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Investing in Future Generations

Global Cocoa Price shocks and their impact upon School Attendance
and Child Employment Rates in Ghana, 1987-1991

by

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Abstract: This paper looks into the responses of cocoa farming households to a negative shock in the global cocoa price with regards to how they invest into the future of their children. The specific child outcomes of focus are child employment rates, school attendance, and household expenditure on schooling and related activities. A differences-in-differences approach is used in line with previous literature studying the effects of macroeconomic shocks upon households in developing countries. Using two Ghana Living Standard Surveys, an analysis is done between the years 1987 and 1991 that finds children of cocoa farmers had a lower child employment rate, higher school attendance, and slightly more spending on female education after the global cocoa price shock. These findings are found to be generally robust, although attention needs to be paid to school attendance which was under the effect of recent educational reform that can have affected the results. Comparisons are made to Côte d'Ivoire in the same time period which show that the two neighbouring countries were on fundamentally different economic and political cycles during this period and some reasons behind this are explored.

Keywords: Ghana, Cocoa, Economic History, Macroeconomic Shocks, Commodity Shocks, Child Outcomes, Child Labour, Schooling

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1 Introduction

The global market of cocoa has been continuously expanding and growing in the last half century. Yet for a market that is heavily speculated upon, its supply is concentrated upon a very small number of large-scale producers. Two countries, Ghana and Côte d'Ivoire, shared 49.8% of the global cocoa output in 2013 and they have been leading producers for most of recent history (FAO, 2019). The reason supply is so concentrated is because the cocoa plant can only be cultivated under certain environmental conditions that are found in West Africa, Latin America, and Indonesia (World Cocoa Foundation, 2010). The fact that cocoa is so unique but demand for it is also high means that countries such as Ghana are highly dependent upon it as an export cash-crop which provides foreign exchange and government revenue. Nevertheless, the fact that cocoa is demanded across the world and traded upon international exchanges with a functioning futures market means that its price is consistently volatile. The following graph shows the evolution of the global cocoa price since the 1980's:

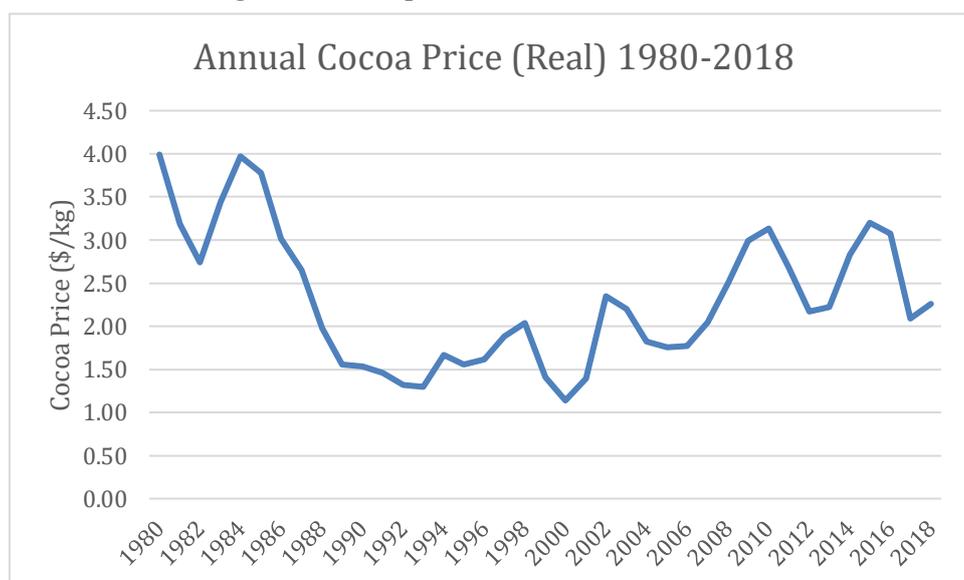


Figure 1 - Annual Cocoa Price (Real) 1980-2018 (Source: World Bank, 2019)

As can be observed from this, there are frequent changes of more than 1 \$/kg from year to year. Considering that global cocoa output has increased from 1,556,484 tonnes in 1974 to 4,585,552 tonnes in 2013, the magnitude of these changes is not insignificant (FAO, 2019). It is therefore of interest to look further into these price fluctuations and their effect upon the households in the producing nations. Since these producers depend so heavily upon the revenues of their cash crops, farmers are likely to show a strong response to shocks whether it is in their own lives or other members of their household.

The contribution of this study is to explore this relationship between the fall in global cocoa prices from 2.65 \$/kg in 1987 to 1.46 \$/kg in 1991 and the investment responses of cocoa

farming households with regards to human capital and the future education of their children. Ghana in specific is the country of focus because since implementing structural adjustment programs in the early 1980's, it has enjoyed a period of positive development which has led to it being classified as a lower-middle-income country by the World Bank in 2011 (Jerven, 2013). Having therefore in general managed to drive positive economic change in recent decades it will be valuable to see whether cocoa price shocks did have an effect upon the population of Ghana and whether cocoa farmers changed their behaviour with regard to internal household working and educational structures or not. Furthermore, Ghana has been at the forefront of cocoa production for more than a century, from when it was still under British colonial rule to the modern times today.

1.1 Research Problem

While it is relatively clear that falling cocoa prices would impact incomes of the Ghanaian state and farmers negatively, the more important area of study is how it affected the lives and choices of households as a whole. This becomes even more relevant when combined with the fact that an estimated 708,000 children were working in cocoa agriculture areas in Ghana between 2016 and 2017 (Global Slavery Index, 2018). Rather than studying income effects of cocoa price changes upon farmers, it would therefore make more sense to explore the problem of how children in farming areas or households are affected by these fluctuations and what it means for their day-to-day lives. While such studies exist for other commodities around the world, and for cocoa in other countries, no easily comparable study was found for Ghana in the review of the literature which is therefore where this thesis will aim to make its contribution. It is important to explore this further and understand the impact that the fluctuations outlined above can have.

1.2 Aim and Scope

The aim of this Thesis is to look specifically into living standard indicators that directly reflect a household's investment into the future human capital of its children. As such it will explore how that investment changes for farmers of a cash-crop such as cocoa when there is a macroeconomic, agricultural shock such as a drop in the global price of cocoa. The idea is that in a country that has broadly been developing in recent decades, there is still the possibility of short-term, impactful fluctuations due to economic shocks that could have a lasting impact upon the welfare and living standards of its population.

As such, the two main research questions analysed in detail for this thesis are

1. How did the fall in the global cocoa price affect child labour force participation and school attendance rates amongst cocoa farming households in Ghana between 1987 and 1991?

2. Does this fall in the global cocoa price also have an effect upon the value of school expenditures amongst cocoa farming households in Ghana?

In answering these questions, the thesis will focus on the cocoa producing regions of Ghana and compare cocoa farmers to non-cocoa farmers in the same regions through a differences-in-differences approach in order to get an understanding of how the effect of the agricultural shock played out amongst the different farmers.

1.3 Outline of the Thesis

This Thesis will be structured as follows: In the next section there will be a review of the relevant literature, as well as a summary of the human capital theory that underlies the analysis of school attendance and child employment rates. It is divided into three parts, starting with the literature on macroeconomic shocks and living standards, following by the economic history of Ghana, and concluded by the summary of the theory. The third section will be a discussion of the survey data used in the empirical analysis of this thesis. It will analyse the source material as well as present the relevant descriptive statistics for the key variables. Fourth, the econometric model will be introduced along with the differences-in-differences methodology that is used as the base to present results. The fifth section will present the key findings on the three outcomes (child employment rate, school attendance, and school expenditure) and also compare the findings to relevant studies in the region on cocoa. Furthermore, robustness checks will be performed looking at the Parallel Trends Assumption underlying the differences-in-differences approach as well as a counter-experiment to show the significance of the cocoa results. Section six concludes the key findings of the thesis and suggests further steps that may be taken.

2 Literature Review and Theory

This section will be divided into a summary of previous research and then an explanation of the central theories that arise out of the literature and will be essential to understanding the aim and results of this thesis. The summary of previous research will be divided into two distinct areas of focus. The first looks at the research that exists focusing on living standards and economic shocks both in the developing and developed world across recent history. The second will focus on the geographic area by looking specifically at the economic history of Ghana and illustrating what research exists both on colonial times and from independence to today. The section of the theoretical approach will start with a general explanation of the human capital model that motivates this thesis before then going into more detail on the trade-offs between possible effects that can be observed amongst the results.

