

**The Aftermath of Sovereign Debt Assistance:
Does Debt Relief Play a Role in Reducing Future Conflict?**

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Abstract

One major obstacle that restrains developing countries from economic growth is debt. Financial burdens due to debt tie up resources that could potentially be used for education, healthcare and other societal improvements. To assist countries that demonstrate large amounts of debt, a group of creditors implemented initiatives with the purpose of assisting developing countries financially through partial or complete debt relief. The question, however, remains as to what extent debt relief assists in reducing future conflict. This paper analyzes this subject in the context of the 36 countries that participated in the 1999 Enhanced Heavily Indebted Poor Countries (HIPC) Initiative, where conflict is measured as battle-related number of deaths caused by a civil war. The regression model contains explanatory variables such as the economic growth (measured as real GDP per capita), the importance of debt relief (in terms of debt relief-to-GDP and debt relief-to-exports) and the duration of the initiative. The results show a negative relationship between debt relief and conflict, but it is not statistically significant. A graphical approach agrees with that finding. Debt relief is a debatable concept that has consequences depending on the scope of the analysis. In my case, the consequence of debt relief on future conflicts cannot be established with statistical significance. The study therefore concludes that even though debt relief may be a great economic advantage to developing countries, there is only weak evidence that it has a bearing on the determination of future conflict.

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Abbreviations

ACLED – The Armed Conflict Location and Event Data Project

This data set was consulted for the data on civil war combats in Africa.

GDP – Gross Domestic Product

This is the primary determinant when measuring the economic health of a nation.

HIPC – Heavily Indebted Poor Countries

The HIPC countries consist of 36 developing countries that have high levels of recorded debt burdens and poverty.

IMF- The International Monetary Fund

The IMF is an international organization that works together with the goal of strengthening economic and financial situations and relationships within and between the global economy.

NPV- Net Present Value

This is the present value of a sum of money, rather than a future monetary amount that will have inflation and interest associated with the value.

OLS – Ordinary Least Squares

This is simply a method for approximating unknown values in a linear regression model.

PRSP- Poverty Reduction Strategy Paper

The PRSP is a requirement imposed on the countries enrolled under the HIPC Initiative.

This paper is jointly written by the government and its citizens to create poverty reduction strategies that will be implemented, prior to receiving the final stock of debt relief.

UCDP- Uppsala Conflict Data Program

The UCDP provides a data set that collects current data since the 1970's on violent conflicts in most of the counties around the world.

WB- The World Bank

The World Bank is a group that stands together to fight poverty and emphasizes economic growth through viable and rational solutions, on a global scale

I. INTRODUCTION

Accumulated sovereign debt has been an economic problem that many countries have faced and it has increasingly become a concern for developing countries. Those countries are known to have a lower industrial capacity than developed ones, and as a result they tend to be exposed to more issues relating to poverty, financial aid in the form of debt, and armed conflict. In efforts to regain economic status, those countries have implemented poverty reduction strategies that often led to the accumulation of debt and that potentially contributed to augmenting the likelihood of future conflict. In an attempt to help developing countries to avoid accumulating debt while struggling to improve their economy, some developed countries and international agencies have implemented initiatives with the purpose of assisting developing countries financially either through partial or complete debt relief. Those initiatives include the Bakers Plan of 1985, the Brady Initiative of 1989, the Heavily Indebted Poor Countries (HIPC) Initiative of 1996, the Enhanced HIPC of 1999, and the Multilateral Debt Relief Initiative (MDRI) of 2005. In evaluating the extent of the success of those plans, the question arises whether debt relief played a role in reducing the incidence of future conflicts in the poor countries as prescribed by the chosen initiative.

To evaluate the relationship between debt relief and future conflict, I use an empirical approach to understand the extent of these efforts. Specifically, this study focuses on the 36 countries involved in the Enhanced HIPC¹ framework of 1999. I use data on the real per-capita Gross Domestic Product (GDP) for each country from the World Bank (WB) Data Outlook (2017). With the assistance of recorded documents and reports from the International Monetary Fund (IMF) and the WB regarding the conditions of approval and graduation from the HIPC

¹ From here onwards, the Enhanced HIPC Initiative of 1999 will be referenced as HIPC.

program, I use financial and economic indicators to estimate appropriate measures of the importance of debt relief (International Monetary Fund, 2017; World Bank, 2016), which are then assessed alongside the number of battle-related deaths stemming from future conflicts² for the countries involved.

While financial and economic indicators for the countries involved with the HIPC are readily available, information on conflicts varies across countries. In this report, a conflict is defined as an episode of violence within a country, or a war. Several types of wars can occur in developing countries, including international wars and intra-state wars. The intra-state wars include civil wars, inter-communal wars, and non-state wars.³ This analysis is limited to intra-state wars, namely civil wars, focusing on battle-related deaths from civil war in the countries of interest. I consulted two data sets: The Armed Conflict Location and Event Data Project (2017, ACLED) which provides data on battle-related casualties in Africa, and the Uppsala Conflict Data Program (2015, UCDP) which provides data on war-related casualties for major civil wars around the world. Information from these two data sources were combined to create a data set on conflict.

The literature on the direct relationship between debt relief and future conflict suggests that debt relief in developing countries should lead to a reduction in conflicts. I will elaborate on these discussions in the section entitled ‘Literature Review.’ Two separate empirical investigations – a graphical approach and a regression analysis – will be used to study the effect of debt relief on future conflicts in the countries covered by the initiative.

² From here onwards, the incidences of future conflicts, and the number of battle-related deaths stemming from future conflicts will be referred to as “future conflicts.”

³ Definitions of these various types of war are found in Sarkees (2010).

From a graphical representation of the data, a moderate relationship between debt relief and the measure of conflict is observed. The data is then combined to create an average observation of the number of battle-related deaths amongst all 36 countries enrolled under the HIPC. The measure of conflict chosen throughout the study is the average change in the battle-related number of deaths from civil war. When evaluating this measure, the results suggest that the HIPC Initiative was moderately successful in reducing future conflict. However, the relationship is not significant at the 5% level in the linear regression model.

This paper is organized as follows. The Enhanced HIPC Initiative will be described in detail in Section II, which will include its background and framework analysis. In Section III, I will discuss the literature on the economic theory surrounding debt relief and conflict economics. The model and data will be summarized and explained in Section IV, using regression analysis with a graphical approach, through the creation of a conflict coefficient. Finally, the statistical analysis will be presented in Section V and the conclusion will follow in Section VI.

II. AN OVERVIEW OF THE HEAVILY INDEBTED POOR COUNTRIES (HIPC) INITIATIVE

The enhanced HIPC Initiative of 1999 was a joint commitment between the IMF and the WB, established with the mission of reducing debt and poverty while stimulating economic growth. By using the factsheets available on their website (International Monetary Fund, 2017; World Bank, 2016) and informational documents (International Monetary Fund, 2001; International Monetary Fund and The World Bank, 2001), along with external seminars hosted by the IMF, particularly discussed by Das et al (2012), I briefly describe the history behind the formation of this program, as well as its goals and expectations.

I. DEFINING DEBT RELIEF

Debt relief can be expressed in terms of maturity extensions, interest reductions, debt reductions, as well as a full cancellation of the debt, as described by Reinhart and Trebesch (2016). In this study, the term is defined as a form of debt restructuring carried out by the IMF and the WB. The reorganization of debt gives the HIPC's the ability to service their debts without shortfalls. It also gives way to freed up financial resources initially used to make debt servicing payments, which can be made available to stimulate economic growth through investments in education, infrastructure, and healthcare.

II. HISTORY

The original HIPC Initiative was launched in 1996 by the IMF, the WB, the Paris Club and other official multi- and bi- lateral creditors. It was the first time in history that this diverse group of creditors united to reduce the external debt of some of the poorest countries in the world. The aim of the original initiative was to reduce external debts to sustainable levels so that poor countries would be able to service their debts through financial assistance, export earnings, and private capital inflows. While many such initiatives were established in the past, their success was limited due to the insolvency of the economies of the underdeveloped countries. The capacity of supporting debt in the less developed countries was greatly exceeded and the need for an initiative that would assist in stimulating economic growth was necessary.

In terms of funding the HIPC, some countries and organizations had agreed to write off the development aid debt and cancel all trade debts by the countries enrolled under the HIPC. For instance, the African Development Bank committed to a large sum of irrevocable debt relief, totaling over \$370 million USD, as noted in their summary of the HIPC Initiative (African

Development Bank Group, 2017). The proceeds from the IMF's off-market gold sales in 1999 were all deposited into a separate account, known as the Poverty Reduction and Growth Trust (PRG-HIPC fund), which was specifically designed for the HIPC. The creation of this financial account was proposed by one of the key creditors country's representative, Gordon Brown, Britain's Chancellor at the time⁴.

Although the original HIPC seems to have been beneficial to poor countries, it was not a realistic or applicable framework due to the presence of conflicts in these countries, out of which over 75% were African. When there are conflicts, it becomes difficult to monitor the spending of debt relief flowing into the countries and the extent to which the aid is being used for the social benefit of the people. By adjusting the original initiative, the new and enhanced HIPC framework of 1999 intended to have more relaxed conditions for program eligibility. The relationship between poverty reduction and external debt relief is emphasized in the enhanced program through the requirement of the Poverty Reduction Strategy Paper (PRSP), which includes joint contributions by the government and civil society of the less developed country. In efforts to reduce debt to a sustainable level, the promotion of economic growth and poverty reduction became the focus of the enhanced HIPC. This approach was used to motivate poor countries to re-allocate spending, originally tagged for debt servicing, towards social services such as healthcare and education. Addison et al (2004) found that the resources released by debt relief, between 60% and 70% of debt service, were equivalent to the new-found spending towards education, healthcare and other social programs. It was also observed that debt relief equivalent to 50% of the debt-to-GDP ratio led to a 0.5 to 1 percentage point increase in the growth rate per year. In restructuring the countries' reform efforts, the HIPC required that the countries applying

⁴ A study entitled "The Latin American Crisis" discusses the various debt relief initiatives and the establishment of the different funding mechanisms used to write off debts of less developed countries. (Ruggiero, 1999)

for the program meet strict conditions to ensure that the investment goes to countries willing to improve their economy and social well-being.

III. OVERVIEW OF REQUIREMENTS

To be considered for funding under the HIPC Initiative, the applicant countries have to satisfy certain conditions. They must have met strict qualifications, including income thresholds⁵, inability to manage debt burden⁶ and contributions to the PRSP. The countries must be able to borrow funds from supported programs and agencies belonging to the IMF and the WB, and they must have performed well with regards to reforms and policies implemented through those programs.

Two milestones need to be passed to receive the full stock of debt relief: the decision point and the completion point. The first objective to reach is the decision point; the guidelines ensure that creditors commit an amount of debt relief in full when the qualifying country reaches this stage. It is at this phase that the country qualifies for a timeline for policy and reform implementation and the inflow of interim aid commences.

After reaching the decision point, countries going through the approval process must pass the second milestone: the completion point. At this stage, creditors lower the debt service payments and the final stock of the first committed debt relief is delivered. To reach this stage, certain reforms and programs must be implemented with the intention to stimulate economic growth and to reduce national poverty. This is done through the proper implementation of the

⁵ The Gross National Product (GNP) in a country must be lower than the minimal requirements to receive a loan from the International Development Association (IDA) to be considered a heavily indebted poor country.

⁶ Developing countries may not be able to manage their debt burdens when either all resources are used towards repaying the debt or when there are not enough resources to service the debt.

PRSP for at least one year. At this stage, the WB considers the country as a graduate from the program.

In comparison to the original HIPC Initiative, regulations and implementation of the enhanced initiative to motivate economic growth and development are based on a more realistic approach. For instance, the debt relief-to-exports ratio is targeted at 150%, down from 250% in the original framework. Also, the debt relief-to-revenue ratio is intentioned at around 250%, compared to the 280% initially. Similarly, the exports-to-GDP ratio and the revenues-to-GDP ratio are both set at 30% and 15%, down from 40% and 20%, respectively.

Despite the credibility of the program and the goals of improved economic well-being, many challenges remain that ensure that debts do not return to unsustainable or unmanageable levels. These include the inability to strengthen the finances in the areas of debt and public spending, as well as ensuring the full participation by creditors to the program. In many cases, creditors committed to an amount but did not deliver the amount of debt relief that was initially agreed upon. Even though some of the major creditors delivered their share of debt relief and assistance, others were lagging. These facts are verified by the factsheets presented by the WB and the IMF.

One impact of the HIPC Initiative that needs to be considered is that of post-conflict countries or those currently facing conflicts during the implementation of the HIPC Initiative. These less-developed nations tend to receive quicker and higher debt relief to assist them in reducing violence. In providing assistance in a time-efficient manner, the goals of poverty reduction and economic stabilization are prominently emphasized. This is done through an earlier decision point, a longer interim period, and more flexible requirements at the completion point.

In observing the importance given to conflict-inflicted countries within the initiative, the remainder of this study will focus, after a review of the literature, on the conflict component of the initiative.

III. LITERATURE REVIEW

Since this paper first explores the incidence of debt relief in each country and then investigates its effect on future conflicts, the literature for each of the above components must be consulted individually. Therefore, I explore the issue of debt relief in underdeveloped countries as a single theoretical framework, whereas the context of conflict economics in direct relation to battle-related deaths caused by civil war is analyzed in another framework.

I. DEBT RELIEF

A. IS DEBT RELIEF BENEFICIAL IN GENERAL?

Is debt relief beneficial? Reinhart and Trebesch (2016) focus on this question while comparing two distinct cases: the countries affected during the interwar period from 1920 to 1939 and the emerging market crisis era from 1978 to 2010. The general finding in both samples is that debt relief is beneficial only if the correct type of intervention is applied. Specifically, the most effective debt relief option is a debt write-off. The other types of debt relief options include maturity extensions, debt reductions, and interest reductions, which are less effective. The data used for their study was taken from the study performed by Cruces and Trebesch (2013) on sovereign debt “haircuts,” or on what we would call debt relief.

Reinhart and Trebesch (2016) concluded that the majority of the debt following World War I resulted from official external sovereign debt. The solution suggested by the Congress of the United States was a full cancellation of the war debt. This debt write-down rendered the economies at question a chance of reestablishment. In contrast, from 1978 to 2010, the emerging market debt crisis was the result of private creditors. Thus, the use of debt relief in this situation had a different effect than the one marked earlier because of the differing causes. In the first case, the complete debt write-off allowed the affected countries another chance to reestablish their economies, return to financial markets and become a part of the IMF and the WB. In the latter instance, the debt relief played more of a role of rebalancing the economies of the countries of interest. In both eras, the debate about the cost-benefit of debt relief depended on many factors. For example, economic growth through increased social welfare and improved infrastructure was the result of freed resources from debt relief. The moratorium announced by US President Herbert Hoover in 1931 was a significant event in relation to debt relief. That announcement gave way to a one-year grace period to the indebted countries based on the premise that loan payments were difficult to make while restructuring a nation. The result of the moratorium was that after the one-year period, a country's payment irregularities worsened until 1934, when all debts were written off. This was known as the "crisis-exit." The literature confirms that debt relief was attempted in two ways according to Reinhart and Trebesch (2016): a moratorium and a full debt write-off.

In acknowledging that debt relief is beneficial, it is important to further assess its broad aftermath. Reinhart and Trebesch (2014) conducted an analysis on the outcome of debt relief in countries during the interwar and in the emerging markets eras, similar to their later study analyzed above. The difference between the two studies is found in the methodology- while their

2014 study consisted of a simple analysis using a graphical approach, their 2016 study included a DID (Difference in Difference) regression. The overall results of both papers, however, remained the same. Reinhart and Trebesch (2014) concluded that the results for the two time periods were similar: debt relief generally led to higher growth of Gross Domestic Product (GDP). Furthermore, the debt-servicing liabilities as well as the overall government debt were lowered. While the results favorably demonstrate that debt relief benefited the economy in the short-run, the question arises of whether these results can be sustained in the long-run.

