by migrating adults can shift the intra-household allocation of resources (including the remittance income) among the household members left behind (Chen, 2006; Mendola and Carletto, 2012). Variations in the gender of the emigrating household members and their relationships with children left behind can affect the welfare outcomes of these children. Second, it would be important to extend the analysis in this paper to children living in hard-to-reach populations. This is particularly relevant for a country like Colombia where internal conflicts have led many children to engage in some of the worst forms of child labor.

References

Acosta, Pablo, "Labor Supply, School Attendance, and Remittances from International Migration: the Case of El Salvador," *World Bank Policy Research Working Paper*, 2006, (3903).

— , "School Attendance, Child Labour, and Remittances from International Migration in El Salvador," *Journal of Development Studies*, June 2011, *47* (6), 913–936.

Alcaraz, Carlo, Daniel Chiquiar, and Alejandrina Salcedo, "Remittances, Schooling, and Child Labor in Mexico," *Journal of Development Economics*, January 2012, *97* (1), 156–165.

Altonji, Joseph G., Fumio Hayashi, and Laurence J. Kotlikoff, "Is the Extended Family Altruistically Linked? Direct Tests Using Micro Data," *The American Economic Review*, 1992, *82* (5), 1177–1198.

Alzúa, María Laura, Guillermo Cruces, and Laura Ripani, "Welfare Programs and Labor Supply in Developing Countries: Experimental Evidence from Latin America," *Journal of Population Economics*, October 2013, *26* (4), 1255–1284.

Amuedo-Dorantes, Catalina and Susan Pozo, "Migration, Remittances, and Male and Female Employment Patterns," *American Economic Review*, April 2006, *96* (2), 222–226.

— **and** — , "Accounting for Remittance and Migration Effects on Children's Schooling," *World Development*, December 2010, *38* (12), 1747–1759.

Angel-Urdinola, Diego F. and Quentin Wodon, "The Gender Wage Gap and Poverty in Colombia," *Labour*, December 2006, *20* (4), 721–739.

Angrist, Joshua David and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton: Princeton University Press, 2009.

Antman, Francisca M., "The Intergenerational Effects of Paternal Migration on Schooling and Work: What Can We Learn from Children's Time Allocations?," *Journal of Development Economics*, November 2011, *96* (2), 200–208.

— , "Gender, Educational Attainment, and the Impact of Parental Migration on Children Left Behind," *Journal of Population Economics*, October 2012, *25* (4), 1187–1214.

Arango, Luis E., Dolores de la Mata, and Nataly Obando, "Echoes of the Crises in Spain and US in the Colombian Labor Market: a Differences-in-Differences Approach," *SERIEs*, November 2015, *6* (4), 441–477.

Attanasio, Orazio, Emla Fitzsimons, Ana Gomez, Martha Isabel Gutiérrez, Costas Meghir, and Alice Mesnard, "Children's Schooling and Work in the Presence of a Conditional Cash Transfer Program in Rural Colombia," *Economic Development and Cultural Change*, January 2010, *58* (2), 181–210.

Baland, Jean-Marie and James A. Robinson, "Is Child Labor Inefficient?," *Journal of Political Economy*, August 2000, *108* (4), 663–679.

Banerjee, Abhijit V., Rema Hanna, Gabriel E. Kreindler, and Benjamin A. Olken, "Debunking the Stereotype of the Lazy Welfare Recipient: Evidence from Cash Transfer Programs," *The World Bank Research Observer*, August 2017, *32* (2), 155–184.

Bargain, Olivier and Delphine Boutin, "Remittance Effects on Child Labour: Evidence from Burkina Faso," *The Journal of Development Studies*, July 2015, *51* (7), 922–938.

Barrientos, Armando and Juan Miguel Villa, "Antipoverty Transfers and Labour Market Outcomes: Regression Discontinuity Design Findings," *The Journal of Development Studies*, September 2015, *51* (9), 1224–1240.

Basu, Kaushik and Pham Hoang Van, "The Economics of Child Labor," *The American Economic Review*, 1998, *88* (3), 412–427.

Bernal, Raquel and Mauricio Cárdenas, "Trabajo Infantil en Colombia," January 2006.

Bhalotra, S., "Child Farm Labor: The Wealth Paradox," *The World Bank Economic Review*, December 2003, *17* (2), 197–227.

Borraz, Fernando, "Assessing the Impact of Remittances on Schooling: the Mexican Experience," *Global Economy Journal*, January 2005, *5* (1).