2.1 Previous Research

2.1.1 Living Standards and Macroeconomic shocks

Looking at the literature on how living standards and various different macroeconomic shocks interact, there are three points that need to be made. First, the historic background of how short-term economic stress has affected various standards of living in pre-industrial societies needs to be explained as a base for all further research in the field. Following this, it will be demonstrated how these pre-industrial theories are still relevant in modern societies, especially those in the developing world. Lastly, the literature on the relationship between export and cash crop shocks and living standards of children will be discussed in order to justify the focus of this thesis and illustrate its purpose and place in the current field of research.

Galloway claims that, “the historical actor was primarily concerned with short-term events...unaware of long-term swings in climate, real wages, and prices.” (Galloway, 1988, p. 275). This statement lies at the centre of any research that proposes to look into the effects of short-term shocks. Rather focus on the long-term trend, which across decades can be largely positive, Galloway proposes to look at shorter fluctuations in grain prices to see whether there were measurable effects on fertility, mortality, and nuptiality. The significant results show that in pre-industrial Europe, individuals did not make family planning decisions based upon long-term outlook but rather upon the season to season changes that they could easily observe and whose effects they would feel much more sharply. These decisions could be observed immediately or anywhere within a 6-12-month window depending on the variables in focus. Galloway’s (1988) study therefore provides the starting point in the research by focusing on aggregate trends but needed to be further supplemented by micro-economic data and studies.

Building on this initial approach, and using longitudinal, historical data from Belgium, China, Italy, Japan, and Sweden, Bengtsson et al. (2004) are able to provide a more detailed look into the responses and mechanisms in reaction to price shocks. Using micro-level data allows them to provide a much deeper level of analysis, filtering down to households, or family units. The results show that families experiencing price shocks showed high selectivity both with regards to position within the family and gender, such as preferential treatment of male children over female ones in times of economic hardship. There were also significant differences in the responses of different socio-economic classes where depending on a household's position within society they would either be more or less insulated from short-term economic stress. All of this starts to build an increasingly complex model of preferences and potential choice in response to short-term economic stress that individuals in affected areas face.

When one considers that families do not just make decisions on behalf of themselves and their current children but also upon the future size of their families, it can be seen that short-term economic stress has an inter-generational effect upon the future. Tsuya et al. (2010) look into the reproductive responses on family units in order to understand how households adjust their fertility plans in times of economic shock and delayed them to future years. On top of this, there is evidence that children born around or during times of famine could suffer from long-term effects of this (Crimmins & Finch, 2006; Barker, 2001). An example of the effects would be an increased risk of several adult diseases. This shows that the impacts of an economic shock do not necessarily dissipate after the end of the crisis and instead they could persist over longer time periods and continue to be felt within a community or region.

The literature up to this point based its findings largely upon data from pre-industrial societies that are by now part of the developed world. However, it can be argued that these mechanisms could also be observed in developing countries today as many of them are highly dependent upon natural resources and agriculture that is still highly susceptible to shock. Baird et al. (2011) and Brinkman et al. (2010) in their studies prove that the historic effects of the previous literature are observable in developing countries and is therefore a useful lens in studying modern development patterns and responses to economic shocks. Especially because, "Macroeconomic volatility is a fact for most of the developing world. In recent decades, the standard deviation of income over time has been approximately twice as large in developing as developed countries." (Baird et al., 2011, p. 854). The pressures that pre-industrial societies faced therefore continue to plague developing nations today. In an article that predates the works of Baird and Brinkman, Lee (1990) compares demographic responses of rich and poor nations and finds that while both are affected by short-term economic stress, it is in the severity of the effect that they differ. Mortality and other effects were often higher and much more immediate in developing countries while the effects in developed countries were much more delayed and less severe.

This brings the previous research to a series of studies in this field that are directly comparable to the subject matter of this thesis and will inform both the theoretical and methodological choices made in the approach. Looking at data from Ethiopia (Yamano et al., 2005) and from Mexico (Cutler et al., 2002), there is significant evidence that as a direct result of recent, not pre-industrial or historic, economic shocks children's health outcomes were negatively affected leading to higher mortality rates and lower heights for affected children. Alderman et al. (2006) discuss these health outcomes in relation to schooling and human capital

investment, prompting the idea that economic shocks do not just have health impacts but also drive change through school attendance and potential labour market participation. In times of crisis, therefore, school attendance and child labour levels could change amongst the affected population and there are a number of studies that attempt to look into this in more detail. This is also the area of previous research that this thesis aims to contribute towards.

Keeping the geographical filter broad, Schady (2004) looks at the effects of a macroeconomic crisis in Peru upon school attendance and child labour, finding no effect on attendance but a significant drop in child employment after the crisis if they are also at school. Looking at studies that focus on changes in a cash-crop such as cocoa, Edmonds & Pavcnik (2005) show declines in child labour as a result of increases in the real price of rice, which served as both a food and cash-crop to households in Vietnam. Studies focusing on changes in the coffee price in Latin America provide a decent comparison for the effects of Cocoa in Ghana and there is one on Brazil (Kruger, 2007) and one focusing on Colombia (Miller & Urdinola, 2010). In Brazil there is evidence of increased child labour and decreased school attendance amongst poorer households while the rich remain unaffected. In the case of Colombia, results show that time investments in children go up when coffee prices, or farmer incomes, go down.

It is also important to note a distinction made by Edmonds & Pavcnik (2005) at this point between forced child labour and work being done to help/support a household in poorer circumstances. Not all the incidences of children of schooling ages working are incidences of oppression or forced labour. Most of these studies, including this thesis, include in the measure of children working factors such as domestic work in the family home as well as helping out on the family farm in order to supplement income. While ideally, the best thing for children is to receive an education for as long as possible, it is important not to misread the severity of the measures of child employment rate as well.

Bringing the literature to the African continent, Beegle et al.'s (2007) study in Tanzania shows that agricultural shocks lead to increased farm work for boys and higher levels of chores for girls. Generally, education seems to lose out against the value of having children work within the family. Looking at Ghana's neighbour and close competitor in global cocoa production, Côte d'Ivoire, there are two studies that are of high comparative value in relation to the empirical results that will be presented later. Jensen (2000) finds a highly significant and large impact upon school enrolment with declines ranging from 33-50%. Using the same data along with some later surveys, Cogneau & Jedwab (2012) perform a difference-in-difference analysis comparing cocoa farmers to non-cocoa farmers between 1988 and 1993. They find that school enrolment fell, and child labour rates increased during this time period. Since this methodology is applicable to Ghana during a similar time period, and no study currently exists, Cogneau & Jedwab's work will prove as an important comparison in understanding and interpreting the outputs presented later in this thesis.

2.1.2 Economic History of Ghana

Having looked at the literature that exists around the impact of agricultural and other macroeconomic shocks upon the living standards in developing societies, it is also important to focus more specifically at the history of Ghana and the place that cocoa has in it as a cash-crop

of major importance to local farmers. First, the attention will be on Ghana's colonial history before then going into accounts of more recent times. Ghana was an English colony known as the British Gold Coast from 1867-1957. What started initially as a few coastal states was expanded by the British into the territories that comprise Ghana today. Since exports and profitability were of major importance to the British, the rise of cocoa (originally a foreign crop) in Ghana is commonly referred to as a success story under colonialization. To put this into perspective, "Ghana exported no cocoa beans in 1892, yet 19 years later, at 40,000 tonnes a year, it became the world's largest exporter of the commodity. Output reached 200,000 in 1923, and passed 300,000 in 1936." (Austin, 2014, p. 1035). What is even more impressive is that this explosion in cocoa production was not driven by European settlers colonizing land under favourable terms, but by the indigenous African population of Ghana. Frankema et al. (2016) show that African producers consistently outperformed any European settlers and were able to protect their interests in the colonial state. In fact, the local administration upheld local land laws that supported indigenous rights to their cocoa farms and outputs consistently in the British Gold Coast (Austin, 2008). Cocoa therefore has a long history in Ghana, with established structures around it and more than 100 years of cultivation by now.

