Documentos CEDE

ISSN 1657-7191 Edición electrónica.

Not all that Glitters Is Gold: Gold Boom,
Child Labor and Schooling in Colombia

Rafael J. Santos

31

AGOSTO DE 2014

Serie Documentos Cede, 2014-31
ISSN 1657-7191 Edición electrónica.

Agosto de 2014

© 2012, Universidad de los Andes–Facultad de Economía–CEDE
Calle 19A No. 1 – 37 Este, Bloque W.
Bogotá, D. C., Colombia
Teléfonos: 3394949- 3394999, extensiones 2400, 2049, 3233
infocede@uniandes.edu.co
<http://economia.uniandes.edu.co>

Ediciones Uniandes
Carrera 1ª Este No. 19 – 27, edificio Aulas 6, A. A. 4976
Bogotá, D. C., Colombia
Teléfonos: 3394949- 3394999, extensión 2133, Fax: extensión 2158
infeduni@uniandes.edu.co

Edición y prensa digital:
Cadena S.A. • Bogotá
Calle 17 A N° 68 - 92
Tel: 57(4) 405 02 00 Ext. 307
Bogotá, D. C., Colombia
www.cadena.com.co

Impreso en Colombia – *Printed in Colombia*

El contenido de la presente publicación se encuentra protegido por las normas internacionales y nacionales vigentes sobre propiedad intelectual, por tanto su utilización, reproducción, comunicación pública, transformación, distribución, alquiler, préstamo público e importación, total o parcial, en todo o en parte, en formato impreso, digital o en cualquier formato conocido o por conocer, se encuentran prohibidos, y sólo serán lícitos en la medida en que se cuente con la autorización previa y expresa por escrito del autor o titular. Las limitaciones y excepciones al Derecho de Autor, sólo serán aplicables en la medida en que se den dentro de los denominados Usos Honrados (Fair use), estén previa y expresamente establecidas, no causen un grave e injustificado perjuicio a los intereses legítimos del autor o titular, y no atenten contra la normal explotación de la obra.

Not all that Glitters Is Gold: Gold Boom, Child Labor and Schooling in Colombia

By RAFAEL J. SANTOS*

This paper estimates the impact of the boom in international gold prices on child labor and schooling in Colombia. I first set up a simple agricultural household model of child labor and commodity price shocks which guides the empirical analysis. Then, I use individual-level information from the censuses of 1985, 1993 (when prices were stable) and 2005 (when prices surged) merged with regional data on gold production capabilities. I define Gold Boom as an interaction between regional gold production capabilities and the international price of gold. I find that child labor is increasing (0.3 standard deviations) and school attendance is decreasing (0.9 standard deviations) in the measure of gold boom. Accordingly, the gold boom decreases school attainment (0.2 standard deviations). This is consistent with the model when initial child labor is low and substitution effects dominate income effects. Finally, I find that the years of education of the head of the household but not her ownership of assets mitigate the collateral effects of the gold boom.

Key Words: Colombia, Natural Resources, Gold mining, Child Labor, Education.

JEL classification: D04; D13; I20; J22; O10; O12

* Universidad de Los Andes, rj.santos@uniandes.edu.co. I thank Carlos Carvajal and Nicolás Santos for their superb assistance in this research. This paper benefited from comments from participants at the CEDE seminar in Universidad de los Andes. I thank Gregory Lee Haugan and Martin Hackmann for their comments in a preliminary version of this paper.

No todo lo que brilla es oro: Boom minero, trabajo infantil y escolaridad en Colombia

By RAFAEL J. SANTOS*

Este paper estima el impacto del boom en el precio internacional del oro en el trabajo infantil y la escolaridad en Colombia. Primero propongo un modelo sencillo de producción agrícola sobre trabajo infantil y choques en el precio de los productos que se usa para guiar el trabajo empírico. Luego, uso información a nivel del individuo de los censos de 1985, 1993 (cuando los precios eran estables) y 2005 (cuando los precios aumentaron) combinado con datos regionales sobre la capacidad para producir oro. Defino una medida de boom minero como una interacción entre las capacidades de producción de oro a nivel regional y los precios internacionales del oro. Encuentro que el trabajo infantil es creciente (0.3 desviaciones estándar) y la asistencia escolar decreciente (0.9 desviaciones estándar) en la medida de boom minero. De igual forma, el boom minero reduce el logro escolar (0.2 desviaciones estándar). Esto es consistente con el modelo cuando el trabajo infantil inicial es bajo y el efecto sustitución domina al efecto renta. Finalmente, encuentro que los años de educación de la cabeza del hogar pero no su tenencia de activos mitiga los efectos colaterales del boom minero.

Palabras Clave: Colombia, Recursos Naturales, Minería de Oro, Trabajo Infantil, Educación.

JEL classification: D04; D13; I20; J22; O10; O12

* Universidad de Los Andes, rj.santos@uniandes.edu.co. Agradezco a Carlos Carvajal y a Nicolás Santos por su inmejorable apoyo en esta investigación. Este paper se benefició de los comentarios de participantes en el seminario CEDE en la Universidad de los Andes. Agradezco a Gregory Lee Haugan y a Martin Hackmann por sus comentarios en una versión preliminar de este paper.

I. Introduction

Child labor is more prevalent in poor families (Rosenzweig (1981), Basu and Pham (1998), Baland and Robinson (2000)). However, the response of child labor to the economic cycle is theoretically ambiguous because, for example, of opposing substitution and income effects. Evaluating the cyclicity of child labor is important for economic development because transitory income shocks might have negative long lasting effects. If child labor hinders human capital accumulation, children who work will on average have lower lifetime earnings ¹.

Empirically, several papers have explored the impact of economic booms and busts on child labor and schooling. For Tanzania, Beegle, Dehejia, and Gatti (2006) find that negative income shocks increase hours worked of children between 7 and 15 years old and that the impact of these shocks is mitigated for families who own assets. For Cote D'Ivoire, Cogneau and Jedwab (2012) find that reductions in administered cocoa-prices lead to less school enrollment and more child labor. But child labor is not always counter-cyclical. For Brazil, Kruger (2007) finds that expansions in the production of coffee depress school enrollment and raise child labor. If an economic boom has the undesired effect of increasing child labor, then public policy could use part of the new resources to counter this effect and to keep kids in school.

This paper contributes to the literature on the cyclicity of child labor by analyzing the impact of the boom in international gold prices on child labor, school attendance and school attainment in Colombia (the 14th largest gold-producing economy). Although a positive association between child labor and mining is frequently documented in the news, this is the first attempt to explore the collateral effects of the 2002 surge in international gold prices on child labor.

I first set up a model which exposes in a simple way the ambiguous effect of an increase in gold prices on child labor and schooling. The model shows that the substitution effect of an increase in gold prices dominates when child labor is initially low, as might be the case in Latin-American as opposed to African countries (see Ferreira and Schady (2009)). Then, I empirically explore the effects of the gold boom using individual level data on child labor, school attendance and school attainment from the censuses of 1985, 1993 (before the increase in gold prices) and 2005 (after the increase in gold prices) and census-unit² level data on gold production and water supply. I proceed by defining a census-unit level measure of gold boom. This is done by interacting international gold prices with a dummy which takes the value of one if the the census-unit produced any gold before the increase in international gold prices. The initial gold production dummy is defined either using gold production in 1978 or gold production in

¹The consequences of child labor on the welfare of the children are not evident since parents can, for example, invest part of the income generated by the children in better health.

²Colombia is divided into 1099 municipalities. A census-unit (of which there are 538) is a grouping of neighboring municipalities created by the Administrative Department of Statistics and the smallest geographic unit in the microdata available to researchers.

2001-2002. Results are similar using either measure. However, self-selection into initially producing gold might generate endogeneity problems that would bias the estimates using OLS. To deal with this problem I use water supply in 2000 as an instrument for producing any gold in 2001-2002. This novel instrumental variables approach relies on the fact that most gold mining in Colombia is placer mining. To take into account that water supply might be correlated with other variables correlated in turn with child labor, I control for the covariates more likely to threaten the identification strategy: The quality of the soil for agriculture, the presence of fluvial ports, and water-related natural disasters. Because in Colombia mining rents attract non-state armed groups, I also take into account the presence of guerrilla and paramilitary groups using a new database on Colombian armed conflict which spans the years 1980-2012.

I start by checking that my census-unit level measure of gold boom increases census-unit level employment. Then, I show that -as for Brazil (Kruger, 2007)- child labor in Colombia is procyclical. In other words, child labor is increasing in my measure of gold boom. School attendance and school attainment are countercyclical. Instrumental variables estimates imply that a standard deviation increase in gold boom increases child labor by 0.32 standard deviations, and decreases school attendance and school attainment by 0.91 and 0.23 standard deviations, respectively. I also find that the years of education of the head of the household but not her ownership of assets mitigate the impact of the gold boom. Interestingly, the finding of procyclical child labor is consistent with related research for Colombia: Miller and Urdinola (2010) find that coffee-induced economic booms deteriorate household investment in child health and lead to higher infant mortality. For the case of Colombia, the argument can be made in favor of policies -such as school subsidies (Schultz (2004) , de Janvry, Finan, Sadoulet, and Vakis (2006))- that reduce the opportunity cost of the time of children in face of temporary windfalls. Furthermore, the same resources generated by the gold boom can be used to promote schooling as was the case for the Indonesian INPRES program, which used oil revenues to dramatically increase the supply of schools ((Duflo, 2001)).

