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## ABSTRACT

### ESSAYS ON THE ECONOMIC IMPACT OF CONFLICT ON COMMUNITIES AND INDIVIDUALS

By

MELISSA ROSE TRUSSELL

JUNE 2015

Committee Chair: Dr. James C. Cox

Major Department: Economics

This dissertation uses varying approaches to examine effects of war on communities and individuals in developing countries, specifically in Liberia, West Africa. The first essay is based on joint work with Robert Moore, which was published in 2012. In it, we use a case study of Saclepea, Liberia, to illustrate the role that an appropriately designed local economic development (LED) plan can play in a rural African community emerging from crisis. This case demonstrates the need for the involvement and cooperation of many parties, including multilateral aid agencies, local, national, and foreign government agencies, multilateral and other international non-governmental organizations (NGOs) and local non-profit organizations, businesses, and individuals. Clear understanding of the stage of assistance (relief, rehabilitation, development) helps to define the role of each entity and the appropriate goals for specific developmental efforts. This case confirms that local participation and involvement in development efforts is an important factor in the sustainability and success of these efforts.

The second essay seeks to answer questions of economic impact of child soldiering in Liberia. Specifically, I look at post-war earnings and educational attainment of former child soldiers, adult soldiers, and non-soldiers. The results indicate that the war in Liberia had

different effects on soldiers than on non-soldiers but that the effects for soldiers do not differ greatly between those who fought as children and those who fought as adults. Moreover, contrary to intuition or to findings in previous literature, the lasting effects for former soldiers do not, in sum, seem to be negative.

In the third essay, I take an experimental approach to understanding trust and trustworthiness among former child soldiers in Liberia. Liberian subjects' decisions in the standard investment game indicate that former child soldiers do not differ in trusting behavior from either adult soldiers or non-soldiers. However, non-soldiers are less trusting than adult soldiers, and child soldiers are less trustworthy than those who started fighting as adults. In a sample of only former child soldiers, those who had only witnessed violence are more trustworthy than those who had been victims of violence. As a whole, Liberians in this experiment tend to trust more than Americans who played the same investment game in previous studies.

The final essay examines many instances of the same investment game to explore the questions of how violence affects trusting and trustworthy behaviors and how those behaviors affect a country's level of violence or peacefulness. Average responses of players in the investment game are compared across countries experiencing varying degrees of peacefulness as measured by the Institute of Economics and Peace's (2015) Global Peace Index. The primary finding is that this macroeconomic peace index can predict trusting behavior but has no effect on trustworthy behavior. Trustworthiness, on the other hand, affects peacefulness.

ESSAYS ON THE ECONOMIC IMPACT OF CONFLICT ON COMMUNITIES AND INDIVIDUALS

BY

MELISSA ROSE TRUSSELL

A Dissertation Submitted in Partial Fulfillment  
of the Requirements for the Degree  
of  
Doctor of Philosophy  
in the  
Andrew Young School of Policy Studies  
of  
Georgia State University

GEORGIA STATE UNIVERSITY

2015

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## ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

Dissertation Chair: Dr. James C. Cox

Committee: Dr. Robert E. Moore  
Dr. Kurt Schnier  
Dr. Volkan Topalli

Electronic Version Approved:  
Mary Beth Walker, Dean  
Andrew Young School of Policy Studies  
Georgia State University  
December 2015

## DEDICATION

This dissertation is dedicated to a generation of Liberians whose childhoods were stolen by a war they neither asked for nor deserved. To the men and women whose experiences are represented in the pages that follow, thank you for trusting me with your stories.

## ACKNOWLEDGEMENTS

I am grateful to my dissertation committee – James Cox, Robert Moore, Kurt Schnier, and Volkan Topalli – for their insight and guidance throughout this journey. In particular, I would like to thank my chair, Dr. Cox, for introducing me to experimental economics and for guiding me through the precise process of constructing and conducting an experiment in a developing country.

I am indebted to my mentor Dr. Robert Moore for convincing me to become an economist and for believing in me when I did not. Thank you for making my passion your priority and for holding me to a standard of excellence. It is no exaggeration to say I would not be here without your leadership, mentorship, and friendship.

I would like to thank my family and friends for your support and for providing therapeutic distractions from my work. To my parents, thank you for being my greatest cheerleaders and for never letting me believe your love or pride depend on my academic achievements. And to my Liberian family Pastor Monmia, Ma T, and all of Refuge Baptist Church, thank you for welcoming me into your community and into your families. To my brother Ocebeo Toway, thank you for providing your invaluable insights into Liberian culture and economy and for your tireless efforts in assisting me with the logistics of my experiment. And to Kalen Gary, thank you for making all of this possible – for travelling with me, for working so hard and so well to make my experiment happen without a hitch, for spending hours typing data into spreadsheets, and for sharing the emotional burden of hearing the heartbreaking stories of hundreds of Liberia's former soldiers. (Sorry you got malaria; happy you survived.)