While there have been no direct studies between changes in the cocoa market and living standards or childhood outcomes in colonial times, there are several works that explore the standard of living in colonial Ghana. Since education will be one of the key outcome variables in this study, the comparison between colonial Ghana and Côte d'Ivoire by Cogneau & Moradi (2014) is relevant towards an understanding of colonial living standards. They find that education levels in the British Ghana were comparatively higher than just across the border and also in comparison to the French colony of Côte d'Ivoire. Furthermore, there was also a North/South divide internally in the countries, which is interesting since cocoa in Ghana is mainly produced in the South. Building upon this, Moradi et al. (2013) look into the development of heights as a proxy for welfare and find, "...that there was a considerable improvement in physical welfare during the colonial period, and one particularly associated with the growth of cocoa income." (Moradi et al., 2013, p. 5-6). A link between cocoa trade, and potentially price, is therefore already documented in colonial times and is interesting for further study. The use of height data, especially from military records, has since been criticized by Bodenhorn et al. (2017) due to sample-selection biases but the study of Ghanaian heights attempts to address some of these while also being aware of its own limitations. Using social tables, Aboagye & Bolt (2018) track economic inequality in Ghana up until 1960. They show that inequality in Ghana increased during colonial times, with cocoa being a driving factor behind both regional and national trends. This was due to cocoa production only being possible in certain regions of the nation and also due to the delay in output from a new cocoa farm being 5-7 years which led to higher capital costs in starting a new farm and entering the market. Cocoa has therefore been quite influential in Ghana's colonial history and it did not cease to be important once Ghana gained its independence as a Republic in 1960.

Post-independence, cocoa continued to be a major part of the Ghanaian economy. From 1960-1974 cocoa accounted for 60-70% of the nation's total exports and roughly half of total government revenue (Atingdui, 1988). Cocoa was seen as the key to Ghana's economic future and its revenues could be used to help the country develop. However, "In the 1970s, Ghana sank into a morass of social, economic and political crises that undermined state authority, resulted in pockets of famine and impoverished large segments of the population, notably rural

producers.” (Woods, 2004, p. 224). Ghana would only emerge from these crises in the 1980s when it implemented the World Bank and IMF suggested structural reforms. This history of crisis, along with the fact that the Cocoa Marketing Board, which sets the producer price for Cocoa farmers in Ghana, consistently exploited farmers by not insulating them against global price changes meant that Ghanaian cocoa farmers were especially susceptible to agricultural shocks and changes in the global cocoa price (Atingdui, 1988). Beyond the end of the 20th century, cocoa has continued to remain important within Ghana as it continues to develop and reach Middle-Income status. It is still a very important source of foreign exchange for the government as an export crop in order to finance capital goods imports and as a large agricultural industry it is also used to support and promote other agricultural growth (Breisinger et al., 2008).

Looking at the fall in global cocoa prices at the end of the 1980s will therefore be looking at a pivotal moment in Ghanaian history, when it had just implemented structural adjustment and was hoping to see the benefits of this but would be faced with a rapidly falling price of its main export crop.

2.2 Theoretical Approach

The theoretical approach that will be applied is one that lies in the theory of human capital and how families invest into the human capital of their children and the preferences and choices they have to face in making that investment. In some of the more prominent studies on human capital, a measure of education is used to account for levels of human capital (Becker & Woessmann, 2009; Lee & Lee, 2016). When looking at the effect that cocoa price changes have upon school attendance, child labour, and value of payments towards school-related activities, what will essentially be explored will be the opportunity cost of choosing schooling over working when incomes within a household fall. What is perhaps most important is that depending on the relative costs of schooling and gains from working the effect could either be positive for school attendance and negative for labour rates or it could be the opposite. In theory, therefore, the effect that an agricultural shock can have upon the children of affected farmers is ambiguous (Schady, 2004). This is because there is an expected future gain from sending your children to school which is compared to the gain of the working at the moment instead. If a price shock depresses current incomes enough that the expected future gain of school is higher than current gains from working, then school attendance rates could rise in times of crisis. If, however, this shock is perceived to be permanent or extremely severe, expected future earnings and current subsistence levels are under pressure which would mean that children would be required by their parents to help out by any means necessary.

There is therefore an income effect as well as a substitution effect at play here. As outlined by Kruger (2007), the overall depressive effect of income matters as well as how likely a household is to substitute the wage of their child’s labour versus school attendance. The relative size of these two effects then determines which outcomes will be observed in response to an agricultural shock. In the comparative studies to Ghana that are based on Côte d’Ivoire, Jensen (2000) finds a clear dominant effect of income that leads to decreasing investment in the future

of children in order to sustain themselves. Cogneau & Jedwab (2012) find similar results but differentiated at a gender level, where girls are more likely to be taken out of school in order to work, while boys will likely stay in school but also have to work at the same time. These competing theoretical effects that can be observed in the literature will be used in the discussion of the results in order to ground the results in theory and to connecting studies.

3 Data

This section will discuss the source material of the two surveys that are used in the empirical analysis and also present the descriptive statistics of key variables that are used. It will therefore consider the reliability, representativity, and validity of the data before then presenting a first look at it.

3.1 Source Material

The survey data used for this thesis is secondary data that was collected by the Ghana Statistical Service with support and funding from the World Bank and later also the European Union. The two datasets used are the first round of the Ghana Living Standards Survey (Ghana Statistical Service, 1988), which took place in 1987-1988, and the third round of the Survey (Ghana Statistical Service, 1991), which took place in 1991. These surveys were an individual questionnaire that grouped together households and gathered information on socio-demographic topics ranging from education, health, employment, and migration to name a few. It is important to note that the Ghana Living Standards Surveys (GLSS) is part of the living standard surveys that are supported across the globe by the World Bank and therefore follow a similar structure and focus to many of the studies in other developing nations which adds to their value in easily comparing effects across countries.

In terms of sampling, the GLSS 1 had a sample of 3,200 households with 15,492 individuals being questioned and the GLSS 3 had a sample size of 4,565 households surveying some 20,403 individuals. In sampling the Ghana Statistical Service made sure to maintain the same regional and urban/rural proportions as they appeared in the national population (Ghana Statistical Service, 1988). Any imperfections in these proportions can therefore be traced back to the 1984 Census in Ghana and not to the sampling methods of this survey. It should be noted that Jerven (2013) has raised some issues around censuses that were run on the African continent and frequent politicisation of the exercise that resulted in over- or under-counting of populations. The fact that the 1984 Census was also supported by the World Bank does lend some credibility to the census. Furthermore, one thing that is clear is that the GLSS 1 and 3 are based upon the same sampling decisions which means that any potential bias is shared by both and does not differ between them. This means that while overall the results could suffer from bias, the changes and relationship across the years are still significant. The survey will therefore be used for econometric analysis since no direct criticism of the representativity of this data could be found and the studies on Côte d'Ivoire used living standard survey of the same format (Cogneau & Jedwab, 2012; Jensen, 2000).

This survey data is secondary, but from the supporting documentation it is clear that the primary collector of the data, the Ghana Statistical Service (1988), took great care in following up on any inconsistencies and irregularities in the data. There is clear evidence of follow-up interviews being done to verify data collection and audit the survey taking. Additionally, after data entry there was a follow-up to check for any errors in the data that contradicted each other and were subsequently removed. The data used is therefore assumed to be of fully usable for econometric study as published by the Ghana Statistical Service and the only data manipulation that had to be done was for the econometric analysis and not to correct for any inherent flaws in the underlying data.

3.2 Descriptive Statistics

In working with the survey data from the two different rounds of the GLSS a number of datasets and variables had to be merged in order to bring together the final, usable dataset. There were a couple of choices that had to be made in order to build the variables and make them easily comparable to econometric purposes. The following descriptive statistics provide a summary of these choices made.

The first step was to filter down the data to the regions of relevance. Since the comparison that will be made will be between cocoa farmers and non-cocoa farmers in the same regions, all non-cocoa producing regions have been removed from the dataset. This leaves us with the



Figure 2 - Administrative Map of Ghana (Source: University of Texas, 2019)

Southern half of the nation and the following regions: Brong-Ahafo, Ashanti, Western, Central, Eastern, and Volta. Greater Accra is also excluded due to it being predominantly urban. These are therefore the regions that will be focused on within the econometric analysis. Furthermore, for the outcome variables of school attendance and child labour, the ages will be filtered to only include 5-16 year olds as these are the main years for schooling and after reaching 16 it is generally possible for individuals to make their own choice of whether to continue schooling or start working. For the total school expenditure variable, the ages remain unfiltered as the spending is taken per household since it is not normally the children attending the schools that are also the ones paying for it. With these general restrictions in place, it is then time to look at the outcome variables in a bit more detail.

