The Determinants of Human Capital Formation: Education Laws, Households, and Shocks in Côte d'Ivoire [1]

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Abstract

This paper examines the determinants of the expansion of education and related inequalities in a developing country context by taking a long-run perspective. Specifically, it examines the role played by intra-household dynamics, education laws, and a large set of shocks (economic shocks, weather shocks as well as wars) over a thirty-year period in Côte d'Ivoire. It develops a conceptual framework based on a Neoclassical model of household behavior and decision making. It relies on a unique pseudo-panel dataset constructed from multiple sources over the 1984–2015 period. Our empirical findings highlight the fundamental role played by economic conditions and shocks in mediating the effect of education laws and in shaping the evolution of socio-economic inequalities in the medium and long-run. Taken together, our results emphasize the importance of economic factors, and the heterogeneity of shocks, in affecting the effectiveness of education policy as well as the evolution of educational attainment and inequalities in a developing country context.

JEL Codes: I24; I25; J16; O1

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1 Introduction

Education has long been regarded as an important determinant of individual productivity and well-being and, at the aggregate level, as a fundamental determinant of economic growth, long-run development and prosperity. Horace Mann emphasized the role of education as "the great equalizer" of economic conditions. Yet, debates remain concerning the role of different determinants of educational attainment, their interplay and the effects that they have in shaping inequalities over time. Existing studies focusing on developing countries have largely examined the role of a limited number of factors in isolation and over a relatively short time-span.

In this paper, we aim to fill a number of gaps in the existing literature and advance scientific knowledge through a comprehensive analysis of the factors that affect a household's decision-making over the investment in its children's education. We aim to develop an understanding of the roles played in that decision-making process by educational policy, economic conditions, as well as a large set of shocks. Specifically, we examine, in a long-run perspective, the interplay of compulsory schooling laws and school building policy, economic conditions, as well as macro-economic, weather and conflict shocks in Côte d'Ivoire over the thirty years spanning 1984–2015. As an overarching theme, we focus on gender differences. Gender gaps in educational attainment remain significant in Côte d'Ivoire, and recent educational interventions are to a large extent aimed at closing this gap.

In this study we first introduce a simple theoretical model and describe the empirical strategy which involves the use of pseudo-panel regression analysis. We then present our empirical results and interpret our findings through the lens of the theoretical model.

The model we adopt is a simple unitary household model derived from Rosenzweig (1990). A critical constraint explicitly incorporated in the model is that of compulsory schooling legislation. We distinguish households by whether this constraint is binding or not. The model also accounts for adult labor supply decisions and distinguishes between rural and urban households, whose behavior is likely to differ.

We construct our dataset by combining ten waves of national household surveys for Côte d'Ivoire (ENV) spanning the 1984–2015 period, along with data on commodity prices, rainfall, and temperature from 1970 to 2018, administrative data on school infrastructure, and PASEC data on the quality of education. Empirically, we adopt the pseudo-panel approach first proposed by Deaton (1985) to account for time-invariant correlated unobservables. We estimate the pseudo-panel regression on four categories of outcomes: educational attainment, child labor, anthropometric outcomes, and fertility-related behavior.

We explore three educational outcomes: "years of education", "school attendance" and "grade deviation", along with "child labor". We find that the 1995 Ivorian educational reform raised the national level of education by 2 years, increased the school attendance rate by approximately 10 percentage points, lowered the child labor participation prevalence rate by 3 percentage points, and also resulted in children catching up by 0.2 grades with respect to the grade designated for their age. Furthermore, the reform reduced the gender gap in years of education from 4 to 2.5 years in favor of males. The compulsory schooling law also reduced the gender gap in the grade deviation from 1 to 0.5 standard grades. However, it widened the gender gap in the school attendance rates from 6.1 to 13 percentage points in favor of boys.

We then add the supply side variables to the analysis. We find increasing class size by one additional student reduces the attendance rate by approximately 0.4 percentage points, and the average standard grade moves 0.01 years ahead. For every new school built per 10,000 residents, students are 0.3 percentage points more likely to enroll in formal education, but are 0.03 more years behind the standard grade. We also consider heterogeneity by gender. For every additional school built per 10,000 residents, school-age boys are 0.4 percentage points more likely to enroll in school, while the corresponding correlation is insignificant for girls aged 6 to 16.

When it comes to the quality of education, we find that individuals exposed to the 1995 compulsory schooling law and provided with an "average-quality education" obtain 2.3 years more education than the unexposed. The corresponding effect for exposed individuals taught by teachers with upper secondary diplomas is 7.6 years. The gender gap in both cases is approximately 3 years in favor of males. Moreover, children exposed to the average quality of education under the compulsory schooling law are 12 percentage points more likely to attend school than those who are unexposed. Children exposed to this mandatory schooling law with all teachers holding upper secondary diplomas are 19 percentage points more likely to attend school and 0.4 standard grades ahead of those who are unexposed. Boys are on average 5 percentage points more likely to attend school than girls and 0.9 standard grades ahead of girls, after controlling for the quality of education supply.

We also conduct several robustness checks. Our main empirical findings are robust to 60 alternative specifications of the cohorts used to construct our pseudo-panel. After accounting for differential treatment length, namely including those partially exposed, the overall exposure effects remain consistent with the original estimates in most cases.

We observe heterogeneity in treatment effects on both school attendance and grade deviation, but not on years of education. The treatment effects of exposure to the 1995 compulsory schooling law on school attendance and grade deviation are 5 percentage points and 0.2 standard grades stronger for girls than for boys, respectively. We also observe stronger treatment effects for households whose head works in the secondary or tertiary sectors than in the primary sectors, and weaker treatment effects for agricultural households working in both cocoa and coffee plantations than other agricultural households.

Central to our study is the analysis of the role of a plethora of shocks. In this regard, we consider three sets of shocks—price shocks on cocoa or coffee, rainfall shocks, and three major event shocks (the 1994 CFA franc devaluation, the 2002 civil war, and the 2011 civil conflict). The empirical findings are consistent with the predictions from the theoretical model: (i) the increase (decrease) in the price of cocoa/coffee results in a fall (rise) in educational attainment among rural households, as measured by school attendance and grade deviation; (ii) flood and drought shocks that reduce agricultural productivity increase the educational attainment of children in unconstrained rural households; (iii) the 1994 devaluation shock, which probably reduced the real wages for urban households, has a strong negative impact on the exposure effects of the compulsory schooling law.

Finally, we explore possible mechanisms through which the schooling legislation is likely to affect educational attainment. Two anthropometric outcomes are explored— the "weight-for-height z-score" (WHZ) and "height-for-age z-score" (HAZ). We find that the expansion of education led to a 1.4 standard deviation increase in WHZ and a 1.4 standard deviation decrease in the HAZ of younger children. However, we do not find effects on gender gaps. The fertility outcomes include "number of children" and "relative fertility". For households whose head works in the secondary or tertiary sectors, exposure to the 1995 compulsory schooling law results in 1 less child or 7 percentage points lower relative fertility. Conversely, the corresponding exposure effects for households whose head works in the primary sector are 0.5 more children or 5-percentage points higher relative fertility. In addition to this, we examine the impact of the compulsory schooling law on child labor. We find that school age children exposed to the compulsory schooling law of 1995 are 13 percentage points less likely to work. These findings suggest that the reduction in the probability of working as a child is an important channel through which the expansion of compulsory schooling raises educational attainment. Other likely channels, as indicated above, include the increase in the quantity of education supply, the improvement in the quality of education supply, and the decrease in fertility among non-agricultural households.

The paper makes three main contributions to the existing literature. First, we provide an analytical framework derived from a Neoclassical model of household behavior that allows us to examine both the supply-side and demand-side factors—as well as the interplay among them—that affect the parental decision over the investment in their children's education and that ultimately affect the expansion of educational attainment and inequalities in society. Second, we provide evidence of the micro-foundations of the educational gaps and persistent inequalities, along the gender and other socio-demographic dimensions, which characterize the Ivory Coast and many other developing countries today. Specifically, we provide a comprehensive analysis and examine the effects of educational interventions, economic conditions as well as a large set of shocks in affecting investments in education. Third, we address these questions by taking a long run perspective and carrying out the empirical analysis over three decades (1984–2015). Our empirical analysis relies on a unique nationally representative household-level dataset, which we constructed by drawing on numerous primary and secondary sources. This allows us to examine the evolution of the educational expansion and inequalities and the role played by shocks in affecting the investment in education over the long run, which is especially rare in a developing country context.

The remainder of the paper is organized as follows. Section 2 introduces the socio-economic, educational and institutional background of Côte d'Ivoire. Section 3 reviews the relevant literature on intra-household allocation, human capital formation and shocks. Section 4 presents the conceptual framework and derives the hypotheses to be tested in the empirical analysis. Section 5 describes the data and the empirical strategy. Section 6 reports the empirical findings and discusses a series of robustness checks. The last section provides concluding remarks.

2 Background

Following independence in 1960, Côte d'Ivoire experienced two decades of rapid economic growth. GDP per capita reached 1,266 USD in 1980, commensurate with middle-income country status (The World Bank 2021). Rapid economic growth, however, was not accompanied by human capital accumulation.

[Figure 1 about here.]

As shown in Panel A1 of Figure 1, and despite being a lower-middle income country, Côte d'Ivoire's level of educational attainment, with a population average of 4 years, is among the lowest in the world. It has the second lowest level of educational attainment among lower-middle income countries (marked as triangles in the plot), and the ninth lowest overall. This poor performance in the educational sphere is puzzling when stacked up against Côte d'Ivoire's "economic miracle" between 1930 and 1980 (Andersson and Andersson 2019). Given its relatively high level of GDP per capita, Côte d'Ivoire's predicted average years of education, shown by the brown reference curve, stands at around 8 years, yielding what amounts to a 50% "deficit". Even in comparison with other West African countries with comparable economic structures and development trajectories (marked in green in the plot), Côte d'Ivoire's mismatch between income and educational attainment stands out: Among the fourteen West African countries in the plot, Côte d'Ivoire has the third highest GDP per capita but the fifth lowest average years of education.

Geographical and gender differentials are also a concern, although Côte d'Ivoire places near the mean among low and lower-middle income countries. Panels A2 and A3 of Figure 1 plot the urban–rural and male–female comparisons for average years of education, respectively, for low and lower-middle income countries. The urban–rural gap in Ivorian educational attainment is enormous in absolute terms, with the red triangle corresponding to Côte d'Ivoire (labeled as "CIV") in Panel A2 lying far above the 45° line: Average years of education is 7 in urban areas and 3 in rural areas. The gender gap for average years of education, plotted in Panel A3, is 6 to 4 in favor of males.

Child labor participation has long been considered as closely inversely related to schooling outcomes. Panel B1 shows the prevalence of child labor participation in low- and lower-middle income countries in the world. Côte d'Ivoire's child labor participation rate is slightly higher than its predicted level, which might be able to explain, at least partially, the country's lower-than-expected level of educational attainment. However, the insignificant gender gap in child labor participation, shown in Panel B2, in contrast with the large gender gap in years of education, suggests that child labor may not be the only channel that contributes to the low level of years of education in Côte d'Ivoire. However, cautions are needed when interpreting the statistics on child labor, as they are compiled from different surveys and most of them are self-reported numbers. Respondents have the incentive and the tendency to under-report these figures.

2.1 Education in Côte d'Ivoire

Despite its post-WWII economic boom, poverty remains a pervasive problem in Côte d'Ivoire. The Ivorian economy is still largely dependent on the export of commodities, particularly cocoa and coffee, making it vulnerable to international price fluctuations and other economic shocks. More than half of the population still resides in rural areas and is reliant on agricultural/primary sector activities for their livelihoods (see the descriptive statistics in Section 5.1.5). Economic shocks directly affect the welfare of households involved in the production of cocoa and coffee, particularly for those without access to formal insurance (Benjamin and Deaton 1993; Cogneau and Jedwab 2012); moreover, since government revenues stem largely from commodity exports, the provision of public goods, including schools, is also vulnerable to economic shocks (Azam 2004).

The Ivorian economy suffered through a prolonged downturn starting in the 1980s, and it was only in 2013 that GDP per capita returned to its 1980 level in real terms. Social mobility in Côte d'Ivoire has also been lagging, with a consequent high level of inequality, especially for those living in rural areas and working in the agricultural sector (Bossuroy and Cogneau 2013).

[Figure 2 about here.]

By leading to the accumulation of human capital, education stimulates economic growth, facilitates inter-generational social mobility, and helps address issues of social inequality. Ivorian educational attainment improved during the rapid economic growth of the 1960s and 1970s, and during the recovery of the 2000s, as shown in Figure 2. However, there is still a large gap between urban and rural areas, and between males and females . The level of educational attainment in the economic capital of Abidjan is more than three times that of any rural area. Shocking disparities also exist between urban and rural females—both urban and rural prime age females born before 1940 have almost no formal education at all, while urban prime age females born after 1980 have attained, on average, over four years of formal education; for those living in Abidjan, the corresponding figure is six. In contrast, rural prime age females born after 1980 have only reached two years of formal education.

The quality of education is also low in Côte d'Ivoire. Ivorian students score the lowest in combined measures of educational attainment. In a worldwide comparison of 165 countries from 1965 to 2015, Ivorian students score slightly above 250, while the average score for African countries is 350, the average score for the whole world is over 450, and the highest score in the world is 600 (Altinok et al. 2018). In recent rounds of the PASEC surveys where the average French language performance score of fifth grade students in thirteen Francophone African countries was 39.4 out of 100, Ivorian students scored 37.4, which is below the median (CONFEMEN 2012).

Educational resources are also distributed heterogeneously in Côte d'Ivoire, be it along the dimensions of gender, urban versus rural place of residence, wealth, or geographical region (UNICEF 2016). For instance, secondary education is almost exclusively the preserve of urban children, with only 4% of rural children attending lower secondary school, and a dismal 1% attending upper secondary institutions. The secondary school enrollment rate of girls is 16 percentage points lower than that of boys (Smeyers 2010).

2.2 EduLaw95: The 1995 Ivorian educational reform

In response, the Ivorian government has attempted on several occasions to raise the national level of educational attainment. One recent effort is the "Education for All" initiative. This corresponds to Côte d'Ivoire's adoption of the international initiative to make education available to all children, and to substantially reduce illiteracy (Oyeniran 2017). The formal implementation mechanism is Law No. 95–696 of 7 September 1995 on Education (hereafter referred to as EduLaw95). EduLaw95 guarantees the right to education for every Ivorian citizen. It establishes neutrality, gratuity, and equality in the public education service. It also formalizes the educational system inherited from the colonial period (République de Côte d'Ivoire 1995).

As in the French educational system that it is based upon, the Ivorian system set out by EduLaw95 comprises three main levels: pre-school and primary education, secondary education, and higher education. Pre-school and primary education are accessible to all children from the age of 3. In practice, pre-school usually lasts three years, and pupils attend primary school from the age of 6. Access to secondary education is conditional on successfully passing a competitive examination after the completion of primary school. Secondary education, consisting of the 4-year lower cycle and the 3-year upper cycle, includes two streams: the general and technical education stream, on the one hand, and the vocational education stream, on the other. After completing secondary education, holders of the baccalaureate (or its equivalent) are eligible to enter the first cycle of higher education. The second cycle of higher education is conditional on the first cycle, and postgraduate training on the second cycle.

EduLaw95 entitles students to state-funded scholarships, based on the academic results of the applicants. The Ivorian government also covers most costs of public-school operations.

A policy tool that complements EduLaw95 is the government's expansion of its investment in educational infrastructure. In 1992, Ivorian public expenditure on education was 200 billion FCFA; in 1999, it had increased by over 50% to reach 315 billion FCFA. Specific efforts include rehabilitating existing schools, distributing schoolbags and school kits, and recruiting more teachers (Oyeniran 2017). Though not the topic of this paper, the Ivorian government took a further step, in 2015, to make education compulsory for children aged 6 to 16, through an amendment to EduLaw95. A further measure, also passed in 2015, was legislation outlawing child labor (U. S. Department of Labor 2020). The 2015 compulsory schooling law, together with the child labor law, marked the country's second stage in its efforts to raise the level of educational attainment.[2]

An important aspect of the expansion of education in Côte d'Ivoire concerns the gender gap. EduLaw95 establishes the equality in education, including the equality in gender and other social-economic background. Similar efforts to improve the enrollment rate especially for girls can also be found in "Project Education BAD IV" in collaboration with the African Development Bank (Oyeniran 2017). The 2015 amendment to EduLaw95 also made the gender equality an important objective.[3]

A certain number of limitations of EduLaw95 and the Ivorian educational system of Côte d'Ivoire in general have been noted. Assie-Lumumba (1995) highlights the relatively low level of educational expenditures. UNICEF (2016) focuses on the gender and rural urban divides. Oyeniran (2017) underlines poor teacher quality. But the hurdles standing in the way of educational reform are many and have hitherto not been formally analyzed. Price shocks, be they related to internationally traded commodities or to monetary policy, are particularly salient in the Ivorian case. Fluctuations in the in-

2. In 2003, Côte d'Ivoire ratified ILO Convention No. 138 and thus raised the minimum age for work to 14. In 2005, the Ivorian government issued a decree to identify hazardous work for children. However, neither regulations had ever been enforced by 2015 when the new Code of Labor was enacted and no impact on either child labor or education is expected.

3. The then president of Côte d'Ivoire, SEM Alassane Ouattara, stated the objective of the 2015 reform as "donner à toutes les filles et les fils de la Côte d'Ivoire, sans distinction de sexe, d'origine et de statut social ; le droit à l'éducation et à une formation de qualité pour faire d'eux, des citoyens modèles qui participent à la vie du pays et de leurs familles respectives" ("to give to all the Ivorian girls and boys, regardless of sex, origin and social status, the right to education and quality training, and to make them model citizens who participate in the life of the country and their respective families"). Source: https://www.gouv.ci/_actualite-article.php?d=6&recordID=5821

ternational prices for cocoa and coffee have already been mentioned. The 50% devaluation of the CFA franc in 1994, designed to boost UEMOA exports, is another example: Net consumers of imported agricultural products were made significantly worse off in the wake of the devaluation, and it is likely that this contributed to reducing household educational expenditures.

Côte d'Ivoire has also experienced two major civil conflicts in recent years, which have inevitably hampered its efforts to increase its stock of human capital. The first Ivorian Civil War broke out in September 2002 following the coup attempt by the rebel FRCI. The country was then split into two—the rebel held the north and the government held south. This conflict ended in March 2007. The second Ivorian Civil Conflict broke out in December 2010, after a controversial presidential election marred by irregularities. It ended in April 2011 with President Gbagbo being captured by FRCI and sent to the Hague to stand trial (Peace Research Institute Oslo 2021).

In this paper, we examine the interplay of educational policy, crystallized in the form of EduLaw95, with all of these economic and political conditions, and quantify how households have reacted in terms of their human capital investments, using data that spans three decades. While it has been argued (Rothstein 2019) that education may act as a great equalizer through improving intergenerational social mobility, it remains to be seen whether this has indeed been the case in Côte d'Ivoire.

3 Literature review

In this paper, we contribute to four main strands of the academic literature: (i) education and human capital formation, (ii) the role of policy in the development process, (iii) household resource allocation and decision making, and (iv) exogenous shocks. Central to our analysis is the focus on gender differences. Boserup et al. (2013) have stressed the importance of females and the gender dimension in development studies. Thus, we particularly review the gender dimension in each of the four strands.

3.1 Household resource allocation and decision making

Educational laws may have indirect effects through intra-household resource allocation. Specifically, a compulsory schooling law shifts the time allocation of children constrained by the law away from child labor and towards schooling. As a result, it lowers family income, and thus siblings not constrained by the law are more likely to work than to attend school. Such spillover effects are found from state-level compulsory schooling laws in the US between 1880 and 1920 (Lingwall 2014).

Similarly, free education increases family disposable income, and thus all siblings are more likely to attend school than to work. Tang et al. (2020) identify such indirect effects from free education in rural China, but only from sisters to brothers: When girls are exposed to the free education reform, the labor force participation rate of their brothers is reduced.

Social norms, and their interplay with policy, can also affect household decisions. Ashraf et al. (2020) identify the practice of bride price as being critical to the success of school construction projects. Specifically, school construction projects increase female educational attainment among ethnic groups who practice bride price, but not among ethnic groups who do not. They show that women with higher levels of educational attainment command a higher bride price: As such, parents of bride-price-practicing ethnic groups are induced to send daughters to school when school construction projects lower the cost of education.

In more general settings, it has been shown that the identity of the person earning income, in particular that individual's gender, is linked with the pattern of household expenditures. In Côte d'Ivoire, specific crops are predominantly cultivated by one gender within a given ethnic group. One can therefore identify gender-specific income from the pattern of gender-specific crops. Using data from the 1986-87 Côte d'Ivoire Living Standard Measurement Survey (LSMS), Hoddinott and Haddad (1995) show that wives' share of cash income within a household has a positive and significant effect on the household budget share for food, and a negative and significant effect on meals eaten out, children's clothing, adult clothing, alcohol and cigarettes.

Duflo and Udry (2004) find similar results using a different approach. When rainfall shocks increase the output of "appreciated" crops, household expenditures shift towards education, staples, and overall food consumption, and away from adult and private goods. When rainfall shocks increase the output of crops cultivated individually by either men or women, household expenditures shift toward adult private goods. When rainfall shocks increase the output of crops predominantly cultivated by women, household expenditures shift towards food consumption.

Using coffee price fluctuations in Columbia as exogenous shocks, Miller and Urdinola (2010) establish procyclical links between coffee prices and child deaths. In a similar setting, Adhvaryu et al. (2019) find impacts on adult mental health from early life cocoa price shocks. By evaluating a randomized grant program, Banerjee et al. (2021) find evidence that positive income shocks indeed increase supply of labor.

Rosenzweig (1990) provides a more general and inclusive model of intra-household resource allocation and decision making. In the model, households maximize welfare, which is determined by the future income of children, human capital per child in the household, number of children and consumption, by allocating children's time between schooling and working. The author shows that changes in the returns to human capital associated with exogenous technical change can lead simultaneously to increases in human capital investments and to reductions in fertility.

Jayachandran (2015) documents that gender inequality is more prominent in poor countries and the correlation is valid in both education and health. The male to female education enrollment ratio is higher in low-income countries, indicating a larger educational disadvantage for females. The female advantage in terms of life expectancy is smaller in poor countries.

Systematic gender bias of parents exists in within-household resource allocation: Boys receive more childcare and nutrition than girls in India (Barcellos et al. 2014), and parents invest more in boys' education than in girls' in rural China (Gong et al. 2005). Though girls may, on average, receive treatment that does not appreciably differ from that afforded to boys, differential treatment can still be observed in extreme circumstances such as poverty (Duflo 2012). Lab-in-the-field experiments have shown that biased parents may allocate resource within household in a discriminatory manner, and such discrimination is especially pronounced among boy-biased parents (Begum et al. 2022).

3.2 Education and human capital formation

Existing research on education in developing countries has often examined education in conjunction with child labor. For instance, through income and/or substitution effects, Cogneau and Jedwab (2012) find that cocoa price shocks which affect household income have a strong impact on the schooling outcomes of children. Gradstein and Ishak (2020) draw similar conclusions on human capital formation by investigating shocks to natural resources. Conflict is another kind of shock affecting human capital formation: Dabalen and Paul (2012) find a strong negative impact of civil wars on educational attainment.

Family size is also commonly considered to be correlated with educational outcomes. However, it is likely to be endogenous. Black et al. (2005) use twin births as an instrument and find that family size is indeed a negligible determinant of educational attainment, while higher birth order has a strong negative impact, which translates later into lower adult earnings and employment possibilities.

Gender inequality also plays an important role in education. Enrollment in school may reduce the likelihood of teenage pregnancy (Osili and Long 2008) and increase child survival rate (Oye et al. 2016). However, free education in rural China lowered male child labor, but did not do so for girls (Tang et al. 2020). Even as incomes rise, gender inequality may still persist in terms of educational outcomes (Colclough et al. 2000).

3.3 The role of policy in the development process

The famous school construction project implemented by the Indonesian government in 1967 is estimated to have resulted in a significant increase in the educational attainment of Indonesians, which has in turn improved their living standards. The effect has even been passed on to the following generation (Duflo 2001; Mazumder et al. 2019). The treatment effects are heterogeneous along the gender dimension. Specifically, the additional education attained by women is concentrated in primary school; the intergenerational effects are stronger for daughters than for sons, especially if mothers are exposed to the project (Akresh et al. 2013).

Lowering the cost of schooling is another policy associated with increased educational attainment. For instance, free education in five Sub-Saharan African countries has in general raised gross enrollment rates (Riddell 2003). Free secondary schooling can also delay girls' fertility and help students get jobs in the formal sectors instead of agriculture (Brudevold-Newman 2021; Duflo et al. 2021).

Grenet (2013) finds positive impacts on labor market outcomes from the British compulsory schooling law, but none for its French equivalent. Brunello et al. (2009) estimate that compulsory schooling in 12 European countries helped to narrow the wage inequality. Compulsory schooling laws in the US have had a similar impact, with heterogeneity by gender and region (Lleras-Muney 2002).

3.4 Exogenous shocks

In addition to the studies already mentioned in the previous sub-sections, there is a large body of literature investigating the effects of exogenous shocks on numerous aspects related to the investment in children.

Climate and weather shocks are among the most studied exogenous shocks. For instance, Hyland and Russ (2019) show that rainfall shocks that lowers the household wealth, through the impact on agricultural production, lead to lower level of female formal education and, in cases of extreme drought, lower adult heights. They also find evidence that such effects can be transmitted to the next generation through mothers.

Nordman et al. (2020) take the perspective on investment in education. They conclude that agricultural productivity shocks from rainfall can reduce expenditures on education and meanwhile increase child labor. The effects are stronger for households without access to credits.

Zimmermann (2020) investigates the positive and negative rainfall shocks separately. Her study provides evidence that negative rainfall shocks have increasingly stronger positive impact on school enrollment over time, while positive rainfall shocks lead to increasingly falling enrollment. Such effects are found to be stronger for girls than for boys.

Another type of shocks commonly presented in the literature are conflicts. Dabalen and Paul (2012) find strong negative impact of civil wars on educational attainment in Côte d'Ivoire. The overall effect is estimated to be between 0.2 to 0.9 drop in average years of education.

Akresh and Walque (2008) study the 1994 Rwanda genocide and find that children exposed to the genocide have obtained, on average, half a year shorter schooling. Similarly, Bertoni et al. (2019) show that the Boko Haram conflict in Northeastern Nigeria have negative effect on school enrollment, and such negative effect is stronger for children older than the mandatory schooling age. León (2012) takes a longer perspective and shows that the negative effects get stronger in the long run, in the case of political violence in Peru.

On the other hand, long-term conflicts, such as the World War II, lead to huge national educational loss and, consequently, loss in gross domestic product (Ichino and Winter-Ebmer 2004). Such loss can even lead to persistent local poverty traps, as shown in the case of the Vietnam War (Miguel and Roland 2011).

Exogenous income shocks are rare and thus studied less intensively. Nonetheless, Beegle et al. (2003) find that transitory income shocks can cause a rise in child labor, and the effects are weaker for households with access to the credit market.

Some studies in the literature focus on early-life shocks. For instance, Almond (2006) shows that utero exposure to the 1918 influenza, also known as the Spanish flu, reduced the educational attainment, increased rates of physical disability, lowered income and socioeconomic status. Similar conclusions are drawn by Gensowski et al. (2019) by investigating childhood exposure to the last Danish polio epidemic.