Brown, Drusilla K., Alan V. Deardorff, and Robert M. Stern, "Child Labor: Theory, Evidence, and Policy," in Kaushik Basu, Henrik Horn, Lisa Romn, and Judith Shapiro, eds., *International Labor Standards*, Oxford, UK: Blackwell Publishing Ltd, January 2003, pp. 194–247.

Calero, Carla, Arjun S. Bedi, and Robert Sparrow, "Remittances, Liquidity Constraints and Human Capital Investments in Ecuador," *World Development*, June 2009, *37* (6), 1143–1154.

Cameron, A. Colin and Douglas L. Miller, "A Practitioner's Guide to Cluster-Robust Inference," *Journal of Human Resources*, 2015, *50* (2), 317–372.

Chen, Joyce J, "Migration and Imperfect Monitoring: Implications for Intra-Household Allocation," *American Economic Review*, April 2006, *96* (2), 227–231.

Cox, Donald and Marcel Fafchamps, "Chapter 58 Extended Family and Kinship Networks: Economic Insights and Evolutionary Directions," in "Handbook of Development Economics," Vol. 4, Elsevier, 2007, pp. 3711–3784.

Cunha, Flavio, James J. Heckman, Lance Lochner, and Dimitriy V. Masterov, "Chapter 12 Interpreting the Evidence on Life Cycle Skill Formation," in "Handbook of the Economics of Education," Vol. 1, Elsevier, 2006, pp. 697–812.

De Hoop, J. and F. C. Rosati, "Cash Transfers and Child Labor," *The World Bank Research Observer*, August 2014, *29* (2), 202–234.

Del Boca, Daniela, Chiara Monfardini, and Cheti Nicoletti, "Parental and Child Time Investments and the Cognitive Development of Adolescents," *Journal of Labor Economics*, April 2017, *35* (2), 565–608.

Dimova, Ralitza, Gil S. Epstein, and Ira N. Gang, "Migration, Transfers and Child Labor," *Review of Development Economics*, August 2015, *19* (3), 735–747.

Dufour, Jean-Marie and Mohamed Taamouti, "Projection-Based Statistical Inference in Linear Structural Models with Possibly Weak Instruments," *Econometrica*, July 2005, *73* (4), 1351–1365.

Duryea, Suzanne and Mary Arends-Kuenning, "School Attendance, Child Labor and Local Labor Market Fluctuations in Urban Brazil," *World Development*, July 2003, *31* (7), 1165–1178.

Edmonds, Eric V., "Chapter 57 Child Labor," in "Handbook of Development Economics," Vol. 4, Elsevier, 2007, pp. 3607–3709.

Edmonds, Eric V and Nina Pavcnik, "Child Labor in the Global Economy," *Journal of Economic Perspectives*, February 2005, *19* (1), 199–220.

Emerson, Patrick M. and André Portela Souza, "Is Child Labor Harmful? The Impact of Working Earlier in Life on Adult Earnings," *Economic Development and Cultural Change*, January 2011, *59* (2), 345–385.

__ , **Vladimir Ponczek, and André Portela Souza**, "Child Labor and Learning," *Economic Development and Cultural Change*, January 2017, *65* (2), 265–296.

Fiszbein, Ariel, Norbert Rüdiger Schady, and Francisco H. G. Ferreira, *Conditional Cash Transfers: Reducing Present and Future Poverty* A World Bank policy research report, Washington D.C: World Bank, 2009.

Garay, Luis Jorge and Adriana Rodríguez, *Estudio sobre migración internacional y remesas en Colombia*, 1 ed ed., Bogotá : [Geneva, Switzerlan]: Ministerio de Relaciones Exteriores de Colombia ; Organización Internacional para las Migraciones (OIM), 2005. OCLC: ocm79434872.

Giannelli, Gianna Claudia and Lucia Mangiavacchi, "Children's Schooling and Parental Migration: Empirical Evidence on the 'Left-behind' Generation in Albania: Children's Schooling and Parental Migration," *LABOUR*, December 2010, *24*, 76–92.

Greene, William, "Fixed Effects and Bias Due to the Incidental Parameters Problem in the Tobit Model," *Econometric Reviews*, December 2004, *23* (2), 125–147.

Haveman, Robert and Barbara Wolfe, "The Determinants of Children's Attainments: A Review of Methods and Findings," *Journal of Economic Literature*, 1995, *33* (4), 1829–1878.

Herrera, Clemencia Ramírez and Laura Mendoza S., *Perfil Migratorio de Colombia 2012: OIM - Colombia*, Bogotá: Organización Internacional para las Migraciones, 2013.

— , **Marcela Zuluaga, and Clara Perilla**, *Perfil Migratorio de Colombia 2010: OIM - Colombia*, Bogotá: Organización Internacional para las Migraciones, 2010.