The finding of a negative response of child labor to an exogenous increase in the price of gold is consistent with research that shows that people invest more in schooling when skilled wages increase, for example because of the introduction of a new technology (Foster & Rosenzweig, 1996); however, in the Colombian case, the other direction of the mechanism might be at play: An increase in unskilled wages is a disincentive for investing in schooling. In that sense, this research also adds to the resource curse literature (Sachs & Warner, 1995) by pointing to another channel through which natural resources check future economic growth.

This papers proceeds as follows: Section II summarizes gold mining in Colombia. Section III lays out a simple theoretical model of child labor and commodity booms. Section IV presents the econometric models. Section V describes the data. Section VI shows the main results and section VII performs a series of

robustness checks. Section VIII concludes.

II. Gold Mining in Colombia

Using the statistics of the central bank of Colombia, gold production in 2005 was 1,150,554.36 troy ounces. At a price of 444.5 dollars per troy ounce this represented approximately 0.5 billion dollars or 0.35% of Colombia's GDP. During the same period total expenditures in education represented about 4.3% of the GDP (World Bank). Gold production is concentrated in the west of the country, from the right flank of the western Andes to the pacific coast (see figures 3 and 4). For the five states³ which produced the most gold in 2005 (in descending order: Antioquia, Bólivar, Córdoba, Caldas and Chocó), gold production represented more than 1% of state-level GDP. For Chocó, one of Colombia's poorest states, gold production represented almost 5% of its GDP.

In part as a response to the dramatic increase in the international price of gold, total gold production in Colombia exhibits an increasing trend since 2001. According to Ingeominas, the number of mining titles increased by 61% between may 2001 and April 2005 (quoted in (Rettberg, 2014)). The data on gold production used in this paper shows a 62% increase in gold production for the period 2001-2005 (figure 1), a period in which gold prices increased by 64% . Figure 2 shows the behavior of the time series of international gold prices. From this figure, it is clear that starting in 2002 there is a change in the trend of gold prices: gold prices are relatively stable between 1985 and 2001 and they increase continuously between 2002 and 2012.

16% of the census units of Colombia reported positive gold production in 2001-2002, before the change in the trend of gold prices. These census units are shown in figure 4. The concentration of gold production in some areas of Colombia gives room for the possibility that a boom in the production of gold increases local economic activity. I will show that local unemployment decreases with a local measure of gold boom in section VI. As pointed out by Fedesarrollo (2013. P29) "In the case of mining [...] this sector creates jobs in remote regions for people with few possibilities and generates employment and economic activity."

Gold production in Colombia is characterized by a high degree of informality, which means that many mines do not have a legal title to operate. According to the state-level census of 2011 (Ministerio de Minas y Energías) 86.7 % of gold mines do not have a mining title. Most mines in Colombia are small mines with less than 6 employees. In theory, gold producers have to pay royalties and most of these are transferred to the municipality where the gold is extracted but informal miners rarely comply with this requisite.

Remoteness, informality and royalties contaminate municipality-level gold production data (in particular, the level of the variable) with non-classical measurement error. Remoteness and informality imply that data on gold production could

³Colombia is divided into 33 states and 1099 municipalities. The municipalities are grouped in 530 census units.

be underreported in places where the state is absent, which are potentially places with less schools and more child labor. The royalties transfer imply that some municipalities have incentives to report gold production, making gold production correlated with unobservables such as corruption.

One important characteristic of gold production in Colombia that will help me in purging the estimates of measurement error and endogeneity is the importance of placer mining. According to the Conquistador, Vasco Nuñez de Balboa,

“The gold is picked with little effort, in two ways: one is to wait for the rivers to grow from the ravines, and when the rising waters have passed they become dry, and the gold stays uncovered from what it steals from the ravines and brings from the mountains big grains; the indians say that they are as big as oranges and as the fist, and pieces, as they say, like flat plates.” Vasco Núñez de Balboa. 1513. Letter to the king.

Figure 3 shows gold mining during the colonial period. From this figure it is evident that almost every river in western Colombia carries gold. Of course, technology changes over time but according to the state-level mining census of 2010-2011 (Ingeominas), 60% of gold production in Colombia still corresponds to placer mining. Furthermore, this relationship can be seen using actual data by comparing figure 4 and figure 5. Figure 4 shows the census units which produced gold in 2001-2002 and the main rivers of Colombia. Figure 5 maps log water supply in the census units of Colombia. From these figures it is apparent that census units with high water supply in 2000 tend to be census units with positive gold production in 2001-2002 and this relationship is particularly strong in the Pacific coast and in the municipalities of Bolívar, where the two major rivers of Colombia, the Cauca and Magdalena rivers, converge.

A potential risk of gold mining in Colombia is the capture of mining rents by non-state armed groups which occupy a big fraction of the Colombian territory. Several articles in the news raise this concern and point to a probable effect from gold mining to the presence of non-state armed groups. Others have highlighted the fact that, in Colombia, the level of violence is affected by commodity booms and busts ((Dube & Vargas, 2013)). The actions of illegal armed groups over time in places with gold production may bias the estimates of the effect of gold booms on schooling and child labor. This concern will be addressed in section VII.

III. Theoretical Model

Consider a unitary household model with one child. The household utility function is ,

$$U = U(h, c) = \alpha u(h) + u(c) \quad (1)$$

where U is a separable utility function with $u' > 0$ and $u'' \leq 0$. h and c are hours the kid spends in school and consumption of the family, respectively.

α reflects how much weight the household gives to the education of the child. Parents have an exogenous income of I and the kid has one unit of labor which he can spend at work or at school,

$$1 = l + h$$

where l is the time that the kid spends at work. The child has access to the following technology,

$$F = t \cdot G(l^+, a^+, s^+) \quad (2)$$

Where G is a neoclassical production function with $G_l > 0$ and $G_{ll} \leq 0$. a is the age of the child and s is an indicator variable for male. We assume that there is a positive return to brawn as measured by the latter two variables so that $F_i > 0$ and $F_{l,i} > 0$ for $i = a, s$. $t = 1 - d$ is an iceberg transportation where $d \in (0, 1)$ is a normalized measure of distance to the workplace (for example, distance to the mine). The budget constraint is,

$$P_G \times F(l) + I = c$$

where P_G is the price of a unit of production, which could be a unit of gold or a unit of any other activity which price is positively correlated with the price of gold. I is the parents exogenous income. I am assuming that no formal labor market is available for children.

The parents maximize,

$$U(h, c) = \alpha u(h) + u\{P_G \times F(1 - h) + I\}$$

Assuming an interior solution, the first order condition yields the standard equality between marginal utilities per dollar spent in each good,

$$\frac{\alpha u'(h)}{P_G F'(L)} = u'(c) \quad (3)$$

Where the price of schooling is its opportunity cost, $P_G F'(L)$. We can rewrite equation (3) as follows,

$$\theta \equiv \alpha u'(h) - u'\{P_G \times F(1 - h) + I\} P_G F'(1 - h) = 0$$

And then we can use the implicit function theorem to compute $\frac{\partial h}{\partial P_G}$ as,

$$\frac{\partial h}{\partial P_G} = \frac{\frac{\partial \theta}{\partial P_G}}{-\frac{\partial \theta}{\partial h}}$$

The numerator of the previous equation is given by,

$$\frac{\partial \theta}{\partial P_g} = -u'(c)F'(l) - u''(c)F(l)P_GF'(l)$$

and the denominator is given by,

$$-\frac{\partial \theta}{\partial h} = -\alpha u''(h) - u''(c)(P_GF'(l))^2 - u'(c)P_GF''(l) > 0$$

Thus the sign of $\frac{\partial h}{\partial P_G}$ is negative and schooling is decreasing in gold prices if,

$$-u'(c)F'(l) - u''(c)F(l)P_GF'(l) < 0$$

$$-\frac{u''(c)}{u'(c)} \times c < \frac{c}{P_GF(L)}$$

$$R(c) < \frac{c}{P_GF(l)} = \frac{I}{P_GF(l)} + 1 \quad (3)$$

where $R(c)$ is the coefficient of relative risk aversion. This basic inequality shows in a straightforward way that households where the substitution effect is high, are more likely to send their kids to work when there is a boom in gold prices. Conversely, when the income effect dominates, families can use the extra-income from the gold boom to send their kids to school. Assessing the effect of the gold boom is thus an empirical matter. As in other models of child labor ((Basu & Pham, 1998; Baland & Robinson, 2000)), exogenous income (I) reduces child labor. Interestingly, parental preferences for schooling (α) mitigate the effects of the gold boom. The age and sex of the kid have theoretically ambiguous effects on child labor. This is because an increase in any of these variables decreases the marginal utility of consumption (which leads to less child labor) but also increases the opportunity cost of schooling (which leads to more child labor). Thus positive responses of child labor to the brawn variables (age and sex) are consistent with dominating substitution effects.