4 Theoretical framework

4.1 Preliminaries

In order to organize the interpretation of our empirical findings, we rely on a simple unitary household model in the tradition of Rosenzweig (1990) in which household preferences $U(\cdot)$ are a function of future child income i when they reach adulthood, a composite contemporaneous household consumption good c, time spent in school t and fertility n. Other household decisions, such as the nutritional status of children and adult labor supply, can also easily be incorporated. Preferences are therefore given by:

$$U(i, c, t, n).$$

For simplicity, we write the returns to human capital as αt where α is the corresponding rental rate.[4] Child income when they attain adulthood is therefore given by:

$$i = \alpha t + b,$$

where b represents (possibly *inter vivos*) transfers from parents to children. As in Rosenzweig (1990), this specification allows for the intertemporal tradeoff inherent in the investment today in a child's human capital tomorrow, while eschewing the complications that would arise if one were to explicitly formulate a two-period model of choice. Finally, we add a constraint which corresponds to compulsory schooling:

$$t \geq \underline{t}. \tag{1}$$

The crux of the problem being considered here boils down to whether or not this constraint is binding, and to what happens when it becomes more so. In particular, it is worth noting, in the population under consideration, that there will be unconstrained and constrained households. For unconstrained households for whom the inequality already held with a strict inequality before the educational reform, the latter's effect is nil, except of course if the increase in $\underline{t}$ pushes them into the constrained category. On the other hand, for households for whom the constraint is or remains binding, its effect will be felt not only on educational attainment but on other decisions under the household's control. Moreover, when calculating a conditional mean, as we do in the empirical work below, the effect of the educational reform can be decomposed into two components: (i) the effect on the choices of constrained households and (ii) the effect on the probability that a household is itself constrained.

Since education t corresponds to the time that a child spends in school (though empirically we also consider a school attendance dummy and grade deviation—see below), gross income from the employment of children will be given by $nw(T - t)$, where w is the wage rate and T is a child's time endowment.[5] The opportunity cost of educating children is foregone earnings nwt.

The household's budget constraint, in which child earnings are pooled with those of the parents at the time at which schooling takes place, is therefore given by:

$$c = y + n\left[w(T - t) - b\right],$$

4. Linearity in educational attainment t renders things analytically tractable below, but is not essential to our results.
5. Specifically, the rental rate on child labor, though unfortunately it will be impossible empirically to distinguish this from the adult wage rate, as was the case in Rosenzweig (1990).

where $w(T-t)$ represents the net resources brought by one child to the household, and y is exogenous parental income. Substituting the constraints into the expression for parental utility yields the unconstrained maximand:

$$U(\alpha t + b, y + n\left[w(T-t) - b\right], t, n).$$

The FOCs associated with this problem in the unconstrained case are given by:

$$\begin{aligned}
\frac{dU}{dt} &= U_i\alpha - U_c nw + U_t = 0, \\
\frac{dU}{dn} &= U_c\left[w(T-t) - b\right] + U_n = 0, \\
\frac{dU}{db} &= U_i - U_c n = 0.
\end{aligned}$$

The solution for all of the models that follow involves substituting the FOC in b into those in t (and other variables later on), which then allows one to write $U_c n(w-\alpha) = U_t$, where we must of course assume, as we shall in what follows, that $w > \alpha$. Combining these last two expressions with the FOC in n then yields the expressions for the marginal rates of substitution (MRS) between time in school and fertility, which must equal the corresponding ratios of shadow prices at the optimum:

$$MRS_{t,n} = \frac{U_t}{U_n} = \frac{n(w-\alpha)}{b - w(T-t)}.$$

For illustrative purposes, let household preferences be given by a simple Cobb-Douglas specification with unitary elasticity of substitution between all arguments: $U(i,c,t,n) = i^\epsilon c^\theta t^\beta n^\delta$.[6] Then straightforward calculations imply that:

$$t^* = \frac{\beta T w}{(w-\alpha)(\beta - \delta + \epsilon)}, \quad n^* = \frac{y(\beta - \delta + \epsilon)}{Tw(\delta + \theta)}, \quad c^* = \frac{y\theta}{\delta + \theta}.$$

Comparative statics are particularly straightforward and largely mirror those obtained through a more general specification which eschews imposing a specific functional form, with the notable exception of fertility. For the homogeneous utility function under consideration, fertility is increasing in exogenous household income y (which may be affected by weather, exchange rate or conflict shocks) and decreasing in the (child) wage rate.

Educational attainment, for children in unconstrained households, is decreasing in the wage rate, since $\frac{dt^*}{dw} = -\frac{\alpha\beta T}{(w-\alpha)^2(\beta-\delta+\epsilon)} < 0$. Educational attainment is independent of exogenous parental income y, though this is in part a function of our simplifying assumption that the latter is not correlated with the rental rate on labor.

Now suppose that the constraint given by (1) is binding. In this case, the household's objective function is given by:

$$U(\alpha\underline{t} + b, y + n\left[w(T-\underline{t}) - b\right], \underline{t}, n),$$

and only two FOCs remain. Household consumption remains unchanged.[7] For the simple Cobb-Douglas parameterization specified above, however, fertility is now equal to:

$$\widetilde{n} = \frac{y(\epsilon - \delta)}{(\delta + \theta)\left[\underline{t}(\alpha - w) + Tw\right]}.$$

It is then straightforward to show, if constraint (1) is binding (and as long as fertility is positive, which depends upon the technical condition that $\epsilon > \delta$), that it will always be the case that $n^* > \widetilde{n}$. [8]

6. There is the additional technical condition, assuming that the wage rate is greater than α, given by $\beta - \delta + \epsilon > 0$, which guarantees that schooling and fertility are positive.

7. i.e. $\widetilde{c} = \frac{y\theta}{\delta+\theta}$; this follows directly from the clever Rosenzweig *inter vivos* transfer trick.

8. For preferences that are not homogeneous, on the other hand, it is entirely possible that a binding educational attainment constraint will lead to an increase in fertility. Straightforward but tedious calculations show that the derivative

4.2 Adding child nutritional status

Now add child nutrition, denoted by x, to household preferences:

$$U(i, c, t, x, n).$$

For tractability, nutrition and education are assumed to be perfect substitutes in the production of child human capital, meaning that:

$$i = \alpha(t + x) + b.$$

The budget constraint, for its part, is now given by:

$$c = y + n\left[w(T - t) - px - b\right],$$

where p is the price of nutrition. For agricultural households, p may be of course be positively correlated with parental income, which is considered below. In the unconstrained case, the appropriate marginal rates of substitution are now given by:

$$\begin{aligned} MRS_{t,n} &= \frac{U_t}{U_n} = \frac{n\,(w-\alpha)}{b + px - w(T-t)}, \\ MRS_{x,n} &= \frac{U_x}{U_n} = \frac{np}{b + px - w(T-t)}, \\ MRS_{x,t} &= \frac{U_x}{U_t} = \frac{w-\alpha}{p}. \end{aligned}$$

The Cobb-Douglas specification, with $U(i, c, t, x, n) = i^{\epsilon} c^{\theta} t^{\beta} x^{\gamma} n^{\delta}$, now yields:

$$x^* = \frac{Tw\gamma}{(p-\alpha)\,(\beta+\gamma-\delta+\epsilon)}, \quad t^* = \frac{Tw\beta}{(w-\alpha)\,(\beta+\gamma-\delta+\epsilon)}, \quad n^* = \frac{y\,(\beta+\gamma-\delta+\epsilon)}{Tw\,(\delta+\theta)}, \quad c^* = \frac{y\theta}{\delta+\theta},$$

where, unsurprisingly, optimal household consumption remains unchanged with respect to the previous, simpler model, and the expressions for the optimal choices of education and fertility are appropriately modified to take into account the inclusion of nutrition in the picture.

In the case where the education constraint is binding, we obtain:

$$\widetilde{n} = \frac{y(\gamma-\delta+\epsilon)}{(\delta+\theta)\,(\underline{t}(\alpha-w)+Tw)}, \quad \widetilde{x} = \frac{\gamma\,(\underline{t}(\alpha-w)+Tw)}{(p-\alpha)(\gamma-\delta+\epsilon)}, \quad \widetilde{c} = \frac{y\theta}{\delta+\theta}.$$

It immediately follows that child nutritional outcomes become worse as the constraint becomes more binding, since $\frac{d\widetilde{x}}{d\underline{t}} < 0$. Notice also that child nutrition is independent of exogenous household income and decreasing, as one would expect, in the price of food. Conversely, fertility is independent of the price of food, and nutritional outcomes are increasing in the rental rate on labor.

4.3 Adult labor supply

We now augment the specification by including a standard adult labor supply decision into the model. The household's endowment of adult labor time is given by Ω, while L denotes adult labor supply. We distinguish between child and adult wages by assuming that the former are a fraction σ of the latter, so that adult wages are denoted by w and child wages by $\sigma w, 0 < \sigma < 1$. For the time being, we have

of $\widetilde{n}$ with respect to $\underline{t}$ is given by:

$$\frac{\begin{array}{l}\left[n^2 w U_{cc} - n\left(U_{ct} + U_{ic}(\alpha+w)\right) + \alpha U_{ii} + U_{it}\right]\left[-\left(nU_{cc} - U_{ic}\right)\left(w\underline{t} + b - Tw\right) + U_c + nU_{cn} - U_{\mathrm{in}}\right] \\ \quad - \left(n^2 U_{cc} - 2nU_{ic} + U_{ii}\right)\left[-\left(w\underline{t} + b - Tw\right)\left(-nwU_{cc} + U_{ct} + \alpha U_{ic}\right) - wU_c - nwU_{cn} + \alpha U_{in} + U_{tn}\right]\end{array}}{\Delta},$$

where Δ is the determinant of the 2 by 2 matrix of second order conditions. As should be obvious, the sign of this expression is ambiguous without imposing further, strong, assumptions.

not distinguished between urban and rural households, but the inclusion of adult labor supply forces us to do so explicitly. Here, we continue with a model structure in which the return to labor input is given by wages. Later, we consider a situation in which adult and child labor are used to produce food.

The unconstrained urban household maximand is now given by:

$$U = n^{\delta} t^{\beta} x^{\gamma} (\Omega - L)^{\eta} (b + \alpha(t + x))^{\epsilon} (n(\sigma w(T - t) - b - px) + Lw + y)^{\theta}.$$

Optimal choices of educational attainment, fertility, child nutrition and adult labor supply are now given by:

$$x^* = \frac{\gamma \sigma w T}{(p - \alpha)(\beta + \gamma - \delta + \epsilon)}, \quad t^* = \frac{\beta \sigma w T}{(\sigma w - \alpha)(\beta + \gamma - \delta + \epsilon)},$$

$$n^* = \frac{(w\Omega + y)(\beta + \gamma - \delta + \epsilon)}{\sigma w(\delta + \eta + \theta)T}, \quad L^* = \frac{w\Omega(\delta + \theta) - \eta y}{w(\delta + \eta + \theta)}$$

with optimal household consumption given by $c^* = \frac{\theta(w\Omega + y)}{\delta + \eta + \theta}$. In the constrained case, we obtain:

$$\widetilde{n} = \frac{(\gamma - \delta + \epsilon)(w\Omega + y)}{(\delta + \eta + \theta)\left(\underline{t}(\alpha - \sigma w) + \sigma w T\right)}, \quad \widetilde{x} = \frac{\gamma\left(\underline{t}(\alpha - \sigma w) + \sigma w T\right)}{(p - \alpha)(\gamma - \delta + \epsilon)}, \quad \widetilde{L} = \frac{w\Omega(\delta + \theta) - \eta y}{w(\delta + \eta + \theta)},$$

whereas optimal household consumption is, as usual, unchanged. The main change with respect to the simpler incarnations of the model is, unsurprisingly that fertility and adult labor supply decisions at the optimum are now functions of the value $w\Omega$ of the household's endowment of adult labor.

4.4 Rural households

For net food producers, household variable income stemming from adult labor is no longer given by wL but by pL, assuming a simple CRS production technology for agricultural output/food which transforms one unit of labor into one unit of food, and assuming (somewhat unrealistically) that rural households do not offer their adult labor on the market (this is akin to assuming autarkic households, at least when it comes to the labor market). Similarly, child labor is assumed to be entirely devoted to agricultural production, in which case total income from agricultural production would be:

$$p[L + \phi(T - t)], \tag{2}$$

where each unit of child labor is assumed to be worth one ϕ'th of adult labor in agricultural production.

In this case, the unconstrained rural household maximand is given by:

$$U = n^{\delta} t^{\beta} x^{\gamma} (\Omega - L)^{\eta} (b + \alpha(t + x))^{\epsilon} (n(-b + p\phi(T - t) - px) + Lp + y)^{\theta}.$$

Optimal choices of educational attainment, fertility, child nutrition and adult labor supply for rural households are now given by:

$$x^* = \frac{\gamma p T \phi}{(p - \alpha)(\beta + \gamma - \delta + \epsilon)}, \quad t^* = \frac{\beta p T \phi}{(p\phi - \alpha)(\beta + \gamma - \delta + \epsilon)},$$

$$n^* = \frac{(p\Omega + y)(\beta + \gamma - \delta + \epsilon)}{pT\phi(\delta + \eta + \theta)}, \quad L^* = \frac{p\Omega(\delta + \theta) - \eta y}{p(\delta + \eta + \theta)}$$

with optimal rural household consumption given by $c^* = \frac{\theta(p\Omega + y)}{\delta + \eta + \theta}$. In the constrained rural case, we obtain:

$$\widetilde{n} = \frac{(\gamma - \delta + \epsilon)(p\Omega + y)}{(\delta + \eta + \theta)\left(\underline{t}(\alpha - p\phi) + pT\phi\right)}, \quad \widetilde{x} = \frac{\gamma\left(\underline{t}(\alpha - p\phi) + pT\phi\right)}{(p - \alpha)(\gamma - \delta + \epsilon)}, \quad \widetilde{L} = \frac{p\Omega(\delta + \theta) - \eta y}{p(\delta + \eta + \theta)},$$

whereas optimal household consumption remains the same.

4.5 Child labor

So far, our Neoclassical model has treated child labor and educational investment symmetrically in that an increase in the latter necessarily leads to a decrease in the former. While this is a convenient simplification, it is likely that labor supply effects are present for children. In order to incorporate this into the model, we also consider a household whose preferences incorporate the leisure of children. Abstracting from parental labor supply and other complications, suppose that the household's utility function is given by:

$$U = n^{\delta} t^{\beta} (b + \alpha t)^{\epsilon} (n(-b + aw) + y)^{\theta} (T - a - t)^{\gamma},$$

where a is child labor and T is their endowment of time; $T - a - t$ therefore represents their leisure. It is then straightforward to show that children are allocated a strictly positive amount of leisure given by $\frac{\gamma \underline{t}(w-\alpha)+Tw(\epsilon-\delta)}{w(\gamma-\delta+\epsilon)}$ when educational attainment is constrained and $T - \frac{\gamma T}{\beta+\gamma-\delta+\epsilon}$ when it is not. For unconstrained households, it should be obvious that the comparative statics of child labor and schooling remain symmetrical and of opposite sign (because they are perfect substitutes). For constrained households, on the other hand, it can be shown that child labor will be an increasing function of $\underline{t}$ when $\frac{\alpha\gamma+w\epsilon}{w} < \delta < \gamma + \epsilon$, which will obtain when the weight placed by parents on child leisure (γ) is particularly low.

Table 1 summarizes the resulting comparative statics results when child nutrition and adult labor supply is taken into account, distinguishing between rural and urban and between constrained and unconstrained households.

[Table 1 about here.]

While the underlying Neoclassical model is extremely simple, it does provide us with straightforward interpretations concerning the effects of EduLaw95, the returns to education and price or productivity shocks on educational attainment, child anthropometrics and fertility. Note also the stark contrast between urban and rural households in terms of the comparative statics of household consumption with respect to agricultural prices, a key aspect of the 1994 CFA Franc devaluation, which resulted in a significant boost to agricultural welfare and riots in urban areas. Our highly stylized model predicts that, for urban households, the increase in food prices depressed household consumption (c^*), while the opposite was true for rural households.

4.6 Observable outcomes

The impact of the introduction of EduLaw95, or of changes in other parameters of interest, on observed outcomes is usually the combination of two effects: (i) the effect on constrained households and (ii) that on unconstrained households; moreover, the relative proportions of each type of household is also affected. In order to formalize this intuition and to construct a mapping from our theoretical model to observable outcomes (given that we cannot directly observe whether or not households are constrained in their educational decisions), suppose that each household in the population is indexed by a parameter λ, which in our case can be thought of as some combination of the taste parameters that characterize household preferences, as well as household characteristics such as non-labor income y and household size Ω. Assume that this composite household characteristics is distributed in the population according to the probability density function $f(\lambda)$ over the interval $[0, \overline{\lambda}]$, and that each household's optimal choice of education is given by a strictly increasing function of this parameter: $t^* = t^*(\lambda), t^*_{\lambda} > 0$. Then constrained households are those for whom ${t^*}^{-1}(\underline{t}) > \lambda$. It follows that the expectation of educational outcomes is given by a weighted mean of the educational attainment of constrained and unconstrained households:

$$E[t] = \underline{t} \int_0^{{t^*}^{-1}(\underline{t})} f(\lambda) d\lambda + \int_{{t^*}^{-1}(\underline{t})}^{\overline{\lambda}} t^*(\lambda) f(\lambda) d\lambda. \tag{3}$$

Integrating by parts yields:

$$E[t] = \underline{t}F(t^{*-1}(\underline{t})) + t^*(\overline{\lambda}) - t^*(t^{*-1}(\underline{t}))F(t^{*-1}(\underline{t})) - \int_{t^{*-1}(\underline{t})}^{\overline{\lambda}} t^*_\lambda(\lambda)F(\lambda)d\lambda,$$

which simplifies to:

$$E[t] = t^*(\overline{\lambda}) - \int_{t^{*-1}(\underline{t})}^{\overline{\lambda}} t^*_\lambda(\lambda)F(\lambda)d\lambda. \tag{4}$$

By Leibnitz's Rule:

$$\frac{\partial E[t]}{\partial \underline{t}} = \frac{\partial t^{*-1}(\underline{t})}{\partial \underline{t}} t^*_\lambda(t^{*-1}(\underline{t}))F(t^{*-1}(\underline{t})) = F(t^{*-1}(\underline{t})) > 0, \tag{5}$$

where the last equality follows from the inverse function rule. Thus, the effect of EduLaw95 should be to unambiguously increase expected educational outcomes, and the magnitude of this effect is proportional to the fraction of constrained households in the population.

Now consider a change in a parameter that affects t^*, such as the returns to human capital α. Rewrite equation (3) to account for the returns to education:

$$E[t] = \underline{t}\int_0^{t^{*-1}(\underline{t},\alpha)} f(\lambda)d\lambda + \int_{t^{*-1}(\underline{t},\alpha)}^{\overline{\lambda}} t^*(\lambda,\alpha)f(\lambda)d\lambda.$$

Direct application of Leibnitz's Rule then yields:

$$\begin{aligned}\frac{\partial E[t]}{\partial \alpha} &= \left[\underline{t} - t^*(t^{*-1}(\underline{t},\alpha))\right] f(t^{*-1}(\underline{t},\alpha))\frac{\partial t^{*-1}(\underline{t},\alpha)}{\partial \alpha} + \int_{t^{*-1}(\underline{t},\alpha)}^{\overline{\lambda}} \frac{\partial t^*(\lambda,\alpha)}{\partial \alpha} f(\lambda)d\lambda \\ &= \int_{t^{*-1}(\underline{t},\alpha)}^{\overline{\lambda}} \frac{\partial t^*(\lambda,\alpha)}{\partial \alpha} f(\lambda)d\lambda > 0,\end{aligned} \tag{6}$$

where the second equality holds because $\underline{t} = t^*(t^{*-1}(\underline{t},\alpha))$. As such, increases in the returns to human capital such as those stemming from school construction or improvements in teacher qualifications should always increase expected educational outcomes in the population. Moreover, the sign of these derivatives is always given by the corresponding comparative statics result for unconstrained households.

Now consider a non-educational outcome, such as fertility choice. Then expected fertility in the population is given by:

$$E[n] = \int_0^{t^{*-1}(\underline{t})} \widetilde{n}(\lambda,\underline{t})f(\lambda)d\lambda + \int_{t^{*-1}(\underline{t})}^{\overline{\lambda}} n^*(\lambda)f(\lambda)d\lambda.$$

In this case, the effect of an increase in the minimum years of education can be decomposed into two components, which are likely to be of opposite sign:

$$\begin{aligned}\frac{\partial E[n]}{\partial \underline{t}} = &\frac{f(t^{*-1}(\underline{t}))}{t^*_\lambda(t^{*-1}(\underline{t}))}\left[\widetilde{n}(t^{*-1}(\underline{t}),\underline{t}) - n^*(t^{*-1}(\underline{t}))\right] \\ &+ \int_0^{t^{*-1}(\underline{t})} \frac{\partial \widetilde{n}(\lambda,\underline{t})}{\partial \underline{t}} f(\lambda)d\lambda.\end{aligned} \tag{7}$$

In the case of homogeneous preferences, we have shown that $\widetilde{n} < n^*$, so the first term is negative. Conversely, our comparative statics results show that the second term is positive. As such, the effect of EduLaw95 on fertility is ambiguous.

Finally, consider the effect on a choice variable such as fertility choice of changes in the returns to education (or any variable aside from $\underline{t}$). Recalling that unconstrained fertility choice is itself a function of α, we can write expected fertility as:

$$E[n] = \int_0^{t^{*-1}(\underline{t},\alpha)} \widetilde{n}(\lambda,\alpha) f(\lambda) d\lambda + \int_{t^{*-1}(\underline{t},\alpha)}^{\overline{\lambda}} n^*(\lambda,\alpha) f(\lambda) d\lambda.$$

Then:

$$\begin{aligned} \frac{\partial E[n]}{\partial \alpha} = & \frac{\partial t^{*-1}(\underline{t},\alpha)}{\partial \alpha} f(t^{*-1}(\underline{t},\alpha)) \left[\widetilde{n}(t^{*-1}(\underline{t},\alpha),\alpha) - n^*(t^{*-1}(\underline{t},\alpha),\alpha)\right] \\ & + \int_0^{t^{*-1}(\underline{t},\alpha)} \frac{\partial \widetilde{n}(\lambda,\alpha)}{\partial \alpha} f(\lambda) d\lambda + \int_{t^{*-1}(\underline{t},\alpha)}^{\overline{\lambda}} \frac{\partial n^*(\lambda,\alpha)}{\partial \alpha} f(\lambda) d\lambda. \end{aligned} \tag{8}$$

Since $\frac{\partial t^{*-1}(\underline{t},\alpha)}{\partial \alpha} < 0$, the first term is positive, at least for homogeneous preferences. For the case of rural households, our comparative statics results from Table 1 yield $\frac{\partial \widetilde{n}(\lambda,\alpha)}{\partial \alpha} = \frac{\partial n^*(\lambda,\alpha)}{\partial \alpha} = 0$, and improvements to the returns to education should unambiguously increase fertility. For urban households, on the other hand, $\frac{\partial n^*(\lambda,\alpha)}{\partial \alpha} = 0$ and $\frac{\partial \widetilde{n}(\lambda,\alpha)}{\partial \alpha} < 0$, so the net effect is ambiguous.

5 Empirical design

5.1 Data

We constructed a unique dataset on household living standards and shocks in Côte d'Ivoire, spanning three decades, by relying on multiple sources.

5.1.1 Côte d'Ivoire household surveys

We obtained data from household surveys for Côte d'Ivoire that cover three decades from 1984 until 2015. The surveys were conducted by the National Statistical Institute of Côte d'Ivoire. There are three series of national household surveys for Côte d'Ivoire, providing a total of ten waves at irregular intervals: (i) the "Enquête Permanente Auprès des Ménages" (EPAM) or "Côte d'Ivoire Living Standards Survey" (CILSS) conducted annually from 1985 to 1988; (ii) the "Enquête Prioritaire sur les Dimensions Sociales de l'Ajustement" (EPDSA) or "Survey on the Social Dimensions of Structural Adjustment" conducted in 1992/1993, and (iii) the "Enquête sur le Niveau de Vie des Ménages" (ENV) conducted in 1995, 1998, 2002, 2008, and 2015. Though the EPAM have a clear panel structure at the household level, the remaining surveys do not share this feature. To utilize the longitudinal advantages embedded in these surveys spanning 30 years, we stack all waves together, disregarding the panel structure. For simplicity, we refer to these data collectively as the "ENV" (surveys of living standards).

ENV waves differ in terms of the sampling instruments used, the number of households surveyed, geographical coverage, survey questions and data availability. More specifically, ENV 1985, ENV 1986, ENV 1987, and ENV 1988 share the same survey structure, ENV 1993 and ENV 1995 share a similar survey structure, ENV 1998 and ENV 2002 share a consistent survey structure, and ENV 2008 and ENV 2014 follow a similar survey structure. We only include variables that are consistently measured across different waves.

"Years of education," also referred to as "years of schooling," records the total standardized years of education the individual has obtained. Standardization is based on the following rules: the highest grade attained in the highest level of education plus the standard years required by all lower levels of education—6 for primary school, 4 for lower secondary school, and 3 for upper secondary school. Note that pre-school does not count towards "years of education". Our standardized "years of education" is not affected by skipping or repeating grades, and is thus consistent and comparable among all individuals. The dummy variable "School attendance" or "attending school" is equal to one if the individual has ever attended school during the past academic year and zero otherwise.

"Grade deviation" is constructed to provide a measure of the (high) prevalence of grade repetition. It is defined as the difference between the actual "years of education" obtained by the individual and the standard "years of education" designated for the corresponding age.[9] Positive numbers indicate being ahead of the standard grade while negative numbers represent lagging behind. In terms of the theoretical interpretation, years of education and the school attendance dummy correspond to t, while the grade deviation variable is inversely related to t.

Recall that in our neoclassical model, school-age children allocate time between working and schooling. Therefore, we construct a dummy variable "child labor" to reflect children's participation in non-chore economic activities, corresponding to $T - t$ in the model.[10] The information is inferred from the self-reported answer to relevant ENV survey questions. Thus, we expect this variable to serve as the lower bound to the real prevalence of child labor.

In addition to educational outcomes, we also look at the health and anthropometric outcomes of infants: In terms of our Neoclassical household model, this corresponds to x. "Height for age" or "length/height for age" is the standardized z-score (HAZ) of an individual's height for a given age and gender. "Weight for age" (WAZ) and "Weight for height" (WHZ) are constructed in a similar manner. Both are calculated according to the Growth Reference by World Health Organization (2006).

The final set of outcomes concern fertility. "Number of children" is simply the total number of children of the household head. Note that this variable ignores heterogeneity in age. Following Rosenzweig (1982), our second measure, "relative fertility", is standardized for age. It measures actual fertility relative to natural fertility. Specifically, it is the total number of children divided by the sum of the natural fertility at the given age of all wives.[11]

We consider several household characteristics as covariates. "Urban" is a dummy variable that equals one when the household resides in an urban area and zero otherwise. In terms of our theoretical modeling, this corresponds to the distinction between the model in which households are net food consumers and that in which they are net food producers. "Household size" is the total number of individuals in the household. "Share of household expenditure on food" is just that and is expected, through the usual Engel curve relationship, to be positively correlated poverty. "Cocoa farmer" and "Coffee farmer" are dummy variables indicating that at least one member of the household is involved in the farming of cocoa and coffee, respectively. "Household head's ethnic group" records the ethnic group of the household head, with the following categories: Mandé North, Mandé South, Gour, Krou, Kwa, non-Ivorian, and others. "Household head's occupation sector" records the economic sector of the household head's occupation, with the following categories: primary sector, secondary or tertiary sector, public sector, and others.