Birdsall and Williamson (2002) focused on the debt relief of poor countries around the world. Most of these countries participated in the HIPC Initiative to strategically stimulate economic growth. The objective was to establish a ‘new aid architecture’ to promote long-term sustainability after development aid was delivered. To determine if debt relief is the best method of assistance, it was compared to various methods of development aid. The results show that development aid thrived in economies with profitable and investment-seeking considerations rather than in economies with developmental considerations. Debt relief increases resources for public spending which positively correlates with sustainable economic growth. The direct effects of an increase in public spending include better education systems, improved healthcare systems and enhanced infrastructure and facilities. Debt relief is recognized to be the most efficient form of support provided to developing countries. Birdsall and Williamson (2002) state that “an assured dollar of debt relief is probably more efficient in generating development than a promised dollar of new aid.” (p.72) Therefore, it can be inferred that sustainability is achieved when debt relief has been delivered rather than just promised.

B. THE CONSEQUENCES OF DEBT RELIEF IN THE PARTICULAR CONTEXT OF THE HIPC COUNTRIES

Beneficial debt relief has been the goal of past financial initiatives in terms of anticipating sustainable and long-term economic growth. The establishment of the HIPC Initiative of 1996 and of the Enhanced HIPC of 1999 attempted to correct the economic goal that the developing countries were striving for. Addison et al (2004) completed an investigation on debt relief in poor countries which focused on the HIPC Initiative. In their research, the emphasis on the positive relationship between debt relief and economic growth rate is a key finding – an increase in the amount of debt relief that a country receives results in more sustainable economic growth. They observed that education and healthcare spending correspond to a proportion between 62% and 70% of debt servicing. This amount was obtained from the funds made available through debt relief aiming to improve the economic condition of the country. Addison et al (2004) confidently supported the HIPC Initiative and discussed the positive aftermath of debt relief on the involved countries.

Birdsall and Williamson (2002) investigated the countries enrolled under the HIPC Initiative. Although their results are consistent with the economic theory that debt relief leads to development, they also expressed criticisms towards the HIPC framework. The HIPC debt relief was beneficial partly because the beneficiaries were required to first prepare a Poverty Reduction Strategy Paper (PRSP) to be submitted to both the IMF and the WB. This requirement allowed the eligible developing countries to take ownership of the strategies that they could implement to reduce poverty and stimulate economic growth.

Likewise, Addison (2003) performed a study which focused on the African countries. More than three quarters of the 36 countries that have graduated from the HIPC Initiative are

African. While conducting detailed research on numerous African countries, he found that many of them are poor and indebted because of past conflicts. Past conflicts have corrupted those nations and have directly affected their institutions, which led to unbalanced investments. Consequently, a low growth rate is observed to indirectly contribute to future conflicts. One of the goal of the HIPC was to prevent those future conflicts from occurring. Due to the PRSP eligibility requirement, poor countries had to prepare a well-designed development strategy on their own so that the plan would be achievable from the point of view of the prospective recipient. This broad-based strategy was an attempt to reduce future conflicts in the developing HIPCs.

By framing economic growth as one of the main goals of debt relief, the effect of the decreasing financial burden on social conflicts in the HIPC countries was subsequently studied by Addison and Murshed (2003). They acknowledged the necessity of studying the effect of debt relief on future conflicts in the countries of interest in order to validate the efficiency of the initiative. They indicated that conflict reduction has been mentioned in debates but never explored rigorously.

In specifying that debt relief frees up financial resources for increased development spending, it can be concluded that debt relief may also contribute to reducing social conflict. For example, debt relief can be considered as an addition of financial resources that cause the government to face a trade-off: either the government increases transfers to the rebel groups engaged in conflict, or it increases the fighting efforts against the rebel groups. Most countries that were conflict-inflicted prior to their enrollment into the HIPC were unstable during and after debt relief was delivered. This does not entail that the debt relief received was useless, but rather that the intensity of conflict was so high in those countries that even debt relief could not provide

enough resources to terminate the conflicts completely. Many of the HIPCs that endured conflicts are rich in natural resources and therefore face threats of appropriation and exploitation. The greed pushing rebel groups to capture these resources is the main cause of conflict in those countries. Addison and Murshed (2003) conducted a statistical study using a model that maximized the expected utility of the government and the rebels with respect to the probability of observing conflict and the respective payoffs. In maximizing the expected utilities in the game, the findings suggest that debt relief is unlikely to eliminate conflict entirely, but it can reduce fighting intensity and cost of war. To further understand the importance of debt relief, an in-depth analysis on the extent of future conflicts is required.

II. CONFLICT ECONOMICS

In discussing the consequences of debt relief on future conflicts, it is important to emphasize the definition of conflict used in this study to better examine the underlying causes of conflicts, namely civil war.

Collier and Hoeffler (1998) analyze the nature of conflict in the context of the economic causes of civil war. They emphasize that a war will generally occur if the rebel groups' incentives outweigh the transaction costs of starting the conflict. These incentives generally consist of the seizure of financial resources that can be appropriated from the government or from the masses because of development aid. The cost of the conflict includes the opportunity cost tied to the fighting-induced drop in economic activity. It is observed that the cost of warfare increases with the duration of the war. In an expanded analysis, Collier and Hoeffler (2002) study the effects of aid and policy on reducing civil conflicts. Although aid and policy are found to have no direct effect on the risk of induced conflict, indirect effects exist. During civil war,

questions arise regarding rebels' target of aid as their incentive to fight. During a conflict, aid is generally reduced by donor countries and organizations so that the only form of aid coming into that nation is food aid. Though health aid was also being brought over to those that needed it, the aid flowing into the country prior to the conflict could be a motive for the rebels to appropriate the new inflow of available resources. This opportunity could result in an outbreak of civil conflict in low-income countries.

More recently, Collier and Hoeffler (2004) studied the causes of a civil war through a cost-benefit analysis. In determining the opportunities of an outbreak of civil war in their previous study, Collier and Hoeffler (2007) conducted an empirical study to investigate the effects of aid on armed conflict, the primary focus of which was the military spending and the extent to which foreign aid is allocated to security and defense purposes. The results show that aid often unintentionally increases the risk of internal conflict. In Africa, it is found that military spending nearly doubles when foreign aid is received. Thus, the authors observe that military spending does not deter rebels from causing upheaval, nor does it reduce the risk of internal conflict.

While aid appears to increase the risk of conflict in some studies, it could also decrease the risk in other contexts. Miguel et al (2004) focused on estimating the effects of economic conditions on the on-set of civil conflicts in low-income African countries. In assessing a variety of explanatory variables, they found that economic growth has a significantly negative effect on the risk of conflict such as a civil war. By conducting a variety of regressions over a sample of countries in Africa, they concluded that economic conditions have a crucial influence on civil conflicts and that increased growth rates lead to reduced risk for future conflicts.

De Ree and Nillesen (2009) take a new approach to study the effect of foreign aid on future civil conflicts. In separating future conflicts into civil conflict on-set and civil conflict duration, a more detailed analysis is formed in understanding the direct effects of development aid. While civil conflict on-set measures the commencement of a battle, civil conflict duration accounts for the length of the battle. Collier et al (2004) took the time to study the effects of the duration of a civil war on the economies of less developed countries. Similarly, De Ree and Nillesen (2009) found that countries with weak institutions and low per capita income are more prone to civil conflict. In comparison to wealthy countries, poor countries face a higher risk of conflict as a direct response to their economic environment. Foreign aid received by most poor countries in Africa was used to increase their military spending which in turn, significantly reduced the duration of the conflict. However, their study concluded that aid had no significant effect on the actual on-set of a civil war.

In the case of the HIPC, most of the less developed countries that were involved in the initiative experienced conflict in the form of a civil war after reaching the decision and completion points of the debt relief. The question of interest remains to determine the extent to which debt relief through the HIPC Initiative reduced the probability of observed conflicts in the future.

While debt relief and conflict have been explored separately in this literature review, the simultaneity of the relationship has yet to be tested. Addison and Murshed (2003) studied the statistical effect of debt relief on the on-set of civil war through utility maximization; however, a more direct approach to understanding the relationship between the variables is absent. By combining the available theories and proposing a new model, this study will attempt to identify the extent to which debt relief plays a role in reducing future conflicts.

IV. METHODOLOGY AND DATA

I. THE DEPENDENT VARIABLE:

A MEASURE OF THE CHANGE IN CONFLICT

The aim of this analysis is to determine whether the HIPC Initiative was successful in reducing future conflicts in the countries where it was implemented. Through the creation of a coefficient which measures the average change in conflict over a period of 15 years before and after the delivery of debt relief, it is possible to evaluate the success of the HIPC program in reducing future conflicts. I choose to conduct this research over the span of 15 years in order to have a long enough period. Although each country joined the HIPC Initiative in a different year, the data for all countries is available 10 years prior to their graduation from the program to at least 5 years after. By using this measure of conflict change as the dependent variable in a regression, the evaluation of the success of the HIPC program can be determined.

The decision and completion points (defined earlier in section II) play an important role in this study because they provide a benchmark for a condensed time interval during which debt relief is received. The period during which each country receives debt relief under the HIPC - specifically between the decision point and the completion point - allows for the choice of an alternative midpoint year (M) between the two milestones to provide a benchmark to compare the results from before and after the delivery of debt relief. Since 'midpoint' more generally refers to separating an interval exactly into half, I choose to label the data point as an 'alternative midpoint' which serves to define the most representative year between the two milestone years. A two-step process is used for determining the most reasonable alternative midpoint year. I first determine the actual midpoint year between the decision and completion points: this assists in a

realistic selection. I then validate my selection by choosing the one year which witnessed conflict from one year before, one year after and the actual midpoint year. If the actual midpoint year recorded an observed conflict, regardless of the number of recorded battle-related deaths, I choose that year; otherwise I choose the year before or the year after. While economic growth can be stimulated directly after declaring an inflow of debt assistance in some countries, in other cases it may not occur until after the nation receives the entire stock of the promised financial aid. I first select the most realistic alternative midpoint year for each country, based on the available information for the period of interest. I then gather the data, commencing ten years prior to the alternative midpoint, i.e. M-10, and ending up to five years after, i.e. M+5. The reason for choosing this interval is not only because the data is available for all countries, but it is also because the trend of the data around the alternative midpoint year may be better evaluated. I will refer to this 'alternative midpoint' as 'midpoint' for the remainder of this study. In being able to observe the economic growth in the years leading up to M, the impact of the majority of the debt relief after the midpoint year can be better analyzed. For instance, if real GDP per-capita is observed to be gradually increasing for the 10 years prior to M, and if I suddenly observe a rapid increase during the first 5 years after M, it is reasonable to expect that debt relief played a role, *ceteris paribus*. However, if the economic activity is shown to be increasing leading up to M and then returns close to initial lower levels within the 5 years after the midpoint year, then the effect of debt relief is not considered to be significant. Therefore, the time interval from M-10 to M+5 seems appropriate to use for data collection and analysis in this work.

Table A1 of the Appendix presents the raw data that I used to calculate the dependent variable. It shows the decision point, the midpoint, the completion point, and the number of battle-related deaths for each of the 10 years before and the 5 years after the midpoint year of

debt relief delivery for all 36 countries. The source of this data will be discussed in more detail in the section below. The total and average yearly number of battle-related deaths from M-10 to M, as well as between M and M+5, are shown in Table A2 of the Appendix for each of the HIPC's. Using the values of the average number of battle-related deaths, I define the coefficient describing change in conflict (R_i) as the ratio of the average number of deaths before the midpoint year to the average number of deaths after that year. The calculated index is shown in the last column of Table 1 (along with the measures of the explanatory variables of the model to be discussed below) for each of the 36 countries:

$$R_i = \frac{\text{Average } [M-10, M]}{\text{Average } [M, M+5]} \quad (1)$$

To determine the success of the HIPC Initiative, evaluating the value of R_i with respect to the value of 1 is useful: if the average number of deaths 10 years prior to M (the numerator) is larger than the average number of deaths 5 years after M (the denominator), then the coefficient will take on a value larger than 1. This would suggest that the HIPC Initiative was successful in reducing the future conflict in the nation of interest. This information will be of value when assessing the effect of R_i on the different measures of the importance of debt relief.

II. THE REGRESSION MODEL

Based on the literature cited above, debt relief can be beneficial or harmful to a nation's economy depending on how the society chooses to use its resources. While the amount of debt relief that each country collects varies according to differing debt stocks, debt-servicing payments and country sizes, it is not the only explanatory variable that determines future conflicts. I select three explanatory variables that affect future conflict. A linear regression model

is used to analyze the success of the HIPC Initiative in reducing future conflicts. Ordinary Least Squares (OLS) estimates are derived from the regressions.

The explanatory variables, shown in Table 1, are a measure of economic growth (*GDP*), a measure of the importance of debt relief (*IMP*), and the duration of the HIPC program (*HIPC*). *GDP* is defined as the percentage change in real GDP per-capita. Two alternative variables are used to define *IMP*: the debt relief-to-GDP ratio (*DGDP*) and the debt relief-to-exports ratio (*DEx*), both of which are recorded at the time of the completion date, or ‘graduation’ from the HIPC Initiative. It is unknown which representation of the importance of debt relief will be statistically significant. Therefore, two different specifications will be performed- one including the debt relief-to-GDP ratio and the other with the debt relief-to-exports ratio. These values are presented in the two middle columns of Table 1 above. The duration of debt relief is determined by counting the number of years between the decision point and the completion point for each country enrolled under the initiative.

The model is defined as follows:

$$R_i = \alpha_0 + \alpha_1 GDP_i + \alpha_2 IMP_i + \alpha_3 HIPC_i + \varepsilon \quad (2)$$

where

R_i represents average change in conflict as described in terms of battle-related casualties in each country, i ,

GDP_i accounts for the percentage change in the average real per-capita GDP from M-10 to M+5,

IMP_i represents the importance of debt relief which is specified as two alternative indicators:

Table 1: Importance of Debt Relief and Conflict Coefficients for HIPC Countries

Country	Time			Measure of Importance of Debt Relief		Duration of HIPC (HIPC)	Percentage Change in the Real GDP Per Capita (% Change (GDP))	Conflict Coefficient, R (AVE M-10 TO M : AVE OF M TO M+5)
	Decision Date	Midpoint Year [M]	Completion Date	% of debt-to-exports at completion point	% of debt-to-GDP at completion point			
Afghanistan	Jul-07	2009	Jan-10	0.10	0.00	3	243.43	0.49
Benin	Jul-00	2002	Mar-03	0.80	0.30	3	53.50	5.45
Bolivia	Feb-00	2000	Jun-01	1.40	0.10	1	8.99	0.18
Burkina Faso	Jul-00	2001	Apr-02	1.60	1.20	2	36.12	0.03
Burundi	Aug-05	2007	Jan-09	2.00	0.90	4	54.48	14.63
Cameroon	Oct-00	2003	Apr-06	2.00	0.90	6	40.40	0.34
Central African Republic	Sep-07	2008	Jun-09	2.80	0.50	2	40.51	0.26
Chad	May-01	2008	Apr-15	2.80	0.60	14	110.75	4.36
Comoros	Jun-10	2011	Dec-12	3.50	0.50	2	3.17	0.00
Republic of Congo	Mar-06	2007	Jan-10	4.50	1.80	4	133.62	79.98
Democratic Republic of Congo	Jul-03	2007	Jul-10	5.20	1.60	7	61.27	2.41
Cote D'Ivoire	Mar-09	2011	Jun-12	5.40	1.80	3	13.70	2.45
Ethiopia	Nov-01	2003	Apr-04	5.90	1.00	3	51.45	15.04
The Gambia	Dec-00	2004	Dec-07	6.20	1.70	7	-19.43	0.19
Ghana	Feb-02	2003	Jul-04	6.40	3.80	2	111.73	15.44
Guinea	Dec-00	2006	Sep-12	7.10	2.20	12	9.52	1.84
Guinea-Bissau	Dec-00	2005	Dec-10	7.30	2.00	10	74.60	4.65
Guyana	Nov-00	2008	Dec-03	8.10	4.50	3	139.62	0.55
Haiti	Nov-06	2008	Jun-09	8.10	1.50	3	52.62	0.00
Honduras	Jun-00	2003	Apr-05	8.30	2.30	5	67.14	1.06
Liberia	Mar-08	2009	Jun-10	8.40	2.30	2	106.93	70.77
Madagascar	Dec-00	2003	Oct-04	8.50	1.00	4	26.82	1.19
Malawi	Dec-00	2003	Aug-06	8.60	2.60	6	56.82	1.18
Mali	Sep-00	2002	Mar-03	10.60	1.60	3	58.72	4.79
Mauritania	Feb-00	2001	Jun-02	10.70	1.60	2	6.78	0.14
Mozambique	Apr-00	2001	Sep-01	11.10	1.20	1	40.15	88.58
Nicaragua	Dec-00	2003	Jan-04	11.50	3.30	4	35.58	0.00
Niger	Dec-00	2002	Apr-04	12.40	1.00	4	24.83	1.48
Rwanda	Dec-00	2003	Apr-05	13.70	1.70	5	42.97	4137.85
Sao Tome & Principe	Dec-00	2004	Mar-07	14.30	2.20	7	318.39	0.00
Senegal	Jun-00	2002	Apr-04	15.60	3.70	4	33.30	3.99
Sierra Leone	Mar-02	2004	Dec-06	16.40	3.10	4	62.87	707.45
Tanzania	Apr-00	2001	Nov-01	19.30	1.80	1	59.30	0.32
Togo	Nov-08	2009	Dec-10	24.70	2.30	2	52.63	22.21
Uganda	Feb-00	2000	May-00	36.60	9.90	1	11.41	0.69
Zambia	Dec-00	2003	Apr-05	0.00	0.00	5	124.10	0.13
TOTAL OF ALL RATIOS								5190.10
AVE RATIO PER INTERVAL								144.17
TOTAL # >=1								21.00
% OF HIPCS >= 1								0.58

$DGDP_i$ denotes the debt relief-to-GDP ratio,

DEx_i characterizes the debt relief-to-exports ratio, and

$HIPC_i$ represents the duration of the HIPC Initiative in each country, measured by counting the number of years between the decision and completion dates.