Interestingly, equation (3) also shows that for households with low initial levels of child labor ($l \rightarrow 0$) child labor is procyclical (increases as P_g increases). With higher initial levels of child labor, the income effect might dominate and child labor might be countercyclical. This is easily seen using the CRRA utility function ($u = \frac{c^{1-\gamma}}{\gamma}$) where,

$$\text{sign}\left(\frac{\partial l}{\partial P_G}\right) = \text{sign}\left(\frac{I}{P_GF(l)} + 1 - \gamma\right)$$

and γ is the coefficient of relative risk aversion. This provides one simple explanation for the observed differences between countries in the cyclicity of child labor ((Ferreira & Schady, 2009)). For example, Kruger (2007) finds that in Brazil child labor is procyclical while Cogneau and Jedwab (2012) finds that in Cote d' Ivoire child labor is countercyclical. In Cote d' Ivoire, since child labor is

initially higher than in Brazil, a boom in the price of a commodity is more likely to decrease child labor. Unfortunately, the data used in this paper do not allow to explore how households with different initial levels of child labor respond to economic shocks. Addressing this question is left for future research.

IV. Econometric Models

A. Main specification

To explore the effect of the gold boom on children outcomes I estimate equation (4),

$$y_{iut} = \beta DGOLD_u \times PG_t + \delta' C_{iut} + \eta' d_t' C_u + \lambda' C_{ut} + \rho_u + \rho_t + \nu_{iut} \quad (4)$$

where y_{iut} is an outcome of interest for children i in census unit u and time t . Since the data are independently pooled cross-sections, I do not observe the same child in different periods of time. $DGOLD_u$ is a dummy if the census unit produces gold before the trend change in gold prices (in 2001-2002) and PG_t are international gold prices. I interpret $DGOLD_u \times PG_t$ as a measure of the gold boom at the census unit level. C_{iut} is a vector of controls which are available at the individual level (in particular the age and sex of the child), C_u are time invariant controls interacted with time dummies (d_t) to allow for different trends in census units with different initial conditions and to allow for a subset of controls that compete directly with $DGOLD_u \times PG_t$. C_{ut} are controls that vary in the census unit and time dimensions. ρ_u and ρ_t are census unit and time fixed effects. Finally ν_{iut} is an error term which allows for arbitrary correlation within census units. Our main parameter of interest is β . For example, when y_{iut} is school attendance, we expect $\hat{\beta} < 0$ if the substitution effect of the gold boom dominates the income effect. I will explore below an econometric model which includes assets and education of the head to try to control for income and preferences for education as suggested by the model. I will also interact both of these variables with my measure of gold boom. For most regressions however, I will omit these variables because of their potential endogeneity.

B. Accounting for the Endogeneity of Initial Gold Production

In my measure of gold boom, PG_t is exogenous and $DGOLD_u$ is predetermined before the increase in gold prices. Several papers estimate equation like (4) to assess the impact of a commodity boom or a commodity crisis. However even if a variable like $DGOLD_u$ is predetermined, it is still endogenous. Besides serial correlation in both the dependent and independent variables, it could be the case, for example, that the census units which produced gold just before 2002 are also places that generate extractive institutions which reduce economic growth and the accumulation of human capital (Acemoglu, García-Jimeno, & Robinson, 2012).

To take into account the endogeneity of $DGOLD_u \times PG_t$ I use $\log(Water)_u \times PG_t$ as an instrument where $\log(Water)_u$ is the natural logarithm of water supply in census unit u , that is the census unit's natural water sources. The idea behind the relevance of this instrument is that, given the importance of placer mining in Colombia and given the importance of water availability in modern mining production processes, a municipality with more water supply (in 2000) has a higher probability of producing gold (in 2001-2002). The exclusion restriction is that -conditional on controls- $\log(Water)_u \times PG_t$ is uncorrelated with the error term in (4). Conditioning on controls is important since water supply is exogenous from an economic perspective but not necessarily from an econometric perspective. I will take into account three sets of covariates correlated with water supply that might have an impact on the children outcome variables; these are: (i) Measures of soil quality (included in C_u), (ii) a measure of the importance of fluvial transportation as proxied by the number of ports (included in C_u) and (iii) measures of natural disasters correlated with the presence of water in the census unit (included in C_{ut}).

V. The Data

The data used in this paper come from several sources. The main independent variables are measured at the individual level using the ipums samples from the censuses of 1985, 1993 and 2005 (<https://international.ipums.org/international/>). This gives me a database with 3 independently pooled cross sections, two (1985 and 1993) correspond to periods before the steep increase in international gold prices and one (2005) corresponds to the period after the steep increase in international gold prices. My main dependent variables are related to child labor and education. Descriptive statistics for these variables are presented in tables 1A and 2A. Worked Last Week is a dummy variable which takes the value of one if the child main activity the week before the census is working. Attended School Last Week is defined similarly. Two other dependent variables are used in this paper: Enrolled in School takes the value of one if the person is currently enrolled in school and School Attainment is a dummy variable which takes the value of one if the person has attained the degree that he should have attained given his age and a normal progression in school.⁴ Because of data availability I focus on children between 10 and 17 years of age except for School Enrollment where I can also observe kids between 5 and 9 years of age. I could in theory define school attainment for children aged 5 to 9 but I avoid doing that because

⁴Definitions are as follows: Children aged 10 should have at least 2 years of primary education (if the child does not have at least 2 years of primary education, School Attainment takes the value of zero, otherwise School Attainment takes the value of one), children aged 11 years old should have at least 3 years of primary education, children aged 12 years old should have at least 4 years of primary education, children aged 13 years old should have at least 5 years of primary education, children aged 14 years old should have at least 1 year of secondary education, children aged 15 years old should have at least 2 years of secondary education, children aged 16 years old should have at least 3 years of secondary education and children aged 17 years old should have at least 4 years of secondary education.

pre-school education is uncommon in rural areas. From these micro-level data I also take some independent variables that are used as controls throughout the paper: The age and sex of the child (a dummy for male) and whether he lives in a rural area. Other independent variables from this source that will be used in the paper are: a dummy which takes the value of one if the head of the household owns the dwelling and the years of education of the head.

The main independent variable of this paper is a dummy which takes the value of one if the census unit has positive gold production between 2001 and 2002 (before the increase in gold prices) interacted with the international price of gold. This variable is a measure of exposure to the gold boom at the census unit level. A dummy for gold production is used instead of the variable in levels because the latter is more likely to be contaminated with measurement error (see section II); also, my instrument has an impact on the probability that a census unit produces any gold, not on the amount of gold produced in the census unit. Gold production data comes from The System of Mining Information of Colombia (www.simco.gov.co). To assess endogeneity issues, I will use as an instrument for the latter interaction, the log of the water supply of the census unit in 2000 interacted with international gold prices, conditioning on exogenous covariates. Water supply comes from IDEAM.

Time invariant controls come from the municipal database of CEDE at Universidad de los Andes except for a variable which counts the number of fluvial ports of national interest in the census unit which comes from the Ministry of Transportation. All these variables are in logs when they are strictly positive and in levels when they have zero values and they are interacted with time dummies as described in equation (4). Time varying controls are the number of natural disasters three years before each census year (from the Desinventar Project of the United Nations) and dummies of guerrilla and paramilitary actions three years before each census year (from the National Center of Historic Memory).

All variables are summarized in table 1A and 1B according to whether the census unit produces gold and in table 2A and 2B according to whether the census unit is above or below median water supply. Stars denote the p-value of a test of equality of the means which allows for clustered standard errors at the census unit level. Some of the main results of this paper can be summarized using information from tables 1A and 2A on the difference in means of the dependent variables: Table 1A shows that, before 2002, in gold producing areas, 0.5% fewer children report working last week and 0.2% more children report attending school last week (relative to non-gold producing areas); however, after 2002, in gold producing areas, 3.4% more children report working last week (difference significant at the 0.01 level) and 4% fewer children report attending to school last week (difference not statistically significant). This apparent reversal of fortune for gold producing places is also observed for school attainment (difference in difference of - 2.7%) but not markedly for school enrollment. A similar pattern is observed in table 2A which divides the sample according to median water supply. However in

those tables, all post-2002 differences are statistically significant and all pre-2002 differences are statistically zero. Notice also the striking similarity between the means of the variables in both tables 1A and 2A.