The following variables measuring individual characteristics are also included: "female" dummy, "age" (either in years or months), "weekly working hours" (not working is recorded as zero), "mother's years of education" (provided that the mother can be linked to the household identifier).

5.1.2 Commodity prices, climate data and other shocks

We obtained commodity prices from the Food and Agriculture Organization of the United Nations (FAO), for the 1970–2018 period. Since we are interested in the potential impact of the prices of cash crops on farmer's decisions, we define price as the "producer price", which measure prices at the factory or plantation gate. All producer prices are year-specific means. In terms of the theory, these variables correspond to p. In this case, the distinction between net food consumers and net food producers is

9. The standard "years of education" designated for age x is approximately x-6, for those aged 6 to 16. For instance, 4 years of schooling is the designated standard for individuals aged 10. If an individual aged 10 has obtained 3 years of schooling, the corresponding "grade deviation" for that individual is -1, or 1 year behind; if an individual aged 10 has obtained 5 years of schooling, the corresponding "grade deviation" for that individual is $+1$, or 1 year ahead.

10. More precisely, "child labor" corresponds to whether $T - t$ is strictly positive.

11. The natural fertility is the cumulative number of children of a woman, assuming no contraception, measured at a given age. Note that the natural fertility is not the maximal fertility. Thus, relative fertility can take values larger than 1.

particularly salient. We focus on two major cash crops in Côte d'Ivoire—cocoa and coffee. We measure shocks in the producer prices of cocoa and coffee in two ways. The first measure is the year-on-year change in the log annual producer prices of either cocoa or coffee. The second measure is the year-on-year change in the annual price of either cocoa or coffee relative to the price of staple crops. The annual price of staple crops is the average price of a bundle of the main staple crops including cassava, maize, plantain, yam, and rice (Food and Agriculture Organization 2009).

For each individual, the price shocks are aggregated (in an additive manner) to various age intervals: age 0–4, age 5–9, age 10–14 and since last year (i.e., current year of the survey and the previous year). Positive price shocks include only price increases during the given time interval and negative price shocks include only price decreases during the given time interval.

We also obtained data on rainfall and temperatures. Monthly data on precipitation and daily mean temperature are obtained from the Climatic Research Unit (CRU) TS version 4.04, at the 0.5° by 0.5° grid level. Daily data on maximum temperature and minimum temperature are obtained from the fifth generation ECMWF reanalysis of atmosphere (ERA5), at a 0.25° by 0.25° grid level.

For precipitation data, monthly rainfalls are first aggregated to annual rainfall by summation, at the grid level. Then the standardized z-scores are calculated at the grid level, with respect to the mean and standard deviation of annual rainfalls over the observed time period for a given grid cell. Finally, the z-scores are aggregated from the grid level to three rural regions (east forest, west forest, and savannah), by taking their arithmetic mean. Similarly, monthly mean temperature data at the grid level are aggregated to annual z-scores at the regional level.

For maximum and minimum temperature, we define two types of extreme episodes—hot day episodes if the daily maximum temperature is higher than 30 ℃ and chilly day episodes if the daily minimum temperature is lower than 10 ℃. Both hot day episodes and chilly day episodes can have a negative impact on the yield of cocoa and coffee. Episodes are first identified at the grid level for each observed day. Then we calculate annual episodes at grid level by summation. Finally, we aggregate annual episodes from the grid level to three rural regions (east forest, west forest, and savannah), by taking the arithmetic mean.

As with the price shocks, the weather shocks, for each individual, are aggregated, by summation, to four age intervals. For the rainfall shocks, (positive) flood shocks correspond to z-scores larger than +0.5 during the given age interval and (negative) drought shocks correspond to z-scores smaller than −0.5. Weather shocks can easily be incorporated into the theoretical model of net food producers by allowing for a productivity parameter A. In this case, total income from agricultural production in equation (2) is now equal to:

$$pA[L + \phi(T - t)].$$

The corresponding comparative statics with respect to A are given in Table 1. We also consider other economic and political shocks. These include the 1994 depreciation of the CFA franc (Azam 2004) and Côte d'Ivoire's two civil wars (using PRIO conflict data) mentioned earlier. The devaluation corresponds of course, to an increase in the relative price of agricultural output p. The entire first Ivorian Civil War took place between ENV 2002 and ENV 2008, while the second occurred between ENV 2008 and ENV 2015. From the theoretical standpoint, the impact of the civil war is complex in that it simultaneously affected agricultural prices p, wage rates w, agricultural productivity A and the returns to education α.

5.1.3 Quantity of education supply

We digitized the data on the quantity of education supply from the Annual Statistics of Education (1984–2015), including the number of schools, the number of classes, and the number of students enrolled. The supply side variables are available at subnational levels—department, region, or district, depending upon the year. We also obtained subnational level population data from the national census or Recensement Général de la Population et de l'Habitation (RGPH). These subnational level variables are matched to the main dataset.[12]

We further construct three variables from these raw supply side variables—"class size", "number of schools per 1000 students", and "number of schools per 10,000 residents". "Class size" is defined as the number of enrolled students or pupils per class. It is an (inverse) indicator of intensity of educational resource and educational quality. The larger the class size, the less educational resource each student is endowed with, and hence the lower educational quality is expected for an average student.

"Number of schools per 1000 students" is defined as the number of schools/establishments per 1000 enrolled students. This is also an indicator for endowment of educational resource and is expected to be positively correlated with educational resource and quality.

"Number of schools per 10,000 residents" is the number of schools/establishments divided by the population (in 10,000s) in the administrative division. This variable, unlike the previous two, is a pure supply side indicator, and is closely related to educational investment and expenditure.

All these subnational level variables on the quantity of education supply are separately calculated for primary level education and lower secondary level education. Moreover, those for primary education are only matched to individuals aged 6 to 12 living in the corresponding area, and those for lower secondary education are matched to individuals aged 13 to 16 living in the corresponding area.

5.1.4 Quality of education supply

Our measures of the quality of education come from the Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN (PASEC). PASEC is a project evaluating the learning achievement of primary school pupils in several francophone Sub-Saharan African countries, similar to the Programme for International Student Assessment (PISA) conducted by the OECD. PASEC evaluates the reading literacy and mathematics ability of a nationally representative sample of second and fifth/sixth grade pupils. In addition, PASEC surveys pupils on their socio-economic backgrounds, teachers on their educational background and class characteristics, and school directors on school management and infrastructure.

Four waves of PASEC evaluations were undertaken in Côte d'Ivoire during the 1995–1996, 2008–2009, 2013–2014 and 2018–2019 academic years. The 2013–2014 and 2018–2019 waves report the ability of Grade 2 and Grade 6 pupils in French literacy and mathematics using standard scores. Each of the four scores has a mean of 500 and a standard deviation of 100 across all participating countries in the same wave. We transform the French and mathematics scores of the 1995–1996 and 2008–2009 waves in a similar manner.[13] It should be noted that these scores are not directly comparable across waves (Altinok et al. 2018). Thus, the raw standard scores can only reflect the ability level relative to the average pupil of the same grade in Francophone Sub-Saharan African countries. To simplify interpretations of empirical results, we divide the scores by 500 so that the score for the average ability equals 1. In other words, the rescaled test scores measure ability relative to its average level.

We include two variables from the PASEC data to measure the quality of education. The student-level variable measuring the quality of education output, "test score", is the average of the standardized French score and the standardized mathematics score. The class-level variable "teacher qualification" measures the quality of the teacher, which is a key education inputs. Specifically, "teacher qualification" is defined as whether the teacher holds an upper secondary education diploma or higher.

We then aggregate both variables through two approaches. The first approach aggregates by taking the mean for a birth cohort, together with the evaluation year, location (rural/urban) and gender.

12. Specifically, the subnational administrative divisions are departments (departements) for ENV 1985 / 1986 / 1987 / 1988 / 1993 / 1995 / 1998 / 2002 and regions (régions) for ENV 2008/2014. Please refer to Table 3 for the specific annual statistics of education and census matched with each wave of ENV.

13. For 1995–1996, the standardization is performed across Burkina Faso (1995–1996), Côte d'Ivoire (1995–1996), Cameroon (1995–1996), Guinea (2003–2004), Madagascar (1997–1998), Mali (2001–2002), Niger (2001–2002), Senegal (1995–1996), and Togo (2000–2001). For 2008–2009, the standardization is performed across Burkina Faso (2006–2007), Burundi (2008–2009), DR Congo (2009–2010), Congo-Brazzaville (2006–2007), Côte d'Ivoire (2008–2009), Gabon (2005–2006), Comoros (2008–2009), Senegal (2006–2007), Tchad (2009–2010), and Togo (2009–2010).

The result from this "cohort aggregation" is matched to individuals of the given gender, born in the given years, residing in the given location, and surveyed in ENV waves no earlier than the given PASEC wave.[14] The second approach aggregates by taking the mean for a year, together with location (rural/urban) and gender. Results from this "year aggregation" are then matched to individuals of the given gender, residing in the given location, and surveyed in the same ENV wave as the given PASEC wave.[15] Note that after aggregation, "teacher qualification" in fact measures the proportion of teachers holding upper secondary or higher diplomas.

The cohort aggregation measures, namely "test score (cohort)" and "teacher qualification (cohort)", measure the quality of the education that the individual has or would have received and can be treated as the intensity of exposure. On the other hand, the year aggregation measures, namely "test score (current year)" and "teacher qualification (current year)", can be treated as socio-demographic characteristics and may be used as explanatory variables.

The impact of the quantity and quality of education is reflected in the theoretical model in changes in the returns to education parameter α. Our theoretical construct (equation (6)) predicts that increases in the returns to education should increase optimal educational attainment for unconstrained households (and thus the population mean), and improve nutritional outcomes for both unconstrained and unconstrained households, be they located in urban or in rural areas.

5.1.5 Analytical sample and descriptive statistics

We pool the individual level observations in all ten waves of the ENV from 1985 to 2014, which we match to the shock data described above. This yields 58,466 households and 307,640 individuals of all ages.

[Table 2 about here.]

Table 2 reports descriptive statistics of the core variables for the first and last waves of the ENV, with all data aggregated at the household level and weighted by household sampling weights. For the eight other waves, please refer to the descriptive statistics in Table A1 and Table A2 in the appendix.

There is a clear trend towards greater urbanization, with the share of residents living in urban areas increasing from 42.8% in 1985 to 48% in 2014, though it decreased slightly in the late 1980s and early 1990s and again in the early 2000s. The average size of an Ivorian household dropped sharply from 7.4 individuals per household in 1985 to 3.5 individuals per household in 2014. A related measure is the number of adult equivalents per household, which has also witnessed steady drop from 4.8 in 1985 to 2.4 in 2014. The trend in household poverty is, in general, encouraging. The share of household expenditure spent on food has fallen continuously, from 54.4% in 1985 to 49.6% in 2014.

Educational attainment generally follows an upward trend over the three decades we consider. The average years of education, for the population aged at least 6, increased by almost a full year, from 2.28 years in 1985 to 3.26 in 2014. However, in 1993 the average years of education dropped to 1.9, bouncing back to 2.2 in 1995, the same level as in 1988. For the school age population, on the other hand, the share attending school during the current academic year has remained relatively stable over the past three decades. It fell from 17% in 1987 to 13% in 1988 and remained at that level until 1993. Then it climbed to 19% in 1995 and 21% in 1998. The level remained above 21% in 2002 and then decreased again to around 17% in 2008 and 2014. Among children of school age, there has also been a drop in the number of grades by which students lag behind where they should be, given their age: from 2.3 standard grades in 1985 to only 1.95 standard grades in 2014. The average years of education

14. Here we consider the following three-year birth cohorts: ages 6, 7, and 8 for the second grade, ages 9, 10 and 11 for the fifth grade, and ages 10, 11, and 12 for the sixth grade. For instance, individuals born in 1990, 1991 and 1992 are considered from the same birth cohort as the second grade in PASEC 1995–1996.

15. The following pairs of PASEC and ENV waves are treated as the same waves: PASEC 1995–1996 and ENV 1997; PASEC 2008–2009 and ENV 2010; PASEC 2013–2014 and ENV 2014.

of a child's mother, for children whose mother can be identified within the household, increased from 1.3 years in 1985 to a peak of 2.8 in 2008. The figure stands at 2.1 in the 2014 survey.

For infants younger than 60 months, HAZ has decreased over time. The average z-score was -0.47 in 1985 and gradually dropped to -2.97 in 2014. WHZ, on the contrary, increased over time. The figure was -0.23 in 1985 and rose to 3.12 in 2014.

Variables such as the share of female household members, and the average age of household members remain relatively consistent across all waves. The female share was around 48% from 1985 until 2002, before it dropped to 45% in 2008 and further to 43% in 2014. The average age of all household members fluctuates between 25 and 27 across all survey waves.

The ENV surveys show that average Ivorians are working more hours per week than in the past. The average number was 15.8 in 1985 and gradually increased over the years and reached 25 hours per week in 2008. However, it then dropped sharply to 15.3 in 2014, likely because of the sharp drop among children younger than 16.

The final set of variables concerns the ethnic group of household heads. We categorize five large ethnic groups (Mandé North, Mandé South, Gour, Krou, and Kwa) in addition to other small ethnic groups and non-Ivorians. There is some fluctuation for each category across survey waves, due to sampling and categorization differences. Mandé North and Mandé South together make up roughly 20% to 25% of all households, Gour account for 10%, Krou for 15%, and Kwa, the largest of all, represent roughly 30% of all Ivorian household heads.

[Figure 3 about here.]

Figure 3 plots the various shocks over three decades. Panel A shows the producer prices of crops since 1960s. There was an abrupt drop in the producer price of cocoa and coffee prior to 1994, after a decades-long increase, which was partially responsible for the 1994 devaluation of the CFA Franc. Cocoa and coffee prices then resumed increasing after the devaluation. Prices also began to fluctuate more wildly, and in 1999, the Ivorian government decided to abolish the marketing board known as the Caisse de stabilisation des prix (Caistab). The liberalization of coffee and cocoa prices caused the variance in prices to increase even further. After the 2002 Civil War, producer prices of both coffee and cocoa suffered large hits and were affected more severely than staple crops.

Rainfall shocks, as shown in Panel B, are mild in most years with several years of strong flood shocks and several years of strong drought shocks across regions. In general, droughts are more common than floods in all three rural areas. There is, however, no discernable pattern across the three rural areas in terms of precipitation shocks.

Panel C shows a general increasing trend in the average daily temperature across the country, and Panel D shows a steady and slightly increasing trend in hot day episodes in all three regions. Global warming has left its mark in both panel C and D. There are few years where temperatures display significant negative shocks, as opposed to their generally upward trend. In general, the savannah area is hotter than the other two forest regions in all years.

[Table 3 about here.]

The descriptive statistics of the supply of education, summarized over regions by academic year, are presented in Table 3.[16] The number of secondary and primary schools across the country remained relatively stable in the late 20th century, and the expansion took off in the early 21st century. By 2014, the average number of primary schools per region reached 1485, 6 times higher than that in 1980s; while the number of secondary schools per region also witnessed a six-fold increase to 137 establishments. The

16. Note that for descriptive statistics we use a common definition of "region" which is consistent across academic years. This is based on "DREN" (Direction Regionale de l'Education Nationale) definition in 1995, which divides the country into ten regions for educational affairs, and each region is supervised by a regional office named after the seat city—Abengourou, Abidjan, Bondoukou, Bouaké, Daloa, Korhogo, Man, Odienné, San-Pédro, and Yamoussoukro.

trends in the number of classes and the number of students follow a similar pattern—both statistics increased moderately in 1980s to 1990s and rose drastically after 2000; afterwards, the number of classes and students for primary education entered a stage of leveling in 2010s, while the corresponding numbers for lower secondary education continued to grow.

For selected rural communities surveyed in ENV 1985–1988, some information on the supply of education is also available. Among the 54 rural clusters in ENV 1985, 49 clusters, or 90%, had primary schools within the cluster, but none had secondary schools. The average distance to the nearest secondary schools for these 54 rural clusters was 25 kilometers. The figures remained stable through the four waves in late 1980s.

[Figure 4 about here.]

Panel A of Figure 4 demonstrates a general increasing trend in the number of schools in all regions in Côte d'Ivoire. Abidjan, the country's largest metropolitan area, accounts for the largest number of schools and has also experienced the fastest expansion of school construction, especially in secondary education after 2000.

The number of schools per 1000 students, or the inverse of school capacity, has been decreasing over the years. As shown in Table 3, there were around 5.5 primary schools per 1000 pupils and 1.5 secondary schools per 1000 students in 1980s. The corresponding figures in 2014 were 4.8 primary schools and 1.1 secondary schools.

The number of schools per 10,000 residents, on the contrary, has been increasing. The construction of both secondary and primary schools has been faster than the growth of population in Côte d'Ivoire. In 1980s, there were only 6 to 7 primary schools and 0.3 secondary schools per 10,000 residents. In 2000, an average region in Côte d'Ivoire had already over 11 primary schools and 0.6 secondary schools per 10,000 residents. The numbers fell slightly afterwards since population growth took off.

Class size, on the other hand, witnessed a completely different trend, as shown in both Table 3 and Panel C of Figure 4. The number for primary education (bottom graph) stayed around 36 pupils per class in 1980s. After the 1995 educational reform, the number rose to 49, as more pupils are enrolled in school while the investment in infrastructure lagged behind. The expansion in educational investment and expenditure after 2000 pressed down the class size in primary education and the figure landed on 43 pupils per class in 2014. The story for secondary education is slightly different. Class size in lower secondary education (top graph) was around 55 students per class in 1980s. The 1994 devaluation strongly hit the enrollment in lower secondary education, which resulted in a sharp drop in class size of lower secondary education in 1990s (Panel B of Figure 4). As a matter of fact, ENV 1995 surveyed parents on their reaction to the 1994 devaluation, and approximately 5% reported that they have pulled their children out of school, around 8% reported that they had transferred their children from schools in the cities to schools in the villages, and 11% reported that they had sent their children to work instead of school. The trend was then flipped around the turn of the century, and the figure started to increase again. In 2014, class size in lower secondary education increased to 83 students per class.

[Figure 5 about here.]

The evolution in the average test score and teacher qualification, separated by grade, gender and location, is plotted in Figure 5. The test scores of both grades follow a V-shaped trend over the observed period. Ivorian students in 1996 showed a medium level of reading and mathematics ability. However, their performance level in 2009 dropped abruptly by 15% relative to pupils in other Francophone Sub-Saharan African countries. Performance level of Ivorian pupils of both grades improved in 2014. The academic performance of the second-grade pupils (solid lines) continued to improve in 2019, while that of the sixth-grade pupils (dashed lines) once again took a downturn.

The gender gap in test score (plots in the upper row) is quite small, with boys (blue lines) performing slightly better than girls (red lines) overall. As for teachers' qualification (plots in the lower row), there is virtually no gender gap. Urban pupils (plots in the right column) have a large advantage over rural pupils (plots in the left column), especially in test score. Urban pupils of both genders in both grades consistently and systematically outperform their rural counterparts by approximately 10%.

Depending on the outcome of interest, we restrict our attention to specific subsamples of observations. For the educational "years of education" outcome, the analysis is restricted to individuals aged 17 to 54, as their level of education is relatively stable and beyond the reach of the impact of EduLaw95. For both "school attendance" and "grade deviation", the analysis is restricted to individuals aged 6 to 16, the target age group of EduLaw95. Since the WHO's Growth Reference (2006) only provides anthropometric references for ages up to 60 months, we restrict both health outcomes ("height for age"/HAZ and "weight for height"/WHZ) to individuals aged 0 to 5.

For each regression, in addition to the above restrictions, the sample is restricted to observations with no missing values for all included independent variables. As independent variables vary across different specifications, the samples vary in size, even for regressions with the same outcome variable. We report the number of observations included in each regression along with the parameter estimates.

5.2 Empirical methodology

5.2.1 Benchmark models

Consider the following benchmark model

$$y_{bi} = x_{bi}\beta + D_b\delta + \varepsilon_{bi} \tag{9}$$

where

y_i is the outcome of individual i born in year b; namely, "years of education", "school attendance", "grade deviation", "weight for height", or "height for age".

D_b is the treatment or exposure status of individuals born in year b. There are two different definitions of exposure (graphically shown in Figure 6):

- a dummy variable "exposed" (green blocks in Figure 6), which equals 0 if the individual is 17 or older in 1995 and equals 1 if the individual is 5 or younger or not born yet in 1995; or
- belonging to the younger cohorts between two exposure cohorts. We categorize each individual as belonging to at most one of the following exposure cohorts (blue blocks in Figure 6):

"Pre" Individuals entirely unexposed to EduLaw95; specifically, those aged 17 to 21 in 1995;

"Post" Individuals fully exposed to EduLaw95; specifically, those aged 1 to 5 in 1995;

"Ctrl" Individuals entirely unexposed to EduLaw95, older age group as control experiment; specifically, those aged 22 to 26 in 1995.

- ∗ For treatment by EduLaw95, "post" are the younger cohorts with respect to "pre".
- ∗ For the "placebo" treatment, "pre" are the younger cohorts with respect to "ctrl".

In case of anthropometric outcomes, we use the exposure of the older siblings instead:

- Any of the older siblings (living in the same household) of the infant is exposed; or
- Any of the older siblings (living in the same household) of the infant belongs to "post" (for treatment) or "pre" (for placebo).

x_{bi} are individual and household characteristics, such as age, sex, household size, and the share of household expenditures devoted to food.

[Figure 6 about here.]

It is likely that there are some unobserved characteristics α_{bi} embedded in ε_{bi} which are correlated with D_b and/or x_{bi}. Typically, birth-cohort fixed effects can eliminate such individual-specific unobserved characteristics through the within transformation. However, we cannot include birth-cohort fixed effects because they would be perfectly colinear with treatment status, which itself is based upon an individual's year of birth.

5.2.2 Pseudo-panel models

To account for time-invariant correlated unobservables, we adopt the pseudo-panel approach first proposed by Deaton (1985) and later developed in an IV framework by Moffitt (1993). Though each individual is only observed in one survey round, we can still add a time subscript $t = 1, \cdots, T$ to equation 9, corresponding to each survey wave. This yields:

$$y_{bi(t)} = x_{bi(t)}\beta + D_{b(t)}\delta + \varepsilon_{bi(t)} \tag{10}$$

where the indices correspond to individual i, born in year b, living in household h, surveyed in year t. We then decompose the disturbance term into $\varepsilon_{bi(t)} = \alpha_{hbi} + u_{bi(t)}$ where α_{hbi} is its time-invariant component. This yields:

$$y_{bi(t)} = x_{bi(t)}\beta + D_{b(t)}\delta + \alpha_{hbi} + u_{bi(t)} \tag{11}$$

Denote pseudo cohorts by $c \in \{1, \cdots, C\}$, defined by some set of time-invariant individual and household characteristics. Let $z_{chbi} = 1$ if individual i, born in year b, living in household h belongs to pseudo cohort c, and 0 otherwise. Note that all individuals in each household h must belong to exactly one pseudo cohort, which is time-invariant. Then we have:

$$\alpha_{hbi} = \sum_{c=1}^{C} \alpha_c z_{chbi} + v_{hbi}$$

Let $\alpha = (\alpha_1, \cdots, \alpha_C)'$ and $z_{hbi} = (z_{1hbi}, \cdots, z_{Chbi})'$. Then 11 can be rewritten as:

$$y_{bi(t)} = z_{hbi}\alpha + x_{bi(t)}\beta + D_{b(t)}\delta + v_{hbi} + u_{bi(t)} \tag{12}$$

It is likely that v_{hbi} and $x_{bi(t)}$ are correlated. However, there is a set of natural instruments for $x_{bi(t)}$ and $D_{b(t)}$—cohort dummies in z_{hbi} interacted with time. Hence, we can estimate 12 by instrumenting $x_{bi(t)}$ with $\bar{x}_{c(t)} = \frac{\sum_i z_{chbi} x_{bi(t)}}{\sum_i z_{chbi}}$, and $D_{b(t)}$ with $\bar{D}_{c(t)} = \frac{\sum_i z_{chbi} D_{b(t)}}{\sum_i z_{chbi}}$.

Following the suggestions in Verbeek (1996), we choose the following household-level time-invariant variables to construct the pseudo cohorts: sex of the household head, birth decade of the household head, educational attainment of the household head, and five regional dummies.[17]

[Table 4 about here.]

Table 4 reports the structure of pseudo cohorts by survey wave.

As a robustness check, we also replicate our main regression results using several alternative definitions of pseudo cohorts.

6 Results

6.1 Educational outcomes

[Table 5 about here.]

17. The five regions/strata are: "Abidjan", "other cities", "west forest", "east forest", and "savannah". Note that the first two regions are urban strata, and the last three regions are rural strata.

Firstly, we examine the effect of EduLaw95 on educational outcomes. Estimates of equation (12) indicate a positive effect on educational attainment of exposure to EduLaw95, as would be predicted by the theoretical expression in equation (5) being positive. As reported in Table 5, for adults aged 17 to 54 at the time of a given survey, those completely exposed to EduLaw95 obtained, on average, 2 years more formal education than those completely unexposed to EduLaw95.

There is also a wide gender gap in years of education—women have, on average, approximately 3 years less formal education than men. In our Neoclassical household model, this can be explained in terms of gender-specific differences in the household preferences stemming from educational attainment, or in gender-specific differences in the returns to education. If we allow household preferences to weight male and female educational attainment differently, and allow the returns to education to be gender-specific, it can be shown that the ratio of unconstrained male to female educational attainment is given by:

$$\frac{t_f^*}{t_m^*} = \frac{\beta_f \left(A\phi p - \alpha_m\right)}{\beta_m \left(A\phi p - \alpha_f\right)}, \tag{13}$$

for rural households, where β_f and β_m are the gender-specific exponents associated with child educational attainment in the household utility function and α_f and α_m are the gender-specific returns to education. A similar expression holds for urban households, where $A\phi p$ is replaced with σw. Household preference for the education of male offspring ($\beta_f < \beta_m$) and higher labor market returns to male education ($\alpha_m > \alpha_f$) both contribute to the gender gap in educational outcomes. Note also that older generations have slightly less formal education than younger generations, but the gap is quite small. Household size, weekly working hours, and the share of household expenditure on food are all negatively and insignificantly related to years of education, though all of these variables are likely to be subject to a good deal of endogeneity.

[Table 6 about here.]

Estimates reported in Table 6, which compare the effect of exposure (Columns 1 to 4) to that of the placebo treatment (Columns 5 to 8), yield a point estimate of roughly 0.5 years more education. For example, the placebo treatment in Column 7 yields younger cohorts ("pre") having roughly 0.4 years more formal education than the older cohorts ("ctrl") and the difference is statistically insignificant. Concomitantly, the impact of exposure to the law, reported in Column 3, shows that the younger cohorts ("post") have 0.96 years more formal education than the older cohorts ("pre").[18] The difference-in-differences in this case is 0.56 years.

There was also a reduction in the gender gap, from approximately 4 years (pre versus ctrl) to approximately 2.5 years (post versus pre).[19] In terms of the Neoclassical model, this is because an increase in the number of constrained households leads to an increase in the proportion of households in the sample for which the ratio $\frac{t_f^*}{t_m^*}$ from equation (13) is now equal to 1.