III. SOURCES OF DATA FOR THE EXPLANATORY VARIABLES

A. THE CHANGE IN THE REAL GDP PER-CAPITA

GDP per capita is a measure of standard of living; when this economic factor rises over time, the expectation holds that the standard of living in that economy is improving, thus indirectly implying a decrease in future conflicts, as suggested by Miguel et al (2004). This economic factor is chosen as the measure of economic growth for this study because it is measured in each year in all the countries. The data for this measure is extracted from The World Bank Data Outlook (2017). The observations are organized into Table A3 in the Appendix for each of the 10 years before and the 5 years after the midpoint year of debt relief delivery. The inclusion of the percentage change of the real GDP per capita as an explanatory variable follows from the study conducted by Addison (2003); by measuring economic growth which is an indicator of debt relief, the success of the HIPC Initiative was reflected through a reduction in future conflict in his study. The percentage change of the real GDP per-capita is calculated as follows:

$$GDP_i = \frac{\text{Average } [M, M+5] - \text{Average } [M-10, M]}{\text{Average } [M-10, M]} \times 100\% \quad (3)$$

where *Average* $[M - 10, M]$ measures the average of the real GDP per-capita from M-10 to M, and *Average* $[M, M + 5]$ is similarly measured from M to M+5. The results of this measure are shown in Table 1 above and the calculations are recorded in Table A4 in the Appendix for each of the 36 countries.

B. THE MEASURES OF THE IMPORTANCE OF DEBT RELIEF:

THE DEBT RELIEF-TO-GDP AND DEBT RELIEF-TO-EXPORTS RATIOS

In this study, the debt relief-to-GDP and debt relief-to-exports ratios are defined as the measures of the importance of debt relief, both of which are regressed separately. Expectations with regards to debt sustainability and trends of future conflicts can be forecasted accurately by determining the need of debt relief with respect to the GDP or exports in the country. Both ratios are evaluated at the completion date for each country within the program. The first ratio measures the country's gross debt relief agreed upon within the HIPC Initiative to the gross domestic product (GDP). The second ratio is defined as the ratio between the agreed amount of debt relief in the country and the net exports. The data on the debt relief-to-exports is derived from International Monetary Fund (2010).

By regressing the variables on conflicts, the expectation that an economy is more financially stable can be observed through a lower value for both ratios. When the amount of debt relief provided to a country is negligible compared to the GDP and net exports in that country, then the debt servicing payments are also lower and less of a burden on the financial health of the economy. On the contrary, it is important to consider that if a developing country receives partial debt relief, then that country did not necessarily receive enough relief. In this case, the effect on the dependent variable will be observed in the opposite direction. For that

reason, only data for the less developed countries that have reached the completion point of the HIPC Initiative will be considered for this study. The data for both measures is extracted from the international reports posted by the IMF.

C. THE DURATION OF THE HIPC INITIATIVE

The debt relief can be received by a poor country at any time either as a lump sum, or as a flow between the decision date and the completion date. Therefore, the duration of the HIPC Initiative is the total number of years between the two significant dates for each country. The value of the duration of the initiative is shown in Table 1. It can be hypothesized that the longer the duration of the HIPC Initiative, the more likely that conflict will be reduced. Countries that take longer to implement a poverty reduction strategy are likely to be more efficient in their approach, resulting in a more stable economy that appreciates reduced conflicts in the future.

IV. DATA ON CONFLICT

In this study, conflict is defined based on the physical violence that is observed between groups of people residing in the same country, namely battle-related casualties due to civil wars. The reasons for the clashes may include the fight to appropriate resources into the country by rebel groups, whether the resources are monetary or not. In order to capture the resulting casualties from most of the conflicts observed in the HIPC countries, I build a data set for the same timeline as the one provided for the debt-relief data compiled earlier. Mueller (2014) provides a guideline on the important factors to consider when measuring conflict and suggests the use of an empirical data set alongside theory to determine the causes and effects of conflict on the economy of a country, on both a micro and macro level.

Two primary data sources are used: The Armed Conflict Location and Event Data Project (2017, ACLED) and The Uppsala Conflict Data Program (2015, UCDP). ACLED provides data on battle-related casualties in all African countries after 2006. In addition to the recorded real-time casualties in each country, the locations and dates of the battles are provided. In contrast, UCDP offers data on war-related casualties for major civil wars around the world from the early 1970's. The Peace Research Institute hosts the UCDP data set and provides information and reports on the recorded armed conflicts.⁷ I use both data sets jointly, along with the detailed information on the armed conflicts in the less developed countries, to get the most insightful and significant information (Peace Research Institute, 2006, 2017)

Both sources contain a lot of information which is condensed to fit the general requirements for this study. In grouping the observed number of battle-related deaths in each year for each country, the first step is to select the appropriate years for which conflict was observed. The midpoint year between the decision and completion dates for the HIPC Initiative is used when determining the civil war casualties. These values are observed for each of the years in the time interval from M-10 to M+5 and are entered in Table A1 in the Appendix. This is done by choosing the UCDP data set as the main source of the study. The information collected from this source is internationally based, whereas the other data set only provides detailed information for Africa. If any of the data is missing in this source, the information is extracted from the ACLED project. This procedure is conducted to correct possible measurement errors in the data collection in either of the sources. Some countries did not experience any civil wars during the time interval of this study, while other countries did experience conflict but the number of battle-related deaths

⁷ Lacina and Gleditsch(2005) provides informational literature on the contributions and differences in each of the data programs used to measure conflict.

may not have been measured accurately. Therefore, assuming there is no conflict in the country at the time, the value of conflict is recorded as zero deaths.

V. STATISTICAL RESULTS

I. CAPTURING THE RELATIONSHIP BETWEEN R_i AND IMP_i THROUGH A GRAPHICAL REPRESENTATION

The conflict coefficient (R_i) is graphed against the two measures of the importance of debt relief, the debt relief-to-exports ratio in Figure 1 and the debt relief-to-GDP ratio in Figure 2. Both graphs display the relationship between the conflict coefficient R_i and the importance of debt relief. Overall, as the value of R_i increases, the values of the debt relief-to-exports ratio decreases, although not substantially. This coincides with the results by Miguel et al (2004) in their study of economic growth and its effect on the on-set of future conflict. To show this relationship, a linear trend line is added to the data.

Based on the graphical representation of this analysis, it is observed that the debt relief-to-exports ratio provides a stronger relationship than the debt relief-to-GDP ratio. The visual interpretation suggests that at least a small correlation between R_i and the debt relief-to-exports ratio exists. In the case of the debt relief-to-GDP ratio, no significant correlation is observed between the variables.

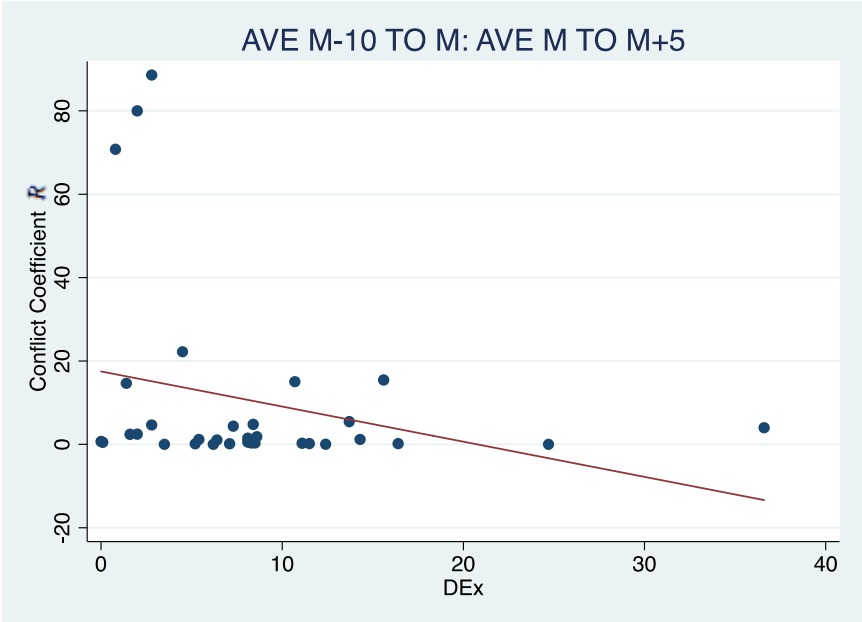


Figure 1. Measure of the Importance of Debt Relief-to-Exports (DEX_i) to R_i

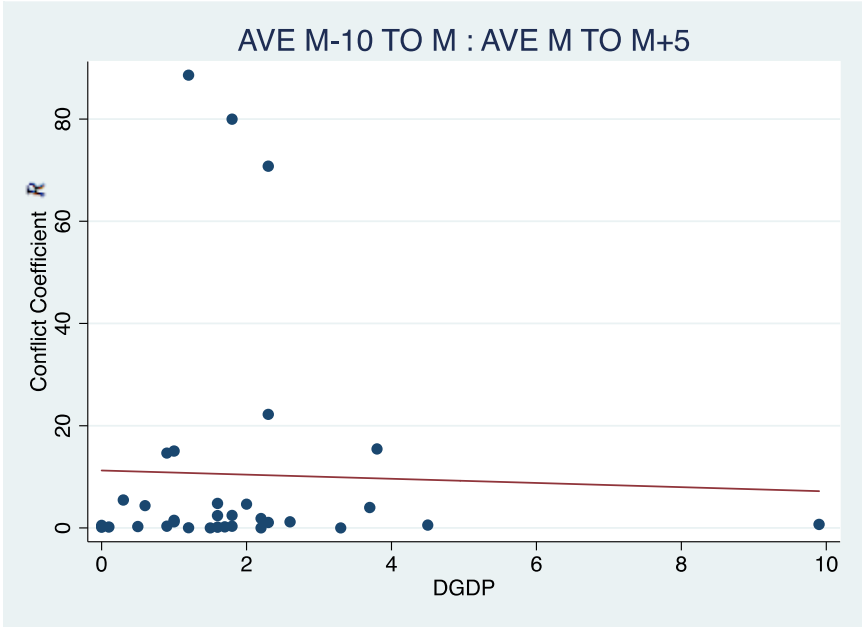


Figure 2. Measure of the Importance of Debt Relief-to-GDP ($DGDP_i$) to R_i

II. GRAPHICAL ANALYSIS SEPARATELY FOR EACH COUNTRY

In this section, an alternative graphical analysis is presented to visualize the extent to which debt relief played a role in influencing civil war in each of the 36 countries separately. In capturing the trend of economic progress in each country, the battle-related number of deaths and the GDP per-capita are graphed from 10 years before the midpoint year to 5 years after. These 36 individual graphs can be found in Figure A1 of the Appendix. In most countries, there is an increase in GDP per-capita over time. For example, beginning at 10 years prior to the midpoint year, real GDP per-capita values are as low as 120 USD in Afghanistan and 372 USD in Zambia. At 5 years after the midpoint year of debt relief assistance, the values in these two countries are 690 and 1366 USD respectively. The steady increase in the real GDP per-capita supports the claim by Reinhart and Trebesch (2014) that the increase implies higher economic growth as a result of debt relief.

Comparing the number of battle-related deaths from M-10 to M+5 to the real GDP per-capita allows for a more formal approach in analyzing the effect of debt relief on future conflict. For example, in Burundi and The Democratic Republic of Congo, I observe a steady decrease in the battle-related number of deaths. The number of civil war deaths during the period of debt relief under the HIPC Initiative decreased from 4250 and 13884 to 31 and 1770 respectively. Although the trend is not as smooth for the other countries an overall decrease is generally observed.

Figure 3 summarizes the trend of the percentage change in the real GDP per capita and of battle-related number of deaths in all the countries enrolled under the HIPC Initiative. The overall increase in the real GDP per-capita is observed overtime as well as a simultaneous

decrease in the measure of conflict. This visual analysis acknowledges that as the percentage change in the GDP per-capita increased overtime in all the HIPC countries combined, the

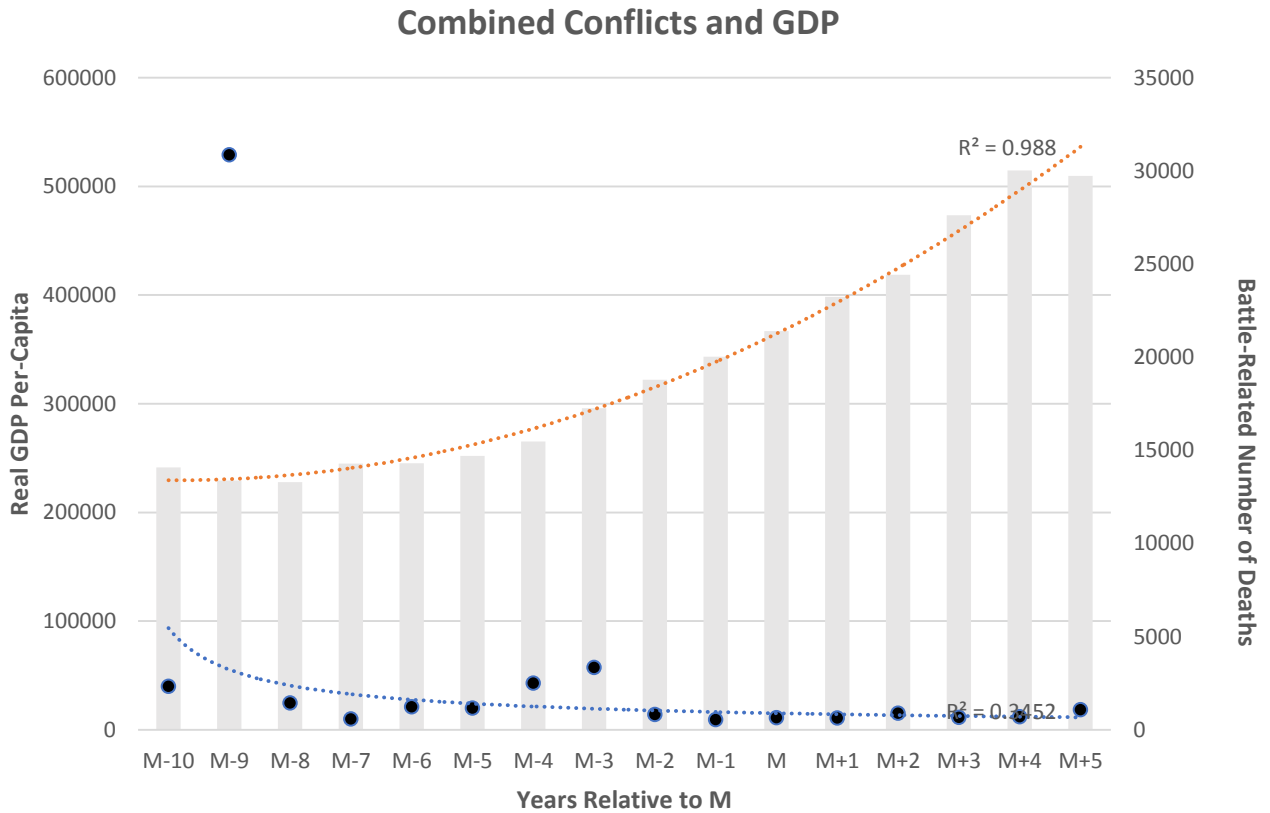


Figure 3. Combined Measure of Real GDP Per-Capita VS Conflict Related Number of Deaths

average change in the measure of conflict decreased, although not to the same level of significance. Through the validation of the values of the line of best fit, R^2 , it can be inferred that while the R^2 value for the measure of conflict is quite low at 0.34, the value for the measure of the real GDP per-capita is exceptionally high, recorded at 0.99. This graphical interpretation suggests that real GDP per-capita does contribute to the decrease of conflict, although at a moderate level.