Regarding differences in independent variables, tables 1B and 2B highlight the importance of taking into account measures of soil quality, natural disasters (in particular floods) and the presence of fluvial ports. These tables also suggest that controlling for initial poverty (unmet basic needs) and correlates of state presence (founding year of the municipality) is important. There is more production of gold and potential to produce gold in census units that were founded more recently and in more remote places. As presented on top of table 2B, places with water supply above the mean have a much higher probability of producing any gold in 2001-2002 relative to places with water supply below the mean (0.325 vs 0.180). This relationship is the heart of my instrumental variables approach.

VI. Results

A. A Gold Boom

The empirical work relies on the assumption that the increase in the international price of gold generates an economic boom in places suitable for producing gold. To test this assumption I regress census-unit level unemployment against the interaction between the dummy of initial gold production and international gold prices, which I call Gold Boom from now on. Importantly, the unemployment measures use information of all individuals recorded in the censuses.⁵ Results are reported in table A1 using all the c_u and c_{ut} controls. Columns (1) and (2) report OLS regressions using respectively the unemployment rate and the unemployment rate for people aged 12 to 30 years old. Both columns show that my measure of Gold Boom is associated with higher economic activity at the census-unit level. Columns (3) and (4) are the corresponding instrumental variables regressions which confirm the OLS findings. To have a sense of the magnitudes of these estimates, keep in mind that the average of Gold Boom is 0.12 and its standard deviation is 0.18. Hence, an increase in one standard deviation in the Gold Boom variable lowers the census-unit level unemployment by 0.9% (OLS) or by 7.1% (IV). The increase in international gold prices generates more economic opportunities in places where gold can be produced.

B. Main Results

Results of estimating (4) by OLS are reported in table 3. All specifications include individual controls, controls at the census-unit level (c_u and c_{ut}) and time and census-unit fixed effects. Column 1 uses Worked Last Week as the dependent variable. The Gold Boom variable as measured by the interaction of the gold

⁵The reason why I cannot use all individuals in the censuses and why I have to use the IPUMS random samples is that the micro-data for the census of 2005 is not publicly available.

production dummy and international gold prices is positive and significant at less than the 1% level ($\hat{\beta} = 0.248$). The average of Worked Last Week is 0.07 with a standard deviation of 0.26 . Thus, a standard deviation increase in Gold Boom is associated with an increase of 6.4% in the probability that the child worked last week (standardized coefficient of 0.15). The gold boom might also have a negative impact on schooling. In column (2), a standard deviation increase in gold boom is associated with a decrease of 7.7% in the probability that the child attended school last week (standardized coefficient of 0.25). If a causal interpretation is given to these estimates, it seems that -on average- the substitution effect of an increase in gold prices dominates the income effect, with families taking their kids out of school to increase their incomes. Consistent with this view, school enrollment also decreases for children aged 10 to 17 years old (column 4) and even for the youngest children aged 5 to 9 years old (column 3). An important question is whether less school attendance translates into poorer academic performance. Column (5) addresses this question by looking at one dimension of academic performance: school attainment. The Gold Boom is also correlated with less school attainment. A standard deviation increase in the Gold Boom measure decreases school attainment by 0.07 standard deviations. This has potentially negative effects on welfare given the positive and permanent effect of years of schooling on wages and the transitory character of the income derived from a boom in the price of a commodity. Age and males dummies have the signs predicted by the model when opportunity costs are dominant.

In table 4 I go one step further in correcting endogeneity biases arising from census units self-selecting into initially producing gold and I use an interaction between Water Supply in 2000 and International Gold Prices as an instrument for my main interaction, the Gold Production Dummy interacted with International Gold Prices or “Gold Boom”. I make use of two facts: First, that a big fraction of the gold produced in Colombia is extracted from rivers (ie: comes from placer mining) and, second, that even if the gold comes from mine veins, large quantities of water are needed to separate the mineral from other materials. I have already documented the first fact (section II). To illustrate the second fact, it is useful to highlight that to produce 25KG of gold, the equivalent of 14 olympic swimming pools of water are needed (Latin American Observatory of Mining Conflicts, El Tiempo). Given that gold production might also affect water supply it is important that the measure of water supply is observed before the steep increase in gold prices starting in 2002. My water supply variable is measured in 2000. The instrument is exogenous in economic terms and could be thought in terms of the model as a measure of the distance to the production site: To the mines or to the location of the economic activity which is positively affected by gold mining. However, econometrically, the water supply of a census unit might be correlated with (i) geographic variables such as the quality of the soil for agriculture, (ii) with variables such as the ease of transportation by fluvial means and (iii) with water-related natural disasters. This is the reason why my regressions control for

variables in each of these three categories.

As shown in the last rows of table 4, log water supply interacted with international gold prices is highly relevant in explaining the Gold Boom variable (F statistic of 20.861). Instrumental variables estimates are in line with the OLS results except when using the enrollment variables for which the coefficient on Gold Boom remains negative and of similar magnitude but insignificant. Worked Last Week is positively affected and Attended School Last Week and School Attainment are negatively affected by Gold Boom. Comparing tables 2 and 3, the IV estimate in the regression of Worked Last Week -for example- is about two times the OLS estimate. One simple explanation for that is measurement error. Another explanation is that the likelihood of reporting gold production is higher in places where the state is present and that the proxies of state presence are coarse. This would bias the OLS estimates downwards if the intensity of policies to eradicate child labor has increased over time in places where the state is present.

Tables 5 and 6 are equivalent to tables 3 and 4 respectively but restrict the sample to children aged 10 to 15 years old. These children should be enrolled in school and completing grades in basic secondary education. Results are almost identical to results using all children aged 10 to 17 years old. Thus my main results are not driven by the inclusion of children aged 16 to 17 years old who might already have completed basic secondary education and who face a higher opportunity cost of attending school.

C. Interactions

What household characteristics mitigate the negative effects of the Gold Boom? In table 7, I run regressions equivalent to those in table 3 and interact sequentially and then simultaneously my gold boom measure with a measure of assets (whether the head owns the dwelling) and with the number of years of education of the head. I restrict attention to the variables Worked Last Week and Attended School Last Week. These interactions explore whether assets or years of education mitigate or exacerbate the effect of the gold boom on child labor and school attendance. Columns 1 to 3 use Worked Last Week as the dependent variable. Columns 4 to 6 use Attended School Last Week as the dependent variable. Columns (1) and (4) include the measure of assets and the measure of assets interacted with Gold Boom. Although, it is confirmed that child labor is an inferior good (houses with assets exhibit less child labor), there is no role for assets in mediating the effect of gold boom on child labor (which is contrary to findings in Beegle et al. (2006)). Columns (2) and (5) include the number of years of education of the head and this variable interacted with Gold Boom. Interestingly, the number of years of education of the head mitigates the impact of gold boom on Worked Last Week and mitigates the impact of Gold Boom on Attended School Last Week. The effect of Gold Boom on Worked Last Week is reduced by 5% for the head with the average years of education while the effect of Gold Boom on Attended School

last week is mitigated by 6%. Both results hold if both interactions are included simultaneously (columns (3) and (6)). An open question is whether the number of years of education of the head is capturing preferences for education (α in the model) or if it is capturing a measure of income that the ownership of a house is not.

Table 8 is equivalent to table 7 but using the instrumental variable approach. No interaction is significant because the instrument is not powerful enough to predict interactions between Gold Boom and Assets and, in particular, interactions between Gold Boom and Education (F statistic of 6.9). Table 8 is nevertheless presented for completeness.

VII. Robustness

A. Pre-trends

Here I use the fact that I have two years of data before the steep increase in gold prices to check whether there are pre-existing trends. To do that I replace the Gold Boom measure in equation (4) with an interaction between the initial gold production dummy (in 2001-2002) and time dummies. I use log water supply interacted with time dummies as an instrument. OLS for Worked Last Week, Attended School Last Week and School Attainment are presented in columns (1), (2) and (3), respectively. The corresponding IV are presented in columns (4), (5) and (6). The OLS point to pre-trends for child labor and school attendance. For Worked Last Week (Column 1), the interaction between the Initial Gold Production Dummy and the year 1993 is positive and highly significant, however much less than the interaction with the year 2005. For Attended School Last Week (column 2), the interaction between the Initial Gold Production Dummy and the year 1993 is negative and marginally significant, but much less in absolute value than the interaction with the year 2005. There are no pretrends for School Attainment (column 3).

When using the instrumental variables approach, pre-trends are eliminated for Work Last Week in column (4) ($pvalue = 0.643$). As before, there are no pretrends for School Attainment in (column (6), $pvalue = 0.77$) but a pretrend remains for Attended School last week in column (5) ($pvalue = 0.035$). I conclude that pre-trends are not a concern when using the exogenous component of Gold Boom for Worked Last Week and School Attainment. However, the negative and significant coefficient in column (5) tones down the results presented in section VI for school attendance (ie: that the Gold Boom reduced School Attendance). However, it should be noted that, in the data, gold prices increased slightly between 1985 ($p_{1985} = 0.317$) and 1993 ($p_{1993} = 0.3598$) so that, for a given elasticity of supply, the argument might not be that there are no pre-trends but that the effect in 1993 is lower than the effect in 2005, which is true in all columns.