IICA, Programa mundial de alimentos, *Efectos del Aumento de los Precios Internacionales de los Alimentos y las Materias Primas Sobre los Ingresos Netos Agrícolas y la Seguridad Alimentaria en Colombia*, IICA Biblioteca Venezuela, 2014.

International Labour Office and ILO International Programme on the Elimination of Child Labour, *Marking Progress Against Child Labour: Global Estimates and Trends 2000-2012*, Geneva: ILO, 2013.

International Programme on the Elimination of Child Labour (IPEC), *Economic Vulnerability, Social Protection and the Fight Against Child Labour* number 1. In 'World report on child labour.', Geneva: ILO, 2013.

Lokshin, Michael and Elena Glinskaya, "The Effect of Male Migration on Employment Patterns of Women in Nepal," *The World Bank Economic Review*, January 2009, *23* (3), 481–507.

Mansuri, Ghazala, "Migration, School Attainment, and Child Labor: Evidence from Rural Pakistan," SSRN Scholarly Paper ID 923252, Social Science Research Network, Rochester, NY June 2006.

McKenzie, David J., "Measuring Inequality with Asset Indicators," *Journal of Population Economics*, June 2005, *18* (2), 229–260.

Mendola, Mariapia and Calogero Carletto, "Migration and Gender Differences in the Home Labour Market: Evidence from Albania," *Labour Economics*, December 2012, *19* (6), 870–880.

Ministerio de Educacion Nacional (MEN), "Deserción Escolar en Colombia," http://colombiadigital.net/desercion-escolar/item/4086-deserci%C3%B3n-escolar-en-colombia-factores-de-riesgo-por-regi%C3%B3n.html 2012.

Moffitt, Robert A., "Chapter 34 Welfare Programs and Labor Supply," in "Handbook of Public Economics," Vol. 4, Elsevier, 2002, pp. 2393–2430.

Newey, Whitney K., "Efficient Estimation of Limited Dependent Variable Models with Endogenous Explanatory Variables," *Journal of Econometrics*, November 1987, *36* (3), 231–250.

Observatorio de Migraciones (ENMIR), "Encuesta Nacional 2008-2009 Resultados Generales de Migraciones Internacionales y Remesas," http://www.observatoriodemigraciones.org 2009.

O'Donnell, Owen, Furio C. Rosati, and Eddy van Doorslaer, "Health Effects of Child Work: Evidence from Rural Vietnam," *Journal of Population Economics*, September 2005, *18* (3), 437–467.

Pinzón-Rondón, Angela M., Sandra Hofferth, and Leonardo Briceño, "Children Working in the Streets of Colombian Cities: Different Pathways to the Street Lead to Different Populations," *Children and Youth Services Review*, December 2008, *30* (12), 1417–1424.

Rapoport, Hillel and Frédéric Docquier, "Chapter 17 The Economics of Migrants' Remittances," in "Handbook of the Economics of Giving, Altruism and Reciprocity," Vol. 2, Elsevier, 2006, pp. 1135–1198.

Ravallion, Martin and Quentin Wodon, "Does Child Labour Displace Schooling? Evidence on Behavioural Responses to an Enrollment Subsidy," *The Economic Journal*, March 2000, *110* (462), 158–175.

Rosenzweig, Mark R., "Population Growth and Human Capital Investments: Theory and Evidence," *Journal of Political Economy*, October 1990, *98* (5, Part 2), S38–S70.

Salas, Vania B., "International Remittances and Human Capital Formation," *World Development*, July 2014, *59*, 224–237.

Texidó, Ezequiel and Jorge Gurrieri, *Panorama Migratorio de América del Sur 2012: OIM*, Buenos Aires: Organización Internacional para las Migraciones, 2012.

Vyas, S. and L. Kumaranayake, "Constructing Socio-economic Status Indices: How to Use Principal Components Analysis," *Health Policy and Planning*, August 2006, *21* (6), 459–468.

Wooldridge, Jeffrey M., *Econometric Analysis of Cross Section and Panel Data*, 2nd ed ed., Cambridge, Mass: MIT Press, 2010.

World Bank, "Datos Sobre Migracion y Remesas," http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1110315015165/Factbook2011Spanish.pdf 2011.

— , *World Development Indicators, 1960–2015* 2016.

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

— , "Migrant Remittances," *Journal of Economic Perspectives*, August 2011, *25* (3), 129–152.