Neither age, household size, or weekly working hours are important factors: The corresponding coefficients are both statistically and economically insignificant in most cases. Poverty, as proxied by the share of household expenditures devoted to food, is negatively correlated with years of education—a 10 percentage point increase in the food share is associated with a 0.4-year drop in years of education in the treatment of interest (column 4) and a 0.2-year drop in the placebo treatment (column 8). These numbers should be taken with a grain of salt, however, since poverty is very likely to be endogenous, as are household size and weekly working hours.

[Table 7 about here.]

We then turn to other educational outcomes for children of school age (6 to 16). Results in Table 7 show that exposure to EduLaw95 led to an increase of between 8 and 14 percentage-points in the school

18. In both Columns 3 and 7, survey waves 1993, 1995, and 2002 are omitted, as in Columns 4 and 8, since the variables "weekly working hours" and "share of household expenditure on food" are not available in these three survey waves.

19. This stems from comparing Column 2 with Column 6, 3 with 7, or 4 with 8.

attendance rate (Columns 1 to 3). Exposure to EduLaw95 also led to children catching up by 0.2 grades with respect to where they should have stood, given their age (Column 4), though the point estimate is often statistically indistinguishable from zero (comparing Column 5 with Column 6).

The effect on child labor participation mirrors the effect on schooling. Column 7 shows that exposure to EduLaw95 reduce the probability of school-age children participate in the labor force by 3.2 percentage points.

Comparing the treatment of interest (post versus pre) with the placebo treatment (pre versus ctrl), exposure to EduLaw95 has also reduced the gender gap in grade deviation from 1 to 0.5 grades, and has even wiped out the gender gap in child labor participation, but it appears to have widened the gender gap in the school attendance rate from 6.1 percentage points to 13 percentage points. The age gap in terms of the school attendance rate has been narrowed down from -3.4 percentage points per year of age to -1.8 percentage points per year of age. This drop also occurs for grade deviation, but the magnitudes are smaller—from -0.78 standard grades per year of age to -0.6 standard grades per year of age.

6.1.1 Quantity of education supply

We now add the supply side into the analysis regarding educational outcomes. Three variables related to the quantity of the education supply are included in this subsection: class size, number of schools per 1000 students, and number of schools per 10,000 residents. Note that we expect from the comparative statics result of equation (6) that increases in the quantity and (as examined below in Section 6.1.2) the quality of education to unambiguously increase educational attainment in that they should both increase the returns to education parameter α in our theoretical model. Our theoretical model, including when it explicitly incorporates child leisure in parental preferences, also implies that child labor should fall.

[Table 8 about here.]

Table 8 reports results after controlling for the supply of education. We find that larger class size is associated with lower school attendance rate and higher child labor participation, but reduced gap in standard grade. For each additional student taken in by a class, the attendance rate is approximately 0.4 percentage points lower, the prevalence of child labor is 0.2 percentage points higher, and the standard grade is, on average, 0.01 years more ahead (or less lagged behind).

The number of schools per 1,000 students, or inversely the school size, is positively associated with both attendance rate and grade deviation. For each additional 1,000-student school built, school attendance rate is 7.2 percentage points higher, child labor participation is 3.3 percentage points lower, and enrolled students reduce the gap to standard grade by 0.3 years.

The number of schools per 10,000 residents, on the other hand, is positively correlated with school attendance while negatively correlated with standard grade and child labor. For every new school built per 10,000 residents, students are 0.2 percentage points less likely to engage in economic activities as child labor, and 0.3 percentage points more likely to enroll in formal education, but also are 0.03 years more lagged behind the standard grade.

Consistent with previous estimates, after controlling for the quantity of education supply, girls are 11 to 15 percentage points less likely to attend school than boys, and meanwhile 7 percentage points more likely to work as child labor. Regarding the standard grade, girls are 0.8 to 1.1 grades behind boys, ceteris paribus.

We further examine the mechanism through which the supply of education, along with exposure to EduLaw95, impacts educational outcomes. Table A5 shows heterogeneity in treatment effects between the two levels of education (primary versus lower secondary). The child-labor reducing effect of EduLaw95 comes solely from the lower secondary level, as expected. Furthermore, we find that class size in primary education, rather than in lower secondary education, drives the negative correlation with the two educational outcomes. Notably, class size in both primary education and lower secondary education are negatively associated with grade deviation, contrary to the baseline results (Table 8) that pool the two levels of education. Meanwhile, the number of secondary schools per 10,000 residents, rather than that of primary schools, is likely the driving force positively correlated with both school attendance and grade deviation, though all of these correlations are statistically insignificant.

Along the gender dimension, heterogeneity is only observed in the relationship between the number of schools per 10,000 residents and school attendance, as shown in Table A6. For every additional school built per 10,000 residents, school-age boys are 0.4 percentage points more likely to enroll in school, while the corresponding correlation is insignificant for girls aged 6 to 16.

In Table A7, we adopt fully flexible specifications with respect to exposure to EduLaw95. We find that exposure to EduLaw95 works as a substitute for class size and number of schools per 10,000 residents. Among individuals not exposed to EduLaw95, a larger class size is associated with a higher school attendance rate and a larger gap with respect to the standard grade, while a larger number of schools per 10,000 residents is also associated with a higher school attendance rate but a smaller gap behind the standard grade. However, these correlations all fade away among those exposed to EduLaw95. These findings suggest that the exposure to EduLaw95 may have operated through an increase in the supply of education, which manifested itself in the building new schools and the recruitment of more teachers (which lowered class size).

6.1.2 Quality of education supply

The previous section focuses on the quantity of the education supply. Now we turn to the quality of education. We adopt two sets of variables to measure the quality of education provided in Côte d'Ivoire — "test score" measuring the quality of education output and "teacher qualification" measuring the quality of education input. "Test score" is centered at 1, which corresponds to the average level across Francophone Sub-Saharan African countries. "Teacher qualification" is the proportion of teachers holding diplomas of upper secondary or higher, ranged between 0 and 1.

[Table 9 about here.]

As stated in Section 5.1.4, when aggregated by cohort and interacted with the exposure variable, both "test score (cohort)" and "teacher qualification (cohort)" are indeed indicators of exposure intensity. Columns 2 and 3 in Table 9 report results using such exposure intensity. We find that individuals exposed to EduLaw95 and offered with the average-quality education obtain 2.3 years longer education than those unexposed. For individuals exposed to EduLaw95 and taught by teachers with upper secondary diplomas, the advantage rises to 7.6 years. Furthermore, both results are consistent with those in Column 1, where the original model is re-estimated with the same analytical sample as in Columns 2 and 3.

Even for people not taught by those qualified teachers, their educational attainment is also higher if there is a higher proportion of qualified teachers. As shown in Column 5 and 6 in Table 9, where "test score (current year)" and "teacher qualification (current year)" are included as explanatory variables, average schooling is 0.14 years longer in school zones with 10 percentage-point more teachers holding upper secondary diplomas. Nonetheless, the gap is statistically insignificant between school zones with different test scores. These results are also consistent with the original model estimated with the same sample of individuals, as shown in Column 4. In all these specifications, the gender gap in years of education is consistently estimated to be around 3 years in favor of males. As we showed in equation (13) the gender gap would only be affected by the quality (and quantity) of education if the latter had differential effects on the gender-specific educational returns α_f and α_m.

[Table 10 about here.]

When it comes to the “school attendance”, “grade deviation” and “child labor” outcomes, the samples are restricted to school-age children. Since the year aggregation variables on the quality of education are only available after 1997, where we observe no unexposed individuals aged 6 to 16, we cannot include such measures of educational quality as covariates. We therefore restrict our attention to results based on aggregation by cohorts, as reported in Table 10. Column 2 indicates that children exposed to the average quality of education under EduLaw95 are 12 percentage points more likely to attend school than those who are unexposed. Symmetrically, these children are 10 percentage points less likely to work early as child labor than the unexposed cohorts. Children exposed to EduLaw95 with all teachers holding upper secondary diplomas are 19 percentage points more likely to attend school, 21 percentage points less likely to join the labor force at an early age and 0.4 standard grades ahead of those who are unexposed, as shown in Columns 3 and 6 respectively. Boys are on average 5 percentage points more likely to attend school than girls and 0.9 standard grades ahead of girls, after controlling for the quality of education supply.

Our basic models (Columns 1, 4 and 7, estimated with the same analytical sample) are therefore robust to controlling for the quality of education. Moreover, teacher qualifications or the quality of educational inputs play a much more important role in keeping students in school and preventing pupils from repeating the grade than does exposure to EduLaw95 and other factors associated with the reform. Similar conclusions can be drawn regarding years of education—the quality of education input generates a much stronger effect.

6.2 Anthropometric outcomes

[Table 11 about here.]

In this subsection, we look at the effect of EduLaw95 on the health of infants. Results for anthropometric outcomes reported in Table 11 indicate that an older sibling’s exposure to EduLaw95 has strong positive spillover effects on their younger sibling’s weight: between a 1.4 (column 1) and a 1.5 (column 2 versus 3) standard deviation increase in WHZ. This stems from exposure to the law having strong negative spillover effects on a younger sibling’s height: between a 1.4 (column 4) and a 3.9 (column 5 versus 6) standard deviation decrease in HAZ. While inter-sibling effects are not explicitly taken into account by our Neoclassical model, and while we do not have anthropometric data on exposed individuals (because they are older than the usual 60-month threshold), it is likely that younger siblings (where there is relatively little scope for trade-offs between working and attending school) are penalized by what should be an improvement in their exposed brethren’s HAZ. Both age and the female dummy are positively correlated with WHZ and negatively correlated with HAZ, though there is no apparent effect on gender or age gaps.

6.3 Fertility

Finally, we examine whether EduLaw95 affects households’ fertility decisions. Two variables are used to measure household fertility choices: “number of children” and “relative fertility”. The former is an absolute measure while the latter is standardized for age and is in relative to the natural fertility.

[Table 12 about here.]

For fertility, the empirical analysis is performed at the household level. We redefine the household’s exposure to EduLaw95 as there being at least one wife younger than 49 years old (assuming that is the maximal age of childbearing) in 1995. Recall from equation (7) that EduLaw95 can increase or decrease observed fertility, depending upon the relative magnitude of the two effects: If the marginal effect of the increase in $\widetilde{n}$ is large enough (and there are enough constrained households in the population), EduLaw95 will increase observed fertility since the second (positive) term in equation (7) will be large relative to the negative first term. The opposite will obtain when the marginal effect $\frac{\partial t^{*-1}(\underline{t})}{\partial \underline{t}}$ of EduLaw95 on the probability of being constrained (as well as the difference between n^* and $\widetilde{n}$) is large enough. As shown in Table A8, exposure to EduLaw95 has rather large effects on the number of children, but minimal effects on relative fertility. Moreover, the impact of EduLaw95 varies according to the sector in which the household head is employed.

Table 12 indicates that exposure to EduLaw95 results in significantly lower fertility amongst households whose head works in the secondary or tertiary sectors, corresponding to the first (negative) effect dominating in equation (7). For these households, exposure to EduLaw95 results, on average, in 1 less child and 7 percentage points lower relative fertility. Conversely, exposed households whose head works in the primary sector have 0.5 more children or 5 percentage points higher relative fertility, compared to unexposed households, as would be the case if the second (positive) term in equation (7) dominates. It can be shown that the marginal effect of EduLaw95 on the fertility of constrained rural households $(\frac{\partial \widetilde{n}}{\partial \underline{t}})$ will be larger than the corresponding term for urban households when:

$$\frac{(\sigma w(T-\underline{t})+\alpha\underline{t}))^2}{(\sigma w-\alpha)(w\Omega+y)} > \frac{(Ap\phi\,(T-\underline{t})+\alpha\underline{t})^2}{(p\phi\mathrm{A}-\alpha)(Ap\Omega+y)}.$$

The numerators correspond to the (square of) the sum of the returns to child labor plus the future returns to education. The denominators correspond to the product of the difference between the marginal returns to child labor and the marginal returns to education, multiplied by the "full income" of adults (the sum of the value of the adult labor endowment plus non-labor income). Ceteris paribus, if the LHS of this expression is large enough in comparison to the RHS, EduLaw95 will, as is observed in our findings, increase (decrease) fertility for rural (urban) households.

[Figure 7 about here.]

Figure 7 summarizes the estimates of the exposure coefficients in preferred specifications of all aforementioned regressions. The exposure to EduLaw95 is found to improve the national level in years of education by 2.15 years, raise the school attendance rates in primary and lower secondary education by 10 percentage points, help students to catch up by 0.2 years with respect to their designated grades, reduce child labor participation rate by 3 percentage points, increase younger siblings' weight for height by 1.43 standard deviations, decease younger siblings' height for age by 1.35 standard deviations, and boost household fertility by 0.29 children or 2 percentage points in relative to natural fertility rate.

6.4 Robustness checks

6.4.1 Alternative specifications of pseudo cohorts

We considered 60 alternative specifications for our pseudo cohorts.[20] Figure 8 plots the estimators of (placebo-) exposure effects from replicating our main regressions using these alternative specifications.

[Figure 8 about here.]

Each subplot in Figure 8 plots the histogram of the estimators of one original empirical model using 60 alternative pseudo cohorts, with the original estimator plotted as a brown reference line. Panel A reports the results on educational outcomes and anthropometric outcomes, at the individual level. Each of the five columns reports results from models with one left-hand side outcome variable (years of education, school attendance rate, grade deviation, WHZ, and HAZ respectively). The top four rows report results from the four sets of models using the "exposed" versus "not exposed" specifications, the middle four rows "post" versus "pre", and the bottom four rows "pre" versus "ctrl". Panel B shows

20. Alternative pseudo cohorts are defined by the following criteria: 3/5/7/10/15-year interval of the household head's birth year, different grouping of educational attainment levels (secondary or higher, compulsory, etc.).

the results on fertility, at the household level. The first three columns report results where number of children is the outcome variable, and the final three columns report results where relative fertility is the outcome variable. Histograms in both panels show that the estimators of interest are largely the same irrespective of the definition adopted.

6.4.2 Heterogeneity in treatment effects

We examined heterogeneity of treatment effects using simple interactive specifications.

[Table 13 about here.]

Along the gender dimension, as shown in Table 13, we observe significant heterogeneity in treatment effects on school attendance, grade deviation and child labor, but not on years of education. On average, the effect of exposure to EduLaw95 on school attendance is 5 percentage points stronger for girls than for boys. Regarding grade deviation, the corresponding exposure effect is 0.2 standard grades stronger for female students than for male students. The exposure effects of bringing down child labor participation is 3.4 percentage points stronger on girls than boys. These results explain the reduction in gender gaps (the coefficients on "female" are smaller in "post" versus "pre" than in "pre" versus "ctrl"), as observed in previous estimations, and are in conformity with the theoretical predictions of equation (13).

Positive effects on school attendance rates are driven by households whose head works in the secondary or tertiary sectors, where the effects are 9 percentage points higher. Similar differences exist for the treatment effects on grade deviation, where the gap is approximately 0.8 standard grades, shown in Table A3. Asymmetrically, the negative effects on child labor stem mainly from the households in the primary sector, where the prevalence of child labor is much higher. In theoretical terms, this means that $F({t^*}^{-1}(\underline{t}))$ in equation (5) was larger for urban than for rural households implying, since $F(\cdot)$ is a cumulative density, that ${t^*}^{-1}(\underline{t})$ was also larger for urban than for rural households. Since, from equation (4) we know that:

$$E[t] = t^*(\overline{\lambda}) - \int_{{t^*}^{-1}(\underline{t})}^{\overline{\lambda}} t^*_{\lambda}(\lambda)F(\lambda)d\lambda,$$

${t^*}^{-1}(\underline{t})_{urban} > {t^*}^{-1}(\underline{t})_{rural}$ implies that $E[t]_{urban} > E[t]_{rural}$, ceteris paribus, which squares with the rural–urban gap in educational attainment that is observed. An additional contribution to the sectoral gap in educational attainment may be provided by the unconstrained optimal level of educational attainment being higher in the secondary or tertiary sectors than in agriculture, in which case we would also have $t^*(\overline{\lambda})_{urban} > t^*(\overline{\lambda})_{rural}$. It is easy to show that this will obtain when:

$$A\phi p > \sigma w,$$

meaning that the marginal product of child labor in the agricultural sector must have been higher than that in the urban sector. In a developing country such as Côte d'Ivoire, in which children are traditionally heavily involved in agricultural tasks from a young age, this would appear to be a reasonable parameter configuration.

Finally, the effects on both school attendance, grade deviation, and child labor are weaker among agricultural households working in both cocoa and coffee plantations, as shown in Table A4. This implies, by the same logic as was applied to the rural–urban comparison, that ${t^*}^{-1}(\underline{t})$ must have been lower in cocoa-coffee plantation agriculture than in non-plantation agriculture. For the former, the increase in school attendance rates are 18 percentage points lower, the reduction in child labor participation is 13 percentage points smaller, and students are almost one years further behind with respect to their standard grade. For years of education, the effects are also smaller for agricultural households. The gaps are 1.6 years for households working in cocoa plantations and 2.9 years for those working in plantations of coffee or other crops.

6.4.3 Differential treatment length

The recent literature in econometrics has raised concerns about variations in the timing of treatment when applying a difference-in-difference methodology (e.g. Chaisemartin and D'Haultfœuille 2020; Callaway and Sant'Anna 2021). Though our study does not feature heterogeneity in treatment timing, as EduLaw95 was implemented homogeneously for all in 1995, it does feature heterogeneity in treatment length.

We have discussed the extreme cases of completely exposed ("post") and completely unexposed ("pre") in Section 5.2.1. Now we include a third group of the partially exposed (denoted as "part" in what follows), namely those between the ages of 6 and 16 in 1995 when EduLaw95 was implemented. These individuals were exposed to EduLaw95 for different lengths of time, varying from 0 to 10 years. For instance, an individual born in 1984 would have been exposed to EduLaw95 for five years between 1995 (at the age of 11) and 2000 (at the age of 16). We further divide the partially exposed into two subgroups: those who were at the secondary school age (13 to 16) and those who were at the primary school age (6 to 12) when EduLaw95 first rolled out. The former group is denoted as "part (short)" as the length of exposure is shorter (under 3 years), and the latter as "part (long)".

We follow the methodology introduced by Goodman-Bacon (2021) and adapt it to our context by replacing the variation in treatment timing by the variation in treatment length. Specifically, we decompose the analysis into three datasets for comparisons, in a manner similar to Cengiz et al. (2019). For the outcome of "years of education", the comparisons are (1) "part (short)" versus "pre", (2) "part (long)" versus "pre", and (3) "post" versus "pre" .[21] For the outcomes of "school attendance" and "grade deviation", the comparisons are (1) "post" versus "part (before 1995)", (2) "part (after 1995)" versus "pre", and (3) "post" versus "pre". For each comparison, we can estimate the average treatment effect, namely the coefficient associated with the exposure variable "younger cohorts", as we did earlier. The overall treatment effect is then the weighted mean of the average treatment effects in all three comparisons, with the variance of the "younger cohorts" variable as the raw weight.

[Table 14 about here.]

As a detailed example of this robustness check, Table 14 reports the results of adapting Model 2 in Table 6 to account for differential treatment length. Columns 1, 2, and 3 show the results of comparing "part (short)" versus "pre", "part (long)" versus "pre", and "post" versus "pre", respectively, and Column 4 shows the weighted mean of these three comparisons as the overall estimation. After accounting for the partially exposed in the analysis, the average exposure effect on years of education increases to 0.95 years, as shown in Column 4, which is 85.5% higher than the original estimation. The gender gap, has been reduced from around 3.4 years (both "part (short)" versus "pre" and "part (long)" versus "pre") to 2.6 years ("post" versus "part"). The overall average gender gap is estimated to be around 3 years, consistent with previous estimates.

[Figure 9 about here.]

Figure 9 provides a more comprehensive picture of the analysis after accounting for differential treatment length. It plots the estimators of the overall exposure effects from replicating the main models, with Panel A, B, C and D correspond to years of education, school attendance, grade deviation, and child labor, respectively, as outcomes. The adapted estimators (marked as blue dots with 95% confidence intervals as error bars) are consistent with the original estimators (marked as red rhombi) in most cases.

21. As the dependent variable "years of education" is restricted to those aged 17 to 54, we do not observe any partially exposed adult before EduLaw95 was introduced. Thus, only "pre" can serve as the control group.

6.4.4 Crop price shocks

[Table 15 about here.]

[Table 16 about here.]

We now consider the impact of crop price shocks, which corresponds to the p variable in our theoretical model. Table 15 and 16 reports results for school attendance rates. In Columns labeled with "(log)", we use the year-on-year difference in the logarithm of the average annual price of a given crop as our indicators of price shocks. In the columns labeled with "(rel)", we use the year-on-year difference in the average annual price of the corresponding crop relative to those of main staple crops as price shock indicators. The shocks are split into positive and negative shocks, summing up only year-on-year increases or decreases, respectively. Price shocks are set to zero for households without any members farming the corresponding crop.

The effect of changes in agricultural prices is given by:

$$\frac{\partial E[t]}{\partial p} = \int_{t^{*-1}(\underline{t},p)}^{\overline{\lambda}} \frac{\partial t^*(\lambda, p)}{\partial p} f(\lambda) d\lambda,$$

where the expression only applies to rural households and where we therefore know from Table 1 that $\frac{\partial t^*}{\partial p} < 0$. We therefore expect an increase (decrease) in p to result in a fall (rise) in educational attainment: $\frac{\partial E[t]}{\partial p} < 0$. A 10% increase in the cocoa or coffee price leads to a 14 or 17 percentage points drop in school attendance, respectively, as shown in Columns 1 and 3. Similarly, a 10% increase in the cocoa price leads to a 0.47 standard grade lagging-behind, as shown in Column 9. Concomitantly, and in line with the theoretical prediction, a 10% decrease in the coffee price causes an 11-percentage-points rise in the school attendance rate (Column 3) and a 0.8 standard grade catching-up (Column 11).

Measuring these shocks by relative prices, we find that a 100 percentage points increase in the price of cocoa or coffee relative to staples leads to a 33 or 53 percentage points drop in school attendance, respectively, as shown in Columns 2 and 4. Similarly, as shown in Column 9, a 100 percentage points increase in the cocoa price leads to 0.13 standard grade lagging-behind. Inversely, a 10% decrease in the coffee price causes a 0.3 standard grade catching-up, as shown in Column 12.

Finally, note that positive coffee price shocks during ages 0 to 4 enhance the effects of exposure to EduLaw95 on school attendance rates among households planting coffee—a 7 or 36 percentage points rise in school attendance for a 10% increase in cocoa prices (Column 3) or a 100 percentage points increase in the price of coffee relative to staples (Column 4), respectively, though these effects are not directly interpretable in terms of our theoretical model because of the low age of the children involved.

Here we again observe the effects on child labor mirroring the effects on school attendance. Meanwhile, we hardly observe any effects from the crop price shocks on years of education. Regarding fertility, households react to rising (falling) coffee prices with higher (lower) fertility.

6.4.5 Weather and climatological shocks

[Table 17 about here.]

The second sets of shocks considered are weather and climatological shocks, which corresponds to A in the theoretical model. From the bottom line in Table 1, we expect shocks that reduce agricultural productivity to increase the educational attainment of children in unconstrained rural households, since $\frac{\partial t^*}{\partial A} < 0$: Intuitively, this is because the marginal product of child labor decreases when A decreases. Flood shocks are defined as positive annual rainfall shocks no smaller than 0.5 standard deviations (i.e., a z-score in the $[0.5, +\infty)$ range).[22] Drought shocks are defined as negative annual rainfall shocks no larger than -0.5 standard deviation (i.e., a z-score in the $(-\infty, -0.5]$ range). Both are summed up

22. "Flood" may not necessarily mean flood or flooding but can also include excess or heavy rain and deluge.

over the specified time-period. These shocks are defined only for households with members engaged in farming and are set to zero otherwise. Due to geographical restrictions, we only consider rural regions and omit observations in urban regions.[23]

Our Neoclassical framework predicts that:

$$\frac{\partial E[t]}{\partial A} = \int_{t^{*-1}(\underline{t},A)}^{\overline{\lambda}} \frac{\partial t^*(\lambda, A)}{\partial A} f(\lambda) d\lambda < 0,$$

where the negative sign stems from our earlier comparative statics result that $\frac{\partial t^*}{\partial A} < 0$ (see Table 1).

The results for years of education are in conformity with this hypothesis. As reported in Table 17, flood shocks suffered when aged 5 to 9 enhance the effect of exposure to EduLaw95: a one-standard-deviation increase in rainfall leads to 2.5 more years of education. The corresponding drought shocks also enhance the effect of exposure to EduLaw95: a one-standard-deviation decrease in rainfall leads to 1.5 years longer in education.

For grade deviation, school attendance and child labor, the correspondence with theoretical predictions is something of a mixed bag. A one-standard-deviation decrease in rainfall during the previous two years leads to an 8.2-percentage-points decrease in school attendance; a one-standard-deviation decrease at ages 0 to 4 leads to a 6.6-percentage-points decrease in school attendance and 7.7-percentage-points increase in child labor participation. A one-standard-deviation decrease in rainfall leads to a 0.3-year lag with respect to the grade that should have been achieved. Flood shocks at ages 0 to 4 increase the effect of exposure to the EduLaw95: a one-standard-deviation increase in rainfall leads to a 0.7 year catch up with respect to the grade one should have reached.

When it comes to the WHZ indicator, drought shocks during the previous two years enhance the spill-over exposure effects from older siblings: a one-standard-deviation decrease in rainfall leads to a 0.8 increase in WHZ.

6.4.6 Event shocks

During the observed time period, there were three critical economic and social event shocks—the 1994 devaluation, the 2002 First Ivorian Civil War, and the 2011 Second Ivorian Civil Conflict. In this subsection, we examine the effect of these shocks, interplayed with EduLaw95, on educational outcomes.

The stimulation effect of the 1994 CFA franc devaluation on Ivorian GDP lasted around three years.[24] Thus, we consider all individuals of school ages (6 to 16) between 1994 and 1996 as exposed to the 1994 devaluation shock.

The most destructive period of the First Ivorian Civil War is between 2002 and 2003. Thus, we treat children aged 6 to 15 when the civil war broke out in 2002 to be fully exposed to the 2002 civil war shock. The Second Ivorian Civil Conflict lasted less than one year. Therefore, individuals aged 6 to 16 in 2011 are considered as exposed to the 2011 civil conflict shock.

There are major differences between the 2002 civil war and the 2011 civil conflict (Hamer 2014). The length of conflicts is one of the most notable differences. The civil war broke out in 2002 and lasted until 2007. Schooling was disrupted during the five-year course, especially in the rebel-held north. While the civil conflict, and consequently the disruption of schooling, lasted for less than a year. Students were reluctant to attend school due to psychological burden and trauma experience, which

23. Specifically, the restriction refers to the five-region stratum. One stratum is "other cities [except Abidjan]" which are scattered over the whole country, and the resolution of our climatological data cannot be pinned down to each of the cities. Also, households in the two urban strata ("Abidjan" and "other cities") rarely engage in agricultural activities which would be sensitive to climatological shocks. Therefore, we only focus on the three rural strata ("east forest", "west forest", and "savannah") in this section.

24. Ivorian GDP growth rate was only 0.81% in 1994. After the devaluation, the GDP growth rate increased to 7.13% and 7.7% in 1995 and 1996, respectively. Then the GDP growth slowed down to 3.74% and 4.93% in 1997 and 1998, respectively. It further decreased to 1.62% in 1999 and even turned negative (−2.07%) in 2000.

is positively correlated with the length of conflicts. School equipment and supplies were looted during both conflicts, and the scale also differs due to the differential length of the conflicts. Another major difference concerns the financial aspect. During the 2002 civil war, budgets of school in the rebel-held north had been frozen and parents had to bear the cost of schooling.