III. REGRESSION ANALYSIS

The results of the regression model presented in equation (1) are summarized below in Table 2. There are two specifications, one involving the debt relief-to-GDP ratio and the other with the debt relief-to-exports ratio, as a measure of the importance of the debt relief. The results can be interpreted through the examination of the t-statistics and the p-values. The relationship between the control variable (*GDP*) and the change in average conflict result in an almost identical t-statistic in both specifications. In the former model, the t-statistic is recorded at 2.75 with a probability of 0.01 while in the latter model, the recorded value is 2.72 with a probability of 0.01. These results are consistent with the conclusion stated by Addison (2003) in that the higher the growth in a country, the more likely the reduction of future conflict in that country will be. Table 3 shows that the correlation coefficient between the GDP variable and the conflict coefficient is 0.42, which is significant at the 5% level. In assessing the regression output directly between the average change in conflict and the representations of the importance of debt relief, different results are observed. In the first specification involving the debt relief-to-GDP ratio, the t-statistic is recorded at -0.54, with a p-value of 0.59, while in the latter model involving the debt relief-to-exports ratio, results provide a t-statistic of -0.75 with a p-value of 0.46. These results coincide with those of Collier and Hoeffler (2002) in that development aid in the form of debt relief has no significant direct effect on the reduction of civil conflict. While the coefficients have the expected signs, there is no significant evidence of a relationship between the variable and the measure of future conflict in this model. The Pearson correlations between conflict and the two different measures of debt relief, shown in Table 3, are very low. The negative sign of the duration coefficient ($HIPC_i$) is also reported as expected. However, the coefficient is not significant at the 5% level.

Table 2. OLS Regression of Actual Conflict Model

OLS Regression Results					
Actual Regression Output					
Regression	Coefficient	Std. Error	t	P> t	R-Squared
1					0.20
GDP	1130.58	410.82	2.75	0.01	
DGDP	-83.72	154.04	-0.54	0.59	
HIPC	-80.30	91.56	-0.88	0.39	
Constant	195.04	617.06	0.32	0.75	
N=36					
2					0.21
GDP	1114.03	410.20	2.72	0.01	
DEx	-27.83	36.95	-0.75	0.46	
HIPC	-88.71	92.53	-0.96	0.35	
Constant	322.91	658.96	0.49	0.63	
N=36					

Table 3. Pearson Correlation Coefficients of Actual Conflict Model

Pearson Correlation Coefficient (p-value in parentheses)						
REGRESSION MODEL		Conflict	GDP	DGDP	DEx	HIPC
	Conflict	1.00				
	GDP	0.42** (0.01)	1.00			
	DGDP	-0.10 (0.58)	-0.06 (0.72)	1.00		
	DEx	-0.14 (0.43)	-0.12 (0.51)	0.77** 0.00	1.00	
	HIPC	-0.06 (0.71)	0.15 (0.39)	-0.13 (0.44)	-0.22 (0.19)	1.00

Results are significant at * $p < 0.01$, ** $p < 0.05$, and *** $p < 0.10$.

The limitations in the data could be a possible explanation for the inconsistency between the results and the theoretical framework provided earlier. These limitations could include issues of endogeneity with the error term, multicollinearity, measurement error, the omitted variable bias, and reverse causality. The small sample size for this study of only 36 countries contributes to another important shortcoming. Future studies may control for these inaccuracies, allowing for the possibility of consistency between statistical results and historical literature and debates.

IV. FURTHER ANALYSIS OF THE CONFLICT COEFFICIENT

The results based on the regression analysis of the coefficient of conflict defined earlier indicated a negative, but not significant relationship between the two measures of the importance of debt relief and the change in conflict as measured by R_i . While in the regression analysis the conclusion implied that debt relief did not play a role in reducing future conflict, a similar result was found in the graphical investigation. In validating the fact that the best measure was chosen to reach the conclusion in the following sections, this final questionable assumption will be verified.

We observe that the value of the coefficient varies for each country as shown in Table 1. In Burkina Faso, for instance, R_i takes on the value of 0.03, indicating that the average number of deaths prior to M was very small and after M was extremely large. In fact, the recorded number of deaths in the country were 0.8 and 27.4 deaths per year respectively. In contrast, in Rwanda, R_i is calculated at 4137.85. This observation indicates that the average number of deaths before the midpoint year was very high, recorded at 51585.20 deaths per year and after the midpoint year was 99.9% lower with 13.6 deaths per year. By examining the overall change in the number

of battle-related deaths in each of the countries through the calculation of R_i , a generalization can be made about the success of the HIPC Initiative.

The value of the coefficient is found to be greater than or equal to 1 for 21 out of the 36 countries enrolled under the HIPC. Therefore, the data suggest that through the delivery of the HIPC debt relief, 58% of the cases are shown to be successful in reducing future conflict.

Although this percentage is lower than expected, it is important to note that the conflict coefficient was derived based on the average number of battle related deaths 10 years before M and 5 years after. While this measure accounts for the analysis of the change in conflict due to debt relief, it lacks the detailed interpretation of the reasons that certain civil wars came about - was it due to financial tension, political tension or weak institutions? Since this detailed information is not included in the model, the generalization is based exclusively on the activity of the overall change in conflict R_i .

VI. CONCLUSION

This paper studied the impact of the 1999 Enhanced Heavily Indebted Poor Countries Initiative (HIPC) on future conflicts. I generated an indicator for the observed change in conflict during the initiative in each of the 36 countries of interest. While some countries showed little to no conflict during the period, most of them were conflict inflicted both prior to and after the delivery of debt relief. The general trend observed through the graphical approach was a modest decrease in the number of battle-related deaths from M-10 to M+5, where M represents the midpoint year between the decision and completion dates for the debt relief program.

The analysis of the conflict coefficient R_i found that on average the HIPC Initiative was only moderately effective in reducing future conflict. The results were not strong enough to

conclude that they were significant. Only 58% of the countries observed a numerical decrease in the average number of deaths after receiving the final stock of debt relief. The consequence of debt relief on future conflicts cannot be established with statistical significance when regressing the proposed model relating the variables associated to debt relief and future conflict. The study therefore concludes that even though debt relief may be a great economic advantage to countries, there is no evidence that it had a bearing on the determination of future conflict. Although debt relief frees up resources for increased development spending, it may also affect social conflicts in different ways. For instance, debt relief can be considered as a source of financial resources that caused the government to face a trade-off: either the government chooses to increase conflict-reducing transfers to the rebel groups engaging in the conflict, or it chooses to increase the fighting efforts against the rebel groups involved. It is important to note that most countries that were conflict-inflicted prior to their enrollment into the HIPC were not completely stable during and after the final delivery of debt relief.

Future studies can be conducted on how debt relief plays a role in reducing future conflict with more relevant measures of civil war conflicts and more complete regressions. By identifying precise explanatory variables in advanced regression analyses, the results may produce different results. Many organizations, such as Plough Shares (2015), spend time on compiling data to create geographic measures of armed conflicts on a yearly basis. Using this information to create a detailed background has the potential to serve as a major asset in analyzing civil wars not only within the HIPC's, but also on a global scale to increase the sample size of the study. More precise regressions could be performed with the importance of the measures of debt relief to provide a deeper insight as to the role that these measures play in reducing future conflict.

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VIII. APPENDIX

Table A1: Decision Date, Midpoint Year, Completion Date and Conflict Intensity Every Year Between M-10 and M+5 for HIPC Countries

Country	Time			Conflict intensity (No. of Armed Conflict Deaths)															
	Decision Date	Midpoint Year [M]	Completion Date	M-10	M-9	M-8	M-7	M-6	M-5	M-4	M-3	M-2	M-1	M	M+1	M+2	M+3	M+4	M+5
Afghanistan	Jul-07	2009	Jan-10	5065	5394	5553	1157	944	817	1711	4982	7004	5660	6499	7151	7565	7822	8131	12550
Benin	Jul-00	2002	Mar-03	1	0	1	4	0	0	2	0	0	2	0	1	0	0	0	0
Bolivia	Feb-00	2000	Jun-01	0	0	0	0	0	0	0	0	2	50	0	0	110	0	0	0
Burkina Faso	Jul-00	2001	Apr-02	0	0	0	0	0	0	0	4	3	1	0	106	1	13	0	16
Burundi	Aug-05	2007	Jan-09	4250	1258	1728	388	3915	2132	1471	536	586	174	61	190	68	153	112	31
Cameroon	Oct-00	2003	Apr-06	47	102		56	6	8	1	16	3	4	4	10	52	31	71	234
Central African Republic	Sep-07	2008	Jun-09	46	20	9	52	539	84	80	73	296	216	192	268	315	138	160	2364
Chad	May-01	2008	Apr-15	85	180	560	133	499	155	470	517	1904	540	271	261	109	17	2	5
Comoros	Jun-10	2011	Dec-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Republic of Congo	Mar-06	2007	Jan-10	10410	3761	977	96	3	234	33	10	15	1	2	1	100	0	1	2
Democratic Republic of Congo	Jul-03	2007	Jul-10	13884	8019	7539	2974	1334	7863	3851	823	302	387	903	1737	5149	805	491	1770
Cote D'Ivoire	Mar-09	2011	Jun-12	2	998	482	261	137	10	4	3	1	23	467	5	2	34	24	0
Ethiopia	Nov-01	2003	Apr-04	133	76	1043	65	9	1005	30786	48666	388	809	1068	475	290	430	500	286
The Gambia	Dec-00	2004	Dec-07	0	0	0	1	0	0	17	6	1	0	1	57	0	15	0	0
Ghana	Feb-02	2003	Jul-04	2	2004	155		5	4	0	30	50	36	7	3	2	3	11	55
Guinea	Dec-00	2006	Sep-12	13	27	0	12	13	256	430	14	2	5	3	15	45	6	160	1
Guinea-Bissau	Dec-00	2005	Dec-10	0	0	0	505	199	0	13	1	3	7	5	68	2	5	6	0
Guyana	Nov-00	2008	Dec-03	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0
Haiti	Nov-06	2008	Jun-09	0	11	0	0	0	0	231	40	46	4		0	0	0	0	0
Honduras	Jun-00	2003	Apr-05	0	0	0	0	0	9	6		1	47	30		0		18	
Liberia	Mar-08	2009	Jun-10	70	101	481	2259	3281	19	16	0	1	0	0	1	18	0	3	26
Madagascar	Dec-00	2003	Oct-04	0	0	0	0	0	0	0	1	2	79	5	1	5	2	25	2
Malawi	Dec-00	2003	Aug-06	0	0	0	0	0	0	0	4	8	1	0	2	0	0	1	3
Mali	Sep-00	2002	Mar-03	77	0	729	2		22	11	59	8	18	5	26	20	12	4	39
Mauritania	Feb-00	2001	Jun-02	10	0	0	0	0	0	3	0	0	1	0	1	26	0	26	0
Mozambique	Apr-00	2001	Sep-01	1914	521	0	0	0	0	0	0	0	1	0	0	0	1	12	2
Nicaragua	Dec-00	2003	Jan-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Niger	Dec-00	2002	Apr-04	29	6	50	67	14	81	147	10	1	4	76	0	4	1	0	98
Rwanda	Dec-00	2003	Apr-05	959	501961	4141	279	4698	1737	29		2044	1	3	16	4	17	19	9
Sao Tome & Principe	Dec-00	2004	Mar-07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senegal	Jun-00	2002	Apr-04	135	285		330	5	366	344	31	56	47	45	39	3	1	129	8
Sierra Leone	Mar-02	2004	Dec-06	2097	3194	943	1233	5165	4593	856	73	1	0	3	1	0	0	7	3
Tanzania	Apr-00	2001	Nov-01	0	1	0	0	0	10	26	20	0	64	37	180	3	17	20	12
Togo	Nov-08	2009	Dec-10	4	1	0	0	2	2	436	0	0	1	2	0	1	0	8	0
Uganda	Feb-00	2000	May-00	809	1018	76		160	537	1765	1354	1220	1044	1229	212	1319	1627	2009	922
Zambia	Dec-00	2003	Apr-05	1	0	0	0	1	1	4	3	7	0	14	6	0	25	75	11
TOTAL				40043	528938	24467	9874	20929	19945	42743	57276	13955	9177	11011	10833	15103	11285	12025	18449

Table A2: Total and Average Conflict Intensity during Sub-Periods for HIPC Countries

Country	Total Number of Conflict Deaths				Average Number of Conflict Deaths			
	M-10 to M-5	M-5 to M	M-10 to M	M to M+5	M-10 to M-5	M-5 to M	M-10 to M	M to M+5
Afghanistan	18930	26673	8.57	49718	3155.00	4445.50	4071.45	8286.33
Benin	6	4	7.86	1	1.00	0.67	0.91	0.17
Bolivia	0	52	846.29	160	0.00	8.67	4.73	26.67
Burkina Faso	0	8	35.19	136	0.00	1.33	0.73	22.67
Burundi	13671	4960	414.57	615	2278.50	826.67	1499.91	102.50
Cameroon	219	36	295.10	402	36.50	6.00	22.45	67.00
Central African Republic	750	941	0.00	3437	125.00	156.83	146.09	572.83
Chad	1612	3857	747.67	665	268.67	642.83	483.09	110.83
Comoros	0	0	3005.29	0	0.00	0.00	0.00	0.00
Republic of Congo	15481	295	116.81	106	2580.17	49.17	1412.91	17.67
Democratic Republic of Congo	41613	14129	4157.62	10855	6935.50	2354.83	4352.64	1809.17
Cote D'Ivoire	1890	508	5.19	532	315.00	84.67	217.09	88.67
Ethiopia	2331	82722	115.43	3049	388.50	13787.00	7640.73	508.17
The Gambia	1	25	55.05	73	0.17	4.17	2.36	12.17
Ghana	2170	127	40.48	81	361.67	21.17	208.45	13.50
Guinea	321	710	1.38	230	53.50	118.33	70.45	38.33
Guinea-Bissau	704	29	15.81	86	117.33	4.83	66.64	14.33
Guyana	0	29	11.69	29	0.00	4.83	2.64	4.83
Haiti	11	321	299.10	0	1.83	53.50	30.18	0.00
Honduras	9	93	20.67	48	1.50	15.50	8.45	8.00
Liberia	6211	36	1.95	48	1035.17	6.00	566.18	8.00
Madagascar	0	87	79.62	40	0.00	14.50	7.91	6.67
Malawi	0	13	4.71	6	0.00	2.17	1.18	1.00
Mali	830	123	118.43	106	138.33	20.50	84.64	17.67
Mauritania	10	4	0.00	53	1.67	0.67	1.27	8.83
Mozambique	2435	1	33.52	15	405.83	0.17	221.45	2.50
Nicaragua	0	0	24570.19	0	0.00	0.00	0.00	0.00
Niger	247	319	0.00	179	41.17	53.17	44.09	29.83
Rwanda	513775	3814	92.05	68	85629.17	635.67	46895.64	11.33
Sao Tome & Principe	0	0	865.71	0	0.00	0.00	0.00	0.00
Senegal	1121	889	22.05	225	186.83	148.17	149.45	37.50
Sierra Leone	17225	5526	22.14	14	2870.83	921.00	1650.73	2.33
Tanzania	11	157	759.86	269	1.83	26.17	14.36	44.83
Togo	9	441	10.57	11	1.50	73.50	40.73	1.83
Uganda	2600	7149	9212	7318	433.33	1191.50	837.45	1219.67
Zambia	3	29	31	131	0.50	4.83	2.82	21.83