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## Chapter I. Introduction

This dissertation uses varying approaches to examine economic effects of war on communities and individuals in developing countries, specifically in Liberia, West Africa. In the next chapter, joint work with Robert E. Moore, we look qualitatively at local economic development (LED) in the city of Saclepea, Liberia. Using a case study approach, we apply themes from the LED literature to Saclepea. Categorizing post-war rebuilding tasks into the distinct stages of relief, rehabilitation, and development helps to identify measurable goals and to prioritize those goals. It then becomes apparent that lasting, positive development requires appropriate contribution of resources and expertise from governments, NGOs, businesses, and international organizations but that it is also necessary for those actors to be intentional about involving local individuals and entities in all stages of rebuilding.

Chapter 3 takes an econometric approach to answering questions of quantitative, microeconomic effects of war on individuals who were involved. I use both parametric and nonparametric analyses to compare earnings across three groups of Liberians six years after the war's end: former child soldiers, former adult soldiers, and non-soldiers. I find that non-soldiers have lower earnings than soldiers, and I present parametric models of employment rate, literacy, and years of schooling to help explain the earnings differences.

In Chapter 4, I use an investment game experiment to delve further into differences among the three types of subjects differentiated in Chapter 3. The investment game pairs subjects into first movers and second movers, and through a short interaction allows the experimenter to measure the first mover's trusting behavior and the second mover's trustworthy behavior. I find that non-soldiers are the least trusting subjects and that child



soldiers are less trustworthy than adult soldiers. Furthermore, I find that Liberian subjects taken together are both more trusting and more trustworthy than American subjects who have participated in the same investment game.

In Chapter 5, I look more closely at why subjects in some countries might be more trusting than subjects in other countries. I use a macroeconomic index of countries' peacefulness along with a pre-existing dataset compiling over eighty instances of the same investment game from studies in countries around the world. I control for differences in implementation of the investment game and find that more peaceful countries are home to more trusting subjects but that peace does not affect trustworthiness. I also model peacefulness as a dependent variable to allow for the possibility of a simultaneous or cyclical relationship between peace and trust or trustworthiness. Indeed, I find that such a relationship exists. Trust does not have a significant effect on peace, but more trustworthy countries are more peaceful.

## Chapter II. Local Economic Development in Saclepea, Liberia<sup>1</sup>

### Introduction

The goal of this paper is to illustrate the critical role that an appropriately designed local economic development (LED) plan can play in the enhancement of the quality of life of a community, especially a community emerging from crisis. In a recent paper, Rogerson and Rogerson (2010, p. 475) identify a “clear need to capture and examine data on LED experiences from across the continent” of Africa. They also note the “imperative for pursuing LED approaches” in rural African regions and small towns (Rogerson and Rogerson, 2010, p. 474). This paper seeks to provide some of this needed evidence based on the experience, LED plans, and LED progress and sustainability in the relatively remote city of Saclepea in Liberia. Saclepea is a city of less than 20,000 people in Nimba County near the borders of Guinea and Côte d’Ivoire, about 375 kilometers from the Liberian capital of Monrovia.<sup>2</sup>

In a recent book on LED assistance strategy, economists Corbett and Fikkert (2009), distinguish among three specific types of assistance: relief, rehabilitation, and development. Distinguishing characteristics of appropriate relief are *urgent* and *temporary*. Relief is aid provided in response to some form of crisis (war or natural disaster, for example). While dependency may be present when relief is given, it can be attributed to the externally imposed crisis. Recipients of relief can well imagine that they could be the donors in a future crisis, and

---

<sup>1</sup> This essay is largely based on joint work with Robert E. Moore (see Trussell & Moore, 2012).

<sup>2</sup> Trussell has provided more extensive background information on Saclepea at <http://en.wikipedia.org/wiki/Saclepea>

dignity can thereby be preserved. The aid provided is *urgent* in that it may be essential to short-run survival.

As a community emerges from the immediate crisis, there is a need for rehabilitation. Rehabilitation is the restoration of the positive attributes of the community, which were present prior to the crisis. At this stage, Corbett and Fikkert (2009, p. 110) suggest, the aid should become more participatory. Rehabilitation is aid that repairs and restores but should be put in place in partnership with the recipient community. Rehabilitation is *working with*, not *doing for*.

In this framework, the process of development begins upon completion of rehabilitation efforts. Corbett and Fikkert (2009, p. 105) define development around the concept of relationships. Development is not brought to or done for, but rather it is done in partnership with a community. They identify a key dynamic of development to be an empowering process that allows each individual involved to more fully achieve his or her potential.