Tables

	All	Boys	Girls	Children Aged [...]		
				12-14	15-16	17-18
	(1)	(2)	(3)	(4)	(5)	(6)
Economic Activity						
Wholesale and retail	0.284	0.261	0.321	0.380	0.292	0.252
Hotels and restaurants	0.094	0.076	0.120	0.097	0.093	0.093
Manufacturing	0.075	0.063	0.092	0.131	0.074	0.057
Storage transportation and communication	0.070	0.055	0.091	0.098	0.071	0.060
Other services	0.028	0.015	0.048	0.025	0.026	0.030
Construction	0.055	0.089	0.003	0.019	0.054	0.067
Domestic service	0.024	0.002	0.057	0.012	0.023	0.028
Others	0.370	0.438	0.267	0.239	0.367	0.413
Hours worked	33.92	35.83	31.01	21.47	30.62	39.28
Share attending school	0.50	0.46	0.56	0.84	0.60	0.35
housework	0.06	0.03	0.11	0.03	0.05	0.07
Observations	16926	10208	6718	2956	4409	9561

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010.* We use the 2-digit International Standard Industrial Classification (ISIC) to classify the economic activities. We present the five most important economic sectors, in addition to the construction and domestic services sector. None of the omitted activities (aggregated as "Others") accounts for more than five percent of working children.

TABLE 2: DESCRIPTIVE STATISTICS

	Recipient (1)	Non-recipient (2)
Outcome variables		
Labor market participation rate	0.106	0.118
Hours worked	30.23	34.01
School attendance rate	0.847	0.820
Household-work participation rate	0.049	0.059
Children characteristics		
Age	15.087	15.006
Male	0.504	0.503
Household head or spouse	0.014	0.015
Household head characteristics		
Female	0.557	0.365
Married	0.337	0.361
Years of education	8.657	7.948
Household characteristics		
Household size	3.755	4.026
Number of children	2.024	2.206
Total remittances	3728	0.000
Wealth index	1.811	1.497
Additional statistics		
Share in bottom metro-area income quartile	0.044	0.304
Observations	4013	139642

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010*. Total amount of remittances in PPP-adjusted US dollar.

	(1)	(2)	(3)
$Treat_H$	-0.121	-0.116	
	(0.037)***	(0.039)***	
$Treat_M$	0.010	0.006	
	(0.028)	(0.028)	
$Treat_L$	-0.009		-0.014
	(0.029)		(0.032)
Observations	143655	109566	75022
Region FE	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes
Region Variables	Yes	Yes	Yes
Observations	143655	108552	64404

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010*. The individual and household controls included are presented in Table 2. Regional controls include the Gini coefficient, the unemployment rate, and the regional GDP growth. Coefficients are reported with standard errors clustered at the region-month-year level in parentheses. */**/*** denotes significance at the 10/5/1 percent level.

TABLE 4: IMPACT OF REMITTANCES ON CHILDREN OUTCOMES

Dependent variable (Panels A and B):	Likelihood to work (Linear probability model)		Hours (Tobit)		School attendance (Linear probability model)	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Non-IV Estimates						
Remittances	-0.0003	-0.0001	-0.0167	-0.0059	0.0004	0.0001
	(0.0001)***	(0.0001)**	(0.0046)***	(0.0029)**	(0.0001)***	(0.0001)
Panel B: IV Estimates						
Remittances	-0.015	-0.022	-0.352	-0.504	-0.010	-0.010
	(0.009)*	(0.009)**	(7.498)	(0.576)	(0.008)	(0.007)
Anderson-Rubin 90-percent confidence interval	[-0.042,-0.003]	[-0.049,-0.010]	–	–	[-0.032, 0.001]	[-0.029, 0.001]
Mean of dependent variable	0.118	0.118	33.9	33.9	0.821	0.821
Dependent variable (panel C):			Remittances			
Panel C: First Stage						
RegionUnempShock	-0.070	-0.071	-0.070	-0.071	-0.070	-0.071
	(0.023)***	(0.022)***	(0.023)***	(0.022)***	(0.023)***	(0.022)***
Kleibergen-Papp rk Wald F statistic	8.89	10.34	8.89	10.34	8.89	10.34
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Child and HH characteristics	No	Yes	No	Yes	No	Yes
Region Variables	No	Yes	No	Yes	No	Yes
Observations	143655	143655	143655	143655	143655	143655

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010*. The individual and household controls included are presented in Table 2. Regional controls include the Gini coefficient, the unemployment rate, and the regional GDP growth. Columns 1-2 and 5-6 in Panel B report coefficients from the LPM with standard errors clustered at the region-month-year level in parentheses. Columns 4-6 in Panel B report the marginal effect from the IV-Tobit calculated based on Wooldridge (2010, Section 17.2). The standard error is bootstrapped with 500 replications and clustered at the region-month-year level. The point estimates and standard errors for the LPM, and the marginal effect and standard error for the Tobit model in Panel A and Panel B are multiplied by 100 for presentation purposes. */**/*** denotes significance at the 10/5/1 percent level.