There were also indirect impacts. The full scale 2002 civil war caused the national poverty rate to rise from 38.4% to 48.9%, especially in the rebel-held north where the poverty rate had even doubled. Almost all Ivorian economic sectors took severe hits from the 2002 civil war. A reduction in household income is very likely "compensated" by children dropping out of school to join the labor force. On the other hand, the impact from 2011 civil conflict had been concentrated on the financial industry (Bastien and Lacroix 2013). Last but not least, during the 2002 civil war, there were major displacement of population, including students and teachers. A vast majority of the displaced population settled in Abidjan, which led to overcrowding of schools in the economic capital.

Note that we do observe individuals right after the two conflicts and thus unable to capture any short-term effects from the two conflicts, which is more likely the case with 2011 civil conflict. Therefore, we expect the adverse educational effect of the 2002 civil war to be more prominent than the 2011 civil conflict in our empirical estimation. In addition, the negative impact of the 2011 civil conflict on education is expected to concentrate on the tertiary and secondary sectors.

[Table 18 about here.]

Table 18 reports results after introducing these event shocks. Note that individuals exposed to the 2002 civil war shock and 2011 civil conflict shock are also exposed to EduLaw95. Moreover, when we look at school-aged individuals (Columns 4 to 12), those exposed to the 1994 devaluation shock are also exposed to EduLaw95. In these cases, the coefficients associated with the exposure to shocks in Columns 2 to 12 correspond to the interaction effects on top of exposure to EduLaw95, as with the coefficient associated with the interaction term in Column 1.

The 1994 devaluation shock has a strong negative impact on exposure to EduLaw95 on all three educational outcomes and a symmetrically strong positive impact on child labor participation. The devaluation reduces the exposure effect to EduLaw95 on years of education by 7.2 years. It also reduces the exposure effect on school attendance by 41 percentage points, reduces the exposure effect on grade deviation by 1.5 standard grades, and enlarges the exposure effect on child labor by 28.7 percentage points. From the theoretical standpoint, this effect presumably stems from the reduction in real wages for urban households.

However, the 2002 civil war shock and the 2011 civil conflict shock have mixed effects. The 2002 civil war reduces the exposure effect to EduLaw95 on school attendance by 5 percentage points, and completely reverses the 10-percentage-point child labor reduction effect, while enhancing the exposure effect to EduLaw95 on grade deviation by 0.46 standard grades. On the other hand, the 2011 civil conflict enhances the exposure effect to EduLaw95 on school attendance and grade deviation by 18 percentage points and 0.27 standard grades, respectively.

As hypothesized above, the economic sectors hurt by the 2002 civil war may differ from those harmed by the 2011 civil conflict. As such, we find heterogeneous exposure effects of the two conflicts as a function of the occupational sector of the household head. Results in Table A9 support this hypothesis. As shown in Column (2), the 2011 civil conflict, in the medium run, has minimal impact on the school attendance of children from households working in the primary sector, while there may be some negative impact on children from households working in non-agricultural sectors. No such phenomenon is observed in the case of the 2002 civil war as shown in Column (1). The differences are more obvious when it comes to child labor. The 2002 civil war significantly hampered the child-labor-reducing effects of exposure to EduLaw95, but only for households in the primary sector as shown in Column (3). On the other hand, Column (4) suggests that the 2011 civil conflict hampered such effects in non-agricultural sectors.

6.4.7 Shocks and supply of education

In this subsection, we comprehensively examine the effect of EduLaw95, along with the supply of education and all the shocks mentioned in the previous sections, on educational attainment. We apply the same empirical strategy as described in Sections 6.1.1 and 6.1.2, and include the supply side variables in the models on shocks (Sections 6.4.4, 6.4.5, and 6.4.6).

[Table 19 about here.]

As shown in Table 19, after controlling for the quantity of education supply, exposure to the 2002 civil war and the 2011 civil conflict slightly reduced the impact on educational outcomes, compared with the previous results. We still observe a positive impact from the 2002 Civil War on both child labor and grade deviation, but the effect on grade deviation is reduced from 0.46 standard grades to 0.28 standard grades. The negative effect of the 2002 Civil War on school attendance vanishes. Meanwhile, the impact from the 2011 Civil Conflict on both school attendance and grade deviation remains largely unchanged. The gender gaps remain at approximately 15 percentage points in school attendance and 1 standard grade, respectively, both in favor of boys. No significant gender differences in child labor is observed.

[Table 20 about here.]

The results incorporating the quality of education remain largely consistent with the original findings, as shown in Table 20. The exposure to education of an average quality leads to approximately 10 to 15 percentage points higher school attendance rates, 5 to 35 percentage points lower child labor participation prevalence, and 0.5 less grade deviation. The exposure to education with all teachers holding upper secondary level diplomas is estimated to raise the likelihood of attending school by 20 to 30 percentage points, lower the child labor participation rate by 18 to 42 percentage points, and help pupils catch-up by 0.5 to 0.9 standard grades.

7 Conclusions

This paper has taken a long run perspective to examine the determinants of human capital formation and the educational expansion in Côte d'Ivoire. The theoretical lens through which we interpret our results is provided by a simple Neoclassical model of household behavior in the tradition of Rosenzweig (1990). Relying on a pseudo panel constructed from a unique household level dataset that spans three decades, the study has analyzed the effects of the expansion of compulsory schooling. On average, the 1995 Ivorian educational reform raised the national level of education by 2 years, increased the school attendance rate by approximately 10 percentage points, lowered the child labor participation rate by 3 percentage points, and resulted in children catching up by 0.2 grades with respect to the grade designated for their age. Spillover effects onto younger siblings are also found within households. The expansion of education led to a 1.4 standard deviation increase in weight-for-height and 1.4 standard deviation decrease in height-for-age of younger children. The 1995 educational reform also led to lower fertility rates, estimated to be 1 less child or 7 percentage points lower in relative fertility among non-agricultural households; conversely, fertility rates increased, by 0.5 child or 5 percentage points in relative fertility, among agricultural households.

The paper has also provided evidence concerning the micro-foundations of the educational gaps and socio-economic inequalities that persist today in Côte d'Ivoire, as they do in other countries at a comparable stage of development. Our empirical evidence suggests that the exposure effect of the expansion in compulsory schooling may have been channeled through increases in the quantity of education supply, improvement in the quality of education supply, reductions in the probability of working as a child, and decreases in fertility among non-agricultural households.

The study also examines the fundamental role played by economic conditions and shocks in mediating the effectiveness of the educational reforms. The impact of price and climatological shocks are carefully documented and largely conform to the predictions stemming from Neoclassical theory. Furthermore, three critical event shocks are also examined. The 1994 devaluation shock is found to have a strong negative impact on the effects of the expansion of education, while the 2002 civil war and 2011 civil conflict shocks have mixed effects. More specifically, the 2002 civil war had stronger negative effects on the agricultural sector while the 2011 civil conflict predominantly affected non-agricultural sectors.

The results have indeed shown that mass education and compulsory schooling may not necessarily act as “the great equalizer”, even in terms of educational attainment. Along the gender dimension, the 1995 Ivorian educational reform reduced the gender gap in years of education from 4 to 2.5 years in favor of males. The gender gap in grade deviation was also lowered from 1 to 0.5 standard grades. However, the gender gap in school attendance was widened from 6.1 to 13 percentage points in favor of boys.

Regarding economic and occupational sectors, the expansion of education lowered fertility rates and reduced household size among non-agricultural households, while causing the opposite among agricultural households. The agricultural–non-agricultural or rural–urban gap in fertility was widened as a result. Its effect on raising school attendance was more than three times as strong among households in the secondary or tertiary sector as among households in the primary sector, contributing to a wider rural–urban gap in schooling.

Agricultural households, compared with non-agricultural households, benefited from smaller effects of compulsory schooling with respect to educational attainment and child labor participation. The reduction in effects was more prominent among agricultural households planting either of the two main cash crops (cocoa and coffee) than agricultural households planting other crops. Volatility in cash crop prices further weakened the positive (negative) effects of compulsory schooling on educational attainment (child labor). Thus, educational disadvantages persist among households planting either cocoa or coffee.

Since both the quantity and the quality of education supply are vital to the educational attainment of individuals, compulsory schooling is as great an equalizer as the equity of education supply. In other words, for compulsory schooling to be “the great equalizer”, it is critical to build schools, recruit and train teachers, and monitor and maintain education quality for disadvantaged regions and disadvantaged groups.

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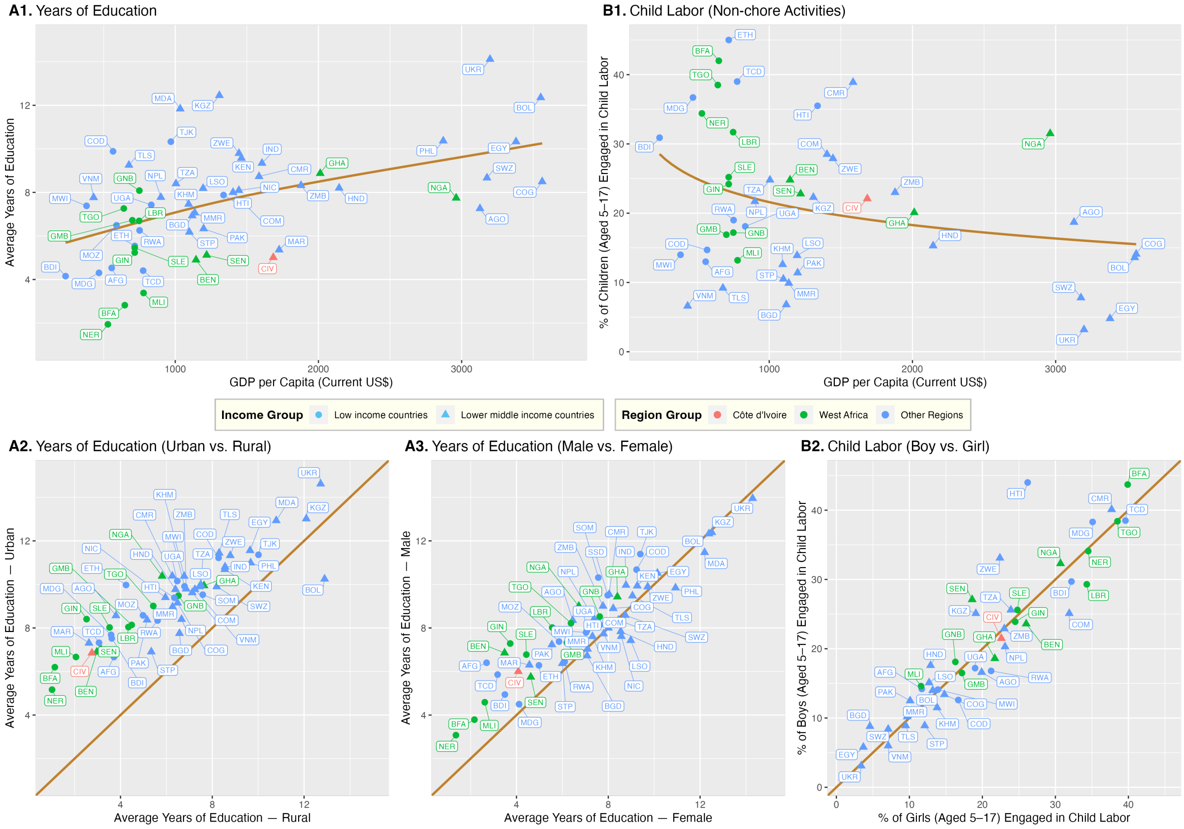
Figures

Figure 1: Mean Years of Education and Prevalence of Child Labor in Low and Lower-Middle Income Countries



Source: World Development Indicators (The World Bank 2021); World Inequality Database on Education (UNESCO 2021); Child Labor Statistics (UNICEF 2022)

Figure 2: Trend in average years of education (aged 17–54)