B. Robustness to Gold Production Dummy measured in 1978

An alternative strategy to that of using gold production just before 2002 to define the initial gold production dummy is to use gold production before the starting year of our data (1985). Such a variable is less likely to be correlated with expectations of gold prices and also less likely to be correlated with variables that evolve in the time frame of the panel like the increase in the activity of non-state armed groups. To implement this strategy I collected data on the number of applications to exploit precious metals by municipality in 1978 (Jacome, 1978). This second definition of the gold production dummy takes the value of one if the number of applications in the census unit (remember that a census unit is composed of municipalities) is positive in 1978. The alternative definition of Gold Boom is just the interaction between this dummy and gold prices. The correlation of both gold production dummies is 0.4769. Unfortunately, I do not have water supply before 1978 and water supply in 2000 is not correlated with the 1978 gold production dummy. For this reason, I just show results using OLS.

These results are in table A3 following the same format as in table 3. The Gold Boom increases the probability that a child worked last week, decreases the probability that a child attended school last week and decreases school attainment. Interestingly, As with the instrumental variables strategy (table 4), School Enrollment does not respond to the Gold Boom. Standardized coefficients are: 0.10 for Worked Last Week (column (1)), 0.10 for Attended School Last Week (column(2)) and 0.09 for School Attainment (column(5)). The standardized coefficients for Worked Last Week and School Attainment are quantitatively very similar than the corresponding OLS estimates using the first definition of Gold Boom. The standardized coefficient for School Attendance however is half the size of the corresponding OLS estimate using the first definition of Gold Boom.

C. Robustness to Using Homogeneous Census Units

Census units are composed of neighbor municipalities but the municipalities that define a census unit did change between 1985/1993 and 2005. In most of the cases, new municipalities were added to the set of municipalities that originally conformed a census unit. To take into account this change in the composition of census units, I restrict the sample to those census units which composition never changed. Results of this exercise are displayed in table A4. OLS for Worked Last Week, Attended School last week and School Attainment are shown in columns (1), (2) and (3), respectively. The corresponding IVs are in columns (4), (5) and (6). Even if the sample size is reduced to 36% of the original sample, results are similar to those found in section VI.B.

D. Robustness to Illegal Armed Actors and Coca Production Controls

The effects found so far might be capturing part of the effect of the presence of non-state armed actors, if any, on child outcomes. For example, since illegal armed

groups can finance themselves with the proceeds from mining, places with initial gold production might be places where these armed groups prospered. Alternatively, places with high water supply might be transportation corridors for illegal activities. I use a new database of Colombian armed conflict to create a dummy of paramilitary presence and a dummy of guerrilla presence 3 years before each census year. For example, a census unit with positive actions by the guerrilla in either 1983, 1984 or 1985, has a value of 1 for guerilla presence in 1985 and 0 otherwise. I also include a dummy of coca production in 1994 interacted with time dummies since there might be complementarities between drug-trafficking and the control of mines. Results, presented in table A5 which follows the same structure as table A4, are unchanged by the inclusion of these controls. Guerrilla and paramilitary presence are insignificant in all cases but school attainment. There (column (3)), paramilitary presence increases the probability that a child is lagging in her educational attainment by 0.7%. The most interesting finding in this sub-section is the correlation between coca production and child outcomes. Places with coca production in 1994 exhibit deteriorating child outcomes over time: Child labor increases (by 2.6% in 1993 and 4.9% in 2005), school attendance decreases (by 3.9% in 1993 and 8% in 2005) and school attainment decreases (by 3% in 1993 and 4.3% in 2005). Whether this is a consequence of the economic opportunities generated by the coca economy, a consequence of the violence that revolves around an illegal activity or just an spurious correlation is an open question for future research. (Dammert, 2008) finds that in Perú, the shift of production of coca-leaves to Colombia, increased Peruvian kids labor supply. Surprisingly, the arrival of coca-leaves to Colombia might have also increased Colombian kids labor supply.

VIII. Conclusion

This paper main question is how child labor and schooling in Colombia respond to the economic boom generated by increasing international gold prices since 2002. After defining a local measure of (exposure to the) gold boom as an interaction between the capability to produce gold and international gold prices, I have shown that the gold boom generates a boom in economic activity as reflected in lower unemployment. The gold boom increases the probability that a children works. Furthermore, the gold boom lowers the probability that a children attends school and the probability that a children has attained the expected level of education given her age. These empirical results echo the theoretical results of a simple agricultural household model of child labor and commodity price booms in the case where the substitution effect of an increase in the price of the commodity trumps the income effect, which is more likely to occur in countries with low initial levels of child labor as Colombia. The collateral effects of this commodity boom have important implications for public policy, the most obvious being that of using part of the new resources originated in the economic boom to lower the opportunity cost of education and thus to silence substitution effects.

I also find that the years of education of the head of the household but not her ownership of assets mitigate the negative effects of the gold boom on child outcomes. Whether years of education measure income or preferences for education (as in the model) is a question that I leave for future research.

Figure 1. : Gold Production in Colombia.

US dollar per Troy Ounce of Gold

Figure 2. : International Gold Prices

Figure 3. : Colonial Placer Mining (Source: West 1952).

Figure 4. : Municipalities with Gold Production in 2001-2002

Figure 5. : Log Water Supply in 2000

Table 1A: Descriptive Statistics of Dependent Variables by Gold Production

	Gold Production	No Gold Production
Worked last week (10 - 17 yo), before 2002	0.135 (0.342)	0.140 (0.347)
Worked last week (10 - 17 yo), after 2002	0.111 (0.315)	0.077 *** (0.266)
Attended school last week (10 - 17 yo), before 2002	0.620 (0.485)	0.618 (0.486)
Attended school last week (10 - 17 yo), after 2002	0.573 (0.495)	0.613 (0.487)
Enrolled in school (5 - 9 yo), before 2002	0.703 (0.457)	0.700 (0.458)
Enrolled in school (5 - 9 yo), after 2002	0.844 (0.363)	0.857 (0.363)
Enrolled in school (10 - 17 yo), before 2002	0.715 (0.451)	0.720 (0.449)
Enrolled in school (10 - 17 yo), after 2002	0.781 (0.413)	0.788 (0.408)
School attainment (10 - 17 yo), before 2002	0.531 (0.499)	0.524 (0.499)
School attainment (10 - 17 yo), after 2002	0.709 (0.454)	0.730 (0.444)
Number of observations (10 - 17 yo)	537315	1204295

Standard deviation in parenthesis

* p<0.1, ** p<0.05, *** p<0.01

section

Table 1B: Descriptive Statistics of Main Independent Variables by Gold Production

	Gold Production	No Gold Production
Log(Water supply)	7.668 (1.834)	6.828 *** (2.100)
Longitude	75.700 (1.442)	74.716 *** (1.408)
Latitude	4.896 (2.301)	6.037 *** (2.757)
Log(altitude)	6.198 (1.714)	6.125 (1.776)
Log(rurality index)	3.822 (0.837)	3.792 (0.866)
Soil quality	2.599 (0.988)	2.836 ** (1.162)
Erosion	1.839 (0.829)	1.923 (0.950)
Distance to the state capital	137.173 (114.413)	117.703 * (94.438)
Distance to markets	340.981 (155.021)	354.810 (141.684)
Log(founding year of census unit)	7.535 (0.054)	7.526 * (0.058)
Unmet basic needs	53.651 (22.217)	51.957 (19.097)
Fluvial ports	0.104 (0.477)	0.041 (0.243)
Rains, before 2002	0.252 (0.562)	0.210 (0.756)
Rains, after 2002	0.156 (0.516)	0.099 (0.374)
Droughts, before 2002	0.041 (0.248)	0.073 * (0.318)
Droughts, after 2002	0.119 (0.424)	0.175 (0.666)
Landslides, before 2002	1.789 (3.662)	0.966 *** (1.646)
Landslides, after 2002	1.533 (2.992)	0.820 ** (1.495)
Floods, before 2002	1.900 (3.336)	1.409 ** (2.801)
Floods, after 2002	3.926 (5.935)	2.671 ** (3.652)
Number of observations	135	395

Standard deviation in parenthesis

* p<0.1, ** p<0.05, *** p<0.01

Table 2A: Descriptive Statistics of Dependent Variables by Water Supply

	Water supply above the median	Water supply below the median
Worked last week (10 - 17 yo), before 2002	0.139 (0.346)	0.138 (0.345)
Worked last week (10 - 17 yo), after 2002	0.111 (0.320)	0.061 *** (0.249)
Attended school last week (10 - 17 yo), before 2002	0.601 (0.490)	0.637 (0.481)
Attended school last week (10 - 17 yo), after 2002	0.554 (0.497)	0.654 *** (0.475)
Enrolled in school (5- 9 yo), before 2002	0.686 (0.464)	0.718 (0.450)
Enrolled in school (5- 9 yo), after 2002	0.840 (0.367)	0.868 ** (0.338)
Enrolled in school (10 - 17 yo), before 2002	0.706 (0.455)	0.731 (0.444)
Enrolled in school (10 - 17 yo), after 2002	0.769 (0.421)	0.805 *** (0.396)
School attainment (10 - 17 yo), before 2002	0.503 (0.500)	0.552 (0.497)
School attainment (10 - 17 yo), after 2002	0.699 (0.459)	0.750 ** (0.433)
Number of observations (10 - 17 yo)	903100	838522