TABLE 5: ROBUSTNESS CHECKS ON EXPORT-INCOME SHARE AND RETURN MIGRATION

	Likelihood to work			
	(1)	(2)	(3)	(4)
Remittances	-0.022	-0.021	-0.021	-0.021
	(0.009)**	(0.009)**	(0.009)**	(0.009)**
Export-related income		0.031		0.031
		(0.007)***		(0.007)***
Share of adults			0.040	0.038
			(0.027)	(0.027)
Kleibergen-Papp rk Wald F statistic	10.34	10.26	10.69	10.60
Anderson-Rubin 90-percent CI	[-0.049,-0.010]	[-0.048,-0.010]	[-0.047,-0.010]	[-0.048,-0.010]
Observations	143655	143655	143655	143655

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010*. The individual and household controls included are presented in Table 2. Regional controls include the Gini coefficient, the unemployment rate, and the regional GDP growth. Coefficients are reported with standard errors clustered at the region-month-year level in parentheses. The point estimates and standard errors are multiplied by 100 for presentation purposes. */**/*** denotes significance at the 10/5/1 percent level.

TABLE 6: HETEROGENEOUS TREATMENT EFFECT OF REMITTANCES BY AGE AND GENDER

	Children Aged [...]		Boys	Girls
	12-14	15-18		
	(1)	(2)	(3)	(4)

Panel A. Dependent variable: Labor market participation

Remittances	-0.014	-0.034	-0.016	-0.028
	(0.007)*	(0.017)**	(0.011)	(0.013)**
Kleibergen-Papp rk Wald F statistic	9.34	5.64	8.57	6.14
Anderson-Rubin 90-percent CI	[-0.035,-0.005]	[-0.091 ,-0.0150]	[-0.047,-0.002]	[-0.070 ,-0.014]
Observations	61141	82514	72290	71365
Labor market participation rate	0.048	0.169	0.141	0.094

	Children Aged 12-14		Children Aged 15-18	
	Boys	Girls	Boys	Girls
	(5)	(6)	(7)	(8)

Panel B1. Dependent variable: Labor market participation

Remittances	-0.014	-0.013	-0.026	-0.039
	(0.008)*	(0.010)	(0.024)	(0.018)**
Anderson-Rubin 90-percent CI	[-0.041 ,-0.004]	[-0.046 ,-0.002]	[-0.106 , 0.014]	[-0.097 ,-0.020]
Labor market participation rate	0.055	0.041	0.207	0.132

Panel B2. Dependent variable: Household-work participation

Remittances	0.008	0.017	0.017	0.047
	(0.005)*	(0.010)*	(0.016)	(0.023)**
Anderson-Rubin 90-percent CI	[0.002, 0.023]	[0.006, 0.050]	[0.001, 0.069]	[0.023, 0.122]
Household-work participation rate	0.011	0.024	0.032	0.147
Kleibergen-Papp rk Wald F statistic	7.62	3.35	2.21	5.53
Observations	31229	29912	41061	41453

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010*. The individual and household controls included are presented in Table 2. Regional controls include the Gini coefficient, the unemployment rate, and the regional GDP growth. Coefficients are reported with standard errors clustered at the region-month-year level in parentheses. The point estimates and standard errors are multiplied by 100 for presentation purposes. */**/*** denotes significance at the 10/5/1 percent level.

TABLE 7: HETEROGENEOUS TREATMENT EFFECT OF REMITTANCES BY WEALTH AND AGE

	All		Children Aged 12-14		Children Aged 15-18	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
	(1)	(2)	(3)	(4)	(5)	(6)
Remittances	-0.064	-0.018	-0.043	-0.010	-0.135	-0.027
	(0.047)	(0.009)*	(0.024)*	(0.007)	(0.258)	(0.016)*
Kleibergen-Papp rk Wald F statistic	2.23	6.68	5.01	4.48	0.30	4.18
Anderson-Rubin 90-percent CI	[-0.219 ,-0.018]	[-0.048 ,-0.007]	[-0.122 ,-0.015]	[-0.032 ,-0.002]	[-0.984 ,-0.006]	[-0.080 ,-0.009]
					U [0.045, 0.715]	
Observations	78328	65327	33825	27316	44503	38011
Labor market participation rate	0.141	0.089	0.061	0.033	0.203	0.130

Notes: The sample includes children between 12-18 years old from *GEIH, 2008-2010*. The individual and household controls included are presented in Table 2. Regional controls include the Gini coefficient, the unemployment rate, and the regional GDP growth. Coefficients are reported with standard errors clustered at the region-month-year level in parentheses. The point estimates and standard errors are multiplied by 100 for presentation purposes. */**/*** denotes significance at the 10/5/1 percent level.