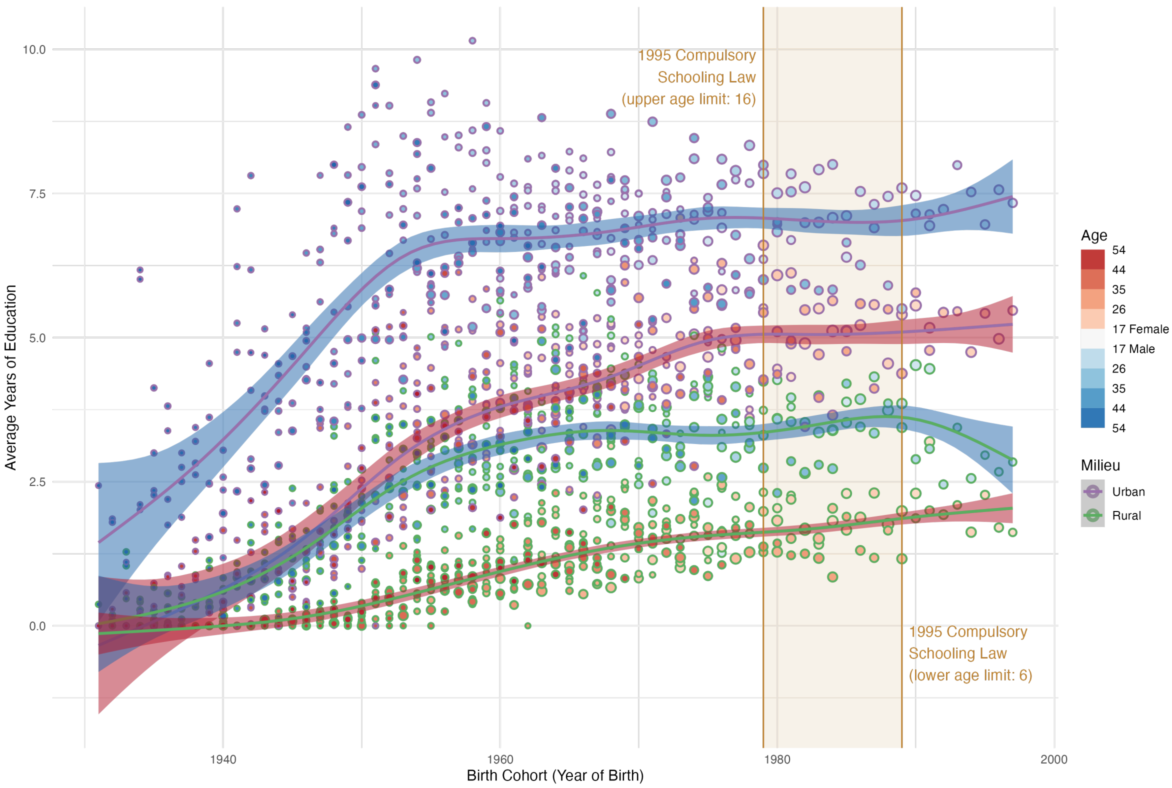


Figure 3: Crop price, weather, and other shocks

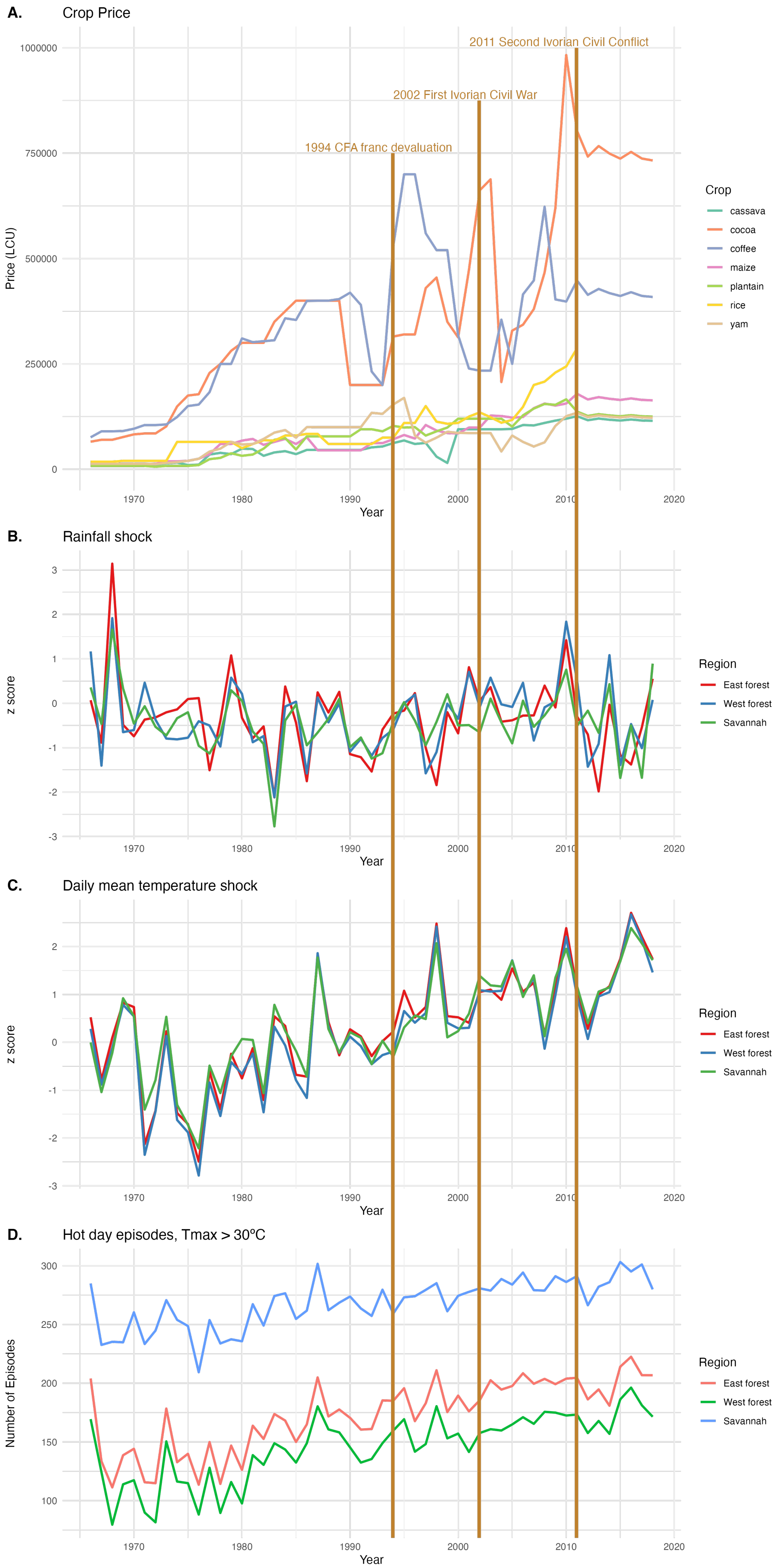


Figure 4: Number of schools and class size

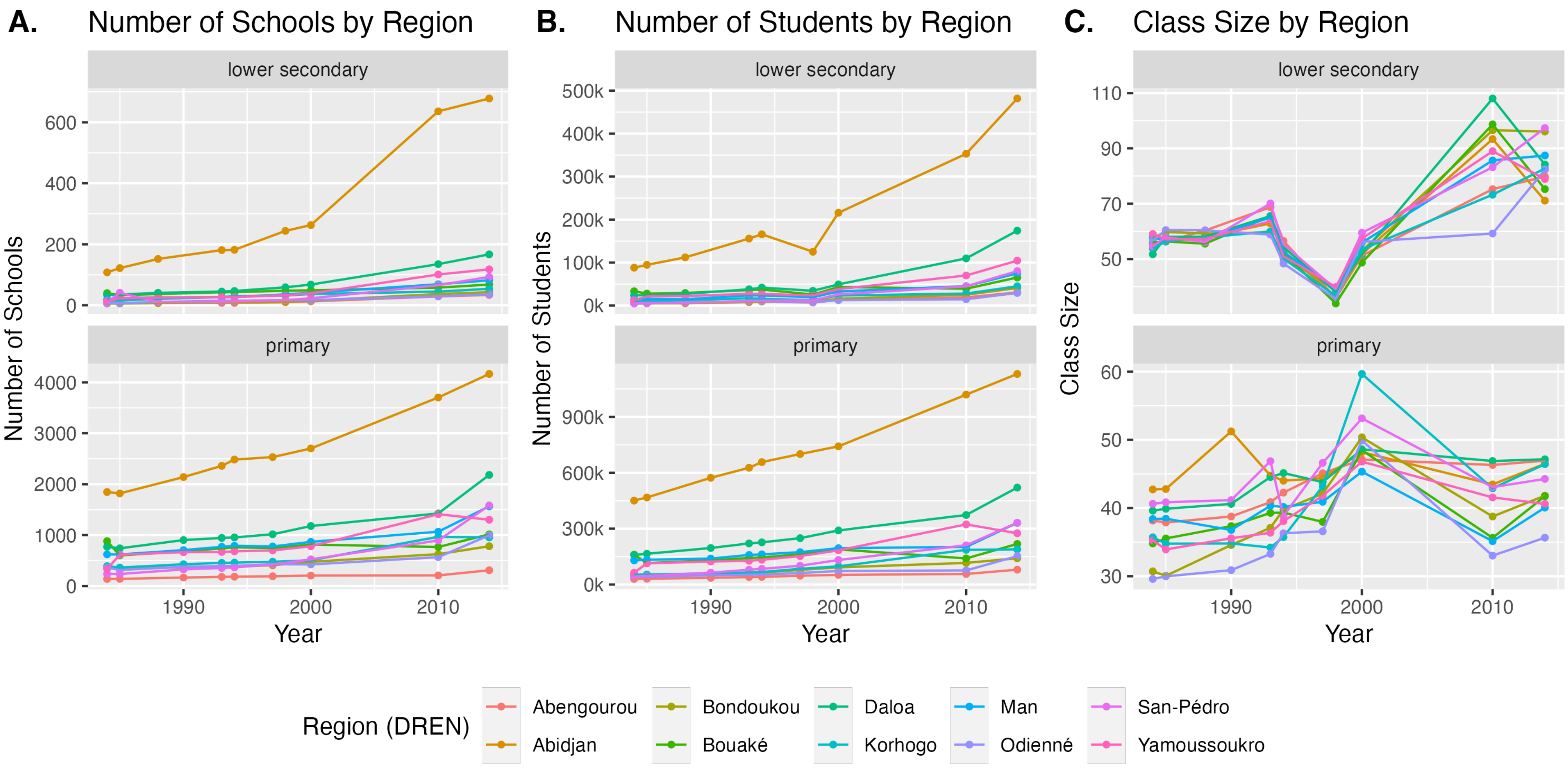


Figure 5: Test score and teacher qualification

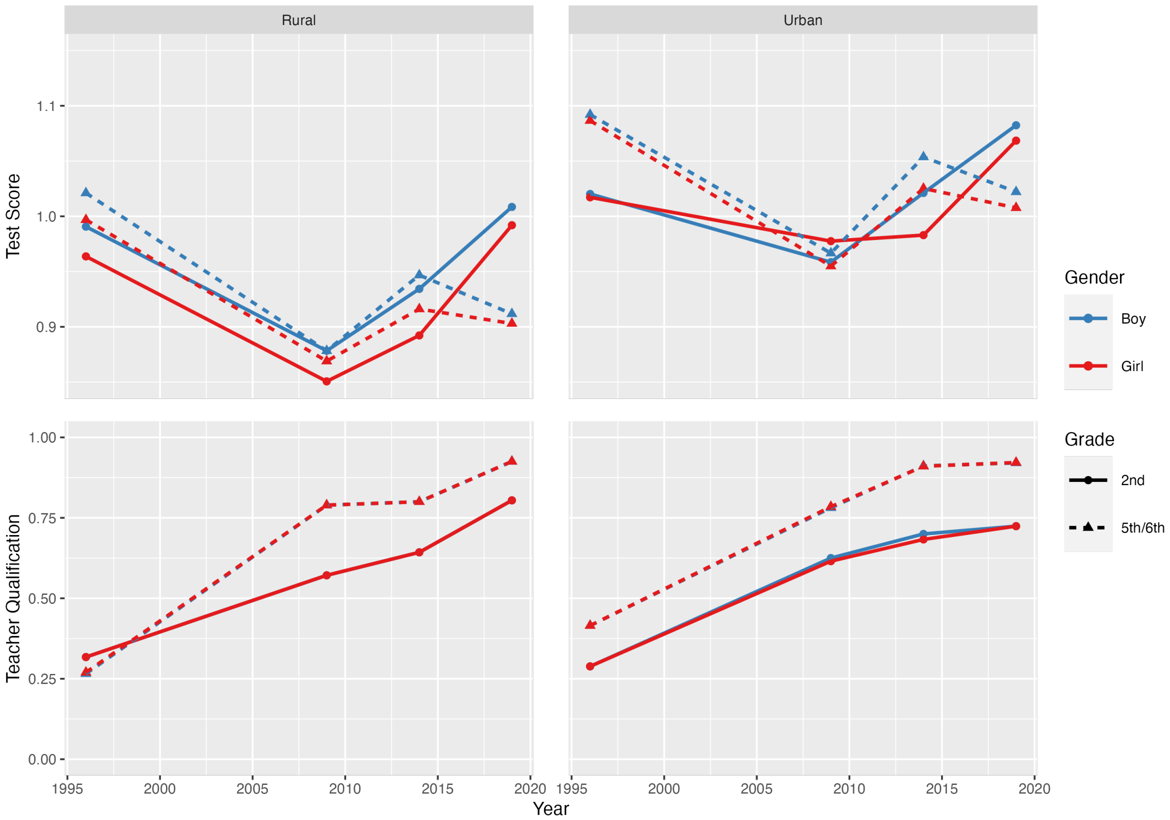


Figure 6: Definitions of exposure

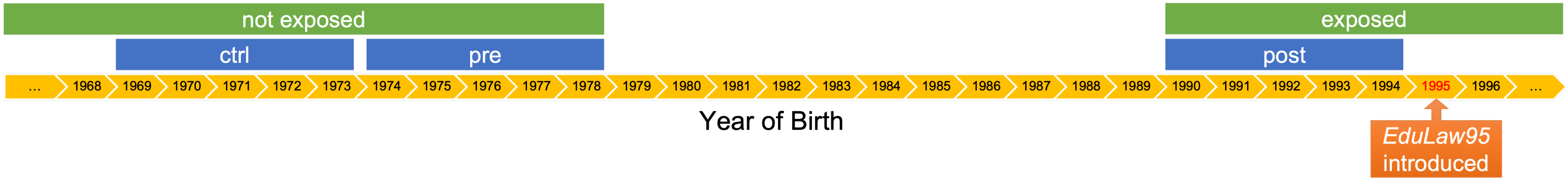
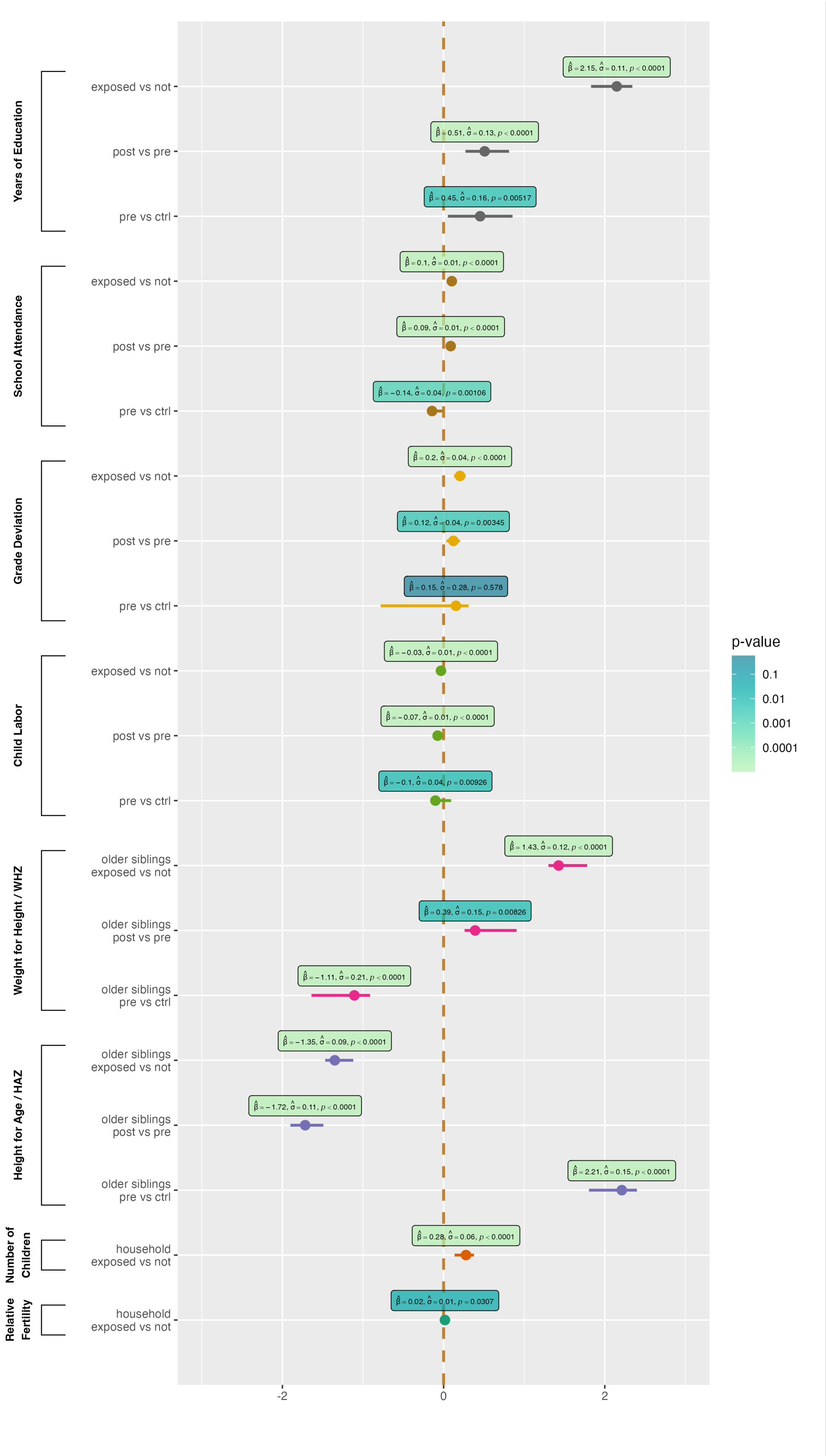
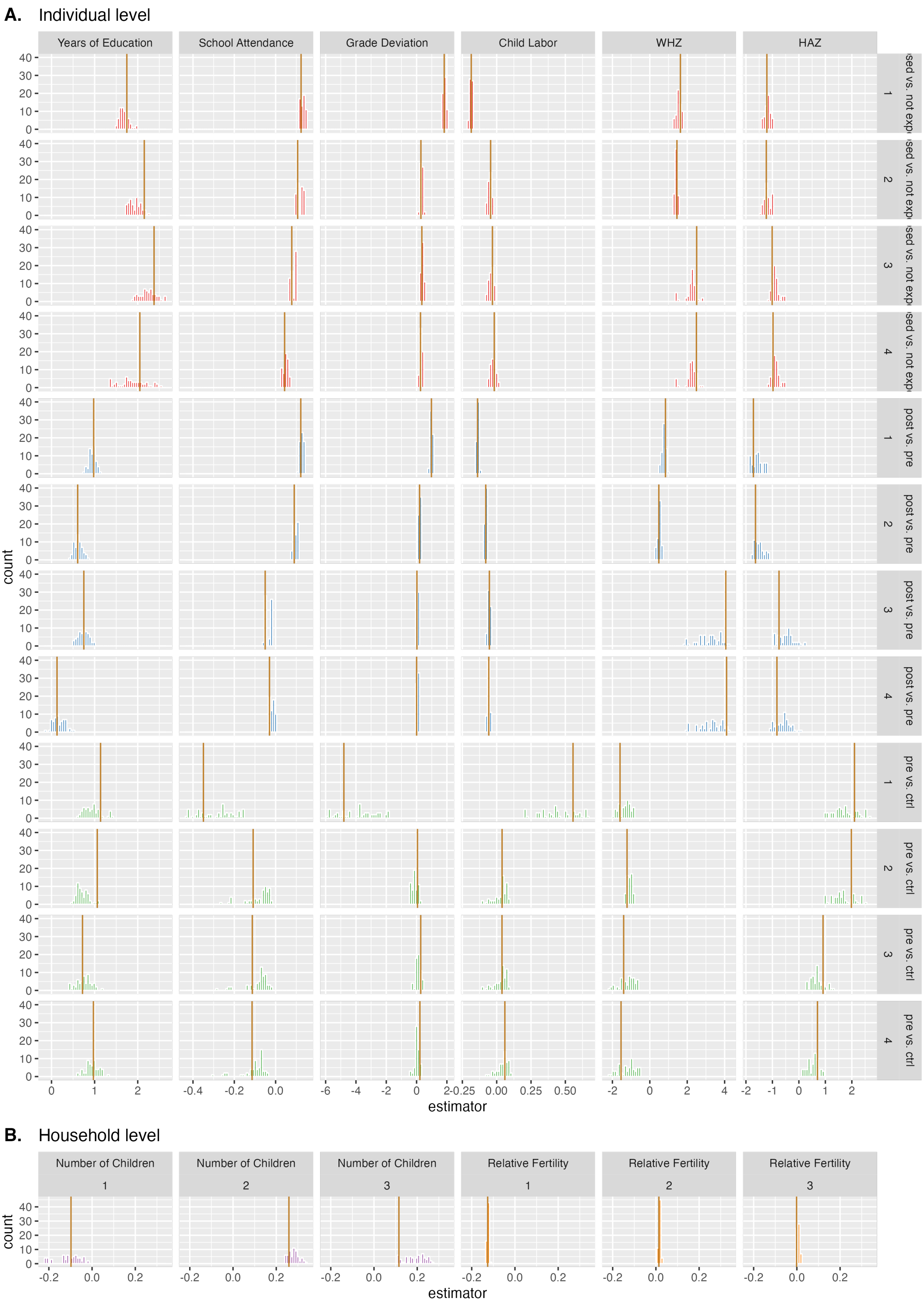


Figure 7: A summary plot of estimated exposure coefficients



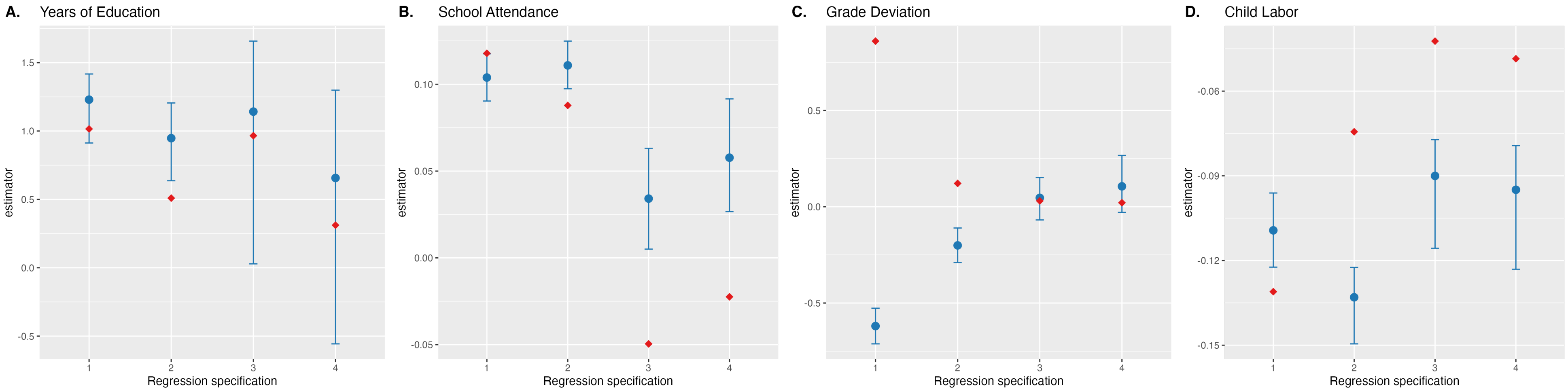
Note: Dots represent the point estimates and lines represent the 95% confidence intervals inferred from bootstrapping; p-values are inferred from conventional standard errors and may not agree with the 95% confidence intervals.

Figure 8: Estimators of exposure using alternative definitions of pseudo cohorts



Note: The alternative definitions of pseudo cohorts are all combinations of the following alternative categorizations for respective time-invariant household characteristics: (a) region or stratum of the residency (one categorization: Abidjan/other cities/west forest/east forest/savannah); (b) sex of the household head (one categorization: male/female); (c) birth year intervals of the household head (five categorizations: 3-, 5-, 7-, 10-, or 15-year intervals); (d) educational attainment of the household head (six categorizations: [1] no diploma/primary/lower secondary/upper secondary/vocational or professional/tertiary, [2] no diploma/compulsory/upper secondary or higher, [3] no diploma/primary/secondary/vocational or professional/tertiary, [4] no diploma/primary/lower secondary/upper secondary or higher, [5] no diploma/primary/secondary or higher, [6] no diploma/at least some education); (e) ethnic group of the household head (two categorizations: [1] Mandé North/Mandé South/Gour/Krou/Kwa/non-Ivorian, [2] no categorization regarding ethnicity)

Figure 9: Estimators of exposure for differential treatment length



Note: Blue dots are estimators of exposure for differential treatment length (weighted mean of three comparisons), with 95% confidence interval as error bars; red rhombi are original estimators ("post" versus "pre"). Please refer to Tables 6 for covariates included in each model.

Tables

Table 1: Comparative statics for the Neoclassical household model

	Unconstrained				Constrained		
	t^*	x^*	n^*	c^*	$\widetilde{x}$	$\widetilde{n}$	$\widetilde{c}$
Urban households:							
EduLaw95: $\underline{t}$					$+$	$+$	0
Agricultural prices: p	0	$-$	0	0	$-$	0	0
Wage rate: w	$-$	$+$	$-$	$+$	$+$	?	$+$
Return to human capital: α	$+$	$+$	0	0	$+$	$-$	0
Agricultural productivity: A	0	0	0	0	0	0	0
Rural households:							
EduLaw95: $\underline{t}$					$+$	$+$	0
Agricultural prices: p	$-$	$-$	$-$	$+$	$-$	$-$	$+$
Wage rate: w	0	0	0	0	0	0	0
Return to human capital: α	$+$	$+$	0	0	$+$	0	0
Agricultural productivity: A	$-$	$+$	$-$	$+$	$+$	$-$	$+$

t: time spent in school; x: nutrition; n: fertility; c: consumption

Table 2: Descriptive statistics of the first and the last ENV waves

	ENV 1985					ENV 2014				
	Min	Median	Mean	Max	SD	Min	Median	Mean	Max	SD
Urban [TRUE]	0	0	0.428	1	0.495	0	0	0.480	1	0.500
Household size	1	8	7.424	99	5.215	1	3	3.450	36	2.343
Share of household expenditure on food	0.051	0.542	0.544	0.928	0.160	0.00001	0.529	0.496	0.979	0.202
Cocoa farmer [TRUE]	0	0	0.255	1	0.436	0	0	0.116	1	0.320
Coffee farmer [TRUE]	0	0	0.312	1	0.464	0	0	0.025	1	0.155
Years of education	0	1.600	2.283	18	2.902	0	1.250	3.259	17	3.950
Attending school [TRUE]	0	0.143	0.171	1	0.214	0	0	0.162	1	0.246
Grade deviation	-10	-2	-2.298	2	2.121	-10	-1.500	-1.959	14	2.552
Height for age	-4.720	-0.490	-0.465	7.050	1.564	-15.650	-2.310	-2.971	22.150	4.474
Weight for height	-5.257	-0.250	-0.225	3.968	1.019	-10.370	1.295	3.122	67.940	7.465
Female [TRUE]	0	0.500	0.490	1	0.216	0	0.500	0.431	1	0.311
Age	8.667	20.916	24.828	90	11.435	7.500	23.333	26.767	105	12.279
Household head's ethnic group [Mandé North]	0	0	0.107	1	0.309	0	0	0.167	1	0.373
Household head's ethnic group [Mandé South]	0	0	0.115	1	0.319	0	0	0.096	1	0.295
Household head's ethnic group [Gour]	0	0	0.111	1	0.314	0	0	0.199	1	0.400
Household head's ethnic group [Krou]	0	0	0.154	1	0.361	0	0	0.142	1	0.349
Household head's ethnic group [Kwa]	0	0	0.323	1	0.468	0	0	0.377	1	0.485
Household head's ethnic group [non-Ivorian]	0	0	0.190	1	0.392	0	0	0.001	1	0.029
Household head's occupation sector [primary]	0	1	0.578	1	0.494	0	1	0.491	1	0.500
Household head's occupation sector [secondary or tertiary]	0	0	0.365	1	0.482	0	0	0.390	1	0.488
Household head's occupation sector [public]	0	0	0.056	1	0.231	0	0	0.067	1	0.250
Weekly working hours (not working = 0)	0	12.876	15.756	110	12.009	0	8	15.299	224	19.403
Mother's years of education	0	0	1.338	21	3.067	0	0	2.078	17	3.765

Please refer to Tables A1 and A2 for descriptive statistics of all ENV waves.

Table 3: Descriptive statistics of data on the quantity of education supply

	Matched census	RGPH 1988						RGPH 1998		RGPH 2014
	Geographical divisions	34 departements	50 departements				10 DRENs†	11 DRENs†	19 régions	33 régions
	Matched ENV wave	ENV 1985	ENV 1986	ENV 1987 & 1988	ENV 1993	ENV 1995	ENV 1998	ENV 2002	ENV 2008	ENV 2014
Lower secondary	Academic year	1984–1985	1985–1986	1988–1989	1993–1994	1994–1995	1998–1999	2000–2001	2010–2011	2014–2015
	Number of schools	26.2000	31.4000	33.9000	39.5000	40.2000	50.8000	56.5000	120.6000	137.3000
		(30.944)	(34.128)	(43.152)	(51.373)	(51.573)	(69.718)	(74.576)	(184.118)	(194.422)
	Number of classes	368.1000	379.2000	423.9000	526.8000	668.8000	751.7000	891.2000	818.8000	1443.3000
		(465.229)	(474.579)	(553.285)	(706.868)	(893.149)	(979.106)	(1177.977)	(1070.426)	(1945.002)
	Number of students	20326.8000	21658.3000	24444.5000	33508.9000	35217.3000	27726.5000	47025.2000	74852.0000	112691.9000
		(25572.850)	(26983.989)	(32033.172)	(44419.232)	(47354.268)	(35386.547)	(60670.660)	(101714.765)	(136666.484)
	Class size	55.6758	57.6085	57.9904	63.9787	52.4155	37.3078	53.8807	86.2081	83.4994
		(2.178)	(1.450)	(1.610)	(3.780)	(2.474)	(1.939)	(3.287)	(14.231)	(8.331)
	Number of schools per 1000 students	1.3740	1.8491	1.4279	1.2056	1.1894	1.7570	1.1754	1.5611	1.1372
		(0.242)	(1.727)	(0.222)	(0.191)	(0.298)	(0.384)	(0.220)	(0.219)	(0.124)
	Number of schools per 10,000 residents	0.2994	0.2943	0.2716	0.3150	0.3221	0.3918	0.6663	0.6349	0.5301
		(0.127)	(0.144)	(0.088)	(0.101)	(0.102)	(0.123)	(0.654)	(0.242)	(0.222)
Primary	Academic year	1984–1985	1985–1986	1990–1991	1993–1994	1994–1995	1997–1998	2000–2001	2010–2011	2014–2015
	Number of schools	595.4000	579.6000	676.9000	724.9000	746.6000	769.8000	848.2000	1163.8000	1485.7000
		(497.721)	(477.050)	(559.775)	(620.239)	(655.300)	(663.312)	(707.442)	(966.795)	(1071.422)
	Number of classes	3065.7000	3157.4000	3415.4000	3781.7000	3931.4000	4239.2000	4200.3000	6464.5000	7656.4000
		(2936.559)	(2968.270)	(3013.065)	(3819.804)	(4082.471)	(4313.290)	(4227.058)	(6354.014)	(6448.183)
	Number of students	117945.3000	121450.9000	142648.9000	157418.1000	163556.7000	181241.1000	204686.1000	270445.8000	337055.8000
		(127122.226)	(130048.647)	(159704.819)	(174642.163)	(183052.568)	(192614.503)	(201933.889)	(281680.696)	(305840.236)
	Class size	36.5592	36.4121	38.1737	39.7630	39.9633	42.2484	49.7686	40.6733	43.1163
		(4.190)	(4.347)	(5.506)	(4.618)	(3.073)	(3.118)	(4.093)	(4.811)	(3.796)
	Number of schools per 1000 students	5.8363	5.4972	5.5381	5.3102	5.2242	4.7285	4.4838	4.8539	4.7761
		(1.530)	(1.289)	(1.252)	(1.235)	(1.168)	(0.964)	(0.694)	(1.172)	(0.824)
	Number of schools per 10,000 residents	7.7797	5.7937	6.5287	6.9190	7.0712	7.3540	11.4338	7.9322	8.2203
		(2.789)	(1.185)	(1.052)	(1.017)	(1.029)	(0.888)	(9.143)	(2.192)	(3.522)

† A DREN (Direction Régionale de l'Éducation Nationale) is a regional office of the Ministry of Education responsible for educational affairs in a subnational region, which may or may not overlap with a subnational administrative division.

Note: Standard errors reported in parentheses

Table 4: Pseudo cohorts by survey wave

Wave	Number of Distinct Cohorts	Number of Distinct Households	Number of Individual per Cohort
1985	98	1576	145.58
1986	98	1587	140.64
1987	95	1584	123.26
1988	102	1596	103.34
1993	123	9600	471.72
1995	106	1200	64.52
1998	131	4176	187.61
2002	147	10713	391.24
2008	154	12050	369.64
2014	153	10051	248.57
Total	192	21965	1521.90

Table 5: Main results: years of education (A)

	Dependent variable:			
	Years of Education (aged 17–54)			
	(1)	(2)	(3)	(4)
Exposed to *EduLaw95*	1.787*** (0.108)	2.148*** (0.113)	2.613*** (0.148)	2.468*** (0.204)
	[1.518, 2.013]	[1.829, 2.342]	[2.185, 2.877]	[1.746, 2.668]
Age		−0.007* (0.003)	−0.015** (0.005)	−0.018*** (0.005)
		[−0.015, −0.001]	[−0.027, −0.006]	[−0.029, −0.008]
Female		−3.279*** (0.177)	−2.773*** (0.257)	−2.687*** (0.262)
		[−3.508, −2.598]	[−3.264, −2.177]	[−3.175, −2.059]
Household Size				−0.001 (0.010)
				[−0.022, 0.015]
Weekly Working Hours				−0.0006 (0.003)
				[−0.012, 0.003]
Share of Household Expenditure on Food				−0.856* (0.371)
				[−1.909, −0.516]
Num.Obs.	98051	98051	45740	45740
Pseudo Cohort FE	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Columns 3 and 4 drop observations in ENV 1993/1995/2002 due to unavailability of certain covariates.

Table 6: Main results: years of education (B)

	Dependent variable:							
	Years of Education (aged 17–54)							
	post vs. pre				pre vs. ctrl			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Younger Cohorts on *EduLaw95* Exposure	1.015*** (0.118) [0.744, 1.253]	0.509*** (0.128) [0.272, 0.812]	0.966*** (0.240) [0.388, 1.432]	0.311 (0.326) [−0.508, 0.965]	0.987*** (0.150) [0.521, 1.224]	0.453** (0.162) [0.053, 0.855]	0.410 (0.225) [−0.081, 0.932]	0.700** (0.268) [0.139, 1.313]
Age		0.066*** (0.008) [0.049, 0.080]	0.041* (0.017) [0.009, 0.076]	0.011 (0.020) [−0.035, 0.049]		0.015*** (0.004) [0.006, 0.022]	0.005 (0.006) [−0.010, 0.016]	−0.007 (0.009) [−0.030, 0.009]
Female		−2.598*** (0.307) [−3.111, −1.649]	−2.572*** (0.560) [−3.754, −1.260]	−2.051*** (0.580) [−3.475, −0.970]		−4.274*** (0.245) [−4.199, −2.971]	−4.007*** (0.356) [−4.267, −2.824]	−3.790*** (0.363) [−4.173, −2.624]
Household Size				0.004 (0.041) [−0.095, 0.090]				0.039 (0.026) [−0.025, 0.093]
Weekly Working Hours				−0.008 (0.006) [−0.025, 0.0006]				−0.005 (0.004) [−0.017, 0.002]
Share of Household Expenditure on Food				−4.233*** (1.084) [−6.761, −2.150]				−1.887** (0.715) [−3.688, −0.532]
Num.Obs.	22504	22504	11370	11370	33058	33058	13557	13557
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001

Columns 3, 4, 7 and 8 drop observations in ENV 1993/1995/2002 due to unavailability of certain covariates.

Table 7: Main results: other educational outcomes and child labor

	Dependent variable:								
	School Attendance (aged 6–16)			Grade Deviation (aged 6–16)			Child Labor (aged 6–16)		
	(1) exposed vs. not	(2) post vs. pre	(3) pre vs. ctrl	(4) exposed vs. not	(5) post vs. pre	(6) pre vs. ctrl	(7) exposed vs. not	(8) post vs. pre	(9) pre vs. ctrl
Exposed to *EduLaw95*	0.102*** (0.008) [0.086, 0.117]			0.203*** (0.044) [0.129, 0.274]			−0.033*** (0.006) [−0.048, −0.022]		
Younger Cohorts on *EduLaw95* Exposure		0.088*** (0.008) [0.073, 0.104]	−0.143** (0.044) [−0.196, −0.015]		0.121** (0.041) [0.034, 0.203]	0.153 (0.276) [−0.780, 0.311]		−0.074*** (0.006) [−0.088, −0.062]	−0.102** (0.039) [−0.075, 0.093]
Age	−0.006*** (0.002) [−0.009, −0.002]	−0.018*** (0.001) [−0.021, −0.016]	−0.034*** (0.005) [−0.047, −0.028]	−0.561*** (0.010) [−0.581, −0.541]	−0.602*** (0.006) [−0.617, −0.585]	−0.780*** (0.031) [−0.803, −0.669]	0.055*** (0.001) [0.051, 0.057]	0.054*** (0.001) [0.051, 0.056]	0.100*** (0.004) [0.080, 0.098]
Female	−0.113*** (0.033) [−0.193, −0.045]	−0.128*** (0.036) [−0.216, −0.040]	−0.061 (0.053) [−0.218, 0.003]	−1.038*** (0.188) [−1.373, −0.380]	−0.538** (0.193) [−1.150, 0.050]	−1.046** (0.330) [−2.022, 0.103]	0.045 (0.025) [−0.048, 0.098]	0.044 (0.027) [−0.048, 0.082]	0.164*** (0.043) [0.011, 0.195]
Num.Obs.	52932	23839	14029	51168	22917	13190	50120	21983	12821
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001

Results of other specifications are available upon request.

Table 8: Results: quantity of education supply (A)

	Dependent variable:								
	School Attendance (aged 6–16)			Grade Deviation (aged 6–16)			Child Labor (aged 6–16)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Exposed to *EduLaw95*	0.095*** (0.018) [0.059, 0.138]	0.118*** (0.009) [0.096, 0.132]	0.054*** (0.009) [0.040, 0.074]	0.521*** (0.109) [0.304, 0.745]	0.367*** (0.054) [0.268, 0.452]	0.122* (0.054) [0.056, 0.229]	0.028 (0.015) [−0.024, 0.058]	−0.030*** (0.007) [−0.045, −0.015]	0.032*** (0.007) [0.006, 0.038]
Class Size	−0.0003 (0.001) [−0.003, 0.002]			−0.021** (0.006) [−0.034, −0.007]			−0.003** (0.0009) [−0.005, 0.0005]		
Number of Schools per 1000 Students		0.069*** (0.006) [0.049, 0.078]			0.417*** (0.041) [0.294, 0.448]			−0.039*** (0.006) [−0.049, −0.018]	
Number of Schools per 10,000 Residents			0.043*** (0.003) [0.033, 0.044]			0.102*** (0.017) [0.066, 0.120]			−0.054*** (0.002) [−0.054, −0.041]
Age	−0.007 (0.005) [−0.017, 0.005]	0.023*** (0.003) [0.012, 0.027]	0.023*** (0.003) [0.015, 0.026]	−0.524*** (0.030) [−0.586, −0.464]	−0.442*** (0.020) [−0.490, −0.420]	−0.542*** (0.017) [−0.571, −0.520]	0.069*** (0.004) [0.054, 0.078]	0.041*** (0.003) [0.036, 0.049]	0.019*** (0.002) [0.017, 0.028]
Female	−0.099** (0.037) [−0.200, −0.019]	−0.066 (0.037) [−0.183, −0.002]	−0.109** (0.037) [−0.194, −0.031]	−1.080*** (0.230) [−1.548, −0.382]	−0.753** (0.232) [−1.365, −0.183]	−1.117*** (0.229) [−1.517, −0.402]	0.122*** (0.029) [−0.016, 0.149]	0.082** (0.030) [−0.037, 0.130]	0.102*** (0.029) [−0.022, 0.132]
Num.Obs.	40015	40015	40015	38454	38454	38454	37772	37772	37772
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Results: quality of education supply (A)

	Dependent variable:					
	Years of Education (aged 17–54)					
	(1)	(2)	(3)	(4)	(5)	(6)
Exposed to *EduLaw95*	2.321*** (0.332) [1.461, 3.059]			2.729*** (0.180) [2.273, 3.031]	2.756*** (0.181) [2.291, 3.052]	1.840*** (0.345) [1.045, 2.404]
Exposed to *EduLaw95* $\times$ Test Score (Cohort)		2.326*** (0.331) [1.517, 3.174]				
Exposed to *EduLaw95* $\times$ Teacher Qualification (Cohort)			7.677*** (1.108) [4.651, 10.015]			
Test Score (Current Year)					−0.959 (0.641) [−2.051, 0.336]	
Teacher Qualification (Current Year)						1.398** (0.463) [0.556, 2.310]
Age	0.002 (0.003) [−0.005, 0.007]	0.002 (0.003) [−0.006, 0.007]	0.002 (0.003) [−0.005, 0.007]	0.017* (0.007) [0.003, 0.032]	0.012 (0.008) [−0.002, 0.032]	−0.014 (0.013) [−0.038, 0.010]
Female	−2.888*** (0.166) [−3.196, −2.347]	−2.889*** (0.166) [−3.210, −2.338]	−2.886*** (0.166) [−3.206, −2.370]	−2.964*** (0.372) [−3.530, −1.951]	−3.013*** (0.373) [−3.653, −1.974]	−3.168*** (0.378) [−3.686, −2.012]
Num.Obs.	92610	92610	92610	30061	30061	30061
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications are available upon request.