Standard deviation in parenthesis

* p<0.1, ** p<0.05, *** p<0.01

2B: Descriptive Statistics of Main Independent Variables by Gold Production

	Water supply above the median	Water supply below the median
Gold Production Dummy	0.325 (0.469)	0.180 *** (0.385)
Longitude	74.958 (1.582)	74.979 (1.364)
Latitude	5.674 (2.825)	5.819 (2.548)
Log(altitude)	5.806 (1.880)	6.502 *** (1.546)
Log(rurality index)	3.831 (0.862)	3.765 (0.855)
Soil quality	2.560 (1.112)	2.792 (1.140)
Erosion	1.714 (0.862)	2.102 *** (0.940)
Distance to the state capital	145.429 (108.429)	98.545 *** (84.351)
Distance to markets	370.429 (156.326)	330.891 *** (129.579)
Log(founding year of census unit)	7.539 (0.051)	7.517 *** (0.061)
Unmet basic needs	56.323 (19.679)	48.215 *** (19.387)
Fluvial ports	0.095 (0.417)	0.016 *** (0.153)
Rains, before 2002	0.243 (0.856)	0.197 (0.514)
Rains, after 2002	0.142 (0.474)	0.082 * (0.339)
Droughts, before 2002	0.071 (0.321)	0.059 (0.281)
Droughts, after 2002	0.142 (0.566)	0.180 (0.662)
Landslides, before 2002	1.141 (2.365)	1.213 (2.350)
Landslides, after 2002	0.982 (2.030)	1.023 (1.986)
Floods, before 2002	1.872 (3.383)	1.172 *** (2.359)
Floods, after 2002	3.920 (5.080)	1.996 *** (3.191)
Number of observations	274	256

Standard deviation in parenthesis

* p<0.1, ** p<0.05, *** p<0.01

Table 3: Child Labor, Schooling and Gold Boom. OLS

	Worked last week	Attended school last week	Enrolled in school (5-9 yo)	Enrolled in school (10-17 yo)	School attainment
Gold Boom	0.248*** (0.0565)	-0.428*** (0.145)	-0.134** (0.0650)	-0.154*** (0.0502)	-0.204*** (0.0544)
Age	0.0330*** (0.000626)	-0.0491*** (0.00118)	0.0859*** (0.00253)	-0.0577*** (0.00174)	-0.0654*** (0.000831)
Male dummy	0.0932*** (0.00873)	-0.0176*** (0.00216)	-0.0185*** (0.00152)	-0.0214*** (0.00314)	-0.0485*** (0.00387)
Lives in rural area dummy	0.0904*** (0.00375)	-0.180*** (0.00542)	-0.162*** (0.00406)	-0.180*** (0.00390)	-0.185*** (0.00365)
t1993	0.0664 (0.253)	0.00829 (0.567)	-0.814* (0.451)	-1.041*** (0.320)	-0.0404 (0.399)
t2005	-0.317 (0.453)	-0.469 (0.808)	-0.442 (0.585)	-1.133*** (0.435)	0.678 (0.508)
Observations	1719600	1719600	1069925	1694981	1719600

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table 4: Child Labor, Schooling and Gold Boom. IV

	Worked last week	Attended school last week	Enrolled in school (5-9 yo)	Enrolled in school (10-17 yo)	School attainment
Gold Boom	0.534** (0.231)	-1.568*** (0.591)	-0.154 (0.288)	-0.192 (0.232)	-0.681** (0.330)
Age	0.0331*** (0.000627)	-0.0494*** (0.00119)	0.0864*** (0.00247)	-0.0580*** (0.00179)	-0.0658*** (0.000794)
Male dummy	0.0938*** (0.00890)	-0.0176*** (0.00213)	-0.0188*** (0.00157)	-0.0215*** (0.00318)	-0.0481*** (0.00396)
Lives in rural area dummy	0.0899*** (0.00382)	-0.180*** (0.00546)	-0.161*** (0.00412)	-0.179*** (0.00395)	-0.185*** (0.00370)
t1993	0.232 (0.273)	-0.649 (0.660)	-1.041** (0.458)	-1.275*** (0.333)	-0.488 (0.443)
t2005	0.176 (0.609)	-2.559* (1.553)	-0.174 (0.778)	-1.108* (0.593)	-0.313 (0.858)
Observations	1646972	1646972	1025107	1623008	1646972
idstat	20.861	20.861	20.612	20.819	20.861
idp	0.000	0.000	0.000	0.000	0.000

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t . The instrument for Gold Boom is an interaction between the log of water supply in 2000 in census unit u and international gold prices at time t . Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table 5: Child Labor, Schooling and Gold Boom restricted to 10 - 15 yo. OLS

	Worked last week	Attended school last week	Enrolled in school (10-15 yo)	School attainment
Gold Boom	0.243*** (0.0646)	-0.444*** (0.163)	-0.150*** (0.0522)	-0.232*** (0.0580)
Age	0.0267*** (0.000858)	-0.0388*** (0.00163)	-0.0459*** (0.00193)	-0.0651*** (0.00187)
Male dummy	0.0655*** (0.00681)	-0.0166*** (0.00208)	-0.0223*** (0.00295)	-0.0489*** (0.00384)
t1993	0.0788 (0.241)	0.0296 (0.635)	-1.103*** (0.315)	0.0277 (0.411)
t2005	-0.296 (0.514)	-0.688 (0.887)	-1.244*** (0.413)	0.368 (0.533)
Lives in rural area dummy		-0.167*** (0.00574)	-0.159*** (0.00385)	-0.176*** (0.00393)
Observations	1316921	1316921	1298226	1316921

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. Sample is restricted to children aged 10 to 15 years old. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table 6: Child Labor, Schooling and Gold Boom restricted to 10 - 15 yo. IV

	Worked last week	Attended school last week	Enrolled in school (10-15 yo)	School attainment
Gold Boom	0.417* (0.242)	-1.603** (0.642)	-0.0902 (0.243)	-0.605* (0.339)
Age	0.0271*** (0.000897)	-0.0392*** (0.00167)	-0.0463*** (0.00198)	-0.0655*** (0.00193)
Male dummy	0.0644*** (0.00680)	-0.0165*** (0.00210)	-0.0221*** (0.00301)	-0.0483*** (0.00393)
Lives in rural area dummy	0.0761*** (0.00388)	-0.166*** (0.00578)	-0.158*** (0.00391)	-0.176*** (0.00399)
t1993	0.210 (0.259)	-0.591 (0.718)	-1.274*** (0.333)	-0.374 (0.448)
t2005	0.0405 (0.612)	-2.766* (1.654)	-1.008* (0.579)	-0.340 (0.859)
Observations	1262079	1262079	1243861	1262079
idstat	20.652	20.652	20.600	20.652
idp	0.000	0.000	0.000	0.000

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. The instrument for Gold Boom is an interaction between the log of water supply in 2000 in census unit u and international gold prices at time t. Sample is restricted to children aged 10 to 15 years old. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table 7: Worked last week and attended school last week, (10-17 yo). OLS. Interactions with Ownership of dwelling and years of education of the head of the household

	Worked last week	Worked last week	Worked last week	Attended school last week	Attended school last week	Attended school last week
Gold Boom	0.2488*** (0.0576)	0.2670*** (0.0626)	0.2662*** (0.0628)	-0.4378*** (0.1411)	-0.4249*** (0.1374)	-0.4330*** (0.1352)
Gold Boom X Ownership	0.0003 (0.0101)		-0.0032 (0.0092)	0.0048 (0.0236)		0.0015 (0.0192)
Gold Boom X Education of the head		-0.0034** (0.0017)	-0.0035** (0.0017)		0.0044* (0.0023)	0.0048** (0.0024)
Ownership	-0.0197*** (0.0027)		-0.0209*** (0.0023)	0.0415*** (0.0069)		0.0438*** (0.0050)
Education of the Head		-0.0022*** (0.0003)	-0.0023*** (0.0003)		0.0129*** (0.0006)	0.0131*** (0.0007)
Observations	1697781	1670213	1652876	1697781	1670213	1652876

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table 8: Worked last week and attended school last week, (10-17 yo). IV. Interactions with Ownership of dwelling and years of education of the head of the household