In the context of LED in the United States, Lupton (2007, 2011), an LED practitioner, touches on themes similar to those of Corbett and Fikkert (2009). Lupton makes the distinction between *betterment* and *development*. He observes, "Betterment improves conditions; development strengthens capacity" (Lupton, 2007, p. 39). He further notes that efficiency in delivering aid is not the same as effectiveness of development. A program can be very efficient in providing food relief but have no long-run impact (development). The problem is that *betterment*, or the *doing for* a target community, while improving conditions, is a one-way exchange with donors on one side and recipients on the other. This imbalance leads either to dependency, or to loss of dignity, or both. Lupton (2007) illustrates this with several examples

of food, clothing, and holiday gift distribution programs. In each case the donor initially feels good; the recipient has received assistance and is better off, at least temporarily; but the positive aspects of this interaction are short-lived before souring. The donor becomes overwhelmed with the needs of and is repelled by the hoarding reaction of the recipients. The recipients suffer loss of dignity due to the dependency created by their receiver status and often come to have an undercurrent of resentment for the donors, regardless of how much benefit they are receiving. Betterment is temporary and therefore ineffective at leading to long run and ongoing improvements in human conditions in the target community.

In Lupton's (2007) view, development, on the other hand, strengthens capacity by creating healthy interdependency. This interdependency is the result of more balanced exchange, where value is given on both sides of the transaction. In short, Lupton (2007) posits that the role of *aid giver* is to create a mutually beneficial exchange (or market) where none existed before. This is the role of a private sector market in a well-developed economy.

In the orthodox economic theory perspective, markets arise, unaided by public sector intervention or non-profit organizations, to satisfy societal needs when certain standard preconditions are met. The need to intervene to foster markets where none exists implies that standard preconditions (infrastructure, supporting or protecting governmental institutions, etc.) are not present, or are too weak, or that there is some form of market failure (monopoly power, asymmetric information, physical or geographical barriers to trade, etc.) that prevents the natural (for profit) emergence of a market. Lupton's (2007) analysis does not delve into these issues, but one would want to be careful to identify the causes of market failure or

missing preconditions prior to attempting intervention. Failure to do so could lead to an underestimation of the challenge at hand.

Corbett and Fikkert (2009, p. 115-9) further warn of the problems of paternalism specifically in resource, spiritual, knowledge, labor, and managerial forms. Paternalism poisons the relationships necessary for successful capacity building development. Rather than focus on what is missing in a community, Corbett and Fikkert (2009, p. 126) and Lupton (2011, p. 139, 177) advise starting with an understanding of the community assets. They describe this process as Asset-Based Community Development (ABCD).

The critical factors and participant roles of the local economic development (LED) process in Africa are nicely defined in Rogerson and Rogerson (2010). Our paper is an attempt to apply the accepted definitions of LED to a specific African case. Additionally, we hope to gain insight by applying the strategic LED assistance models of Corbett and Fikkert (2009) and Lupton (2007, 2011). Part of the challenge is that in a specific case there are not cleanly defined boundaries among the identified core features of LED and participant roles. Nevertheless, we will attempt to disentangle these for the Liberian city of Saclepea to determine what can be learned and to illustrate how a development plan can be informed and improved with this analysis.

We begin with an initial assessment based on first-hand observations between 2010 and 2012. We discuss the recent history of development in Saclepea and describe lessons learned from Saclepea's progress between the end of Liberia's civil wars and 2014, when Trussell revisited the area and assessed development progress since 2012. The 2014 observations are

not an exhaustive list of development progress in Saclepea since the original analysis, but they provide some insight into the vector of growth in the city since 2012.

### **The crisis: Liberian civil wars and their impact on Saclepea**

From the drafting of the country's first constitution in 1847, through the 1970s, Liberia was a peaceful and relatively prosperous West African nation (Approved Revised Draft Constitution of the Republic of Liberia, n.d.; BBC, 2012). Liberia's GDP per capita in 1970 was greater than that of any of its neighboring countries and more than twice that of Ghana (Heston, Summers, & Aten, 2011). Saclepea, in northeastern Liberia, was no exception to the Liberian trend of prosperity. Historically, the Mano and Gio tribes resided in Saclepea; therefore, most of the town's land belonged to individuals and families of these tribes. But, by the end of the 1980s, business in Saclepea was dominated by members of the Mandingo tribe. In fact, descendants of multiple tribes lived in Saclepea, and the tribes coexisted – even intermarried – peacefully (O. Toway, personal communication, September 20, 2011).