TABLE 8: REMITTANCES AND HOUSEHOLD LABOR SUPPLY

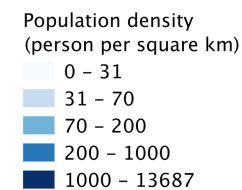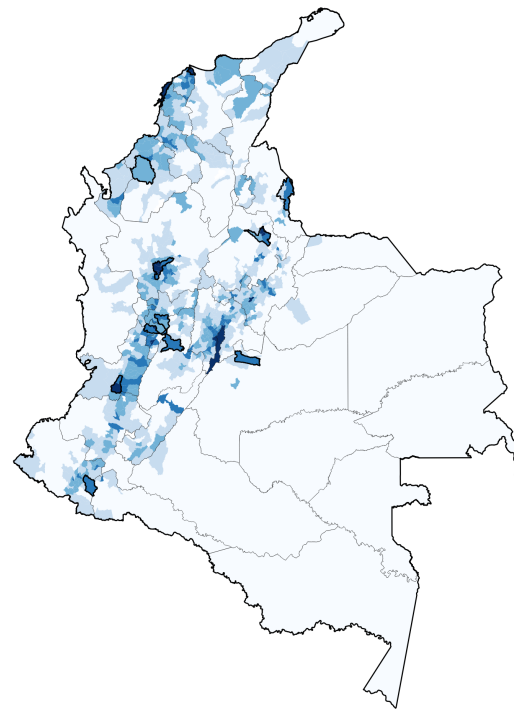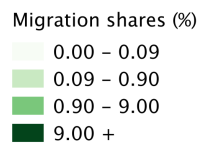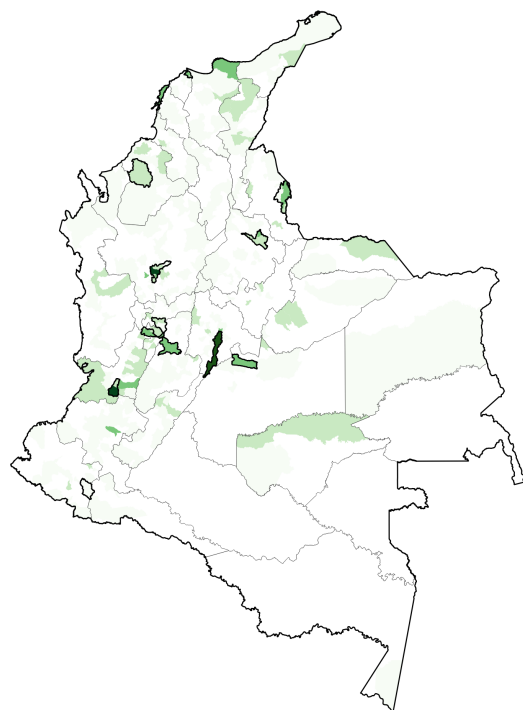|	Children	Adults (Children-Linked Sample)				
		All	Male	Female	Poor	Non-Poor
	(1)	(2)	(3)	(4)	(5)	(6)
Remittances	-0.022	-0.041	-0.003	-0.063	-0.100	-0.030
	(0.009)**	(0.015)***	(0.009)	(0.025)**	(0.081)	(0.014)**
Kleibergen-Papp rk Wald F statistic	10.34	8.93	6.50	7.79	1.68	6.87
Anderson-Rubin 90-percent CI	[-0.049,-0.010]	[-0.090 ,-0.024]	[-0.025, 0.016]	[-0.144 ,-0.038]	[-0.366 ,-0.039]	[-0.075 ,-0.016]
Observations	143655	241272	105431	135841	122232	119040
Labor market participation rate	0.118	0.687	0.806	0.595	0.689	0.686

Notes: The sample includes children between 12-18 years old, and adults between 19-65 years old in households with children from *GEIH, 2008-2010*. The individual and household controls included are presented in Table 2. Regional controls include the Gini coefficient, the unemployment rate, and the regional GDP growth. Columns report coefficients from the LPM with standard errors clustered at the region-month-year level in parentheses. The point estimates and standard errors are multiplied by 100 for presentation purposes. */**/*** denotes significance at the 10/5/1 percent level.