	Worked last week	Worked last week	Worked last week	Attended school last week	Attended school last week	Attended school last week
Gold Boom	0.5403** (0.2357)	0.4892* (0.2528)	0.5124** (0.2541)	-1.5730*** (0.5926)	-1.2174** (0.5647)	-1.2419** (0.5680)
Gold Boom X Ownership	0.0130 (0.0616)		-0.0440 (0.0686)	-0.0383 (0.1152)		-0.0737 (0.1149)
Gold Boom X Education of the head		0.0052 (0.0108)	0.0036 (0.0106)		-0.0242 (0.0189)	-0.0210 (0.0186)
Ownership	-0.0214*** (0.0078)		-0.0160* (0.0090)	0.0472*** (0.0162)		0.0530*** (0.0144)
Education of the Head		-0.0034** (0.0015)	-0.0033** (0.0015)		0.0165*** (0.0032)	0.0163*** (0.0032)
Observations	1625760	1598865	1582060	1625760	1598865	1582060
idstat	10.366	6.957	8.173	10.366	6.957	8.173
idp	0.001	0.008	0.004	0.001	0.008	0.004

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. The instrument for Gold Boom is an interaction between the log of water supply in 2000 in census unit u and international gold prices at time t. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table A1: Census-unit level Unemployment and Gold Boom. OLS and IV

	Unemployment rate (OLS)	Unemployment rate 12-30 yo (OLS)	Unemployment rate (OLS)	Unemployment rate 12-30 yo (IV)
Gold Boom	-5.234** (2.393)	-9.102*** (3.338)	-39.27** (16.21)	-45.58* (23.59)
t1993	-8.356 (11.90)	-6.274 (16.25)	-22.48 (14.40)	-22.05 (19.31)
t2005	43.74** (20.65)	52.28* (28.16)	3.614 (33.26)	8.062 (44.65)
Observations	1565	1565	1511	1511
idstat			25.294	25.294
idp			0.000	0.000

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of unemployment (scale of 0 to 100) in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. The instrument for Gold Boom is an interaction between the log of water supply in 2000 in census unit u and international gold prices at time t. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table A2: Child Labor, Schooling and Gold Boom. Pretrends

	Worked last week (OLS)	Attended school last week (OLS)	School attainment (OLS)	Worked last week (IV)	Attended school last week (IV)	School attainment (IV)
Gold Dummy X t1993	0.0144*** (0.00427)	-0.0168* (0.0100)	-0.00842 (0.00745)	0.00912 (0.0197)	-0.101** (0.0481)	-0.0110 (0.0370)
Gold Dummy X t2005	0.0327*** (0.00690)	-0.0541*** (0.0169)	-0.0259*** (0.00768)	0.0639** (0.0283)	-0.210*** (0.0733)	-0.0813* (0.0448)
Age	0.0330*** (0.000626)	-0.0491*** (0.00118)	-0.0654*** (0.000831)	0.0331*** (0.000627)	-0.0494*** (0.00119)	-0.0658*** (0.000794)
Male dummy	0.0932*** (0.00873)	-0.0176*** (0.00216)	-0.0485*** (0.00387)	0.0938*** (0.00890)	-0.0176*** (0.00213)	-0.0481*** (0.00396)
Lives in rural area dummy	0.0904*** (0.00375)	-0.180*** (0.00542)	-0.185*** (0.00365)	0.0900*** (0.00382)	-0.179*** (0.00546)	-0.185*** (0.00371)
t1993	0.110 (0.262)	0.0238 (0.600)	-0.0374 (0.419)	0.0622 (0.372)	-1.083 (0.920)	-0.264 (0.587)
t2005	-0.311 (0.452)	-0.467 (0.807)	0.679 (0.510)	0.151 (0.601)	-2.623* (1.565)	-0.280 (0.863)
Observations	1719600	1719600	1719600	1646972	1646972	1646972
idstat				19.390	19.390	19.390
idp				0.000	0.000	0.000

* p<0.10, ** p<0.05, ***p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against gold production dummy interacted with time dummies. Gold production dummy takes the value of 1 if the census-unit produces any gold in 2001-2001. The instrument for the interactions of gold dummy with time dummies are interactions between the logarithm of water supply and time dummies. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table A3: Child Labor, Schooling and Gold Boom with initial gold production dummy defined using the year of 1978.
OLS

	Worked last week	Attended school last week	Enrolled in school (5-9 yo)	Enrolled in school (10-17 yo)	School attainment
Gold Boom (alternative definition)	0.202*** (0.0686)	-0.353** (0.145)	-0.0508 (0.0662)	-0.0579 (0.0557)	-0.304*** (0.0551)
Age	0.0330*** (0.000626)	-0.0491*** (0.00118)	0.0859*** (0.00253)	-0.0577*** (0.00174)	-0.0654*** (0.000831)
Male dummy	0.0932*** (0.00873)	-0.0176*** (0.00216)	-0.0185*** (0.00152)	-0.0214*** (0.00314)	-0.0485*** (0.00387)
Lives in rural area dummy	0.0905*** (0.00376)	-0.180*** (0.00543)	-0.162*** (0.00407)	-0.180*** (0.00391)	-0.185*** (0.00364)
t1993	0.0221 (0.258)	0.0827 (0.576)	-0.763* (0.458)	-0.982*** (0.325)	-0.0680 (0.396)
t2005	-0.481 (0.457)	-0.191 (0.795)	-0.280 (0.588)	-0.944** (0.438)	0.634 (0.487)
Observations	1719600	1719600	1069925	1694981	1719600

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial 1978 gold production in census-unit u and international gold prices at time t. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table A4: Child Labor, Schooling and Gold Boom. Sample restricted to stable census units (with the same municipality in all years). OLS and IV

	Worked last week (OLS)	Attended school last week (OLS)	School attainment (OLS)	Worked last week (IV)	Attended school last week (IV)	School attainment (IV)
Gold Boom	0.229*** (0.0805)	-0.488** (0.241)	-0.0974 (0.113)	0.543* (0.297)	-2.282** (1.140)	-1.566** (0.676)
Age	0.0300*** (0.000989)	-0.0443*** (0.00124)	-0.0618*** (0.00107)	0.0302*** (0.00101)	-0.0448*** (0.00128)	-0.0627*** (0.000905)
Male dummy	0.0682*** (0.0138)	-0.0118*** (0.00350)	-0.0427*** (0.00729)	0.0694*** (0.0149)	-0.0123*** (0.00353)	-0.0417*** (0.00768)
Lives in rural area dummy	0.0808*** (0.00527)	-0.173*** (0.00906)	-0.183*** (0.00657)	0.0794*** (0.00542)	-0.172*** (0.00925)	-0.182*** (0.00676)
t1993	0.181 (0.313)	-0.0157 (0.714)	-0.0416 (0.782)	0.432 (0.388)	-0.943 (1.201)	-0.936 (0.972)
t2005	0.139 (0.441)	-1.515 (1.261)	-0.277 (1.009)	0.821 (0.645)	-5.065* (2.782)	-2.446 (1.771)
Observations	677277	677277	677277	614563	614563	614563
idstat				9.254	9.254	9.254
idp				0.002	0.002	0.002

* p<0.1, ** p<0.05, *** p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. The instrument for Gold Boom is an interaction between the log of water supply in 2000 in census unit u and international gold prices at time t. Sample is restricted to census units that are composed of the same municipalities in all years. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

Table A5: Child Labor, Schooling and Gold Boom with Conflict Presence 3 years before and Coca Production. OLS

	Worked last week (OLS)	Attended school last week (OLS)	School attainment (OLS)	Worked last week (IV)	Attended school last week (IV)	School attainment (IV)
Gold Boom	0.212*** (0.056)	-0.364** (0.146)	-0.168*** (0.053)	0.464** (0.233)	-1.644*** (0.617)	-0.639* (0.343)
Guerilla Presence Dummy (3 years before)	-0.003 (0.004)	0.005 (0.008)	-0.001 (0.004)	-0.003 (0.004)	0.006 (0.008)	0.001 (0.004)
Paramilitary presence Dummy (3 years before)	0.004 (0.003)	0.002 (0.008)	-0.007* (0.004)	0.002 (0.003)	0.009 (0.008)	-0.006 (0.004)
Coca Production X t1993	0.026*** (0.008)	-0.039** (0.018)	-0.030*** (0.012)	0.024*** (0.009)	-0.031 (0.020)	-0.028** (0.013)
Coca Production X t2005	0.049*** (0.016)	-0.080*** (0.024)	-0.043*** (0.012)	0.044** (0.019)	-0.044 (0.033)	-0.028 (0.018)
Age	0.033*** (0.001)	-0.049*** (0.001)	-0.065*** (0.001)	0.033*** (0.001)	-0.049*** (0.001)	-0.066*** (0.001)
Male dummy	0.093*** (0.009)	-0.018*** (0.002)	-0.049*** (0.004)	0.094*** (0.009)	-0.018*** (0.002)	-0.049*** (0.004)
Lives in rural area dummy	0.090*** (0.004)	-0.178*** (0.005)	-0.184*** (0.004)	0.089*** (0.004)	-0.178*** (0.005)	-0.184*** (0.004)
t1993	-0.078 (0.242)	0.122 (0.544)	0.072 (0.379)	0.151 (0.268)	-0.710 (0.665)	-0.457 (0.420)
t2005	-0.511 (0.426)	-0.268 (0.773)	0.760 (0.493)	-0.050 (0.584)	-2.687* (1.597)	-0.236 (0.871)
Observations	1698351	1698351	1698351	1626619	1626619	1626619
idstat				19.623	19.623	19.623
idp				0.000	0.000	0.000