In 1980, however, the country was shaken when the Liberian presidency was forcefully taken from President William Tolbert in a coup led by Samuel Doe, a Liberian military leader, who became the first Liberian president not descended from freed American slaves, known as Americo-Liberians (BBC, 2012; Liberia: Coup at Dawn, 1980). Doe's take-over came after growing perturbation with corruption in Tolbert's regime and with Americo-Liberian leadership in general (Liberia: Coup at Dawn, 1980). Doe was officially elected president in 1985, but the election was known to be fraudulent (WGBH Educational Foundation, 2002). His policies persecuted Liberians of certain ethnicities, particularly those from the Gio and Mano tribes of

Nimba County (Uppsala Conflict Data Program, n.d.). In their effort to increase their economic and political power, the Mandingo tribe sided with Doe's Krahn tribe. Mano and Gio in Saclepea and throughout Nimba County became targets of discrimination and violence (O. Taway, personal communication, September 20, 2011). Thus, under Doe, political and ethnic tensions continued to increase in Saclepea and in all of Liberia (Uppsala Conflict Data Program, n.d.).

As a result of these growing tensions, Doe's regime became a target of political plots. First, in 1985, Thomas Quiwonkpa staged a failed coup but was quickly assassinated (Liberia Comrades Turned Enemies, 1985). Later, Charles Taylor, a former member of Doe's regime, organized an invasion of Liberia across the Côte d'Ivoirian border in 1989 (Peace Direct, 2011). Taylor's army was primarily recruited from among Gio and Mano Liberians (Uppsala Conflict Data Program, n.d.). By 1990, Doe had been killed and his government toppled, but factions split off from each side of the Doe-Taylor conflict, and fighting among these splinter groups continued and escalated (Peace Direct, 2011). War became rampant in Liberia, with warriors fighting for various causes, usually related to tribal loyalties. A ceasefire was finally reached in 1996 (Peace Direct, 2011). The next year, Charles Taylor was elected president of Liberia in democratic elections overseen by the United States (US), the United Nations (UN), the Organization of African Unity, and the Economic Community of West African States (ECOWAS) (History of Liberia, 2004).

Peace was short-lived. Political and tribal tension continued to grow, intensified by Taylor's controversial support for rebels in Sierra Leone's Civil War. In 1999, a second civil war began with an invasion of rebels fighting against Taylor's supporters. After four more years of

widespread, brutal combat, Taylor resigned in 2003, bringing an end to the second civil war.

UN peacekeepers moved into Liberia, setting the stage for the country's democratic election of President Ellen Johnson-Sirleaf in 2005. (Peace Direct, 2011)

During the wars, schools, healthcare, electricity, and water or sanitation systems were destroyed throughout Nimba County, and formal sector jobs in the county became almost nonexistent (Nimba County Development Committee, 2008). Saclepea became a "ghost town" according to one observer. Mano and Gio fighters burned Mandingo businesses and homes, and they reclaimed land they had previously sold to members of other tribes. Only those who wielded weapons and joined the fighting were safe in the town. Others were forced to flee, many hiding for extended periods in the undeveloped bush of rural Nimba County (O. Toway, personal communication, September 20, 2011).

Liberia has enjoyed relative stability since the second war's end (Peace Direct, 2011). Liberians still work, however, to reconstruct their country after fourteen years (1989-2003) of devastating conflict (Uppsala Conflict Data Program, n.d.). Infrastructure was destroyed in Liberia's capital city of Monrovia and throughout rural Liberia. Many Liberian homes and businesses lost electricity in 1989 and still have not seen its return (Peace Direct, 2011). According to Penn World Table data, the country's GDP per capita when the wars ended in 2003 was less than 21 percent of its level at the time of the 1980 coup (Heston, Summers, & Aten, 2011).

In Saclepea, though great strides have been made in the areas of business and development, much work remains. There are many unsettled land disputes flooding the judicial system after residents returned to find their land destroyed or occupied by members of other



tribes. In addition, Saclepea was a rebel training ground for child soldiers, and the ramifications of child soldiering are still felt today, particularly in terms of decreased education and limited job opportunities for former child soldiers (O. Toway, personal communication, September 20-21, 2011). By one report, “Many of the young people have spent more time engaged in war than in school” (Nimba County Development Committee, 2008). Of grave concern are the short- and long-term effects of the trauma of war on the people of Saclepea. A random-sample study of Nimbaians in 2008 found evidence of posttraumatic stress disorder (PTSD) in 48.3% of participants (Galea, Rockers, Saydee, Macauley, Varpilah, & Kruk, 2010).

All told, at war's end, over 250,000 Liberians – more than ten percent of the country's pre-war population – had died, and one-third of the remaining population had sought refuge in other countries (Heston, Summers, & Aten, 2011; Peace Direct, 2011). Those who stayed to see the end of both civil wars struggle to pick up the pieces.