Table 10: Results: quality of education supply (B)

	Dependent variable:								
	School Attendance (aged 6–16)			Grade Deviation (aged 6–16)			Child Labor (aged 6–16)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Exposed to *EduLaw95*	0.118*** (0.010) [0.098, 0.140]			0.058 (0.063) [−0.032, 0.180]			−0.110*** (0.008) [−0.131, −0.096]		
Exposed to *EduLaw95* × Test Score (Cohort)		0.119*** (0.011) [0.099, 0.140]			0.032 (0.065) [−0.061, 0.167]			−0.102*** (0.009) [−0.123, −0.087]	
Exposed to *EduLaw95* × Teacher Qualification (Cohort)			0.191*** (0.016) [0.157, 0.226]			0.435*** (0.100) [0.260, 0.635]			−0.214*** (0.013) [−0.247, −0.192]
Age	−0.039*** (0.002) [−0.043, −0.034]	−0.039*** (0.002) [−0.043, −0.034]	−0.040*** (0.002) [−0.044, −0.036]	−0.722*** (0.015) [−0.750, −0.682]	−0.725*** (0.015) [−0.752, −0.680]	−0.707*** (0.014) [−0.734, −0.667]	0.071*** (0.002) [0.066, 0.075]	0.072*** (0.002) [0.066, 0.076]	0.071*** (0.002) [0.065, 0.075]
Female	−0.061 (0.038) [−0.182, −0.031]	−0.060 (0.038) [−0.178, −0.023]	−0.058 (0.038) [−0.175, −0.024]	−0.980*** (0.228) [−1.511, −0.353]	−0.986*** (0.228) [−1.465, −0.266]	−0.916*** (0.228) [−1.450, −0.267]	0.117*** (0.029) [−0.006, 0.136]	0.118*** (0.029) [−0.005, 0.141]	0.108*** (0.029) [−0.007, 0.139]
Num.Obs.	25313	25313	25313	24006	24006	24006	23987	23987	23987
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications are available upon request.

Table 11: Main results: health outcomes

	Dependent variable:					
	Weight for Height (aged 0–5)			Height for Age (aged 0–5)		
	(1) exposed vs. not exposed	(2) post vs. pre	(3) pre vs. ctrl	(4) exposed vs. not exposed	(5) post vs. pre	(6) pre vs. ctrl
Older Siblings Exposed to *EduLaw95*	1.427*** (0.119)			−1.350*** (0.089)		
	[1.301, 1.781]			[−1.469, −1.121]		
Older Siblings in Younger Cohorts on *EduLaw95* Exposure		0.391** (0.148)	−1.107*** (0.206)		−1.717*** (0.111)	2.211*** (0.154)
		[0.261, 0.905]	[−1.639, −0.913]		[−1.901, −1.491]	[1.804, 2.398]
Age in Months	0.048*** (0.010)	0.105*** (0.009)	0.099*** (0.008)	0.009 (0.007)	−0.023*** (0.006)	−0.026*** (0.006)
	[0.005, 0.047]	[0.048, 0.087]	[0.045, 0.082]	[−0.012, 0.018]	[−0.030, −0.004]	[−0.033, −0.007]
Female	0.115 (0.372)	0.135 (0.373)	0.157 (0.373)	−0.084 (0.280)	−0.157 (0.280)	−0.170 (0.280)
	[−0.673, 0.784]	[−0.736, 0.893]	[−0.775, 0.897]	[−0.473, 0.556]	[−0.508, 0.498]	[−0.544, 0.537]
Num.Obs.	20996	20996	20996	21226	21226	21226
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications are available upon request.

Table 12: Results: fertility, by household head occupation sector

	Dependent variable:	
	Number of Children	Relative Fertility
	(1)	(2)
Household Exposed to *EduLaw95*	0.493** (0.155) [0.157, 0.781]	0.052** (0.019) [0.013, 0.084]
Household Exposed to *EduLaw95* × Household Head in [Secondary/Tertiary] Sector	−1.411*** (0.305) [−1.918, −0.730]	−0.124*** (0.037) [−0.212, −0.034]
Household Exposed to *EduLaw95* × Household Head in [Public/Other] Sector	−0.718* (0.333) [−1.315, −0.129]	−0.079 (0.041) [−0.162, 0.009]
Age of Household Head	0.255*** (0.018) [0.224, 0.295]	−0.003 (0.002) [−0.007, 0.001]
Age of Household Head × Household Head in [Secondary/Tertiary] Sector	0.139*** (0.041) [0.059, 0.207]	0.027*** (0.005) [0.016, 0.037]
Age of Household Head × Household Head in [Public/Other] Sector	0.123* (0.049) [0.033, 0.214]	0.017** (0.006) [0.004, 0.030]
Age^2 of Household Head	−0.003*** (0.0002) [−0.003, −0.003]	−0.0001*** (0.00002) [−0.0001, −0.00007]
Age^2 of Household Head × Household Head in [Secondary/Tertiary] Sector	−0.0006 (0.0004) [−0.001, 0.0002]	−0.0002*** (0.00005) [−0.0003, −0.0001]
Age^2 of Household Head × Household Head in [Public/Other] Sector	−0.001* (0.0005) [−0.002, −0.0001]	−0.0002** (0.00006) [−0.0003, −0.00006]
Household Head's Years of Education	−0.180*** (0.046) [−0.237, −0.045]	−0.018** (0.006) [−0.027, 0.0006]
Household Head's Years of Education × Household Head in [Secondary/Tertiary] Sector	0.236*** (0.065) [0.050, 0.298]	0.021** (0.008) [−0.004, 0.033]
Household Head's Years of Education × Household Head in [Public/Other] Sector	0.129* (0.064) [−0.029, 0.212]	0.013 (0.008) [−0.007, 0.026]
Number of Wives	2.297*** (0.236) [1.570, 2.687]	−0.020 (0.029) [−0.078, 0.023]
Number of Wives × Household Head in [Secondary/Tertiary] Sector	0.009 (0.366) [−0.780, 1.077]	−0.064 (0.044) [−0.141, 0.032]
Number of Wives × Household Head in [Public/Other] Sector	−0.219 (0.534) [−1.251, 1.359]	0.015 (0.065) [−0.127, 0.142]
Num.Obs.	22217	22110
Pseudo Cohort × Household Head Occupation Sector FE	Yes	Yes

Reference category for Household Head Occupation Sector is [Primary].
95% confidence interval from 1000 bootstraps (stratified by Household Head Occupation Sector) reported in brackets
Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Results of other specifications are available upon request.

Table 13: Results: heterogeneity in treatment effects on education and child labor, by gender

	Dependent variable:			
	Years of Education (aged 18–54)	School Attendance (aged 6–16)	Grade Deviation (aged 6–16)	Child Labor (aged 6–16)
	(1)	(2)	(3)	(4)
Exposed to *EduLaw95*	1.815*** (0.125)	0.077*** (0.011)	0.113 (0.061)	−0.019* (0.009)
	[1.475, 2.082]	[0.057, 0.098]	[0.024, 0.216]	[−0.042, −0.006]
Exposed to *EduLaw95* × Female	−0.293 (0.187)	0.051*** (0.015)	0.203* (0.087)	−0.035** (0.012)
	[−0.702, 0.198]	[0.019, 0.080]	[0.059, 0.332]	[−0.057, −0.005]
Age	0.008** (0.003)	0.0005 (0.002)	−0.516*** (0.013)	0.062*** (0.002)
	[0.0002, 0.014]	[−0.004, 0.005]	[−0.540, −0.488]	[0.056, 0.064]
Age × Female	−0.017*** (0.005)	−0.012*** (0.003)	−0.086*** (0.019)	−0.015*** (0.003)
	[−0.032, −0.010]	[−0.018, −0.006]	[−0.128, −0.052]	[−0.020, −0.008]
Num.Obs.	98051	52932	51168	50120
Pseudo Cohort × Female FE	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps (stratified by Female) reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications are available upon request.

Table 14: Results: differential treatment length

	Dependent variable:			
	Years of Education (aged 17–54)			
	(1) part (short) vs. pre	(2) part (long) vs. pre	(3) post vs. pre	(4) overall
Younger Cohorts on *EduLaw95* Exposure	1.603*** (0.144)	0.630*** (0.108)	0.509*** (0.128)	0.948*** (0.127)
	[1.163, 1.839]	[0.383, 0.867]	[0.273, 0.831]	[0.637, 1.205]
Age	−0.0009 (0.005)	0.031*** (0.007)	0.066*** (0.008)	0.029*** (0.007)
	[−0.008, 0.010]	[0.017, 0.046]	[0.047, 0.081]	[0.017, 0.043]
Female	−3.412*** (0.267)	−3.360*** (0.282)	−2.598*** (0.307)	−3.171*** (0.283)
	[−3.736, −2.343]	[−3.572, −2.210]	[−3.060, −1.648]	[−3.490, −2.111]
Num.Obs.	29816	33474	22504	74542
Weight	0.2452	0.25	0.1855	/
Pseudo Cohort FE	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Results: crop price shocks

	Dependent variable:							
	School Attendance (aged 6–16)				Child Labor (aged 6–16)			
	(1) Cocoa (log)	(2) Cocoa (rel)	(3) Coffee (log)	(4) Coffee (rel)	(5) Cocoa (log)	(6) Cocoa (rel)	(7) Coffee (log)	(8) Coffee (rel)
$\ln(P^{\text{cocoa}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*	−0.115 (0.119) [−0.358, 0.192]				0.139 (0.097) [−0.080, 0.395]			
$\ln(P^{\text{cocoa}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*	−1.428*** (0.180) [−1.843, −1.083]				−1.035*** (0.145) [−1.361, −0.666]			
$\ln(P^{\text{coffee}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*			0.730*** (0.154) [0.104, 0.822]				−0.726*** (0.120) [−0.851, −0.188]	
$\ln(P^{\text{coffee}}) \downarrow$ During Age 0–4 × Exposed to *EduLaw95*			14.153*** (4.012) [−0.103, 17.595]				−21.941*** (3.219) [−23.701, −6.167]	
$\ln(P^{\text{coffee}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*			−1.704*** (0.334) [−2.552, −1.058]				1.208*** (0.268) [0.469, 1.805]	
$\ln(P^{\text{coffee}}) \downarrow$ Since Last Year × Exposed to *EduLaw95*			−1.056*** (0.297) [−1.392, −0.066]				0.748** (0.242) [−0.094, 0.987]	
$(P^{\text{cocoa}}/P^{\text{staple}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*		−0.015 (0.028) [−0.083, 0.045]				−0.0004 (0.023) [−0.058, 0.054]		
$(P^{\text{cocoa}}/P^{\text{staple}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*		−0.335*** (0.035) [−0.407, −0.260]				−0.179*** (0.028) [−0.238, −0.111]		
$(P^{\text{coffee}}/P^{\text{staple}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*				0.353*** (0.044) [0.149, 0.338]				−0.299*** (0.035) [−0.299, −0.098]
$(P^{\text{coffee}}/P^{\text{staple}}) \downarrow$ During Age 0–4 × Exposed to *EduLaw95*				3.566** (1.126) [−0.408, 4.599]				−6.083*** (0.904) [−6.399, −1.517]
$(P^{\text{coffee}}/P^{\text{staple}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*				−0.526*** (0.049) [−0.617, −0.404]				0.057 (0.039) [−0.058, 0.128]
$(P^{\text{coffee}}/P^{\text{staple}}) \downarrow$ Since Last Year × Exposed to *EduLaw95*				0.306*** (0.058) [0.136, 0.405]				0.238*** (0.046) [0.080, 0.326]
Num.Obs.	52932	52932	52932	52932	50120	50120	50120	50120
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Other covariates included in the regressions: Exposed to EduLaw95, Age, Female, and the level variables of respective price shocks

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications and on anthropometric outcomes are available upon request.

Table 16: Results: crop price shocks (B)

	Dependent variable:						
	Grade Deviation (aged 6–16)				Years of Education (aged 17–54)	Number of Children	Relative Fertility
	(9) Cocoa (log)	(10) Cocoa (rel)	(11) Coffee (log)	(12) Coffee (rel)	(13) Cocoa (log)	(14) Coffee (log)	(15) Coffee (log)
$\ln(P^{\text{cocoa}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*	0.851 (0.681) [−0.531, 1.674]				−12.434 (15.466) [−40.070, 28.929]		
$\ln(P^{\text{cocoa}}) \uparrow$ During Age 5–9 × Exposed to *EduLaw95*					3.041 (9.295) [−16.018, 21.887]		
$\ln(P^{\text{cocoa}}) \uparrow$ During Age 10–14 × Exposed to *EduLaw95*					3.172 (12.775) [−22.669, 30.877]		
$\ln(P^{\text{cocoa}}) \downarrow$ During Age 10–14 × Exposed to *EduLaw95*					7.376 (12.575) [−19.134, 34.775]		
$\ln(P^{\text{cocoa}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*	−4.766*** (1.046) [−6.516, −3.052]						
$(P^{\text{cocoa}}/P^{\text{staple}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*		0.251 (0.160) [−0.113, 0.451]					
$(P^{\text{cocoa}}/P^{\text{staple}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*		−1.265*** (0.201) [−1.557, −0.916]					
$\ln(P^{\text{coffee}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*			−0.924 (0.884) [−2.290, 0.676]				
$\ln(P^{\text{coffee}}) \downarrow$ During Age 0–4 × Exposed to *EduLaw95*			29.166 (23.088) [−12.788, 57.714]				
$\ln(P^{\text{coffee}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*			−3.437 (1.910) [−5.413, 0.667]				
$\ln(P^{\text{coffee}}) \downarrow$ Since Last Year × Exposed to *EduLaw95*			−8.466*** (1.722) [−10.885, −5.840]				
$(P^{\text{coffee}}/P^{\text{staple}}) \uparrow$ During Age 0–4 × Exposed to *EduLaw95*				−0.337 (0.252) [−0.795, 0.042]			
$(P^{\text{coffee}}/P^{\text{staple}}) \downarrow$ During Age 0–4 × Exposed to *EduLaw95*				6.142 (6.484) [−6.869, 13.872]			
$(P^{\text{coffee}}/P^{\text{staple}}) \uparrow$ Since Last Year × Exposed to *EduLaw95*				−0.281 (0.280) [−0.679, 0.235]			
$(P^{\text{coffee}}/P^{\text{staple}}) \downarrow$ Since Last Year × Exposed to *EduLaw95*				−3.201*** (0.337) [−3.488, −2.321]			
Household Exposed to *EduLaw95* × $\ln(P^{\text{coffee}}) \uparrow$ Since Last Year						3.376*** (0.567) [2.220, 4.464]	0.365*** (0.074) [0.224, 0.514]
Household Exposed to *EduLaw95* × $\ln(P^{\text{coffee}}) \downarrow$ Since Last Year						−1.440** (0.542) [−2.560, −0.401]	−0.171* (0.070) [−0.311, −0.010]
Num.Obs.	51168	51168	51168	51168	47707	34821	34612
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Other covariates included in the regressions: the level variables of respective price shocks, and
(columns 9–13) Exposed to EduLaw95, Age, Female; or
(columns 14–15) Household Exposed to EduLaw95, Age of Household Head, Age of Household Head squared, Household Head's Years of Education, Number of Wives

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications and on anthropometric outcomes are available upon request.

Table 17: Results: weather shocks

	Dependent variable:				
	Years of Education (aged 17–54)	School Attendance (aged 6–16)	Grade Deviation (aged 6–16)	Child Labor (aged 6–16)	WHZ (aged 0–5)
	(1)	(2)	(3)	(4)	(5)
Flood Shocks (z-score) During Age 0–4 × Exposed to *EduLaw95*	2.027 (3.088) [−5.032, 10.072]	0.075* (0.033) [0.012, 0.150]	0.658*** (0.197) [0.294, 1.111]	−0.030 (0.031) [−0.099, 0.040]	
Flood Shocks (z-score) During Age 5–9 × Exposed to *EduLaw95*	2.478*** (0.715) [0.162, 3.628]				
Flood Shocks (z-score) During Age 10–14 × Exposed to *EduLaw95*	−0.754 (0.575) [−2.005, 0.909]				
Drought Shocks (z-score) During Age 0–4 × Exposed to *EduLaw95*	0.520* (0.238) [−0.202, 0.864]	0.065*** (0.018) [0.014, 0.089]	−0.104 (0.100) [−0.375, 0.009]	−0.076*** (0.017) [−0.103, −0.029]	
Drought Shocks (z-score) During Age 5–9 × Exposed to *EduLaw95*	−1.542*** (0.376) [−2.069, −0.207]				
Drought Shocks (z-score) During Age 10–14 × Exposed to *EduLaw95*	0.667 (0.439) [−0.565, 1.572]				
Drought Shocks (z-score) Since Last Year × Exposed to *EduLaw95*		0.081*** (0.012) [0.041, 0.096]	0.322*** (0.067) [0.127, 0.351]	0.029** (0.011) [0.013, 0.063]	
Flood Shocks (z-score) Since Last Year × Older Siblings Exposed to *EduLaw95*					−0.112 (0.927) [−2.389, 1.732]
Drought Shocks (z-score) Since Last Year × Older Siblings Exposed to *EduLaw95*					−0.789*** (0.213) [−1.338, −0.106]
Num.Obs.	47458	29285	28313	28232	11717
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes

Other covariates included in the regressions: Exposed to EduLaw95, Age, Female, and the level variables of respective weather shocks

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications, including those with temperature shocks, and on outcomes of HAZ are available upon request.

Table 18: Results: event shocks

	Dependent variable:					
	Years of Education (aged 17–54)			School Attendance (aged 6–16)		
	(1)	(2)	(3)	(4)	(5)	(6)
Exposed to *EduLaw95*	2.444*** (0.134) [2.001, 2.604]	1.991* (0.934) [−0.400, 4.311]	2.211*** (0.183) [1.741, 2.527]	0.079*** (0.008) [0.070, 0.101]	0.120*** (0.009) [0.101, 0.138]	0.067*** (0.008) [0.050, 0.083]
1994 Devaluation	6.512*** (0.392) [4.129, 6.245]			−0.407*** (0.018) [−0.396, −0.320]		
2002 Civil War		0.177 (1.045) [−2.492, 2.751]			−0.050*** (0.013) [−0.073, −0.024]	
2011 Civil Conflict			−0.177 (0.407) [−1.057, 0.762]			0.180*** (0.009) [0.163, 0.198]
Exposed to *EduLaw95* × 1994 Devaluation	−7.146*** (0.491) [−6.909, −4.356]					
Age	−0.020*** (0.003) [−0.024, −0.010]	−0.007* (0.003) [−0.015, −0.001]	−0.007* (0.003) [−0.015, −0.002]	−0.040*** (0.002) [−0.039, −0.030]	−0.002 (0.002) [−0.006, 0.002]	−0.013*** (0.002) [−0.016, −0.009]
Female	−3.439*** (0.177) [−3.531, −2.655]	−3.280*** (0.177) [−3.491, −2.568]	−3.280*** (0.177) [−3.464, −2.537]	−0.089** (0.033) [−0.173, −0.032]	−0.119*** (0.033) [−0.193, −0.048]	−0.119*** (0.033) [−0.193, −0.048]
Num.Obs.	98051	98051	98051	52932	52932	52932
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications and on anthropometric outcomes are available upon request.

	Dependent variable:					
	Grade Deviation (aged 6–16)			Child Labor (aged 6–16)		
	(7)	(8)	(9)	(10)	(11)	(12)
Exposed to *EduLaw95*	0.124** (0.045) [0.077, 0.221]	0.034 (0.053) [−0.041, 0.132]	0.147** (0.046) [0.077, 0.226]	−0.018** (0.006) [−0.040, −0.012]	−0.110*** (0.007) [−0.126, −0.094]	0.015* (0.006) [−0.002, 0.026]
1994 Devaluation	−1.479*** (0.113) [−1.547, −1.066]			0.285*** (0.016) [0.198, 0.275]		
2002 Civil War		0.460*** (0.077) [0.307, 0.614]			0.209*** (0.011) [0.183, 0.229]	
2011 Civil Conflict			0.267*** (0.053) [0.174, 0.357]			−0.245*** (0.007) [−0.257, −0.230]
Exposed to *EduLaw95* × 1994 Devaluation						
Age	−0.699*** (0.014) [−0.713, −0.642]	−0.596*** (0.011) [−0.619, −0.568]	−0.574*** (0.010) [−0.596, −0.553]	0.082*** (0.002) [0.070, 0.081]	0.038*** (0.002) [0.035, 0.042]	0.066*** (0.001) [0.061, 0.068]
Female	−0.732*** (0.189) [−1.199, −0.243]	−0.939*** (0.189) [−1.312, −0.303]	−1.018*** (0.188) [−1.373, −0.368]	−0.022 (0.025) [−0.081, 0.063]	0.098*** (0.025) [−0.017, 0.127]	0.024 (0.025) [−0.048, 0.075]
Num.Obs.	51168	51168	51168	50120	50120	50120
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications and on anthropometric outcomes are available upon request.

Table 19: Results: quantity of education supply (B)

	Dependent variable:							
	School Attendance (aged 6–16)				Grade Deviation (aged 6–16)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposed to *EduLaw95*	0.112*** (0.018) [0.078, 0.155]	0.067*** (0.011) [0.048, 0.092]	0.012 (0.018) [−0.010, 0.065]	0.041*** (0.009) [0.025, 0.060]	0.468*** (0.111) [0.243, 0.666]	−0.002 (0.068) [−0.090, 0.141]	0.454*** (0.114) [0.235, 0.674]	0.118* (0.054) [0.046, 0.227]
Class Size	0.0005 (0.001) [−0.002, 0.002]		0.003** (0.001) [−0.00007, 0.004]		−0.024*** (0.007) [−0.037, −0.009]		−0.018** (0.007) [−0.031, −0.004]	
Number of Schools per 10,000 Residents		0.042*** (0.003) [0.032, 0.044]		0.031*** (0.003) [0.022, 0.034]		0.110*** (0.017) [0.069, 0.127]		0.098*** (0.018) [0.058, 0.117]
2002 Civil War	−0.067*** (0.016) [−0.092, −0.035]	−0.031* (0.015) [−0.062, −0.003]			0.257** (0.097) [0.094, 0.418]	0.287** (0.096) [0.101, 0.442]		
2011 Civil Conflict			0.176*** (0.010) [0.155, 0.194]	0.130*** (0.010) [0.113, 0.153]			0.128* (0.061) [0.034, 0.223]	0.038 (0.064) [−0.047, 0.153]
Age	−0.007 (0.005) [−0.017, 0.005]	0.024*** (0.003) [0.015, 0.027]	−0.026*** (0.005) [−0.032, −0.011]	0.012*** (0.003) [0.003, 0.015]	−0.521*** (0.030) [−0.588, −0.464]	−0.550*** (0.017) [−0.583, −0.525]	−0.540*** (0.031) [−0.605, −0.479]	−0.546*** (0.018) [−0.582, −0.521]
Female	−0.104** (0.037) [−0.194, −0.021]	−0.110** (0.037) [−0.203, −0.031]	−0.119** (0.037) [−0.205, −0.035]	−0.115** (0.037) [−0.192, −0.040]	−1.042*** (0.230) [−1.454, −0.299]	−1.085*** (0.229) [−1.459, −0.336]	−1.084*** (0.230) [−1.527, −0.340]	−1.116*** (0.229) [−1.526, −0.326]
Num.Obs.	40015	40015	40015	40015	38454	38454	38454	38454
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001

	Dependent variable:			
	Child Labor (aged 6–16)			
	(9)	(10)	(11)	(12)
Exposed to *EduLaw95*	−0.023 (0.015) [−0.076, −0.009]	−0.050*** (0.009) [−0.079, −0.039]	0.156*** (0.016) [0.092, 0.158]	0.052*** (0.007) [0.029, 0.061]
Class Size	−0.006*** (0.0009) [−0.007, −0.003]		−0.008*** (0.0009) [−0.008, −0.004]	
Number of Schools per 10,000 Residents		−0.049*** (0.002) [−0.050, −0.037]		−0.037*** (0.002) [−0.038, −0.026]
2002 Civil War	0.253*** (0.013) [0.220, 0.272]	0.192*** (0.013) [0.165, 0.225]		
2011 Civil Conflict			−0.253*** (0.008) [−0.265, −0.234]	−0.191*** (0.009) [−0.214, −0.181]
Age	0.071*** (0.004) [0.056, 0.075]	0.012*** (0.002) [0.010, 0.021]	0.099*** (0.004) [0.081, 0.099]	0.035*** (0.002) [0.033, 0.044]
Female	0.169*** (0.029) [0.013, 0.169]	0.133*** (0.029) [0.0001, 0.146]	0.127*** (0.029) [−0.0008, 0.138]	0.100*** (0.029) [−0.021, 0.123]
Num.Obs.	37772	37772	37772	37772
Pseudo Cohort FE	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001

Table 20: Results: quality of education supply (C)

	Dependent variable:	School Attendance (aged 6–16)		Grade Deviation (aged 6–16)		Child Labor (aged 6–16)	
	Variable of interest:	Exposed to *EduLaw95* × Test Score (Cohort)	Exposed to *EduLaw95* × Teacher Qualification (Cohort)	Exposed to *EduLaw95* × Test Score (Cohort)	Exposed to *EduLaw95* × Teacher Qualification (Cohort)	Exposed to *EduLaw95* × Test Score (Cohort)	Exposed to *EduLaw95* × Teacher Qualification (Cohort)
Models on binary shocks							
Featured covariates:	1994 Devaluation	0.150*** (0.013) [0.126, 0.174]	0.196*** (0.016) [0.164, 0.225]	0.282*** (0.077) [0.161, 0.430]	0.389*** (0.100) [0.247, 0.591]	−0.160*** (0.010) [−0.185, −0.145]	−0.212*** (0.013) [−0.245, −0.190]
Featured covariates:	2011 Civil Conflict	0.091*** (0.012) [0.067, 0.115]	0.286*** (0.039) [0.200, 0.357]	−0.178* (0.074) [−0.283, −0.051]	−0.373 (0.239) [−0.755, 0.081]	−0.051*** (0.010) [−0.074, −0.033]	−0.181*** (0.032) [−0.248, −0.111]
Models on price shocks							
Featured covariates:	$\ln(P^{\text{cocoa}})$ array × variable of interest	0.126*** (0.014) [0.098, 0.156]	0.224*** (0.022) [0.181, 0.267]	0.185* (0.087) [0.035, 0.354]	0.587*** (0.135) [0.382, 0.867]	−0.052*** (0.012) [−0.084, −0.032]	−0.179*** (0.018) [−0.221, −0.140]
Featured covariates:	$(P^{\text{cocoa}}/P^{\text{staple}})$ array × variable of interest	0.124*** (0.014) [0.098, 0.155]	0.222*** (0.022) [0.178, 0.265]	0.116 (0.087) [−0.020, 0.293]	0.539*** (0.134) [0.341, 0.844]	−0.046*** (0.012) [−0.078, −0.028]	−0.174*** (0.018) [−0.218, −0.140]
Featured covariates:	$\ln(P^{\text{coffee}})$ array × variable of interest	0.157*** (0.014) [0.126, 0.182]	0.252*** (0.021) [0.203, 0.288]	0.508*** (0.085) [0.337, 0.636]	0.945*** (0.124) [0.709, 1.206]	−0.077*** (0.011) [−0.105, −0.057]	−0.188*** (0.017) [−0.232, −0.155]
Featured covariates:	$(P^{\text{coffee}}/P^{\text{staple}})$ array × variable of interest	0.152*** (0.014) [0.120, 0.179]	0.238*** (0.021) [0.195, 0.276]	0.508*** (0.085) [0.325, 0.634]	0.976*** (0.123) [0.726, 1.189]	−0.074*** (0.012) [−0.102, −0.053]	−0.177*** (0.017) [−0.221, −0.149]
Models on weather shocks							
Featured covariates:	Flood Shocks array × variable of interest	0.237*** (0.073) [0.097, 0.386]	0.329** (0.118) [0.093, 0.588]	0.219 (0.413) [−0.462, 1.158]	0.515 (0.669) [−0.668, 2.010]	−0.359*** (0.065) [−0.469, −0.195]	−0.419*** (0.105) [−0.620, −0.178]
Models with supply side variables							
Featured covariates:	Class Size	−0.019 (0.025) [−0.041, 0.064]	0.183*** (0.027) [0.127, 0.252]	0.538*** (0.158) [0.199, 0.911]	1.609*** (0.196) [1.069, 1.944]	0.119*** (0.021) [0.008, 0.113]	−0.228*** (0.026) [−0.296, −0.179]
Featured covariates:	Number of Schools per 10,000 Residents	0.082*** (0.014) [0.055, 0.111]	0.171*** (0.019) [0.134, 0.210]	−0.082 (0.086) [−0.193, 0.121]	0.152 (0.120) [−0.010, 0.446]	−0.025* (0.011) [−0.066, −0.010]	−0.122*** (0.015) [−0.177, −0.106]

Numbers reported are coefficients on the variable of interest (see column header). In addition to the ones listed in the first column, all models include Age, Female, Pseudo Cohort FE as covariates.
95% confidence interval from 1000 bootstraps reported in brackets
Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
This table only reports coefficients on the variable of interest in selective models. Complete results are available upon request.