* p<0.10, ** p<0.05, ***p<0.01

Robust standard errors clustered at the census-unit level in parentheses. Repeated cross-sections regressions of outcomes for child i in census unit u and time t against Gold Boom. Gold Boom is defined as an interaction between a dummy of initial (2001-2002) gold production in census-unit u and international gold prices at time t. Besides controls shown, all regressions include the following census-unit level time-invariant controls interacted with time dummies: longitude, latitude, log altitude, log rurality index, soil quality, erosion, distance to the state capital, distance to markets, the log of the founding year of the census unit, unmet basic needs in 1993 and the number of fluvial ports in the census unit. Time varying census-unit level controls are number of disasters: Rains, Droughts, Landslides and Floods. All regressions include time and census-unit fixed effects.

References

- Acemoglu, D., García-Jimeno, C., & Robinson, J. A. (2012). Finding Eldorado: Slavery and long-run development in Colombia. *Journal of Comparative Economics*, 40(4), 534-564. Retrieved from <http://ideas.repec.org/a/eee/jcecon/v40y2012i4p534-564.html>
- Baland, J. M., & Robinson, J. A. (2000). Is child labor inefficient? *Journal of Political Economy*, 108(4), pp. 663-679. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1318683
- Basu, K., & Pham, V. (1998). The economics of child labor. *American Economic Review*, 88(3). Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1318683
- Beegle, K., Dehejia, R. H., & Gatti, R. (2006, October). Child labor and agricultural shocks. *Journal of Development Economics*, 81(1), 80-96. Retrieved from <http://ideas.repec.org/a/eee/deveco/v81y2006i1p80-96.html>
- Boo, F. L. (2012). In school or at work: Evidence from a crisis. *Oxford Development Studies*.
- Cogneau, D., & Jedwab, R. (2012). Commodity price shocks and child outcomes: The 1990 cocoa crisis in cote d ivoire. *Economic Development and Cultural Change*, 60(3), pp. 507-534. Retrieved from <http://www.jstor.org/stable/10.1086/664017>
- Dammert, A. C. (2008). Child labor and schooling response to changes in coca production in rural peru. *Journal of Development Economics*, 86(1), 164 - 180. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0304387807000521> doi: <http://dx.doi.org/10.1016/j.jdeveco.2007.06.007>
- de Janvry, A., Finan, F., Sadoulet, E., & Vakis, R. (2006). Can conditional cash transfer programs serve as safety nets in keeping children at school and from working when exposed to shocks? *Journal of Development Economics*, 79(2), 349 - 373. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0304387806000095> (Special Issue in honor of Pranab Bardhan Special Issue in honor of Pranab Bardhan Conference in honor of Pranab Bardhan) doi: <http://dx.doi.org/10.1016/j.jdeveco.2006.01.013>
- Dube, O., & Vargas, J. (2013). Commodity price shocks and civil conflict: Evidence from colombia*. *The Review of Economic Studies*. Retrieved from <http://restud.oxfordjournals.org/content/early/2013/02/15/restud.rdt009.abstract> doi: 10.1093/restud/rdt009
- Duflo, E. (2001). Schooling and labor market consequences of school construction in indonesia: Evidence from an unusual policy experiment. *American Economic Review*, 91(4), 795-813. Retrieved from <http://www.aeaweb.org/articles.php?doi=10.1257/aer.91.4.795> doi: 10.1257/aer.91.4.795
- Edmonds, E. V. (2005). Does child labor decline with improving economic status? *Journal of Human Resources*, XL(1), 77-99. Retrieved from <http://jhr>

- .uwpress.org/content/XL/1/77.abstract doi: 10.3368/jhr.XL.1.77
- Edmonds, E. V., & Pavcnik, N. (2005, March). The effect of trade liberalization on child labor. *Journal of International Economics*, 65(2), 401-419. Retrieved from <http://ideas.repec.org/a/eee/inecon/v65y2005i2p401-419.html>
- Fedesarrollo. (2013). *Estudio sobre los impactos socioeconómicos del sector minero en colombia: Encadenamientos sectoriales*.
- Ferreira, F., & Schady, N. (2009). Aggregate economic shocks, child schooling, and child health. *World Bank Research Observer*.
- Foster, A. D., & Rosenzweig, M. R. (1996, September). Technical Change and Human-Capital Returns and Investments: Evidence from the Green Revolution. *American Economic Review*, 86(4), 931-53. Retrieved from <http://ideas.repec.org/a/aea/aecrev/v86y1996i4p931-53.html>
- Giraldo, J., & Muñoz, J. C. (1952). *Informalidad e ilegalidad en la explotación del oro y la madera en antioquia*. Medellín, Colombia: Universidad Eafit.
- Jacome, E. G. (1978). El oro en colombia. *Boletín de la Sociedad Geográfica de Colombia*, 33(113).
- Jensen, R. (2000). Agricultural volatility and investments in children. *American Economic Review*, 90(2), 399-404. Retrieved from <http://www.aeaweb.org/articles.php?doi=10.1257/aer.90.2.399> doi: 10.1257/aer.90.2.399
- Kis-Katos, K., & Sparrow, R. (2009, August). *Child Labor and Trade Liberalization in Indonesia* (IZA Discussion Papers No. 4376). Institute for the Study of Labor (IZA). Retrieved from <http://ideas.repec.org/p/iza/izadps/dp4376.html>
- Kruger, D. (2007). Coffee production effects on child labor and schooling in rural brazil. *Journal of Development Economics*, 82(2), 448-463. Retrieved from <http://EconPapers.repec.org/RePEc:eee:deveco:v:82:y:2007:i:2:p:448-463>
- Miller, G., & Urdinola, B. P. (2010, 02). Cyclicity, Mortality, and the Value of Time: The Case of Coffee Price Fluctuations and Child Survival in Colombia. *Journal of Political Economy*, 118(1), 113-155. Retrieved from <http://ideas.repec.org/a/ucp/jpolec/v118y2010i1p113-155.html>
- Psacharopoulos, G. (1994). Returns to investment in education: A global update. *World Development*, 22(9), 1325 - 1343. Retrieved from <http://www.sciencedirect.com/science/article/pii/0305750X94900078> doi: [http://dx.doi.org/10.1016/0305-750X\(94\)90007-8](http://dx.doi.org/10.1016/0305-750X(94)90007-8)
- Psacharopoulos, G., & Patrinos, H. A. (2002, September). *Returns to investment in education : a further update* (Policy Research Working Paper Series No. 2881). The World Bank. Retrieved from <http://ideas.repec.org/p/wbk/wbrwps/2881.html>
- Restrepo, V. (1952). *Estudio sobre las minas de oro y plata de colombia*. Bogota, Colombia: Publicaciones del Banco de la Republica.

- Rettberg, A. . O.-R. J. (2014). Conflicto dorado: Explorando la relación entre minería de oro, conflicto armado y criminalidad en colombia (golden conflict: Exploring the relationship between gold mining, armed conflict, and criminality in colombia). *Working Paper*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2418883
- Rosenzweig, M. R. (1981). Child work, poverty and underdevelopment. In G. Rodgers & G. Standing (Eds.), (chap. Household and Non-household Activities of Youths: Issues of Modelling, Data and Estimation Strategies.). International Labour Office.
- Sachs, J. D., & Warner, A. M. (1995, December). *Natural Resource Abundance and Economic Growth* (NBER Working Papers No. 5398). National Bureau of Economic Research, Inc. Retrieved from <http://ideas.repec.org/p/nbr/nberwo/5398.html>
- Schultz, T. P. (2004). School subsidies for the poor: evaluating the mexican progressa poverty program. *Journal of Development Economics*, 74(1), 199 - 250. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0304387803001858> (New Research on Education in Developing Economies) doi: <http://dx.doi.org/10.1016/j.jdeveco.2003.12.009>
- Strauss, J., & Thomas, D. (1995). Chapter 34 human resources: Empirical modeling of household and family decisions. In J. Behrman & T. Srinivasan (Eds.), (Vols. 3, Part A, p. 1883 - 2023). Elsevier. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1573447105800063> doi: [http://dx.doi.org/10.1016/S1573-4471\(05\)80006-3](http://dx.doi.org/10.1016/S1573-4471(05)80006-3)
- West, R. C. (1952). *Colonial placer mining in colombia*. Louisina, USA: Louisiana State University Press.