### **The restoration period**

Using Corbett and Fikkert's (2009) and Lupton's (2011) three-stage response to crisis – relief, rehabilitation, development – one may identify an obvious beginning of the relief period after a single event crisis such as an earthquake, a tsunami, a bombing, etc. Relief is needed to restore order immediately following any such event, and once a semblance of stability is established, rehabilitation may begin. When a crisis occurs over an extended period of time, the boundary between relief and rehabilitation may not be as easy to precisely determine.

For Saclepea, in the case of the Liberian civil conflict, we consider that relief was administered before the war's end and was the vehicle through which the end was brought

about and peace was restored. Figuratively in the Corbett and Fikkert (2009) model and literally in this case, relief is administered to stop the bleeding caused by a crisis. It seems, then, that relief in Saclepea had run its course by the end of the war or very shortly thereafter. With peace came the need for rehabilitation.

Since the entire nation had been crippled by the war, most of the responsibility for the initiation of rehabilitation fell to international agencies and non-governmental organizations (NGOs). Table 2-1 provides a brief overview of relief, rehabilitation, and development work that has begun or been completed in Saclepea, and the table identifies five categories of major entity types in the process: the Liberian national government, Saclepea's local government, intergovernmental organizations (e.g. the UN), international NGOs, and local NGOs or businesses. According to both Rogerson and Rogerson (2010) and Corbett and Fikkert (2009), the organizations in all of these categories must cooperate with specific focus on local development to build Saclepea's best chance for successful and sustainable development.

## **Relief**

### *Disarmament*

Immediately before and after the official end of Liberia's civil conflict, the UN and other agencies moved into the country to aid in the disarmament process. Within two months of the signing of the peace agreement, the UN in conjunction with several NGOs developed an action plan for disarmament in Liberia. The action plan charged a Joint Implementation Unit (JIT) with carrying out a Disarmament, Demobilization, Rehabilitation, and Reintegration (DDRR) program under the supervision of Liberia's National Commission on Disarmament, Demobilisation, Rehabilitation, and Reintegration (NCDDRR). The UN Mission In Liberia (UNMIL) was

Table 2-1. Recovery tasks by entity type and stage

ENTITY TYPE	STAGE		
	Relief	Rehabilitation	Development
<b>National Government</b>	disarmament	rebuilding schools road repair settling land disputes	healthcare
<b>Local Government</b>		settling land disputes	electricity and plumbing
<b>International NGO</b>		reintegration programs rebuilding schools and providing supplies healthcare	computer center savings and finance
<b>Intergovernmental (e.g. U.N.)</b>	disarmament	reintegration programs provision of school supplies road repair	
<b>Local NGO/Business</b>		business and market	improving education computer center Women's Center and gender issues savings and finance postal service

established and given overall command of DDDR. (UN Development Programme Liberia, 2003-2004)

The disarmament and demobilization program took place in three phases, each phase opening new disarmament centers progressively further from Monrovia. In all, disarmament centers were in eight locations throughout Liberia. At each location, weapons were voluntarily surrendered by men, women, and children – Liberians and non-Liberians – to be destroyed (Agència Catalana de Cooperació al Desenvolupament, n.d.). The closest disarmament location to Saclepea was the last location to open (on August 17, 2004) and was in Ganta, about 50

kilometers from Saclepea but relatively easily accessed by a direct road between the two cities (UN Development Programme Liberia, 2003-2004).

Disarmament phases officially began on December 7, 2003, and ended in November 2004. By official UNMIL count, 101,495 men, women, and children had been disarmed and demobilized by the end of the program (Agència Catalana de Cooperació al Desenvolupament, n.d.).

## **Rehabilitation**

### *Reintegration programs*

After the successful peace agreement and disarmament, Liberians could begin the process of rehabilitating from the war's devastation. For former combatants, the first stages of rehabilitation were included as benefits of the DDDR programs offered by NCDDRR. This official reintegration program was designed to provide two-and-a-half years of aid before ex-combatants would be considered "normal" citizens of their communities. Former members of militant forces, regardless of age, were eligible for reintegration packages provided they first participated in the NCDDRR disarmament program. Three percent of reintegration program participants (1651 individuals) chose to settle in Nimba County (UN Development Programme Liberia, 2003-2004).

The goals of the programs were reconciliation in communities and social and economic reintegration into society. First, reconciliation and social reintegration: UNMIL went throughout the country with the message of peace; special emphasis was given to reintegrating those who had been refugees outside Liberia or displaced within Liberia; group counseling was

provided to community members; and some ex-combatants were given aid to return directly into participation alongside other community members in education or business. For economic assistance, aid recipients had several options: 1) 8 months of vocational training, apprenticeship, or publicly provided jobs; 2) 3 years of regular schooling; 3) a one-time allotment of agricultural products or aid in establishing an animal farm; and 4) for those who met further reliability requirements, micro-finance (UN Development Programme Liberia, 2003-2004).