A Appendix

A.1 Descriptive statistics of ENV data by survey wave

Table A1: Descriptive statistics of all ENV waves: individual level

	1985	1986	1987	1988	1993	1995	1998	2002	2008	2014
Number of individuals	14398	13867	11847	10561	58021	6839	24594	58106	59699	47635
Female [TRUE]	0.4897	0.4787	0.4883	0.4950	0.4770	0.4692	0.4719	0.4616	0.4522	0.4309
	(0.216)	(0.224)	(0.226)	(0.225)	(0.244)	(0.248)	(0.254)	(0.272)	(0.276)	(0.311)
Age	24.8283	26.0348	25.4376	25.0898	25.0104	25.2304	24.2983	24.9046	25.5639	26.7669
	(11.435)	(12.449)	(12.821)	(12.392)	(12.559)	(11.950)	(11.040)	(10.810)	(11.390)	(12.279)
Years of education	2.2831	2.4230	2.4588	2.2060	1.8695	2.2138	2.7769	3.2174	3.3272	3.2592
	(2.902)	(2.938)	(2.955)	(2.512)	(3.458)	(2.638)	(3.070)	(3.541)	(3.556)	(3.950)
Attending school [TRUE]	0.1714	0.1646	0.1798	0.1320	0.1395	0.1920	0.2150	0.2212	0.1790	0.1617
	(0.214)	(0.223)	(0.227)	(0.206)	(0.201)	(0.254)	(0.277)	(0.286)	(0.233)	(0.246)
Grade deviation	-2.2981	-2.2628	-2.2437	-2.1888	-1.4756	-2.5735	-2.4070	-2.3846	-1.9567	-1.9593
	(2.121)	(2.009)	(2.091)	(2.003)	(4.360)	(2.107)	(2.372)	(2.377)	(2.619)	(2.552)
Weekly working hours (not working = 0)	15.7556	16.8119	17.4479	17.8547	NaN	NaN	22.5717	21.6317	25.1476	15.2989
	(12.009)	(12.402)	(12.886)	(13.076)	(-0.000)	(-0.000)	(16.773)	(20.651)	(22.321)	(19.403)
Weekly working hours (not working = 0) among children	3.2137	4.2067	3.8523	3.3629	NaN	NaN	4.3539	4.0761	2.8256	0.8667
	(7.413)	(9.124)	(8.398)	(7.904)	(-0.000)	(-0.000)	(10.041)	(12.047)	(12.127)	(5.772)
Height for age	-0.4649	-0.4571	-0.6437	-0.7002	-1.6682	NaN	NaN	-2.5008	-2.2745	-2.9714
	(1.564)	(1.864)	(1.708)	(1.754)	(1.766)	(-0.000)	(-0.000)	(2.556)	(3.725)	(4.474)
Weight for height	-0.2249	-0.0348	-0.0946	-0.1169	0.1213	NaN	NaN	1.0537	2.1972	3.1219
	(1.019)	(1.378)	(1.537)	(1.348)	(1.491)	(-0.000)	(-0.000)	(3.136)	(6.544)	(7.465)
Mother's years of education	1.3378	1.4630	1.6208	1.5069	1.7161	2.0440	2.7449	2.6867	2.7971	2.0779
	(3.067)	(3.122)	(3.290)	(2.910)	(3.676)	(3.472)	(4.020)	(4.331)	(4.190)	(3.765)

Reported statistics are mean (standard deviation) weighted by sampling weights.

Table A2: Descriptive statistics of all ENV waves: household level

	1985	1986	1987	1988	1993	1995	1998	2002	2008	2014
Number of households	1588	1600	1600	1600	9600	1200	4200	10800	12600	12899
Urban [TRUE]	0.4282	0.4306	0.4250	0.3900	0.4156	0.4088	0.4591	0.4462	0.4305	0.4798
	(0.495)	(0.495)	(0.494)	(0.488)	(0.493)	(0.492)	(0.498)	(0.497)	(0.495)	(0.500)
Number of adult equivalents per household	4.7985	4.6043	4.3696	4.2469	3.9165	3.7799	3.8905	3.6021	3.2917	2.4353
	(3.090)	(2.699)	(2.603)	(2.413)	(2.282)	(2.166)	(2.443)	(2.292)	(2.026)	(1.364)
Household size	7.4239	7.1008	6.7691	6.5846	6.0086	5.7394	5.8976	5.4082	4.8600	3.4498
	(5.215)	(4.601)	(4.497)	(4.183)	(3.925)	(3.682)	(4.115)	(3.922)	(3.405)	(2.343)
Number of wives	1.1291	1.1422	1.1433	1.1323	1.0696	0.9855	1.0030	0.8820	0.8329	0.6995
	(0.721)	(0.763)	(0.735)	(0.699)	(0.703)	(0.644)	(0.702)	(0.646)	(0.608)	(0.560)
Share of household expenditure on food	0.5443	0.5136	0.5244	0.5495	0.5337	0.5346	0.5642	NaN	0.4720	0.4956
	(0.160)	(0.161)	(0.170)	(0.159)	(0.165)	(0.167)	(0.178)	(-0.000)	(0.182)	(0.202)
Cocoa farmer [TRUE]	0.2555	0.2676	0.2654	0.2772	0.2711	0.2795	0.2223	0.2193	0.2296	0.1162
	(0.436)	(0.443)	(0.442)	(0.448)	(0.445)	(0.449)	(0.416)	(0.414)	(0.421)	(0.320)
Coffee farmer [TRUE]	0.3122	0.3245	0.2629	0.2496	0.2210	0.2111	0.1811	0.1711	0.1143	0.0246
	(0.464)	(0.468)	(0.440)	(0.433)	(0.415)	(0.408)	(0.385)	(0.377)	(0.318)	(0.155)
Household head's ethnic group [Mandé North]	0.1067	0.1087	0.0934	0.1003	0.1037	0.1273	0.1557	0.1170	0.1517	0.1671
	(0.309)	(0.311)	(0.291)	(0.300)	(0.305)	(0.333)	(0.363)	(0.321)	(0.359)	(0.373)
Household head's ethnic group [Mandé South]	0.1149	0.1445	0.1788	0.1574	0.0717	0.0864	0.0835	0.1041	0.0782	0.0960
	(0.319)	(0.352)	(0.383)	(0.364)	(0.258)	(0.281)	(0.277)	(0.305)	(0.268)	(0.295)
Household head's ethnic group [Gour]	0.1109	0.1139	0.1166	0.1110	0.1330	0.1333	0.0932	0.1175	0.1347	0.1994
	(0.314)	(0.318)	(0.321)	(0.314)	(0.340)	(0.340)	(0.291)	(0.322)	(0.341)	(0.400)
Household head's ethnic group [Krou]	0.1542	0.1215	0.1212	0.1346	0.1255	0.1655	0.1374	0.1469	0.1315	0.1420
	(0.361)	(0.327)	(0.327)	(0.341)	(0.331)	(0.372)	(0.344)	(0.354)	(0.338)	(0.349)
Household head's ethnic group [Kwa]	0.3233	0.3203	0.2970	0.3305	0.3117	0.2910	0.3074	0.3086	0.2948	0.3771
	(0.468)	(0.467)	(0.457)	(0.471)	(0.463)	(0.454)	(0.461)	(0.462)	(0.456)	(0.485)
Household head's ethnic group [non-Ivorian]	0.1900	0.1911	0.1929	0.1662	0.2543	0.1966	0.2228	0.2059	0.2091	0.0008
	(0.392)	(0.393)	(0.395)	(0.372)	(0.436)	(0.398)	(0.416)	(0.404)	(0.407)	(0.029)
Household head's occupation sector [primary]	0.5784	0.5863	0.5567	0.6053	0.6082	0.5857	NaN	NaN	0.5486	0.4912
	(0.494)	(0.493)	(0.497)	(0.489)	(0.488)	(0.493)	(-0.000)	(-0.000)	(0.498)	(0.500)
Household head's occupation sector [secondary or tertiary]	0.3651	0.3675	0.3841	0.3306	0.3312	0.2333	NaN	NaN	0.0997	0.3899
	(0.482)	(0.482)	(0.487)	(0.471)	(0.471)	(0.423)	(-0.000)	(-0.000)	(0.300)	(0.488)
Household head's occupation sector [public]	0.0564	0.0463	0.0592	0.0641	0.0606	0.0727	NaN	NaN	0.0639	0.0672
	(0.231)	(0.210)	(0.236)	(0.245)	(0.239)	(0.260)	(-0.000)	(-0.000)	(0.245)	(0.250)

Reported statistics are mean (standard deviation) weighted by sampling weights.

A.2 Heterogeneity in treatment effects

Table A3: Results: heterogeneity in treatment effects, by household head occupation sector

	Dependent variable:		
	School Attendance (aged 6–16)	Grade Deviation (aged 6–16)	Child Labor (aged 6–16)
	(1)	(2)	(3)
Exposed to *EduLaw95*	0.061*** (0.012) [0.040, 0.092]	−0.168* (0.079) [−0.237, 0.030]	−0.061*** (0.011) [−0.092, −0.041]
Exposed to *EduLaw95* × Household Head in [Secondary/Tertiary] Sector	0.089*** (0.026) [0.036, 0.141]	0.813*** (0.165) [0.447, 1.082]	0.114*** (0.023) [0.062, 0.149]
Exposed to *EduLaw95* × Household Head in [Public/Other] Sector	−0.007 (0.029) [−0.063, 0.040]	0.363* (0.185) [−0.144, 0.516]	0.083** (0.026) [0.038, 0.119]
Age	−0.052*** (0.003) [−0.056, −0.043]	−1.112*** (0.025) [−1.112, −1.023]	0.096*** (0.003) [0.085, 0.100]
Age × Household Head in [Secondary/Tertiary] Sector	0.014* (0.006) [−0.00004, 0.022]	0.631*** (0.039) [0.490, 0.662]	−0.019*** (0.006) [−0.033, −0.010]
Age × Household Head in [Public/Other] Sector	0.026** (0.008) [0.007, 0.041]	1.015*** (0.054) [0.787, 1.032]	−0.051*** (0.008) [−0.067, −0.037]
Female	−0.166*** (0.049) [−0.249, −0.038]	−0.700* (0.312) [−1.317, −0.169]	−0.006 (0.042) [−0.110, 0.117]
Female × Household Head in [Secondary/Tertiary] Sector	−0.049 (0.075) [−0.198, 0.092]	−1.772*** (0.479) [−2.190, 0.008]	0.061 (0.064) [−0.107, 0.177]
Female × Household Head in [Public/Other] Sector	0.060 (0.085) [−0.160, 0.191]	−0.002 (0.541) [−1.037, 1.141]	0.076 (0.073) [−0.099, 0.206]
Num.Obs.	32696	31296	30833
Pseudo Cohort × Household Head Occupation Sector FE	Yes	Yes	Yes

Reference category for Household Head Occupation Sector is [Primary].

95% confidence interval from 1000 bootstraps (stratified by Household Head Occupation Sector) reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications are available upon request.

Table A4: Results: heterogeneity in treatment effects, by crops farmed

	Dependent variable:			
	Years of Education (aged 18–54)	School Attendance (aged 6–16)	Grade Deviation (aged 6–16)	Child Labor (aged 6–16)
	(1)	(2)	(3)	(4)
Exposed to *EduLaw95*	3.822*** (0.183) [3.181, 4.204]	0.074*** (0.019) [0.034, 0.109]	0.542*** (0.111) [0.300, 0.764]	0.084*** (0.016) [0.054, 0.104]
Exposed to *EduLaw95* × Household Farming [Cocoa and Coffee]	−0.858 (0.510) [−2.030, −0.054]	−0.091*** (0.027) [−0.142, −0.030]	−0.858*** (0.155) [−1.117, −0.490]	−0.136*** (0.022) [−0.178, −0.093]
Exposed to *EduLaw95* × Household Farming [Cocoa]	−1.609*** (0.425) [−2.425, −0.590]	0.053 (0.032) [−0.013, 0.113]	−0.103 (0.184) [−0.404, 0.255]	−0.145*** (0.026) [−0.199, −0.095]
Exposed to *EduLaw95* × Household Farming [Coffee]	−2.902** (1.004) [−4.474, −1.220]	−0.030 (0.040) [−0.114, 0.057]	−0.739** (0.233) [−1.081, −0.337]	0.007 (0.033) [−0.076, 0.076]
Exposed to *EduLaw95* × Household Farming [Other Crops]	−2.925*** (0.248) [−3.401, −2.146]	0.095*** (0.023) [0.050, 0.147]	0.147 (0.135) [−0.106, 0.441]	−0.262*** (0.019) [−0.294, −0.221]
Age	−0.053*** (0.007) [−0.068, −0.035]	−0.011*** (0.003) [−0.018, −0.005]	−0.358*** (0.019) [−0.414, −0.318]	0.047*** (0.003) [0.041, 0.052]
Age × Household Farming [Cocoa and Coffee]	0.029** (0.011) [0.002, 0.049]	−0.016** (0.005) [−0.025, −0.002]	−0.381*** (0.032) [−0.424, −0.287]	0.033*** (0.005) [0.022, 0.041]
Age × Household Farming [Cocoa]	0.049*** (0.011) [0.018, 0.066]	0.014* (0.006) [−0.0004, 0.025]	−0.282*** (0.036) [−0.334, −0.190]	0.026*** (0.005) [0.013, 0.035]
Age × Household Farming [Coffee]	0.013 (0.016) [−0.019, 0.037]	−0.006 (0.008) [−0.020, 0.014]	−0.405*** (0.051) [−0.480, −0.294]	0.034*** (0.007) [0.013, 0.046]
Age × Household Farming [Other Crops]	0.048*** (0.008) [0.023, 0.062]	0.015*** (0.004) [0.007, 0.023]	−0.239*** (0.024) [−0.283, −0.175]	−0.007* (0.004) [−0.014, −0.000003]
Female	−3.829*** (0.303) [−4.046, −2.586]	−0.308*** (0.053) [−0.360, −0.138]	−1.936*** (0.306) [−2.382, −0.569]	0.241*** (0.039) [0.080, 0.220]
Female × Household Farming [Cocoa and Coffee]	1.431** (0.482) [−0.179, 1.943]	0.369*** (0.075) [0.075, 0.418]	1.883*** (0.436) [0.165, 2.311]	−0.140* (0.059) [−0.206, 0.049]
Female × Household Farming [Cocoa]	0.730 (0.502) [−0.597, 1.514]	0.202** (0.077) [−0.031, 0.304]	1.427** (0.448) [−0.163, 1.936]	−0.327*** (0.060) [−0.323, −0.080]
Female × Household Farming [Coffee]	2.106*** (0.615) [0.270, 2.361]	0.271** (0.085) [0.010, 0.353]	0.950* (0.481) [−0.446, 1.772]	−0.247*** (0.065) [−0.305, −0.019]
Female × Household Farming [Other Crops]	1.186** (0.389) [−0.217, 1.697]	0.193** (0.066) [0.010, 0.291]	1.412*** (0.381) [−0.047, 1.980]	−0.304*** (0.051) [−0.322, −0.089]
Num.Obs.	98051	52932	51168	50120
Pseudo Cohort × Crops Farmed FE	Yes	Yes	Yes	Yes

Reference category for Crops Farmed is [None]. Results of other specifications are available upon request.
95% confidence interval from 1000 bootstraps (stratified by Crops Farmed) reported in brackets
Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Results of other specifications are available upon request.

A.3 Results featuring quantity of education supply

Table A5: Results: quantity of education supply, by level of education

	Dependent variable:		
	School Attendance (aged 6–16)	Grade Deviation (aged 6–16)	Child Labor (aged 6–16)
	(1)	(2)	(3)
Exposed to *EduLaw95*	0.180*** (0.029) [0.120, 0.234]	0.159 (0.155) [−0.143, 0.697]	−0.223*** (0.024) [−0.310, −0.190]
Exposed to *EduLaw95* × [Primary] Education	−0.145*** (0.031) [−0.207, −0.084]	0.189 (0.169) [−0.376, 0.486]	0.309*** (0.026) [0.271, 0.396]
Class Size	−0.001 (0.0009) [−0.003, 0.0006]	−0.003 (0.005) [−0.019, 0.007]	0.0005 (0.0008) [−0.0006, 0.004]
Class Size × [Primary] Education	0.003* (0.001) [0.0008, 0.007]	0.010 (0.008) [−0.002, 0.029]	−0.011*** (0.001) [−0.015, −0.010]
Number of Schools per 10,000 Residents	0.014 (0.042) [−0.068, 0.106]	0.250 (0.227) [−0.355, 0.865]	0.303*** (0.035) [0.193, 0.376]
Number of Schools per 10,000 Residents × [Primary] Education	0.014 (0.042) [−0.081, 0.096]	−0.239 (0.228) [−0.842, 0.361]	−0.337*** (0.036) [−0.408, −0.224]
Age	−0.074*** (0.010) [−0.094, −0.053]	−1.299*** (0.059) [−1.367, −1.027]	0.207*** (0.009) [0.158, 0.204]
Age × [Primary] Education	0.126*** (0.011) [0.100, 0.145]	0.899*** (0.064) [0.626, 0.969]	−0.168*** (0.010) [−0.168, −0.118]
Female	−0.133** (0.041) [−0.232, −0.071]	−2.225*** (0.219) [−2.513, −1.113]	0.073* (0.032) [−0.026, 0.130]
Female × [Primary] Education	0.017 (0.059) [−0.059, 0.177]	1.745*** (0.314) [0.578, 2.168]	0.008 (0.047) [−0.127, 0.093]
Num.Obs.	40015	38454	37772
Pseudo Cohort × Level of Education FE	Yes	Yes	Yes

Reference category for Education Level is [Lower Secondary].
95% confidence interval from 1000 bootstraps (stratified by Level of Education) reported in brackets
Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Results of other specifications are available upon request.

Table A6: Results: quantity of education supply, by gender

	Dependent variable: School Attendance (aged 6–16) (1)	(2)	(3)
Exposed to *EduLaw95*	0.027 (0.023) [−0.018, 0.074]	0.025 (0.024) [−0.023, 0.074]	0.002 (0.023) [−0.040, 0.050]
Exposed to *EduLaw95* × Female	0.016 (0.033) [−0.048, 0.095]	0.041 (0.034) [−0.021, 0.118]	−0.006 (0.033) [−0.068, 0.076]
Class Size	0.0005 (0.001) [−0.002, 0.003]	0.0004 (0.001) [−0.002, 0.003]	0.001 (0.001) [−0.001, 0.004]
Class Size × Female	0.002 (0.002) [−0.003, 0.005]	0.003 (0.002) [−0.002, 0.006]	0.003 (0.002) [−0.002, 0.006]
Number of Schools per 10,000 Residents	0.044*** (0.003) [0.030, 0.046]	0.044*** (0.003) [0.030, 0.046]	0.036*** (0.004) [0.023, 0.040]
Number of Schools per 10,000 Residents × Female	−0.006 (0.005) [−0.016, 0.007]	−0.007 (0.005) [−0.017, 0.005]	−0.011* (0.005) [−0.019, 0.003]
2002 Civil War		0.008 (0.021) [−0.039, 0.048]	
2002 Civil War × Female		−0.089** (0.031) [−0.146, −0.025]	
2011 Civil Conflict			0.093*** (0.014) [0.069, 0.125]
2011 Civil Conflict × Female			0.086*** (0.021) [0.044, 0.122]
Age	0.031*** (0.006) [0.011, 0.038]	0.031*** (0.006) [0.012, 0.037]	0.018** (0.006) [0.001, 0.029]
Age × Female	−0.029** (0.009) [−0.047, −0.005]	−0.030*** (0.009) [−0.046, −0.007]	−0.037*** (0.009) [−0.052, −0.011]
Num.Obs.	40015	40015	40015
Pseudo Cohort × Female FE	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps (stratified by Female) reported in brackets
Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Results of other specifications are available upon request.

Table A7: Results: quantity of education supply, by exposure

	Dependent variable:	
	School Attendance (aged 6–16)	Grade Deviation (aged 6–16)
	(1)	(2)
Class Size	0.008*** (0.002) [0.002, 0.010]	−0.073*** (0.012) [−0.098, −0.032]
Exposed to *EduLaw95* × Class Size	−0.008*** (0.002) [−0.012, −0.002]	0.089*** (0.015) [0.040, 0.112]
Number of Schools per 10,000 Residents	0.011 (0.006) [−0.003, 0.022]	0.114** (0.036) [0.015, 0.162]
Exposed to *EduLaw95* × Number of Schools per 10,000 Residents	0.022** (0.007) [0.006, 0.035]	−0.135** (0.042) [−0.183, −0.020]
Age	−0.072*** (0.010) [−0.085, −0.044]	−0.337*** (0.062) [−0.565, −0.233]
Exposed to *EduLaw95* × Age	0.124*** (0.012) [0.091, 0.141]	−0.214** (0.074) [−0.308, 0.053]
Female	−0.053 (0.053) [−0.213, 0.009]	−1.041** (0.334) [−1.948, 0.059]
Exposed to *EduLaw95* × Female	−0.014 (0.083) [−0.131, 0.208]	0.525 (0.513) [−0.774, 1.625]
Num.Obs.	40015	38454
Pseudo Cohort × Exposed to EduLaw95 FE	Yes	Yes

95% confidence interval from 1000 bootstraps (stratified by Exposed to EduLaw95) reported in brackets

Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of other specifications are available upon request.

A.4 Results on fertility

Table A8: Results: fertility

	Dependent variable:					
	Number of Children			Relative Fertility		
	(1)	(2)	(3)	(4)	(5)	(6)
Household Exposed to *EduLaw95*	−0.135*** (0.036)	0.278*** (0.059)	0.188* (0.080)	−0.128*** (0.005)	0.017* (0.008)	0.009 (0.009)
	[−0.204, −0.054]	[0.137, 0.377]	[0.027, 0.331]	[−0.137, −0.117]	[0.0005, 0.032]	[−0.011, 0.028]
Age of Household Head		0.269*** (0.010)	0.273*** (0.012)		0.0005 (0.001)	0.00006 (0.001)
		[0.254, 0.290]	[0.255, 0.302]		[−0.002, 0.003]	[−0.002, 0.004]
Age^2 of Household Head		−0.003*** (0.00009)	−0.003*** (0.0001)		−0.0001*** (0.00001)	−0.0001*** (0.00001)
		[−0.003, −0.003]	[−0.003, −0.003]		[−0.0001, −0.00009]	[−0.0001, −0.00009]
Household Head's Years of Education		−0.149*** (0.026)	−0.192*** (0.031)		−0.014*** (0.003)	−0.014*** (0.004)
		[−0.169, −0.060]	[−0.214, −0.088]		[−0.017, −0.003]	[−0.020, −0.002]
Number of Wives		2.300*** (0.179)	2.673*** (0.208)		0.003 (0.023)	0.010 (0.024)
		[1.682, 2.582]	[1.805, 2.882]		[−0.055, 0.025]	[−0.061, 0.032]
Share of Household Expenditure on Food			−1.173** (0.415)			−0.163*** (0.048)
			[−1.822, −0.126]			[−0.232, −0.034]
Num.Obs.	34891	34821	26708	34682	34612	26576
Pseudo Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes

95% confidence interval from 1000 bootstraps reported in brackets

Conventional standard errors reported in parentheses; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Columns 3 and 6 drop observations in ENV 1993/1995/2002 due to unavailability of certain covariates.

Results of other specifications are available upon request.

A.5 Robustness on event shocks

Table A9: Results: event shocks by household head occupation sector

	Dependent variable:			
	School Attendance (aged 6–16)		Child Labor (aged 6–16)	
	(1)	(2)	(3)	(4)
Exposed to *EduLaw95*	−0.187 (0.101) [−0.297, 0.026]	−0.185* (0.080) [−0.243, 0.012]	−0.246*** (0.014) [−0.276, −0.215]	−0.027* (0.011) [−0.055, −0.005]
Exposed to *EduLaw95* × Household Head in [Secondary/Tertiary] Sector	0.922*** (0.199) [0.547, 1.280]	0.789*** (0.175) [0.423, 1.062]	0.266*** (0.027) [0.211, 0.314]	0.110*** (0.024) [0.059, 0.149]
Exposed to *EduLaw95* × Household Head in [Public/Other] Sector	0.564* (0.223) [0.013, 0.837]	0.357 (0.188) [−0.151, 0.493]	0.196*** (0.031) [0.139, 0.237]	0.073** (0.026) [0.028, 0.107]
2002 Civil War	0.049 (0.162) [−0.183, 0.351]		0.468*** (0.022) [0.403, 0.504]	
2002 Civil War × Household Head in [Secondary/Tertiary] Sector	−0.349 (0.342) [−1.029, 0.181]		−0.363*** (0.046) [−0.475, −0.276]	
2002 Civil War × Household Head in [Public/Other] Sector	−0.456 (0.289) [−1.096, −0.036]		−0.308*** (0.039) [−0.373, −0.231]	
2011 Civil Conflict		0.128 (0.094) [−0.006, 0.289]		−0.314*** (0.013) [−0.340, −0.288]
2011 Civil Conflict × Household Head in [Secondary/Tertiary] Sector		−0.002 (0.200) [−0.359, 0.321]		0.218*** (0.028) [0.167, 0.263]
2011 Civil Conflict × Household Head in [Public/Other] Sector		−0.015 (0.174) [−0.351, 0.248]		0.186*** (0.024) [0.149, 0.226]
Num.Obs.	31296	31296	30833	30833
Pseudo Cohort × Household Head Occupation Sector FE	Yes	Yes	Yes	Yes

Reference category for Household Head Occupation Sector is [Primary].
95% confidence interval from 1000 bootstraps (stratified by Household Head Occupation Sector) reported in brackets
Conventional standard errors reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$