Table A3: Real GDP Per-Capita as a Measure of Debt Relief Every Year Between M-10 and M+5 for HIPC Countries

Country	Time			Amount of Debt Relief		GDP Per Capita																
	Decision Date	Midpoint Year [M]	Completion Date	NPV Terms (Mill USD)	Nominal Terms (Mill USD)	M-10	M-9	M-8	M-7	M-6	M-5	M-4	M-3	M-2	M-1	M	M+1	M+2	M+3	M+4	M+5	
Afghanistan	Jul-07	2009	Jan-10	582	1280				120	192	204	225	257	280	380	384	459	570	622	691		
Benin	Jul-00	2002	Mar-03	262	460	315	407	276	362	382	357	375	399	370	374	412	509	571	587	609	686	
Bolivia	Feb-00	2000	Jun-01	1330	2060	710	764	791	788	806	887	958	1007	1059	1013	1007	958	914	917	978	1046	
Burkina Faso	Jul-00	2001	Apr-02	553	930	346	241	244	193	236	249	229	256	265	226	235	261	324	371	407	422	
Burundi	Aug-05	2007	Jan-09	833	1366	152	137	122	129	126	115	106	119	141	155	159	183	190	214	241	244	
Cameroon	Oct-00	2003	Apr-06	1267	4917	1028	681	627	680	669	637	676	583	589	648	791	893	915	965	1071	1192	
Central African Republic	Sep-07	2008	Jun-09	578	804	270	274	245	246	257	291	318	333	354	404	464	454	447	488	473	322	
Chad	May-01	2008	Apr-15	170	260	225	191	166	197	221	293	455	660	712	801	929	804	896	988	973	985	
Comoros	Jun-10	2011	Dec-12	146	136	392	429	539	610	615	641	712	786	769	759	819	778	823	841	717	..	
Republic of Congo	Mar-06	2007	Jan-10	7252	15222	808	660	776	1036	878	927	1049	1362	1738	2145	2259	3094	2428	2953	3453	3191	
Democratic Republic of Congo	Jul-03	2007	Jul-10	1575	1738	137	136	101	397	150	171	170	190	213	247	273	311	286	311	350	391	
Cote D'Ivoire	Mar-09	2011	Jun-12	1576	3415	664	718	875	930	942	963	1079	1258	1233	1236	1232	1281	1446	1544	1399	..	
Ethiopia	Nov-01	2003	Apr-04	1935	3275	165	125	134	145	141	125	119	124	120	112	119	136	162	194	244	326	
The Gambia	Dec-00	2004	Dec-07	67	112	720	738	774	713	725	683	637	543	442	361	415	433	440	520	609	550	
Ghana	Feb-02	2003	Jul-04	2187	3500	375	333	386	404	392	416	420	265	275	312	376	426	502	930	1099	1234	
Guinea	Dec-00	2006	Sep-12	639	800	476	454	422	400	340	316	324	371	387	304	296	407	433	430	430	448	
Guinea-Bissau	Dec-00	2005	Dec-10	489	790	215	224	218	164	174	281	292	303	340	371	401	396	455	553	517	518	
Guyana	Nov-00	2008	Dec-03	610	1354	973	939	960	937	972	999	1059	1111	1961	2334	2570	2698	2999	3409	3759	3929	
Haiti	Nov-06	2008	Jun-09	140	213	451	494	462	414	393	330	388	465	505	616	675	668	662	741	767	810	
Honduras	Jun-00	2003	Apr-05	556	1000	655	629	700	705	796	869	879	1138	1187	1196	1228	1299	1406	1547	1721	1900	
Liberia	Mar-08	2009	Jun-10	2739	4600	161	183	174	177	133	149	168	178	210	231	302	327	379	414	453	458	
Madagascar	Dec-00	2003	Oct-04	836	1900	267	228	235	288	247	253	244	246	279	263	317	246	276	293	379	472	
Malawi	Dec-00	2003	Aug-06	939	1628	214	122	142	228	260	166	163	156	149	297	265	280	287	305	328	383	
Mali	Sep-00	2002	Mar-03	539	895	318	309	222	281	281	265	280	320	267	305	332	389	436	485	518	592	
Mauritania	Feb-00	2001	Jun-02	622	1100	694	684	568	581	606	600	566	539	535	477	463	459	525	598	693	938	
Mozambique	Apr-00	2001	Sep-01	2143	4300	238	161	162	160	158	215	251	281	298	275	254	260	281	333	366	382	
Nicaragua	Dec-00	2003	Jan-04	3308	4500	397	855	898	917	917	952	981	1016	1044	1010	1016	1092	1175	1245	1351	1518	
Niger	Dec-00	2002	Apr-04	644	1190	278	184	173	201	205	183	199	186	160	167	180	218	235	253	261	295	
Rwanda	Dec-00	2003	Apr-05	651	1316	313	126	219	227	285	282	240	216	201	196	213	237	287	337	398	492	
Sao Tome & Principe	Dec-00	2004	Mar-07	117	263								516	563	658	704	824	859	911	1149	1123	
Senegal	Jun-00	2002	Apr-04	488	850	751	690	457	560	567	510	536	535	475	482	513	643	732	773	808	949	
Sierra Leone	Mar-02	2004	Dec-06	675	994	236	227	246	221	173	170	157	256	280	295	294	321	360	400	454	441	
Tanzania	Apr-00	2001	Nov-01	2026	3000	194	174	156	160	181	217	251	298	301	308	306	310	326	348	446	476	
Togo	Nov-08	2009	Dec-10	282	360	332	266	266	287	317	357	379	384	428	523	509	496	572	573	589	630	
Uganda	Feb-00	2000	May-00	1027	1950	248	185	154	168	202	282	287	289	295	261	261	238	244	242	293	321	
Zambia	Dec-00	2003	Apr-05	2499	3900	372	405	411	379	441	353	330	340	377	376	429	531	692	1030	1103	1366	

Table A4: Change in the Real GDP Per-Capita for HIPC Countries

Country	Time			Percentage Change in the Real GDP Per Capita		
	Decision Date	Midpoint Year [M]	Completion Date	Ave M-10 to M	Ave M to M+5	% Change (GDP)
Afghanistan	Jul-07	2009	Jan-10	150.77	517.78	243.43
Benin	Jul-00	2002	Mar-03	366.31	562.29	53.50
Bolivia	Feb-00	2000	Jun-01	890.11	970.16	8.99
Burkina Faso	Jul-00	2001	Apr-02	247.46	336.84	36.12
Burundi	Aug-05	2007	Jan-09	132.85	205.23	54.48
Cameroon	Oct-00	2003	Apr-06	691.73	971.19	40.40
Central African Republic	Sep-07	2008	Jun-09	314.15	441.42	40.51
Chad	May-01	2008	Apr-15	440.90	929.21	110.75
Comoros	Jun-10	2011	Dec-12	642.71	663.11	3.17
Republic of Congo	Mar-06	2007	Jan-10	1239.87	2896.53	133.62
Democratic Republic of Congo	Jul-03	2007	Jul-10	198.69	320.42	61.27
Cote D'Ivoire	Mar-09	2011	Jun-12	1011.79	1150.41	13.70
Ethiopia	Nov-01	2003	Apr-04	129.90	196.74	51.45
The Gambia	Dec-00	2004	Dec-07	613.66	494.45	-19.43
Ghana	Feb-02	2003	Jul-04	359.46	761.10	111.73
Guinea	Dec-00	2006	Sep-12	372.00	407.42	9.52
Guinea-Bissau	Dec-00	2005	Dec-10	271.20	473.52	74.60
Guyana	Nov-00	2008	Dec-03	1346.84	3227.33	139.62
Haiti	Nov-06	2008	Jun-09	472.13	720.57	52.62
Honduras	Jun-00	2003	Apr-05	907.48	1516.80	67.14
Liberia	Mar-08	2009	Jun-10	187.91	388.85	106.93
Madagascar	Dec-00	2003	Oct-04	260.62	330.51	26.82
Malawi	Dec-00	2003	Aug-06	196.44	308.05	56.82
Mali	Sep-00	2002	Mar-03	289.04	458.76	58.72
Mauritania	Feb-00	2001	Jun-02	573.88	612.77	6.78
Mozambique	Apr-00	2001	Sep-01	223.02	312.57	40.15
Nicaragua	Dec-00	2003	Jan-04	909.18	1232.62	35.58
Niger	Dec-00	2002	Apr-04	192.41	240.19	24.83
Rwanda	Dec-00	2003	Apr-05	228.81	327.13	42.97
Sao Tome & Principe	Dec-00	2004	Mar-07	221.88	928.33	318.39
Senegal	Jun-00	2002	Apr-04	552.37	736.30	33.30
Sierra Leone	Mar-02	2004	Dec-06	232.23	378.24	62.87
Tanzania	Apr-00	2001	Nov-01	231.43	368.69	59.30
Togo	Nov-08	2009	Dec-10	367.91	561.55	52.63
Uganda	Feb-00	2000	May-00	239.11	266.40	11.41
Zambia	Dec-00	2003	Apr-05	383.07	858.48	124.10

Figure A1. Real GDP Per-Capita VS Conflict Related Number of Deaths Every Year Between M-10 and M+5 for HIPC Countries

Note that the primary vertical axis (left axis) represents the Battle-Related Number of Deaths, while the secondary vertical axis (right axis) represents the Real Per-Capita GDP. The bar graph characterizes the trend of the Real Per-Capita GDP over time, whereas the dotted markers symbolize the conflict measure of civil war deaths.