Figures

FIGURE 1: HISTORICAL MIGRATION, POPULATION, AND GEIH COVERAGE

(A) HISTORICAL MIGRATION SHARES   (B) POPULATION DENSITY

Migration shares (%)
- 0.00 – 0.09
- 0.09 – 0.90
- 0.90 – 9.00
- 9.00 +

Population density
(person per square km)
- 0 – 31
- 31 – 70
- 70 – 200
- 200 – 1000
- 1000 – 13687

Notes: For Panel A, the historical migration shares are measured as the percentage of migrants from total migrants by municipality. We use the question on the respondent's country of residence five years ago from IPUMS sample of the 2005 Census data. For Panel B, the population density data are obtained from SIGOT. Thin lines are departmental (or regional) borders, while bold lines encapsulate the metropolitan areas covered in our GEIH sample.

FIGURE 2: DESTINATION-COUNTRY SHOCKS AND REMITTANCE INFLOW

(A) THE UNITED STATES

(B) SPAIN

(C) VENEZUELA

(D) ECUADOR
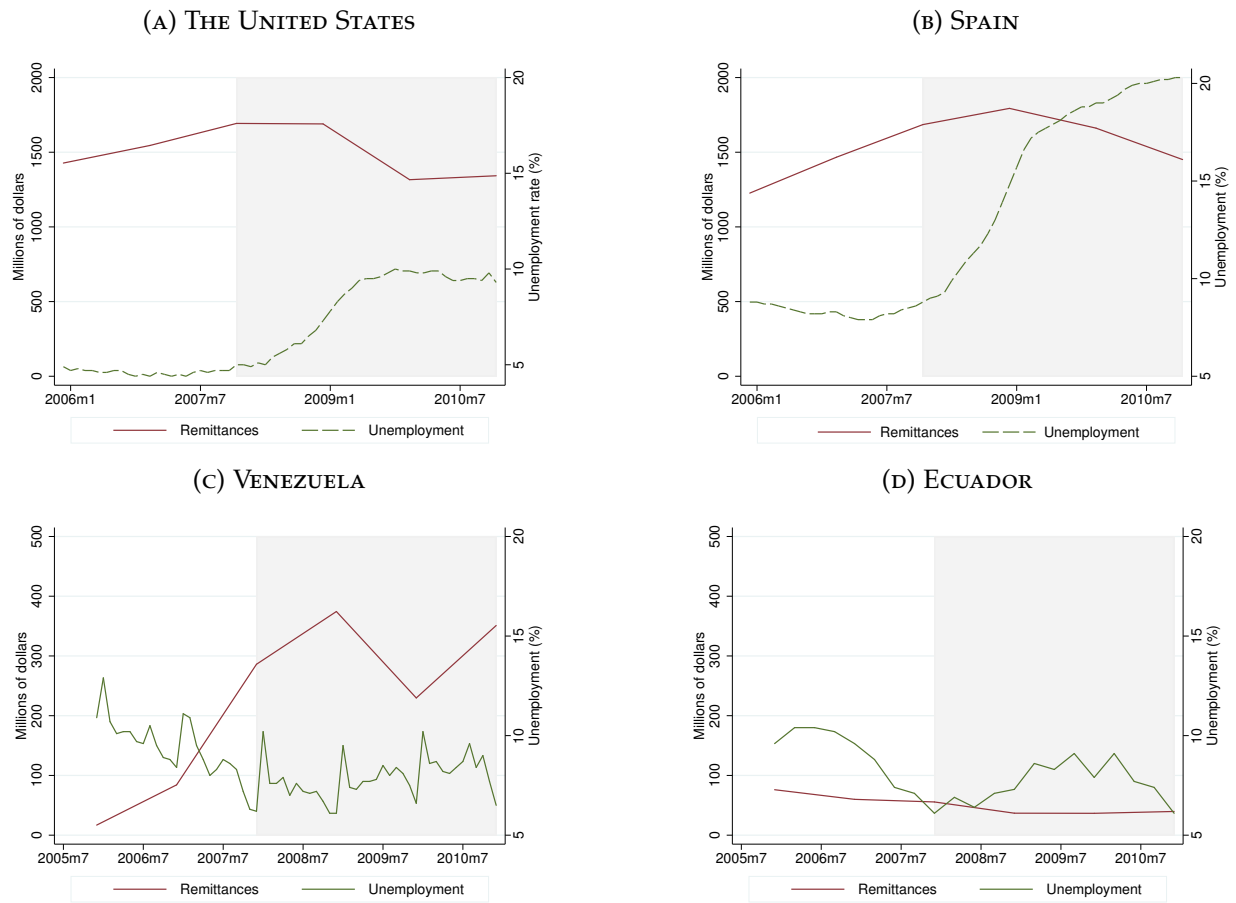
Notes: Remittance flows are obtained from the Colombian central bank, *Banco de la República*, and unemployment rates are obtained from Eurostat for Spain, the Bureau of Labor Statistics for the United States, the National Institute of Statistics (INES) for Venezuela, and the Economic Commission for Latin America and the Caribbean (ECLAC) for Ecuador.