Consistent with Rogerson and Rogerson's (2010) descriptions of local economic development in Africa, reintegration programs were designed to require involvement – both through funding and implementation – from various government and non-government, local and international organizations, coordinated through the Technical Coordination Committee and the Project Approval Committee. For example, the United States Agency for International Development (USAID), Handicap International, and other agencies with expertise in issues related to women, children, or disabled individuals were called on to assist with reintegration of those groups. The World Food Programme provided food allowances to new reintegration participants. Liberia's own public vocational college, Booker Washington Institute, contributed both training opportunities and program marketing (UN Development Programme Liberia, 2003-2004).

Liberia's DDR programs officially ended in April of 2009, having given opportunities for reintegration aid to 101,495 demobilized Liberians. Smaller, community-level programs continue to target the approximately 5000 ex-combatants who demobilized but had not participated in reintegration programs by 2009 (UN Security Council, 2009). In 2012, the United

Nations High Commission for Refugees (UNHCR) began a dedicated effort to return home and reintegrate the nearly 63,000 Liberians remaining as refugees outside the country (UNHCR, 2012).

### *Schools*

Rebuilding education is critical to rehabilitating Liberia. In Saclepea, schools did not officially close during the war, but attendance was, at times, impossible. Saclepeans report having been chased away from school by armed fighters (O. Taway, personal communication, March 28, 2012). After the war's end, Liberia's national government and international NGOs (e.g. the Red Cross) moved into Saclepea to rebuild schools. UNHCR, USAID, and other international organizations contributed school supplies and support. Even still, nearly six years passed after the war before Saclepean families began to send their children to school with any regularity for a couple of reasons: 1) many families remained fearful that the war was not really over, and 2) others felt education was useless in a society in which success and power could be attained through wielding weapons.

Recognizing that Liberian education still is not fully restored to the state it would have been in without the war, the West African Examination Council (WAEC) administers a unique test to Liberians, whose education standards are lower than other WAEC member countries (The West African Examinations Council, n.d.). Indeed, Saclepea's schools suffer, among other issues, overcrowding and under-funding or -staffing. The Peace Corps provides a few outside teachers for Saclepea's government school, but improvement of facilities, class sizes, and teacher quality will remain critical issues as Saclepea looks to sustain long-term development.

### *Road repair*

Fourteen years of civil conflict left Liberian infrastructure in a state of devastating disrepair. A chief concern in and around Saclepea was road condition, particularly between Saclepea and the larger cities of Ganta and Monrovia. Once a two or three hour drive, now a trip to Monrovia, if possible at all, would take a minimum of six hours and could take days. In order to rehabilitate their post-war economy, Saclepeans needed to be able to do business in Monrovia, Liberia's port city. Moreover, even within the city, children were sometimes unable to attend school when potholes filled with rainwater blocked their passage from home to school. Each county district, including Saclepea's, listed road repair as its top priority in the Nimba County Development Agenda (Nimba County Development Committee, 2008).

UNMIL's station in Saclepea helped with some of the road repair issues. The UN repaired roads they often used in their daily operations. Thus, the road between Saclepea and Ganta, where UNMIL has another station, was repaired relatively quickly, and some stretches of the road to Monrovia have also been made drivable. In 2010 a grassroots community effort convinced UNMIL to work together with community members to repair one of the worst potholes within Saclepea so children would not be kept from school during rainy season. This effort is exemplar of the motivation and cooperation required of local economic development described by Rogerson and Rogerson (2010). It also displays the importance of gauging community needs to prioritize projects, a necessity in rehabilitation and development according to Corbett and Fikkert (2009).

While roads in much of Liberia still are nowhere near adequate, road construction is underway throughout the country, including on the roads from Monrovia, through Ganta and Saclepea, and south to Tapita. Travel from Monrovia to Saclepea was 8+ hours our first visit in 2010 and had improved to 6 hours in 2014. Main roads will be paved to provide safe and reliable transportation even during Liberia's rainy season. These repairs will allow Saclepean vendors to sell in markets in surrounding towns.

### *Settling land disputes*

After fourteen years of unrest, property rights and ownership of land were often fuzzy at best. Nimba County has experienced the worst of Liberia's post-war land disputes. In particular, disputes have raged between the Mandingo tribe, who sided with Doe's administration in the war, and the Mano and Gio tribes, who sided with Taylor after they were targeted by Doe. When the Mandingos moved into Nimba long before the war, the native tribes welcomed them and lived together with them peacefully, but the formalities of granting official property rights were overlooked. Thus, when war caused a rift between the groups, land disputes erupted, sparking arson and further violence.