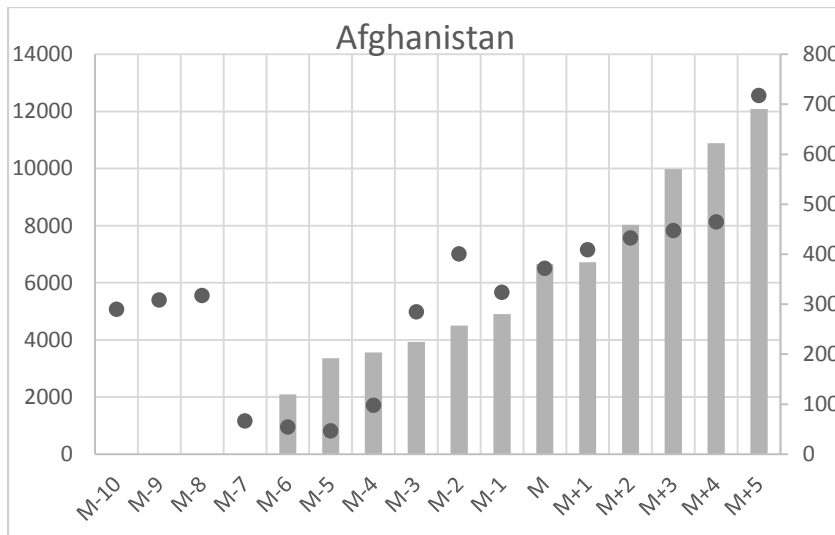


Figure A1a. Afghanistan

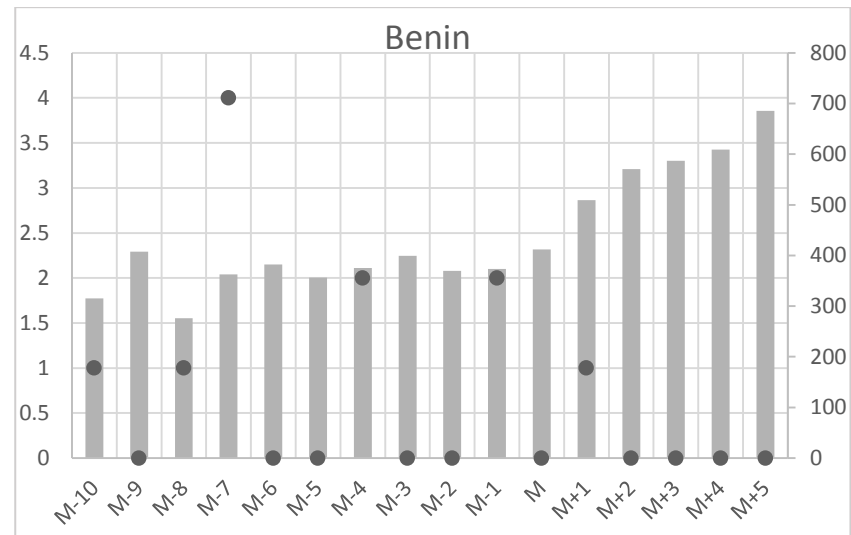


Figure A1b. Benin

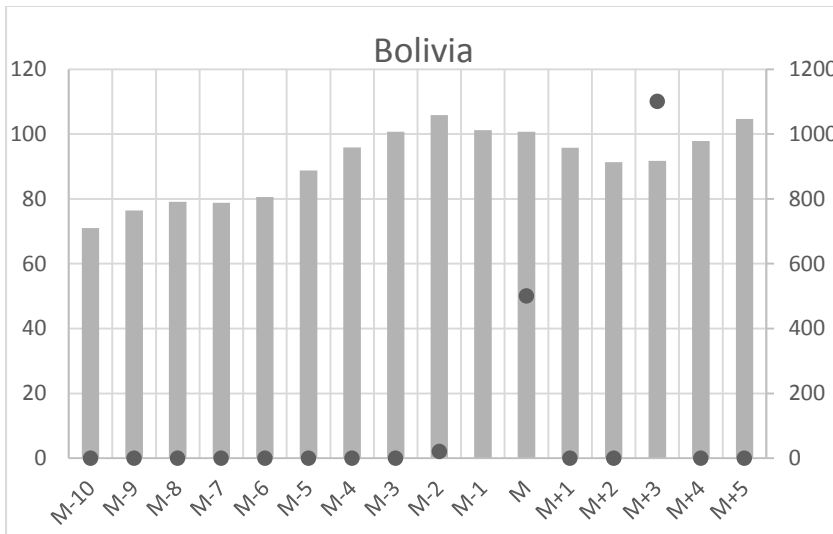


Figure A1c. Bolivia

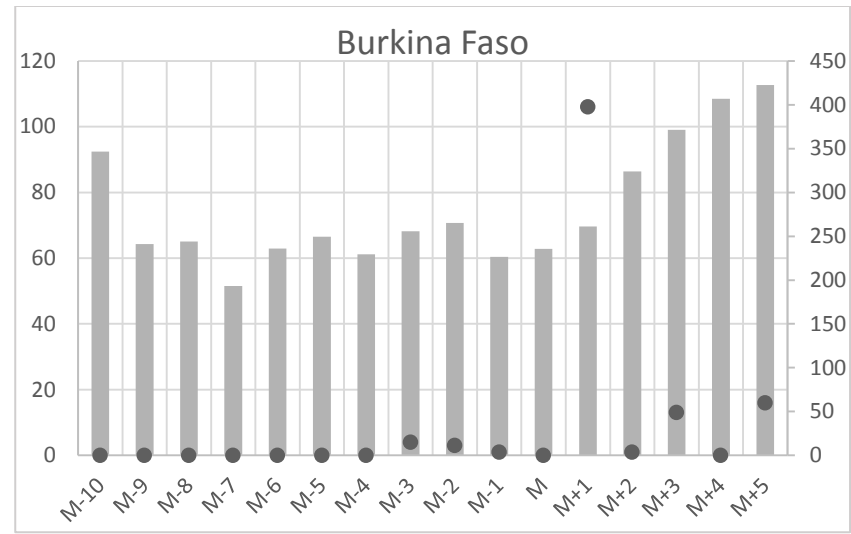


Figure A1d. Burkina Faso

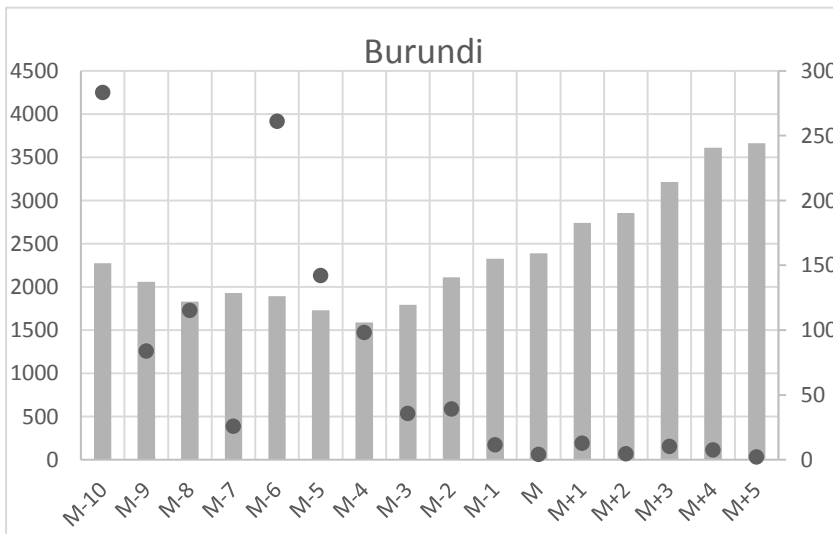


Figure A1e. Burundi

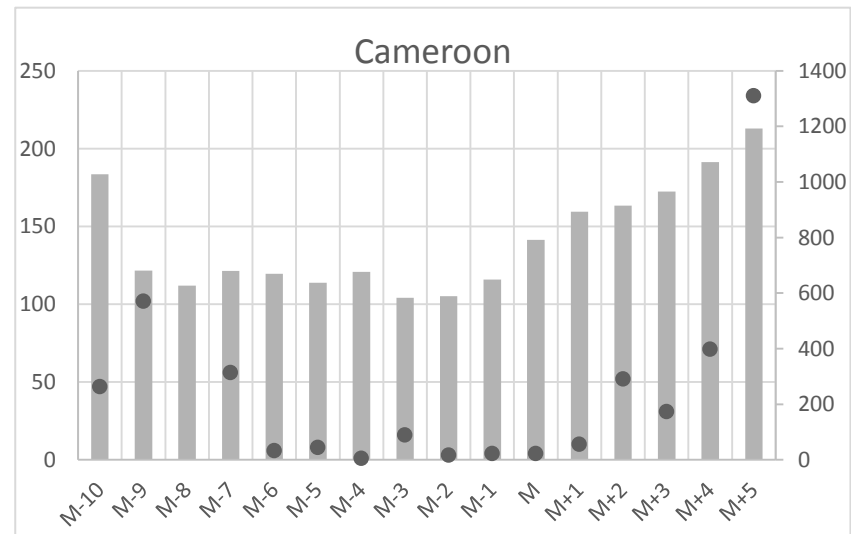


Figure A1f. Cameroon

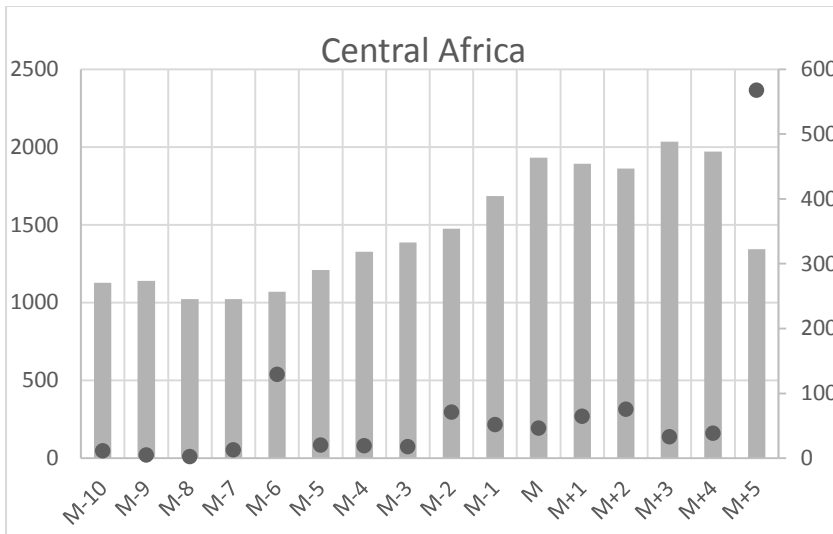


Figure A1g. Central Africa

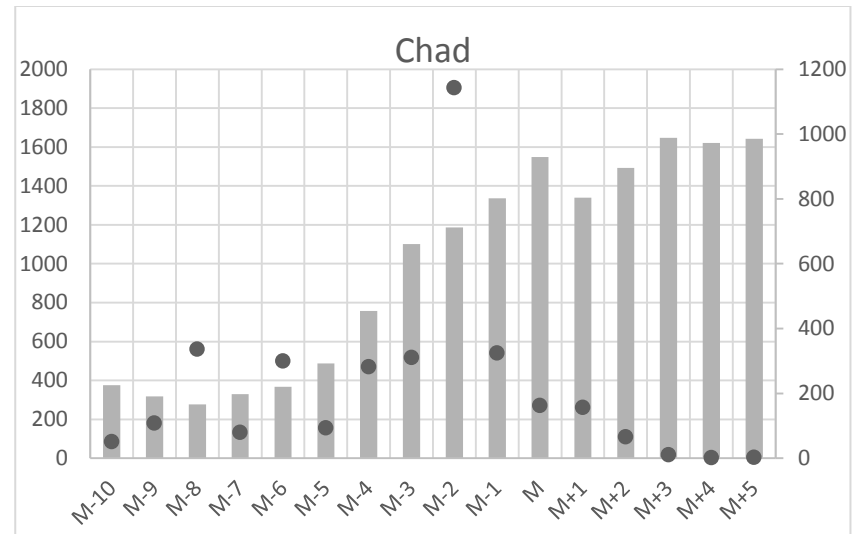


Figure A1h. Chad

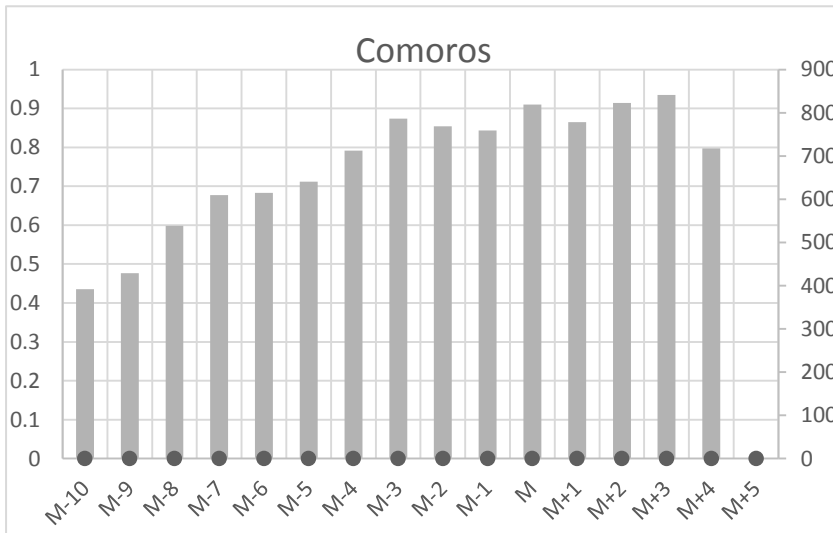


Figure A1i. Comoros

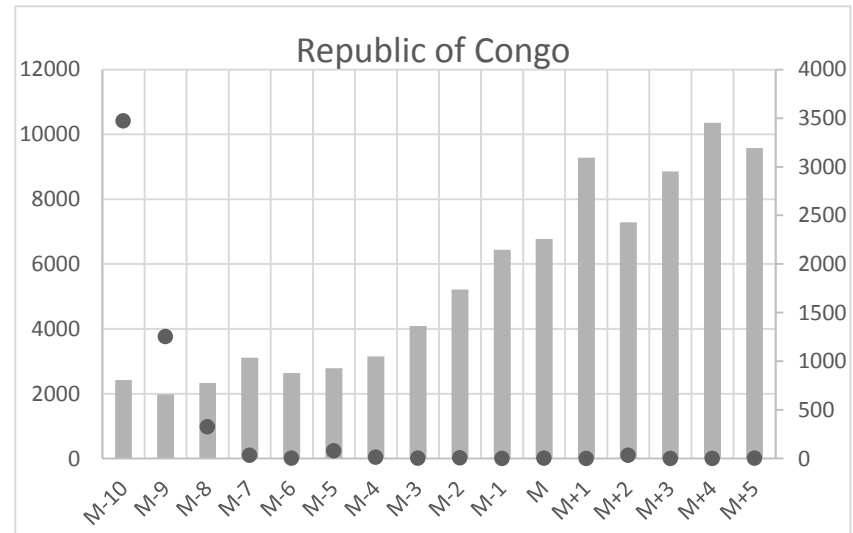


Figure A1j. Republic of Congo

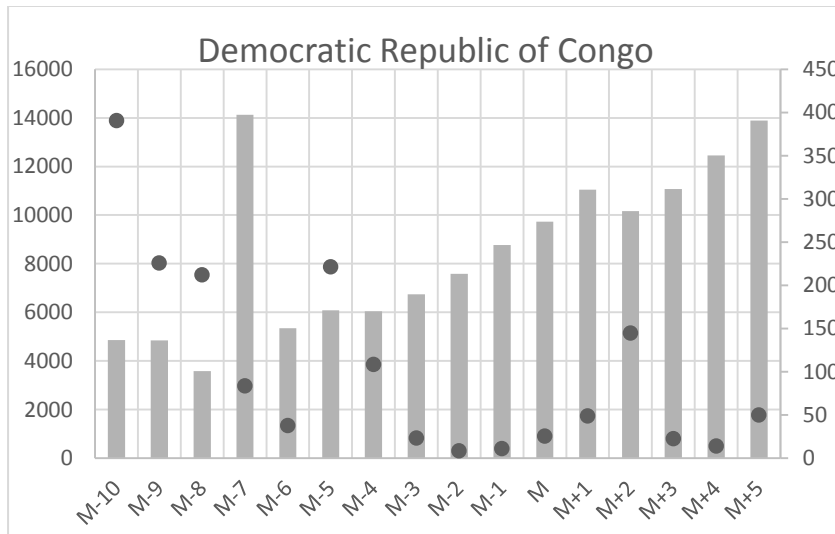


Figure A1k. Democratic Republic of Congo

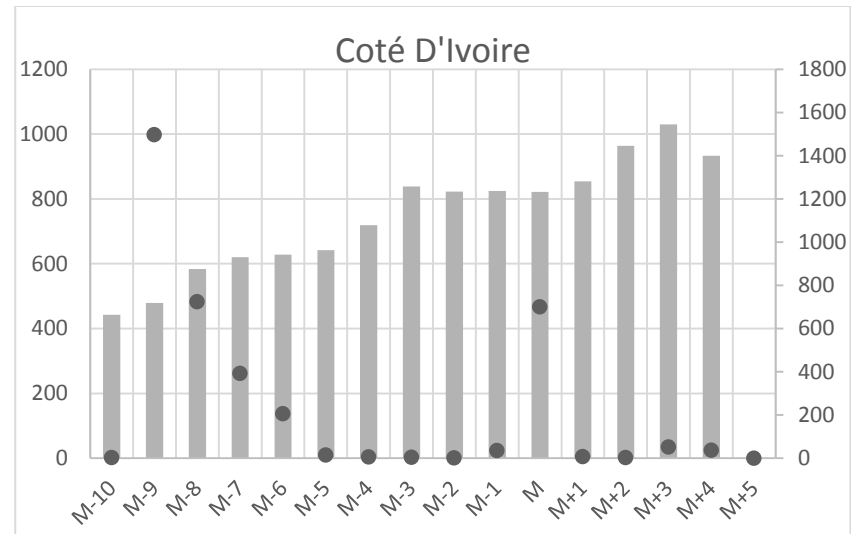