The first outcome variable is that which will be used as an indicator of child employment rates or child labour. This is the variable that questions all survey participants whether they have worked in the last 7 days and it was verified for validity by comparing it to the question of how many hours individuals worked over the last 7 days to ensure that answers were accurate. It could be said that only looking for work in the last 7 days is too short a timeframe to accurately depict whether children are working consistently. However, as Austin (2005) points out, work on cocoa farms can be found year-round whether it is helping out during harvest or preparing old and new plantations during the off season. The other choice from the survey would have been the question of whether an individual has worked at all over the last 12 months, which is a much longer timeframe but gives an imprecise measure of how much or how intensely an individual has worked. The details that could be controlled for when looking at the last 7 days give a much better account of work intensity along with the fact that work likely is not short during any part of the year as seasonality does not have such a strong impact in cocoa. Looking at Table 1, we can see that in the means of having worked in the last 7 days there seems to be quite large changes amongst the cocoa farmers, while the working rates of non-cocoa farmers seem to have remained largely the same. In fact, the mean for cocoa farming male children appears to have dropped below that of non-cocoa farming children. This effect could also be an indication that in 1987 the effect of cocoa for males was much stronger while by 1991 school enrolment and a focus on education prevailed as a whole in Ghanaian society. Female children, traditionally not as closely involved in the cocoa farming within a household, do not show a large difference between 1987 and 1991.

School attendance was measured in terms of whether a child has attended school at all over the last 12 months since a lot of survey questionnaires went out during the summer and autumn months which could have been impacted by school holidays. The variable for school attendance over the last month was therefore disregarded and annual school attendance was taken instead. Unfortunately, this does leave room for some imprecision as children could have attended school over the last year but have since been taken out of it. Nevertheless, it is still the most accurate measure that could be used out of the survey data. Looking at the means in Table 1, we can see that school attendance increased for both cocoa and non-cocoa farming households and seemed to converge to almost similar levels by 1991 as children of cocoa farmers caught up. It therefore needs to be noted that cocoa farming households did start at a significantly lower level in 1987 though. The fact that school attendance increased overall for all households can be seen as evidence of schooling being more promoted by authorities and supported by the households themselves. The different dynamic between cocoa and non-cocoa farmers will be further discussed in the results section, as it seems from looking at this table that with school

attendance rising more rapidly for cocoa farmers, there appears to be a positive effect despite the negative impact of the cocoa price drop.

Table 1 - Descriptive Statistics (means of outcome variables)

Descriptive Statistics	1987		1991	
	Cocoa	Non-Cocoa	Cocoa	Non-Cocoa
Working in the last 7 Days	7,029 Observations			
-combined	0.533	0.387	0.270	0.351
-male	0.656	0.396	0.167	0.369
-female	0.425	0.378	0.392	0.331
School Attendance	7,029 Observations			
-combined	0.453	0.687	0.883	0.859
-male	0.484	0.685	0.900	0.883
-female	0.424	0.690	0.862	0.832
School Expenditures	11,823 Observations			
-combined	7.361	7.503	8.708	8.606
-male	7.472	7.459	8.726	8.636
-female	7.269	7.546	8.684	8.566

Lastly, the outcome variable of school expenditures is a sum of all possible kinds of expenditures on schooling such as tuition, books, uniform, PTA contributions, transport, etc. From this, any kind of scholarship or payments by distant relatives (non-household members) towards school fees are subtracted. It can therefore be seen as a function of household (disposable) income available for investment in schooling but also of the availability of missionary schools and similar schools with free education. Due to its British colonial legacy, there were a lot of missionary schools present in the southern states of Ghana (Cogneau & Moradi, 2014). For the empirical analysis, the natural logarithm of school expenditure was used. This is because of the underlying distribution of the original variable that had a very long tail. With the natural logarithm the observations were brought closer together and the outliers now do not skew perception and analysis as they did before. The differences in the distributions can be observed in Figure 3 below. The fact that the underlying distribution is like this shows that

for a majority of Ghanaian households, spending on education is low (both in 1987 and 1991) with a few households being able to spend much more. Given that this is in part a function of household income, it suggests something about income distributions in Ghana as well. Nevertheless, what we can observe in Table 1 of descriptive statistics is that this variable seems to have undergone the least amount of change between 1987 and 1991, but there are still some differences between females of cocoa and non-cocoa farming households that appear to be the strongest in these conditional means and may prove to be significant in further empirical analysis.

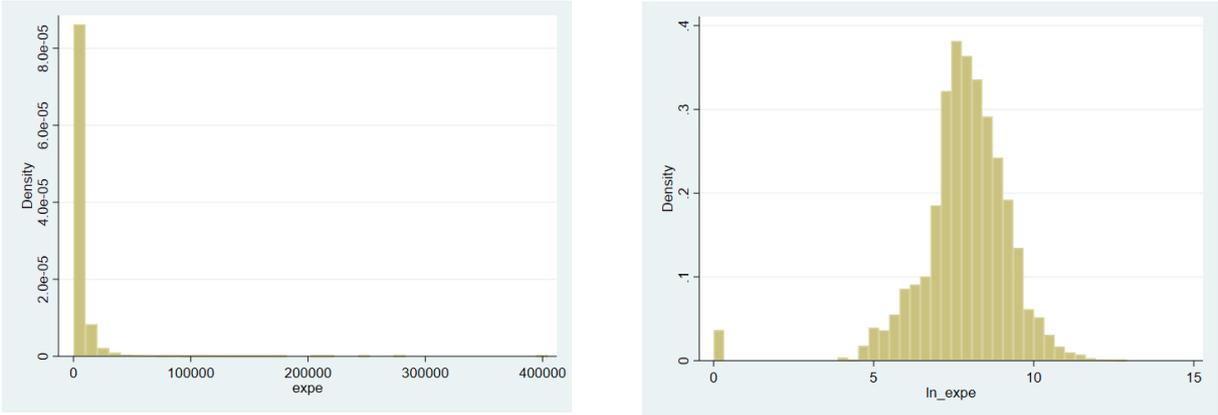


Figure 3 - Distributions of School Expenditure and $\ln(\text{School Expenditure})$

4 Methods

The methodological approach for this thesis is necessarily a quantitative, post-positivist one. In order to be able to compare the school attendance and child labour rates of children of cocoa farmers, this is the most intuitive approach that will allow for comparison to the existing literature. As such, the approach is informed by Creswell (2013) in its design and structure. Given the available data described above and the timing of the global cocoa price drop, the quantitative method employed will be a differences-in-differences analysis using the fall in global cocoa price from 2.65 \$/kg in 1987 to 1.46 \$/kg in 1991 as the treatment (World Bank, 2019). This 45% drop in price across just 4 years provides a perfect opportunity to explore the impact that global cocoa price changes can have upon the farming population of Ghana and the choices they make with regards to investing into the human capita of their children. The treatment group in this case will be cocoa farmers in cocoa producing regions of Ghana, which are compared against non-cocoa farmers in the same regions. The treatment, the drop in global cocoa price, directly affects those that grow the cash-crop while not affecting farmers of different produce. The outcomes of school attendance, employment rates in the last 7 days, and spending on schooling will be compared for children between the ages of 5-16 between 1987/1988 and 1991. A differences-in-differences approach was used by several other studies that either focus on Ghana or Cocoa price changes (Moradi et al., 2013; Jensen, 2000; Cogneau & Jedwab, 2012).

In order to apply a differences-in-differences analysis on the GLSS 1 and GLSS 3 survey data, the following econometric model will be used for each of the outcome variables:

$$C_{it} = \beta_0 + \beta_1 Year_{1991} + \beta_2 Cocoa_{it} + \beta_3 Cocoa_{1991,it} + \beta_4 X_{it} + \beta_5 H_{it} + \epsilon_{it}$$

For each of the three outcomes C (school attendance, child labour, school spending), this model measures an effect for each child i in year t ($t = 1987$ or 1991) or individual in a household in the case of school spending, since the spending does not necessarily occur by the child. $Year_{1991}$ is the time dummy variable that indicates whether treatment occurred and has a value of 1 for the year 1991 and 0 for any year before that. $Cocoa_{it}$ is a dummy for whether a child belongs to a cocoa farming family or not. $Cocoa_{1991,it}$ is an interaction of $Year_{1991}$ and $Cocoa_{it}$ that gives the differences-in-differences output from this regression analysis. X_{it} are a series of time-invariant controls for region or cluster (groupings of 12-48 households) that aim to control for any shared localised effects of living in the same larger or smaller geographical area. Lastly, H_{it} are a group of household level controls that will be used in the models to control for religion, house ownership, and recent illnesses in an attempt to increase the detail of the results. Further controls can also be added in order to increase robustness of the results or attempt to further refine the model.

In order to test whether this above model is valid, there are a couple of sensitivity or robustness checks that can be done in order to verify the results. These will follow the

presentation of the results. The central assumption of a differences-in-differences approach is the Common (or Parallel) Trends Assumption, which supposes that the treatment and control groups were on the same trajectories before the treatment and the measured differences are only due to treatment (Jakiela & Ozier, 2018). While it seems straightforward to assume that global cocoa price changes would only affect cocoa farmers and the normal of lives of all farmers in Ghana are similar, this will need to be investigated. Secondly, to test the model there will be a placebo differences-in-differences model that uses a treatment group of non-cocoa farmers to compare to the control group to show that the change only affected cocoa farmers (Vermeersch, 2007).