Appendix

Section A1 describes the principal component analysis and the list of variables used to construct the wealth index. Section A2 reports additional tables mentioned in the paper.

A1 Wealth Index: Principal Component Analysis

Our wealth index is constructed based on a set of household assets using a principal component analysis (Vyas and Kumaranayake, 2006). In particular, given the vector of assets X, the first principal component is the linear combination:

$$Y = a_1 x_1 + a_2 x_2 + \cdots + a_n x_n$$

where Y is our principal component index that proxies for household wealth, x_n is a standardized variable with zero mean, and a_n are the coefficient estimates. The principal component reports an index which assigns a larger weight to assets which vary most among households. Given that we use dummy variables, the coefficients capture the effects of a change from zero to one in each particular asset on the wealth index. We use the variable Y as the index to classify households into different socio-economic groups. Table A1 presents the full list of the variables that are used as inputs to our wealth index and their respective weights.

TABLE A1: RESULTS FROM THE PRINCIPAL COMPONENTS ANALYSIS

	Mean (1)	Standard Deviation (2)	Factor Score (3)
Assets			
Home ownership	0.435	0.496	0.087
Electricity	0.959	0.199	0.199
Television	0.617	0.486	0.264
Refrigerator	0.841	0.366	0.272
Car	0.159	0.365	0.200
Telephone	0.572	0.495	0.309
Internet	0.276	0.447	0.219
Source of water supply			
Aqueduct pipe	0.961	0.193	0.299
Pipe to other source	0.008	0.090	-0.155
Well with pump	0.002	0.047	-0.050
Water tank	0.002	0.040	-0.049
Storm water	0.0002	0.013	-0.022
River	0.001	0.021	-0.034
Public stack	0.002	0 .041	-0.079
Trolley tank	0.0002	0.014	-0.023
Water bearer	0.004	0.059	-0.131
Bottled water	0.005	0.070	-0.053
Sanitation facility			
Toilet connected to [. . .]			
sewage	0.903	0.295	0.380
septic tank	0.065	0.247	-0.268
river or sea	0.0003	0.017	-0.137
Toilet off line	0.010	0.097	-0.047
Latrine	0.001	0.028	-0.046
No service	0.006	0.074	-0.201
Type of floor material			
Ground/sand	0.023	0.148	-0.201
Cement	0.263	0.440	-0.246
Rough wood	0.025	0.156	-0.011
Brick	0.620	0.485	0.351
Marble	0.008	0.087	0.032
Polished wood	0.014	0.118	0.025
Carpet	0.006	0.076	0.026

Notes: The sample includes all households from *GEIH, 2008-2010.*

A2   Additional Tables

| | Total Population | Share of population who migrated to [. . .] | | | | |
| | | All destinations | United States | Spain | Venezuela | Ecuador |
	(1)	(2)	(3)	(4)	(5)	(6)
Pereira	572,860	18.70	7.98	7.64	2.30	0.78
Cúcuta	663,270	16.23	0.00	0.22	16.01	0.00
Cali	2,560,721	11.08	4.05	3.08	3.26	0.69
Bucaramanga	915,531	9.04	1.19	0.71	6.81	0.32
Bogotá	7,029,970	8.67	3.60	1.74	2.50	0.82
Medellín	3,046,541	8.15	4.80	1.49	1.66	0.21
Villavicencio	386,988	7.97	1.83	3.26	2.88	0.00
Ibagué	431,005	5.80	1.66	0.69	3.45	0.00
Barranquilla	1,523,223	4.83	1.24	0.63	2.93	0.02
Cartagena	974,463	4.42	0.06	0.20	4.14	0.02
Manizales	454,228	3.11	2.05	0.94	0.10	0.02
Montería	522,382	1.54	0.32	0.12	1.09	0.00
Pasto	347,655	0.15	0.00	0.00	0.15	0.00

Notes: We use the question on the respondent's country of residence five years ago from IPUMS to compute total number of migrants and construct the distribution of migrants by metropolitan area. We then use the distribution of migrants and the number of Colombian migrants in the United States, Spain, Venezuela, and Ecuador to construct the share of migrants. Data of Colombians migrants in the US comes from the Pew Hispanic Research Center; in Spain from *Ministerio de Empleo y Seguridad Social de España*; in Venezuela from *Instituto Nacional de Estadística*; and in Ecuador from *Censo de Ecuador*.