When violence over disputed land spiked in Nimba in 2006, President Sirleaf appointed the Special Presidential Nimba Land Disputes Commission to evaluate claims and report suggestions for resolution. That Commission's recommendations led to opening new areas for business to allow members of both parties to own and operate businesses in prominent areas rather than fight for space in existing business or market areas.



Disputes continued, and in 2008, a second Commission was appointed to evaluate claims, specifically including claims in Saclepea. This Commission's work involved 71,389,000 Liberian Dollars (LD) worth of land and promised "win-win" solutions in each case (Violence Again in Nimba Land Feud, 2012).

As of May 2012, many suggestions from the first Commission had not been implemented, and solutions promised by the second Commission had not been announced. But, by June, in accordance with findings and recommendations of the second Commission, monetary compensation had been provided to displaced parties of disputes in 75% of the Commission's coverage area, including in Saclepea. Violence is still a threat in the areas of Nimba that have not received promised compensation, and in 2012, concerned citizens in Ganta organized to petition for a speedy solution (Carter, 2012; Violence Again in Nimba Land Feud, 2012). Reports indicated that tensions surrounding land disputes had improved but not completely subsided in 2014.

### *Healthcare*

Prior to Liberia's civil war, Saclepea had accessible, yet sometimes inadequate, healthcare. Access to healthcare deteriorated during the fourteen-year conflict. Not long after peace agreements were signed, the French organization Medcins Sans Frontiers (MSF or Doctors Without Borders) began to help restore Saclepean healthcare to its pre-war condition. MSF staffed the Saclepea Health Center on the outskirts of town from 2003 until 2009, when MSF deemed the Center prepared for the international organization's withdrawal (O. Toway, personal communication, May 25, 2012).

Funded by the Liberian government, the Center includes a public pharmacy and provides in-patient and outpatient care free of charge. It has now, in fact, surpassed the level of care provided in Saclepea before the civil war (O. Toway, personal communication, May 17, 2012). Thus, the Saclepea Comprehensive Health Center is a success story demonstrating ways of helping without hurting; MSF took charge of rehabilitation but involved local personnel so that by the end of MSF's stay in Saclepea, the Center was prepared to operate and continue growth without outside intervention.

### *Business and market*

Business in Saclepea nearly vanished during the fourteen-year war. Only those who were willing to fight were able to have businesses. The only jobs available were soldiering jobs, and if a non-soldier were caught trying to buy or sell, his belongings would be stripped from him without cause or delay (O. Toway, personal communication, June 1, 2012).

After the war, Saclepea's businesses began to bounce back relatively quickly, spurred by international NGOs, who bought food and supplies locally when they moved into the region to aid the recovery. Saclepea's economy now revolves around its weekly market, which has outgrown its pre-war popularity and is now one of the largest outdoor markets in Liberia. The center of town features a small-scale daily market and a bustling business district of small shops open daily to sell items like furniture, flooring, cell phone charging services, cassette tapes, and snacks.

## **Development**

In order to best capture the progress of efforts to date in Saclepea, we have separated the analysis of the development stage into two parts. In the next section, we review the development accomplishments, and in the following section, we review the remaining opportunities and needs.

### Development: Accomplishments

#### *Schools*

After rehabilitation efforts had rebuilt schools in Saclepea, local churches began to contribute to development of education beyond pre-war standards by establishing their own schools as a means of providing education but also of financially supporting the churches. In 2012, Saclepea had fourteen schools, the majority of which were privately funded. By 2014, the city had at least two new private elementary schools.

Saclepea struggles to improve education quality; therefore, Atlanta-based non-profit West Africa Crossroads Corporation (WACC) funded teacher training in Saclepea in 2010. The training lasted for 20 eight-hour days and involved three classes of 40 teachers each, 75 percent of whom considered themselves Saclepeans. Making local involvement a priority, WACC provided only direction and funding (salaries for instructors and administrators, stipends for participants), and staffing and enrolling were left to Saclepea's District Education Officer (DEO).

Training was well received, with 100 percent positive feedback from teachers and administrators, but WACC board members were unhappy with administrative oversight. WACC had been told all trainers would come from the University of Liberia, but Saclepea's DEO

appointed himself and a Saclepean principal to be trainers (and earn trainers' salaries).

Moreover, WACC received information that the amount of time spent on administrative tasks, such as taking attendance, was more than ideal, and valuable instruction time was lost.

WACC has since shifted its focus toward computer-based learning with the establishment of the Saclepea Community Computer Center. WACC president Steve Skinner reports, "We don't believe it is feasible to bring the existing base of teachers up to competent levels of performance; hence, our focus on computers" (personal communication, June 26, 2012 & September 13, 2012).