These checks are done in order to address the assumption of the model and some of the limitations of the differences-in-differences method. Since the method is frequently based on policy analysis or interventions, a common flaw is that the treatment is in fact endogenous to the observed effect and therefore produces invalid results (Bertrand et al, 2002). In order to address this issue, the global cocoa price is used as the measure of the shock, as this is least likely to have endogeneity issues. Looking at FAO (2019) cocoa output data, it seems that while output remained steady in Ghana, global cocoa output was rising between 1987-1991 which contributed to the depression of global cocoa prices. Since there was no significant drop in output, and Ghana was not withholding crops from the global market in an attempt to influence prices, changes in the global cocoa price should be unaffected by farmer's actions in Ghana especially with regards to their investment in children and education. Other studies used internally set producer prices or output in Côte d'Ivoire (Jensen, 2000; Cogneau & Jedwab, 2012), which could have possible endogenous effects since cocoa farmer's past decisions could have had an effect upon the levels of output or nationally set prices. Bertrand et al. (2002) also discuss bias in standard errors that can occur in differences-in-differences results but propose a solution of aggregating the datasets into two distinct periods, one of pre-intervention and one of post-intervention. This is the underlying structure of the data used here as well and should therefore address these concerns.

Lastly, there is significant precedence in the literature in using a differences-in-differences approach when only panel data is available for the analysis of agricultural shocks. This can be seen in the literature review and the comparable studies on cocoa. In order to contribute and be comparable, the methodology applied in this thesis is therefore further justified.

5 Empirical Analysis

5.1 Results

The following table present the overall differences-in-differences results for all three measured outcomes. Column (1) is a base model with no controls, Column (2) controls for regional factors and H_{it} controls, and Column (3) swaps the regional controls for the smaller set of cluster controls while still controlling for H_{it} . Tables with the full regression coefficients and results can be found in Appendix A.

Table 2 - Differences-in-Differences Results

	Differences-in-Differences		
	(1)	(2)	(3)
Working in the last 7 Days			
-combined	-0.215*** (0.053)	-0.207*** (0.053)	-0.194*** (0.053)
-male	-0.473*** (0.077)	-0.461*** (0.077)	-0.450*** (0.077)
-female	0.014 (0.073)	0.022 (0.073)	0.039 (0.072)
School Attendance			
-combined	0.308*** (0.045)	0.305*** (0.045)	0.293*** (0.045)
-male	0.273*** (0.065)	0.270*** (0.064)	0.247*** (0.065)
-female	0.341*** (0.062)	0.336*** (0.062)	0.330*** (0.062)
School Expenditures			
-combined	0.266** (0.126)	0.261** (0.126)	0.246** (0.126)
-male	0.134 (0.192)	0.161 (0.192)	0.138 (0.192)
-female	0.395** (0.166)	0.362** (0.164)	0.359** (0.165)

*** p<0.01; ** p<0.05; * p<0.10

5.1.1 Child Employment Rate

Looking at the first of the three outcomes considered, we can see that as a result of the cocoa price shock, there was a decrease in child labour rate amongst cocoa farming households in comparison to their non-cocoa farming counterparts. Overall, the effect is significant, but this changes slightly when the results are divided by gender. There seems to be a significant impact upon the proportion of male children who worked, while the female children remain unaffected. Looking at the conditional means from the descriptive statistics we can see that although there were small changes between the survey years, the proportion of female children working in cocoa households remained around 40% while the proportion in non-cocoa households was around 35%. A possible explanation for this is that, traditionally, cocoa farming in Ghana was the responsibility of the males within the household, while female members of the household focused on planting food crops for own consumption and domestic chores (Austin, 2014). What these results also suggest is that in cocoa households, the direct effect of decreased income was not enough to force children to remain working. Instead there was a substitution effect as the profitability of cocoa farming fell. It appears that since the return on labour on a cocoa farm fell as global price fell, male children were not required to work anymore leaving them with more free time and less obligation and the ability to pursue schooling and studies if a household could afford it. While this effect exists for males, it appears that for female children with different obligations within the household, the effect of the cocoa price change did not change the relative cost or value of their labour and therefore did not lead to a measurable change in their likelihood to be working.

5.1.2 School Attendance

School attendance shows a marked increase during the crisis years. As a by-product of Ghana's development programmes and increasing access to schooling, the expectation would be that school attendance would rise over time, but what we can see here is that school attendance for cocoa farmers rose faster than it did for non-cocoa farmers, leading to a positive difference. Differently to the proportion of children working, the school attendance effect can be observed across both males and females and therefore carries an overall positive effect. When considering the conditional means of this variable as well, what can be observed is that across Ghana education appears to have become more of a priority during these years but there also appears to be a distinct catch-up effect of cocoa farmers. Before the crisis, school attendance amongst cocoa farmers was 20% lower compared to non-cocoa farmers. After 1991, school attendance for both groups was above 85%. One possibility is that for cocoa farmers after the commodity price shock, the value of continued investment, such as using their children's labour on their farms, into cocoa started to fall and they were now more likely to invest in the future of their children by having them attend school. It could therefore be that Ghanaian cocoa farmers chose to invest into the human capital of their household rather than use money to reinvest into their farms and expand. Furthermore, hand in hand with the decrease in male children working, there could be more disposable income around to send children to school if one did not have to pay them, in kind or cash, for working. A further look into total household spending on education and schooling might shed some light on this and contribute

towards explaining a possible causal relationship between the changes in cocoa price upon schooling in Ghana.

5.1.3 Household spending on Schooling

Total household expenditure on schooling, as a natural logarithm, has increased as a whole in Ghana during the cocoa price shock and at first glance there is a less significant difference between cocoa and non-cocoa farming households. There is however a significant difference for the spending on female children. School expenditure for female children of cocoa households increased by a greater margin than it did for female children in non-cocoa farming households, this holds when controlling for religious background of the household as well as house ownership and recent illnesses. This does contribute some evidence towards the fact that cocoa households were able to invest more money into the education of their children, but it is not conclusive as it is unclear why specifically only spending on female children increased. Furthermore, the very high number of very low expenditure or no expenditure at all despite having children that are attending school suggests that for a significant number of households the choice of sending a child to school did not depend so much on the monetary costs and expenses but rather on the opportunity costs of having that child working within the household or contributing to household income in some other way. This low spending level is likely due to the fact that historically there is a large incidence of missionary schools accepting children of different religious background in Ghana (Cogneau & Moradi, 2014) which drives down the overall costs of schooling relative to other countries without a large missionary presence. Missionary schools were more present in the southern, cocoa-farming states of Ghana and therefore would keep school spending low. This mixture of effects means that there is therefore no clear evidence that overall spending increased as a result of cocoa household diverting their income or having higher disposable income levels after freeing labour from their farms.

5.2 Discussion

The discussion will be divided into two parts. First the above results will be compared to other studies that focus either on the effects of cocoa shocks or the effects of other commodity shocks. Key differences and similarities will be made clear so that in the second part theory can be incorporated in order to understand the reasons behind the differences that can be observed.

The results presented in this thesis differ from the results of the two closest comparable studies in Côte d'Ivoire but are in line with some other studies on macroeconomic shocks. In order to frame the discussion, results will be referred to as either pro-cyclical or counter-cyclical. Pro-cyclical would mean that investment in children would fall as the commodity price of cocoa also fell. In a counter-cyclical case, investment in children would rise in opposition to the commodity price falling. Cogneau & Jedwab's (2012) study on the 1990 cocoa crisis in Côte d'Ivoire is pro-cyclical. They find that school enrolment falls and the proportion of children that work rises as a direct result of a cocoa price shock. The results of this thesis show opposing results to this, with a lower proportion of children working and an increase in school

attendance, as well as some increase in spending on schooling for those affected by the cocoa shock. Jensen (2000) also finds pro-cyclical results on investment in children in Côte d'Ivoire in response to adverse agricultural conditions. While Ghana and Côte d'Ivoire are neighbours and competitors on the global cocoa market, there are still marked differences in their political and economic structures as well as their colonial and cocoa production history. These could be the explaining factors behind these differences as will be discussed below.