Figure A1l. Coté D'Ivoire

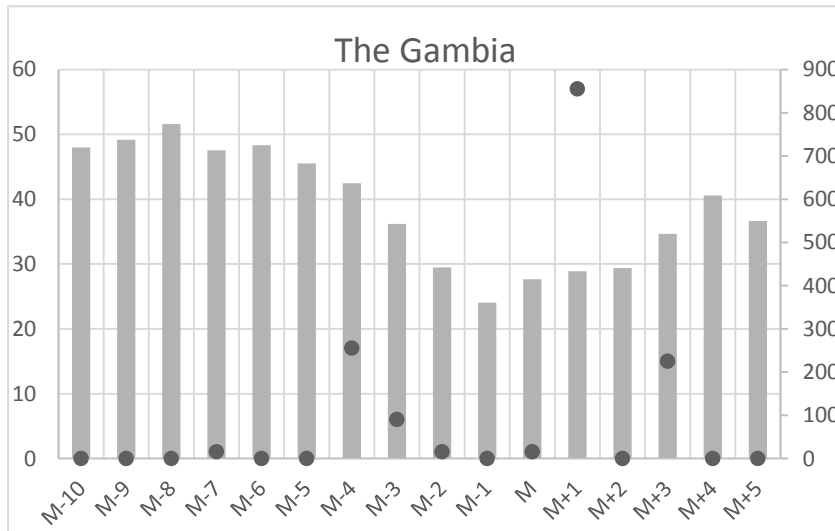


Figure A1m. The Gambia

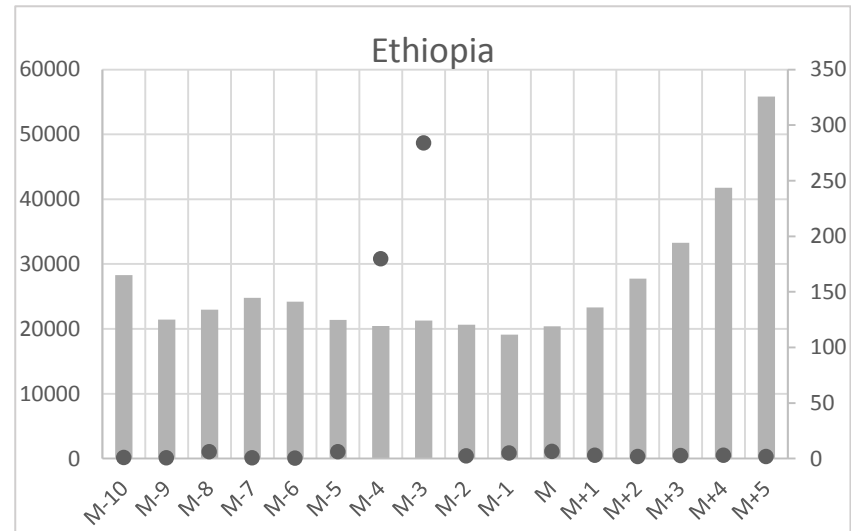


Figure A1n. Ethiopia

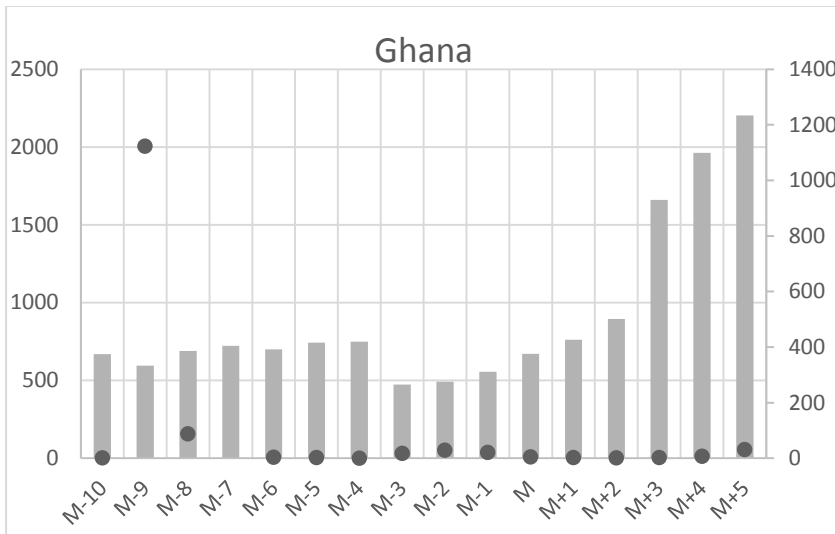


Figure A1o. Ghana

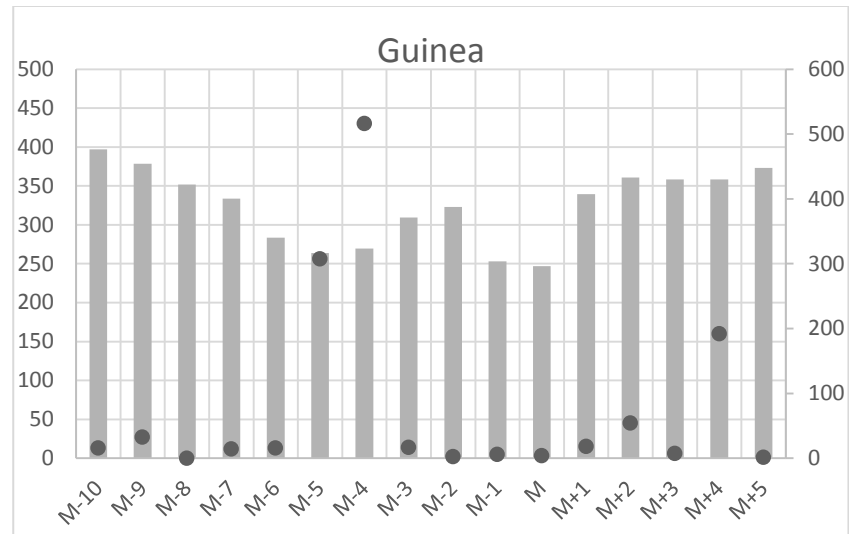


Figure A1p. Guinea

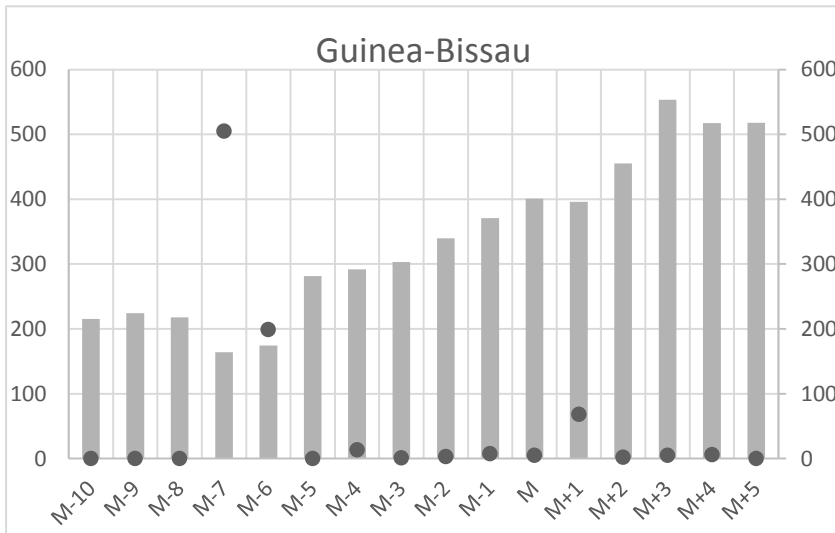


Figure A1q. Guinea-Bissau

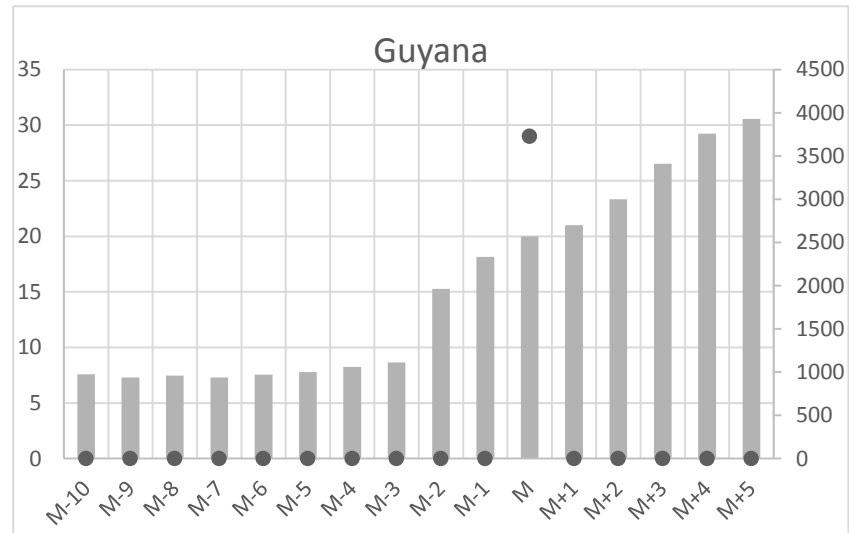


Figure A1r. Guyana

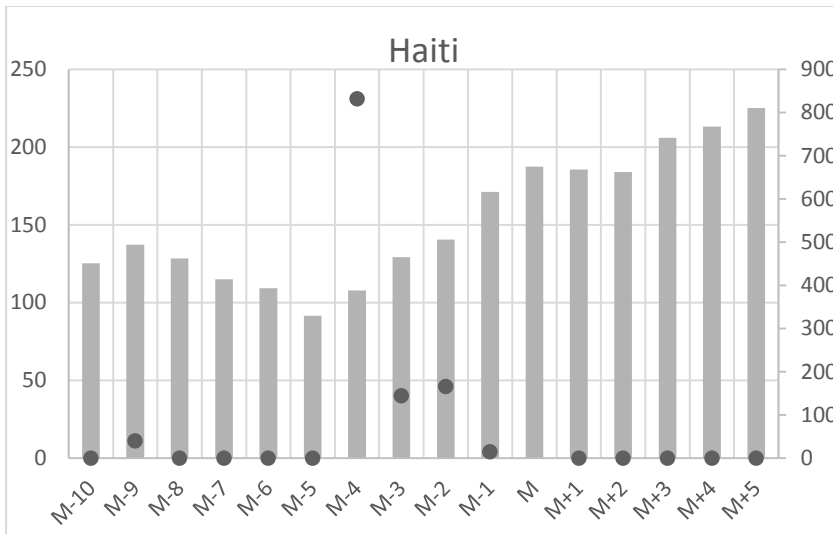


Figure A1s. Haiti

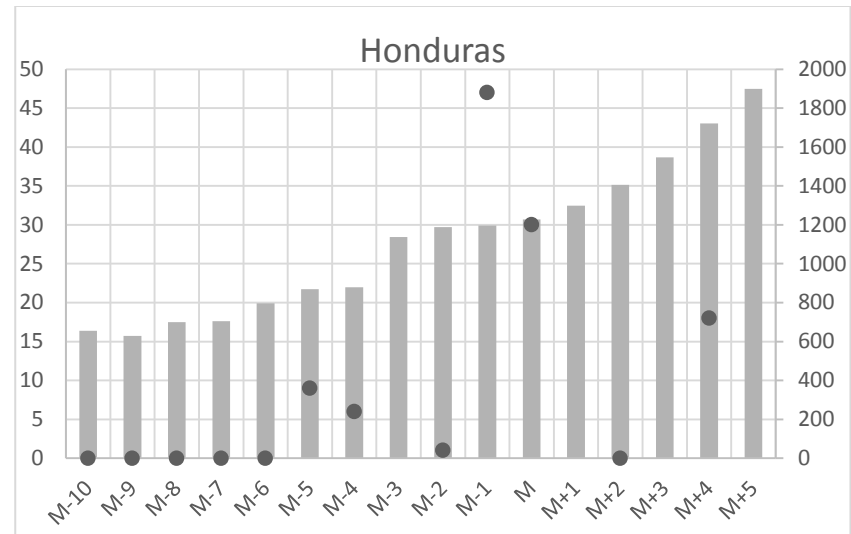


Figure A1t. Honduras

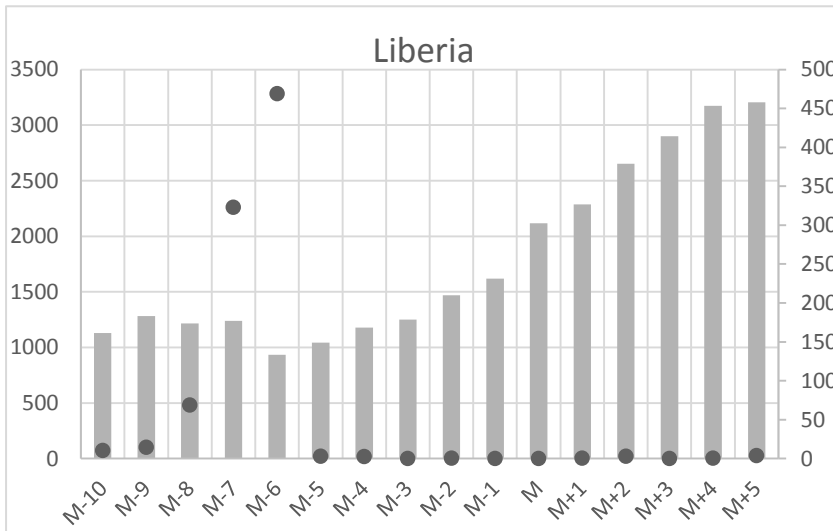


Figure A1u. Liberia

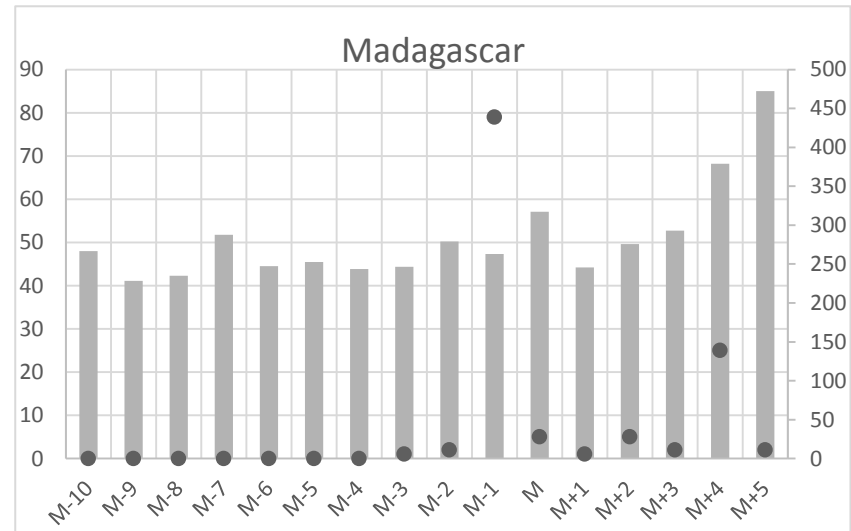


Figure A1v. Madagascar

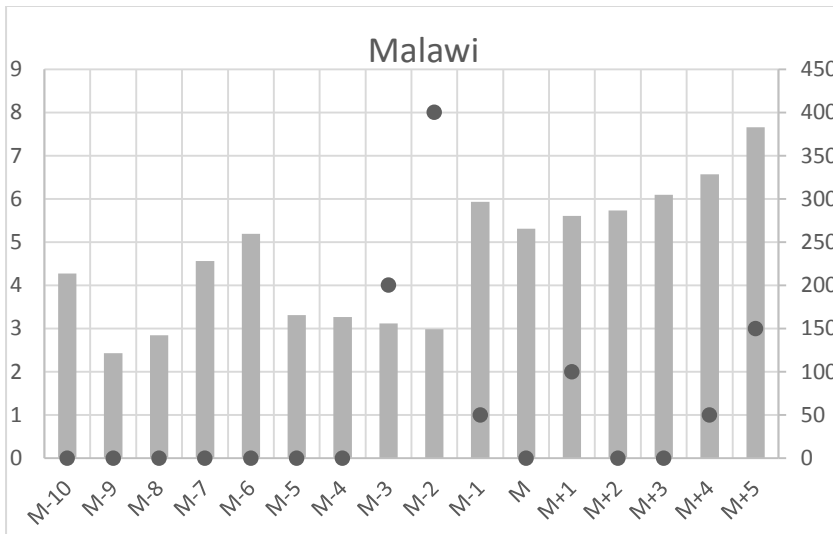


Figure A1w. Malawi

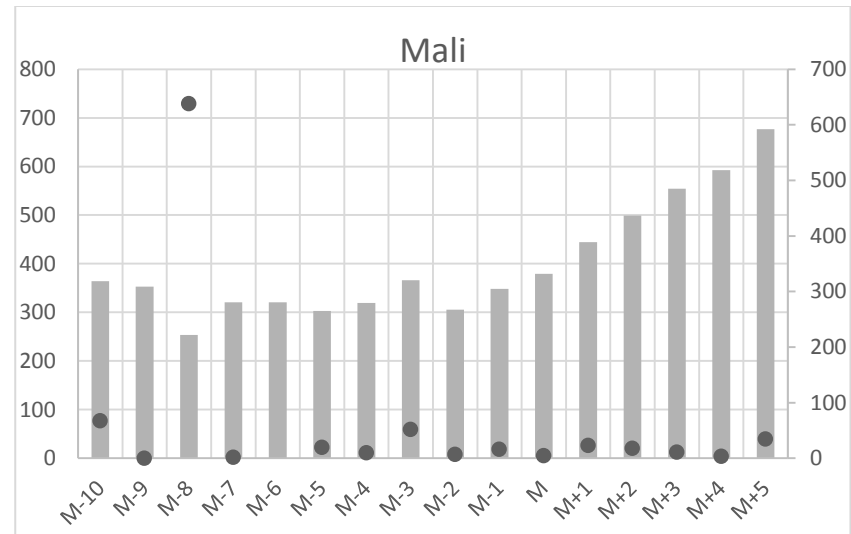


Figure A1x. Mali