Looking at similar results to those presented here, the literature is based upon studies in Latin America. Schady (2004) finds counter-cyclical results following a macroeconomic crisis in Peru where those exposed to the crisis were observed to have higher school attainment. His explanation for this is that during times of crisis there are fewer jobs available in the affected regions which means children have no real alternative to attending school the monetary costs are not too high. This could also help explain the results found here, as with lower return on cocoa, less labour would be required or hired by farmers and if there is no labour scarcity it is less likely that children would be hired over experienced cocoa workers. In a study of how coffee prices affect child outcomes, Miller and Urdinola (2010) also find counter-cyclical results with regards to investment into the health of infants. They too describe an effect that in times of negative price shocks, there is more free time available within a household which allows for more intensive care of children. It is interesting that similar effects as observed in this thesis can be seen on a difference continent and further research would be useful to understand more about the common characteristics between these scenarios in order to provide a more detailed comparison.

Given that the case of cocoa in Ghana differs from the case of cocoa in Côte d'Ivoire, there needs to be a more in-depth discussion of why exactly such a difference exists. Woods (2004) in his comparative analysis of the political history of Ghana and Côte d'Ivoire provides an interesting qualitative explanation that could account for why opposing effects are observed. His claim is that both Ghana and Côte d'Ivoire have a similar history of dependency of cocoa, but the cycles of internal cocoa boom and bust is shifted by 20 years between the two. As stated in the literature review, in the 1970s Ghana experienced a series of social, political, and economic crises that eventually forced into the arms of the IMF and World Bank and their structural adjustment programs. By the time of the surveys used for this study (1987-1991) Ghana had already spent several years on the road to recovery. Woods (2004) shows that a similar crisis to this happened in Côte d'Ivoire, but it only started in the late 1980s which is when Cogneau and Jedwab's (2012) study is based. This crisis in Côte d'Ivoire ended in a military coup in the 1990s. It could therefore be that the underlying economic cycles are misaligned between Ghana and Côte d'Ivoire which means that the two cases are not necessarily fully comparable. Looking at some empirical evidence of this, it is useful to look at cocoa output in these two countries from the 1960s to 1990. Figure 4 shows this and as we can see, output in Ghana did indeed undergo a boom phase post-independence before crashing in the 1970s only to start recovering again in the mid-1980s. Cocoa farmers in Ghana therefore, had already experienced previous shocks in the form of output falls and were likely not willing to invest heavily into their farms when the price shock came at the end of the 1980s. This could mean they would have a preference for investing into their children's human capital over using their labour on their farms in order to produce more. Côte d'Ivoire's output history, however, is a completely different one. Once output started to increase, it did not stop, and cocoa farmers likely continued to invest into their farms throughout this period. When the price shock came

for them, it is more likely that they followed through on their commitment to cocoa and invested into their farms rather than the education of their children. This could then explain the different results of Cogneau and Jedwab (2012) when compared to the results outlined above.

COCOA OUTPUT IN GOLD COAST/GHANA AND IVORY COAST IN 1,000 METRIC TONNES (1900-1990)

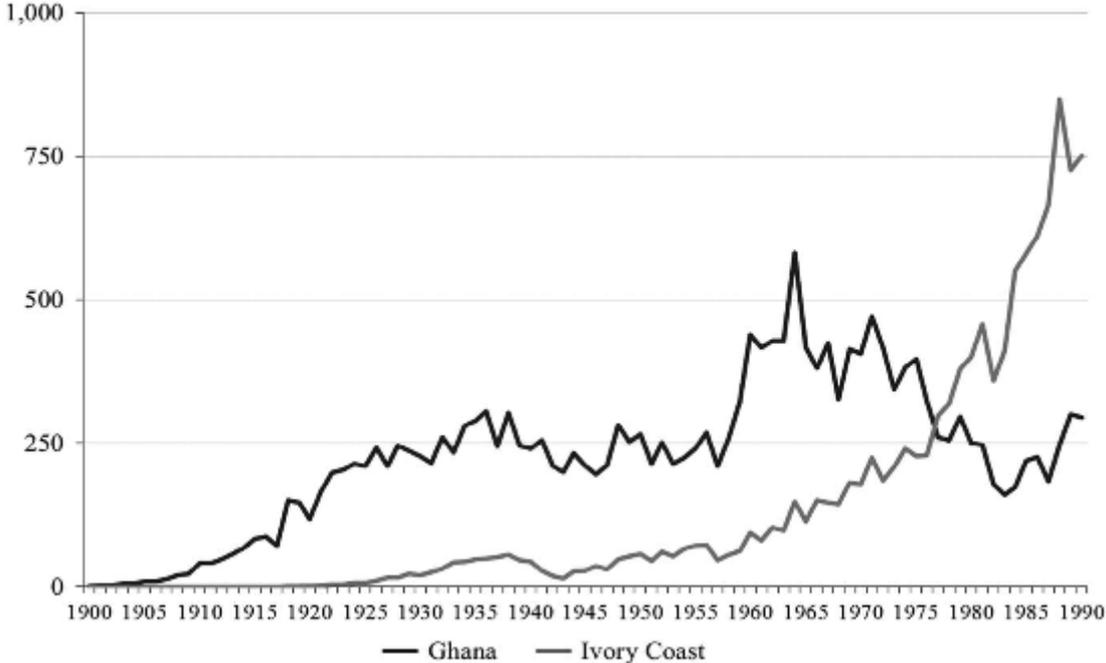


Figure 4 - Cocoa Output in Ghana and Côte d'Ivoire, 1900-1990 (Source: Frankema et al, 2016)

5.3 Sensitivity Testing

As outlined in the methodology section, below follow two sensitivity and robustness checks for the differences-in-differences model employed in this thesis. They will aim to support the conclusions from the empirical analysis by showing that they are relevant and significant.

5.3.1 Parallel Trend Assumption

A differences-in-differences model depends upon the assumption that the control group (non-cocoa farming households) and the treatment group (cocoa farming households) were on the same trajectory or developmental path before the treatment process began. If this assumption is not valid, then the differences-in-differences approach fails to measure a significant result as a result of the treatment. Since for this thesis only two periods of data were used, the methods of testing the parallel trend assumption suggested by Jakiela & Ozier (2018) are not valid for the data at hand. The problem with trying to identify the pre-1987 trend in Ghana is that there is no previous GLSS to base analysis off and no other available data that

could be used. However, as a crude test of the parallel trend assumption, a similar method to Cogneau & Jedwab (2012) will be used. The GLSS 1 questioning took place across 6 months in the end of 1987, leading into 1988. This data will be separated into the two years to get a trend at the beginning of the crisis that can then be compared to the trend after the crisis. While it should not be perfectly parallel, there should be an observable parallel trend between cocoa farmers and non-cocoa farmers between 1987 and 1988 while there should be divergence by 1991 if the parallel trend assumption holds true.

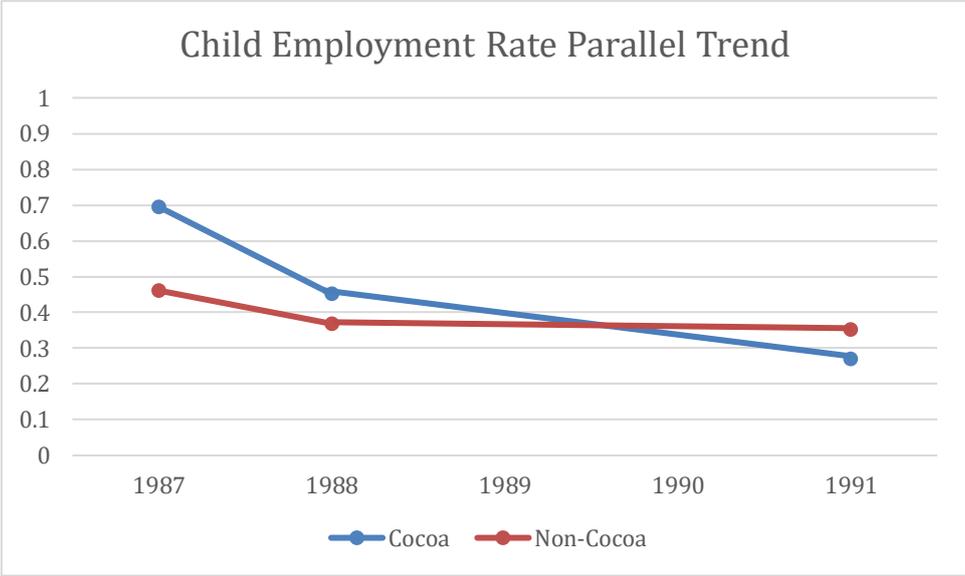


Figure 5 - Child Employment Rate Parallel Trend

Figure 5 shows the trend for child employment rate across the period studied and while the comparison between 1987 and 1988 is not strictly parallel, this could be due to the nature of the survey question and variable construction rather than the parallel trend assumption being violated. It is a measure of whether someone has worked over the last 7 days and if the child employment rate amongst cocoa farmers is susceptible to a price shock then it is likely that this would already manifest itself within a couple of month of experiencing that shock especially since the variable would only include people that recently worked. As mentioned before, it is difficult to fully test this assumption without data that reaches further back in time.

Below in Figure 6, the parallel trend for school attendance is a bit clearer especially since the measure of school attendance is a more long-term one that is shows responsiveness across years rather than weeks. The initial trend up to 1988 is very similar between cocoa and non-cocoa farming households before the previously mentioned catch-up effect can then be observed. The parallel trend assumption in this graph therefore appears to hold. A similar story can be observed in Figure 6 of the school expenditure. Here the two groups are distinctly parallel before taking up different trajectories by 1991 after the price shock.

It seems therefore that in general, the parallel trend assumption appears to hold or at the very least there are reasons for why it might not, given the limitations of the method applied here. To further test the model, a counter or placebo experiment can be run to test its validity.

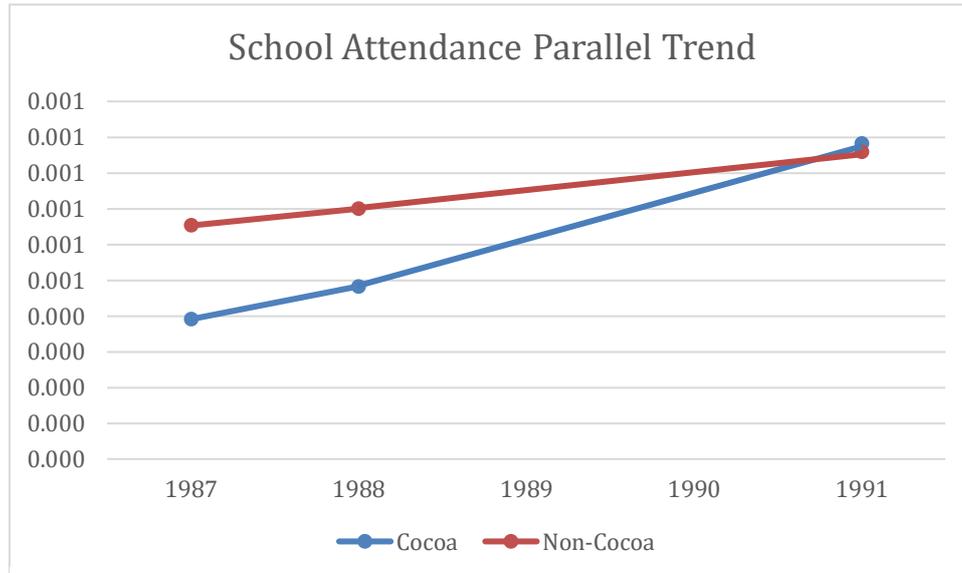
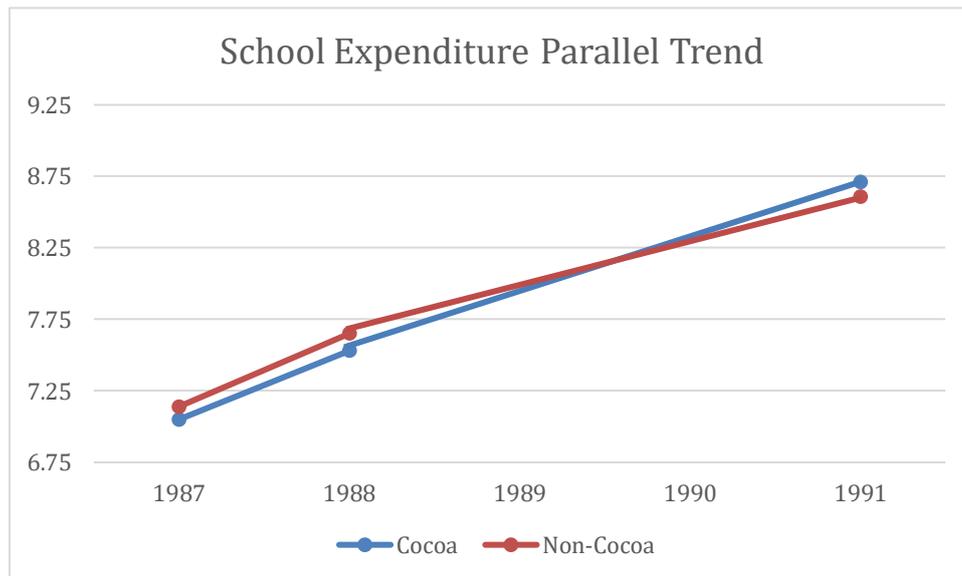


Figure 6 - School Attendance Parallel Trend & School Expenditure Trend



5.3.2 Counter-Experiment

The counter-experiment is a means of testing the differences-in-differences methods by changing the treatment group to a different one that should in theory be unaffected by the shock of falling global cocoa prices. Since cocoa is a cash-crop in Ghana that is only produced in order to be sold, this treatment group will be changed to maize. Maize is a food crop used primarily internally within Ghana and makes up around 50% of the national cereal production (Ragasa et al, 2014). The maize farmers will be compared to non-maize farmers for the time period of 1987-1991 and it is expected that the fall in global cocoa prices should not have a

significant impact upon the choices made by maize farming households during this time. The descriptive statistics for this experiment can be found in Appendix B and the differences-in-differences results are presented in Table 3 below:

Table 3 - Differences-in-Differences Counter-Experiment Results

COUNTER EXPERIMENT	Differences-in-Differences		
	(1)	(2)	(3)
Working in the last 7 Days			
-combined	-0.019 (0.031)	-0.019 (0.031)	-0.028 (0.031)
-male	-0.032 (0.044)	-0.032 (0.043)	-0.047 (0.044)
-female	0.000 (0.045)	-0.002 (0.045)	-0.006 (0.045)
School Attendance			
-combined	0.121*** (0.026)	0.118*** (0.026)	0.126*** (0.026)
-male	0.102*** (0.035)	0.100*** (0.035)	0.107*** (0.035)
-female	0.140*** (0.039)	0.139*** (0.039)	0.147*** (0.039)
School Expenditures			
-combined	0.026 (0.075)	-0.079 (0.074)	0.018 (0.075)
-male	0.189* (0.107)	0.006 (0.107)	0.170 (0.107)
-female	-0.002 (0.105)	-0.189* (0.103)	-0.016 (0.105)

*** p<0.01; ** p<0.05; * p<0.10

Looking at the results for child employment rate, we can see that the effect observed amongst cocoa farmers cannot be observed in this case. These results hold for controls as well as both genders. This suggests that the fall in global cocoa prices likely did change household behaviour around child employment as the profitability of cocoa farms fell as the previously observed effect is not present in this case. There is no clear evidence at all of any change in employment for children of maize-farming households, the means are similar to non-maize farmers before and after the price drop meaning that, if anything, they moved in the same trend for both groups. The story for school attendance, however, is a different one. Here, there does appear to be a significant difference between maize and non-maize farmers. Although the observed effect amongst cocoa farming households is twice as large, there should not be an effect for maize

farmers in the above model. This suggests that there is something else influencing the increases in school attendance of farming households beyond the increase in response to the cocoa price shock. It could be that a government policy towards education means there was an increased focus towards driving up school enrolment and attendance. In fact, in 1987 Ghana implemented a series of education reforms aimed towards increased access to primary education, more inclusive curriculum, and more vocational training in schools (Akyeampong, 2007). These reforms would have an overall positive effect upon farmers of all kinds and farmers of certain key, highly represented crops could show a positive difference in the model when compared to other farmers. The difference for cocoa farmers is still much larger than that of the maize farmers but the overall result of the differences-in-differences analysis becomes more ambiguous with this finding. Lastly, with regard to school expenditure there are some significant results but these do not hold when controlling for regional or smaller cluster effects. This would suggest that for this outcome, the results for cocoa farming households are supported as in this comparative experiment there is no evidence of cocoa price shocks having a significant effect upon the amount of money spent on school tuition and other schooling costs.

The results of the counter-experiment show that for the first and third outcome variables, there appear to be significant differences between cocoa farming households and non-cocoa farming households in response to the price shock as no such differences can be observed amongst the maize farmers. On the question of school attendance, the conclusion remains ambiguous as there definitely seems to be a strong effect for cocoa farmers but this is offset by the finding of this counter-experiment and the fact that Ghana as a whole was undergoing educational reform during this period that could have impacted these results in general.