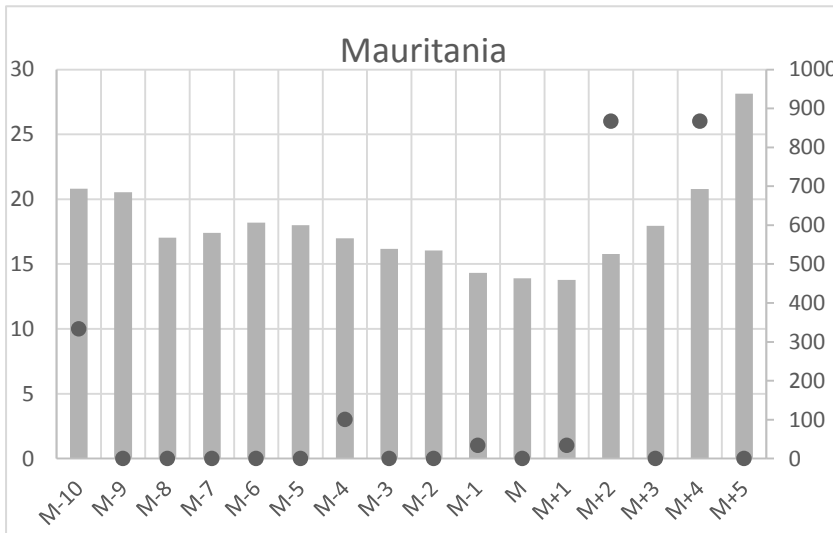


Figure A1y. Mauritania

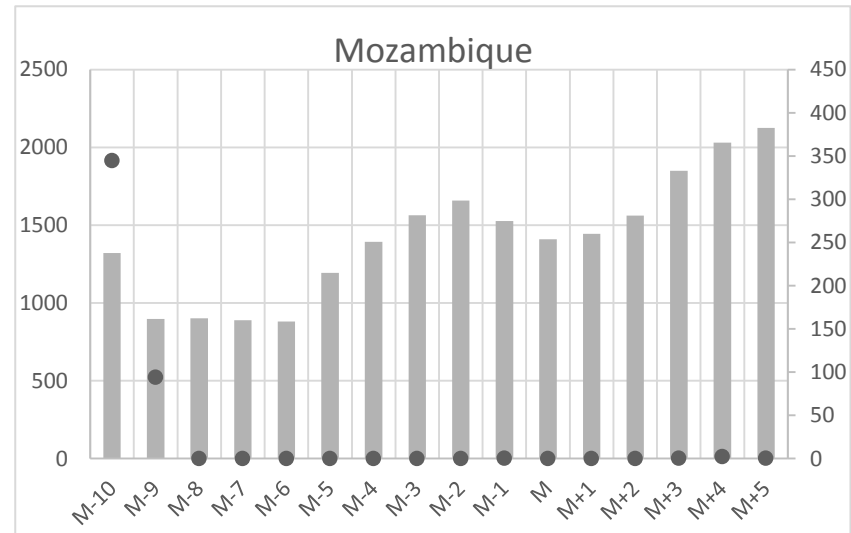


Figure A1z. Mozambique

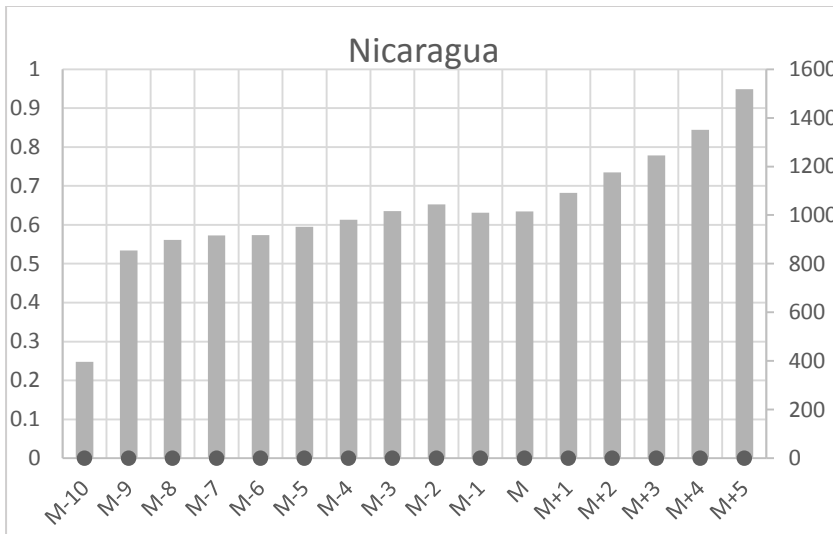


Figure A1aa. Nicaragua

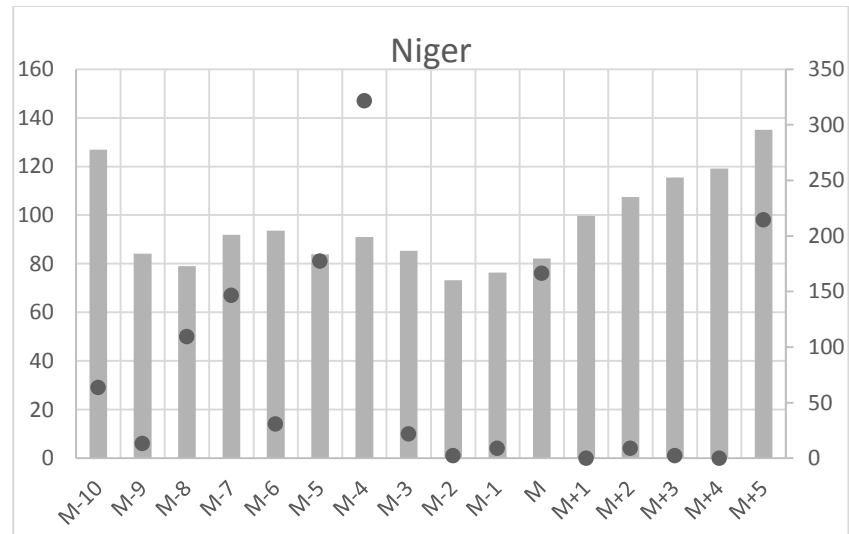


Figure A1ab. Niger

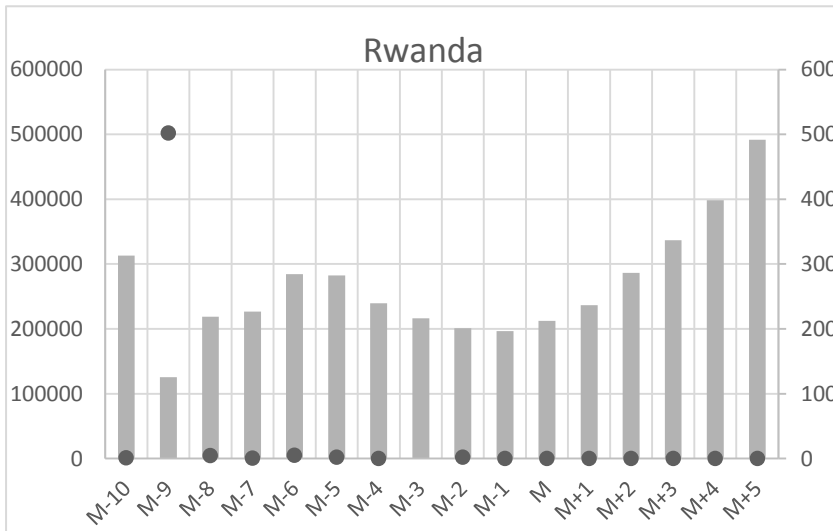


Figure A1ac. Rwanda

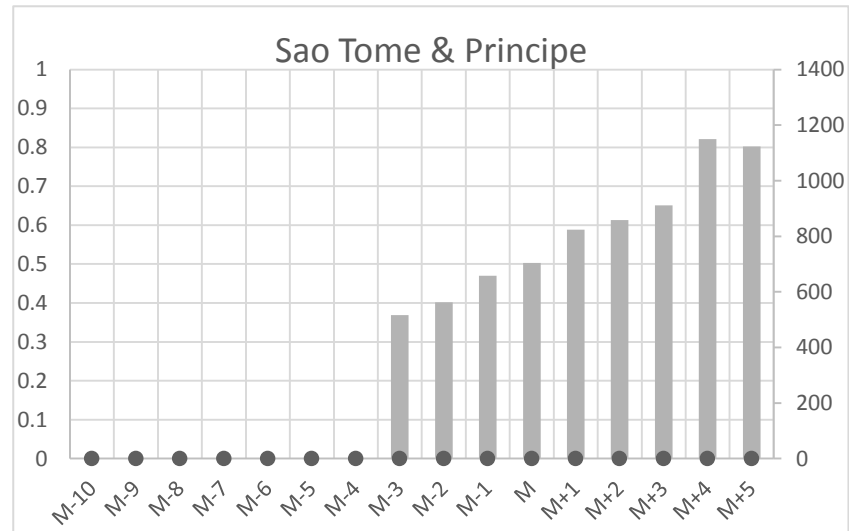


Figure A1ad. Sao Tome & Principe

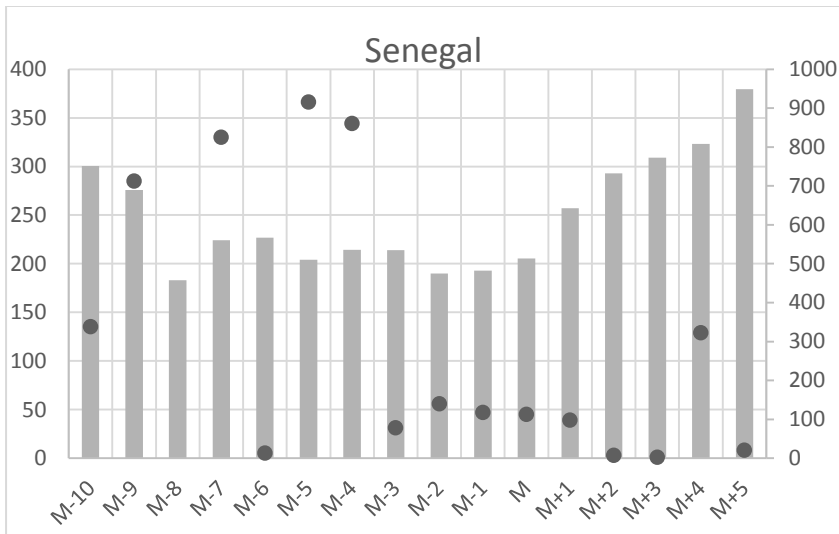


Figure A1ae. Senegal

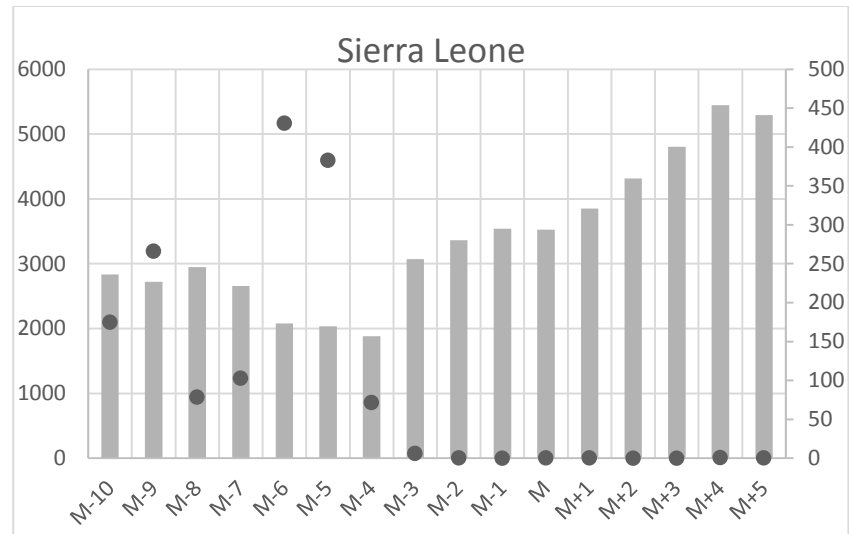


Figure A1af. Sierra Leone

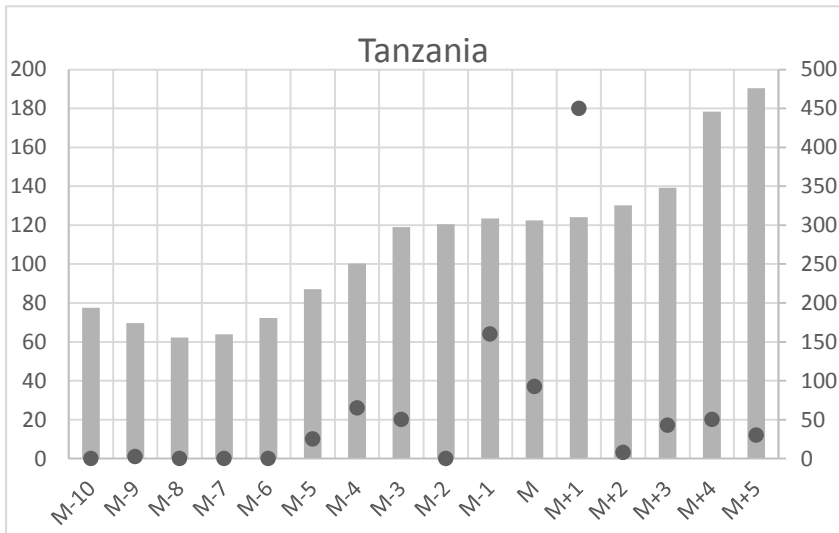


Figure A1af. Tanzania

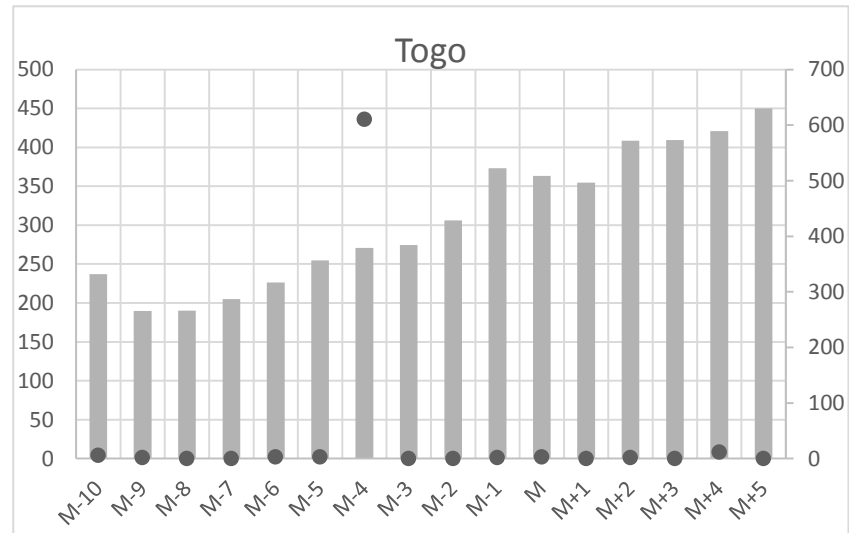


Figure A1ag. Togo

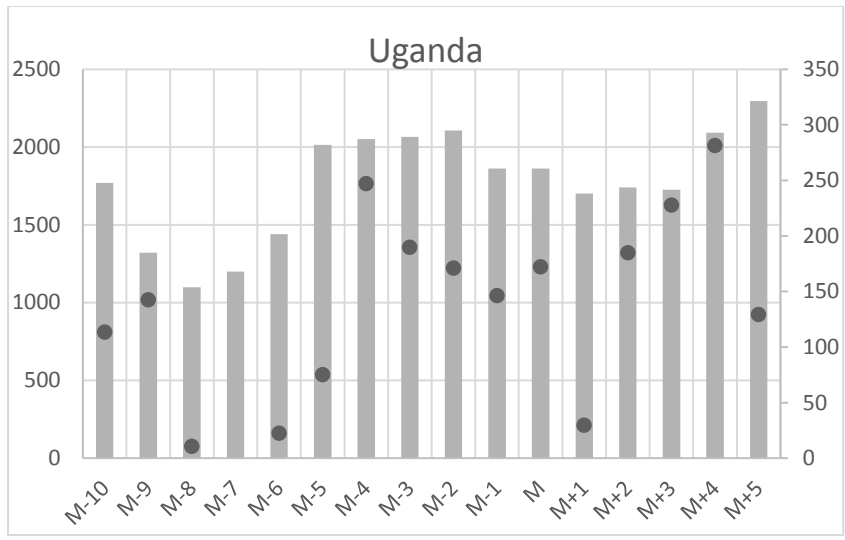


Figure A1ah. Uganda

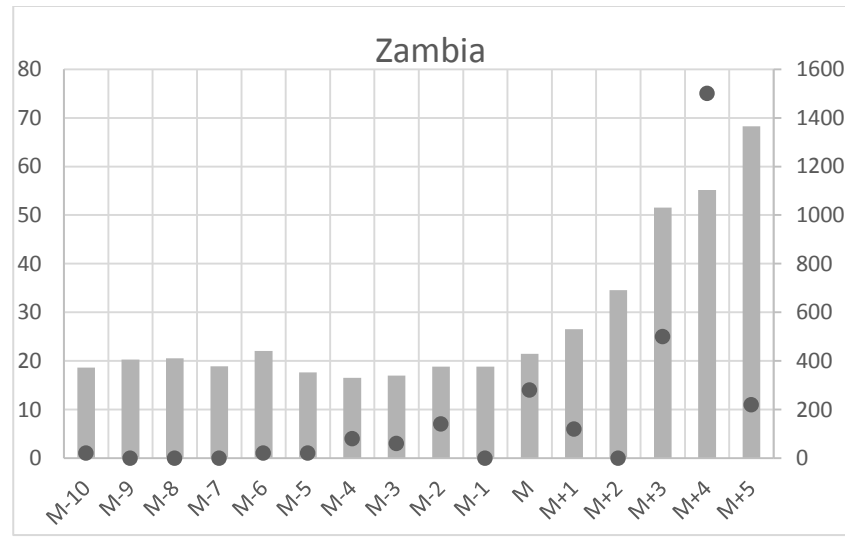


Figure A1ag. Zambia