6 Conclusion

Macroeconomic shocks have throughout history had significant impacts upon the choices made by households with regards to their future. Ghana, as one of the world's largest producers of cocoa, was exposed to such a shock between 1987 and 1991, when the global cocoa price fell from 2.65 \$/kg in 1987 to 1.46 \$/kg in the space of four years. The subsequent choices made by households in Ghana's cocoa producing regions have been the focus of this thesis.

6.1 Research Aims & Objectives

The objective of this thesis was to explore the relationship between the fall in the global price of cocoa and the investment decisions that cocoa farming households make with regards to the future of their children and their human capital. The way this could manifest was in changes in the employment rates of children, school attendance, or potentially household expenditure on schooling, and the aims could be summarized by the following two research questions.

1. How did the fall in the global cocoa price affect child labour force participation and school attendance rates amongst cocoa farming households in Ghana between 1987 and 1991?
2. Does this fall in the global cocoa price also have an effect upon the value of school expenditures amongst cocoa farming households in Ghana?

Looking at the first one, child employment rates and school attendance showed the most significant results in the empirical analysis. For male children, child employment rates in cocoa farming households dropped significantly in response to the crisis, suggesting a substitution effect away from child employment when the profitability of cocoa farms falls. School attendance in the entirety of Ghana rose between 1987 and 1991, but it rose much faster for all children of cocoa farming households as they caught up to the levels of non-cocoa farming households. This overall increase in school attendance is likely a contributing factor in the fall of child employment rates. The second question aimed to dig a little deeper in the choice regarding schooling and found that in spending there was a slight positive difference in spending on education for female children of cocoa farmers but not for males. This suggests that the increases in school attendance and decrease in male child employment rates can be more seen as an increased investment of time, and a trade-off in opportunity cost, into the human capital of the children rather than an actual monetary change being made by households.

6.2 Implications

The implication of these results and the answers to the research questions is that Ghana underwent very different response mechanisms to a cocoa price shocks than its close neighbour and biggest competitor on the global market, Côte d'Ivoire. As outlined by Cogneau & Jedwab (2012) and Jensen (2000) child employment rates rose and school attendance fell in response to a cocoa commodity shock. It appears that cocoa in Ghana did not possess the central role in the economy that it did in Côte d'Ivoire. Owing to previous decades of declining growth and crises, cocoa farmers in Ghana seemed less likely to commit to their farms and when profitability fell they sent their children to school instead of utilizing their labour on their farms. School reforms and availability programmes in Ghana appear to have paid off not just for cocoa farmers but for all rural farming households in cocoa regions. Even when not comparing the results to neighbouring Côte d'Ivoire, there are still significant impacts of cocoa price fluctuations that are evidenced here and it is important to understand the effect that reliance on a cash-crop can have upon the local population of a country especially when it is a crop as volatile as cocoa.

6.3 Future Research

Further research could take one of two paths. Firstly, the findings from this thesis need to be expanded upon as what is shown here is that there was a significant impact upon the investment into their children by cocoa farmers in response to a cocoa price shock, but some of the direct channels of causation are still unclear. This is due to the fact that this beyond the scope of the research questions and aims outlined at the beginning as well as some inherent limitations of the methodology applied. Furthermore, some of the right data was either unavailable or incomplete for the period from 1987-1991 covered in this thesis. As mentioned previously, Jerven (2013) does discuss inherent limitations of African statistical data and further research and refinement may also be necessary in order to introduce more detail into the empirical work. Looking for and constructing that additional data would be a valuable extension of this research in adding to the model that has been presented and proving some of the potential channels of causation that have been discussed. Secondly, the differences that were outlined between Ghana and Côte d'Ivoire in the discussion of the results need to be subjected to further analysis. Woods (2004) qualitative narrative focussing on different cycles of cocoa dependency could be looked into in detail by comparing the empirical data living standard survey data from Ghana and Côte d'Ivoire. It could then be tested whether different levels of output growth, dependency on cocoa, or possible governance, would change the effects outlined in this paper. This kind of control and follow up would then show more accurate results for both countries that would be useful in future comparison and studies on cocoa.

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Appendix A

Child Employment Rate:

Combined	Regression Results		
	(1)	(2)	(3)
Working in the last 7 Days			
Year 1991	-0.080*** (0.011)	-0.124*** (0.014)	-0.452*** (0.079)
Cocoa	0.146*** (0.041)	0.138*** (0.041)	-0.137*** (0.041)
DiD (Year 1991 x Cocoa)	-0.215*** (0.053)	-0.207*** (0.053)	-0.194*** (0.053)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Male	Regression Results		
	(1)	(2)	(3)
Working in the last 7 Days			
Year 1991	-0.085*** (0.015)	-0.135*** (0.019)	0.240** (0.111)
Cocoa	0.260*** (0.060)	0.249*** (0.060)	0.247*** (0.060)
DiD (Year 1991 x Cocoa)	-0.473*** (0.077)	-0.461*** (0.077)	-0.450*** (0.077)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Female	Regression Results		
	(1)	(2)	(3)
Working in the last 7 Days			
Year 1991	-0.075*** (0.016)	-0.110*** (0.020)	0.679*** (0.115)
Cocoa	0.047 (0.056)	0.040 (0.057)	0.048 (0.056)
DiD (Year 1991 x Cocoa)	0.014 (0.073)	0.022 (0.073)	0.039 (0.072)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

School Attendance:

Combined	Regression Results		
	(1)	(2)	(3)
School Attendance			
Year 1991	0.181*** (0.009)	0.241*** (0.012)	-0.199*** (0.068)
Cocoa	-0.234*** (0.035)	-0.222*** (0.035)	-0.222*** (0.035)
DiD (Year 1991 x Cocoa)	0.308*** (0.045)	0.305*** (0.044)	0.293*** (0.045)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Male	Regression Results		
	(1)	(2)	(3)
School Attendance			
Year 1991	0.186*** (0.013)	0.248*** (0.016)	-0.268*** (0.094)
Cocoa	-0.201*** (0.051)	-0.189*** (0.050)	-0.185*** (0.051)
DiD (Year 1991 x Cocoa)	0.273*** (0.065)	0.270*** (0.064)	0.247*** (0.065)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Female	Regression Results		
	(1)	(2)	(3)
School Attendance			
Year 1991	0.174*** (0.013)	0.230*** (0.017)	-0.131*** (0.098)
Cocoa	-0.265*** (0.048)	-0.250*** (0.048)	-0.252*** (0.048)
DiD (Year 1991 x Cocoa)	0.341*** (0.062)	0.336*** (0.062)	0.330*** (0.062)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

School Expenditure:

Combined	Regression Results		
	(1)	(2)	(3)
School Expenditures			
Year 1991	1.190*** (0.027)	1.302*** (0.032)	0.934*** (0.228)
Cocoa	-0.142** (0.082)	-0.121 (0.082)	-0.128 (0.082)
DiD (Year 1991 x Cocoa)	0.266** (0.126)	0.261** (0.126)	0.246** (0.126)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Male	Regression Results		
	(1)	(2)	(3)
School Expenditures			
Year 1991	1.293*** (0.038)	1.339*** (0.045)	0.793*** (0.324)
Cocoa	0.013 (0.128)	0.007 (0.128)	0.007 (0.128)
DiD (Year 1991 x Cocoa)	0.134 (0.192)	0.161 (0.192)	0.138 (0.192)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Female	Regression Results		
	(1)	(2)	(3)
School Expenditures			
Year 1991	1.073*** (0.037)	1.251*** (0.044)	1.159*** (0.318)
Cocoa	-0.276*** (0.105)	-0.232** (0.104)	-0.247** (0.105)
DiD (Year 1991 x Cocoa)	0.395** (0.166)	0.362** (0.164)	0.359** (0.165)
Regional Control	No	Yes	No
Cluster Control	No	No	Yes
Religious, Illness, and House Ownership Control	No	Yes	Yes

Appendix B

Descriptive Statistics Counter Experiment	1987		1991	
	Maize	Non-Maize	Maize	Non-Maize
Working in the last 7 Days	6,781 Observations			
-combined	0.407	0.384	0.353	0.348
-male	0.410	0.393	0.366	0.381
-female	0.404	0.374	0.338	0.308
School Attendance	7,029 Observations			
-combined	0.641	0.685	0.880	0.804
-male	0.663	0.681	0.906	0.822
-female	0.617	0.689	0.851	0.782
School Expenditures	11823 Observations			
-combined	7.489	7.593	8.591	8.670
-male	7.445	7.643	8.638	8.464
-female	7.530	7.699	8.530	8.701