#### *Saclepea Community Computer Center*

In January of 2011, WACC – committed to following the model set forth by Corbett and Fikkert (2009) – mentored Saclepeans through the process of opening a public, for-profit community computer center. The Saclepea Community Computer Center (SCCC) provided computer training courses as well as open computer and Internet access (with fee for time in use) to community members. SCCC's board members and employees all were Saclepean citizens, and by the end of 2011, SCCC had recorded "over 1000 hours of web browsing, 300 graduates of computer classes, [and] 5000 pages of printed documents and certificates" (West Africa Crossroads Corporation, 2011).

The SCCC was fully owned and operated by Saclepeans, and WACC intentionally limited its involvement to analyzing financial reports and providing advice when it was requested. WACC reported in September of 2012 that the Center was "making money and [had] a healthy bank account" in Ganta. The business was financially stable enough that the board elected to

build a new facility on donated land, and the building's foundation had been laid. (Sandy Skinner, personal communication, September 19, 2012).

Unfortunately, due to some poor management decisions and disagreements among board members and between staff and the board, the SCCC had been closed several months when we arrived in early 2014. Under the leadership of the founding board chairman, new board members had been appointed to take the place of members who had been absent from meetings, and the original staff had been fired and replaced. Almost no communication was being made with WACC.

The building that had begun years earlier was not completed, and the SCCC had recently started renting a new space in town. The new board was working to reopen the center for daily operation in this space and had begun recruiting for a computer class to be offered there in the near future.

### *Women's Center*

Saclepea native Theresa Monmia founded the Saclepea Women's Center in 2008 to raise awareness of the plight of women and girls facing gender based violence (GBV). Located near the center of town, the Women's Center offers workshops and counseling for both victims and perpetrators of GBV.

In 2014 it was clear that the Women's Center was still an impressive and highly successful force for development in Saclepea. Prior to 2014, the Saclepea Women's Center was operated by local Saclepean women and affiliated with the International Rescue Committee (IRC) in Monrovia. The local women made great strides to bring about awareness of the issue

of violence against women, but they were not authorized to settle cases of domestic dispute; rather, they reported cases to IRC who would then send caseworkers to Saclepea to investigate and settle the cases.

In February of 2014, the IRC turned over legal responsibilities of the Women's Center wholly to the local women. Having worked closely with IRC caseworkers for many years, the Center's local volunteers were prepared to be named social workers themselves and given authority to settle legal domestic disputes. The Center also was able to establish a payroll that included these new caseworkers as formal employees.

Several cases were tried and decided by the new, local caseworkers during the few weeks that we were in Saclepea. One or more caseworkers investigated circumstances, heard testimony, and pronounced judgment in each case. The decision of the caseworker and punishments or awards announced by her are legally binding, similar to judgment in a civil suit in the U.S. Caseworkers do not try criminal cases but often are called upon to give testimony before criminal courts.

In addition to bringing justice in cases of domestic abuse, a focus of the Women's Center efforts is to economically empower women, thereby allowing them the freedom to remove themselves from abusive relationships. The Center owns a large swamp in which they employ women to plant, cultivate, and harvest rice. Women then take part in cleaning and selling the rice in Saclepea's market, and they divide the profits among themselves. In 2010, the Center was awarded a contract from the World Food Programme to provide all the rice for school lunches in Saclepea and surrounding areas. The women also have recently begun to farm crops other than rice.

The Women's Center offers its members the opportunity to participate in a savings club to help them manage their money. Participants contribute monthly, and the money they save is invested in the Center's rice business. At the end of each year, women are given back their investment plus a portion of the rice profit, and they may choose to reinvest for the following year. The Saclepea Women's Center is making a non-trivial impact on local economic development in Saclepea as it builds a strong force of economically independent women.

### *Healthcare*

Saclepea has several privately funded health clinics and one public clinic, each with its own pharmacy. Healthcare in Saclepea is supported not only by local and national organizations but also by international aid. Pharmacies are stocked by international NGOs who send overstocked or outdated drugs from other countries to Liberia. Moreover, Saclepea's public health center received a large shipment of hospital beds and other medical equipment from WACC in 2011 (West Africa Crossroads Corporation, 2011).

The public health clinic suffered setbacks during the 2014-2015 Ebola outbreak when several staff members were forced into three weeks of quarantine after contacting a patient with the disease. Since the outbreak was concentrated in Monrovia, Saclepea saw only a few cases of Ebola, and the health clinic was able to return quickly to regular operation.

### Development: Opportunities and needs

In 2008, Nimba County officials, with the help of the UN, prepared a county development plan. The plan states that "basic infrastructure including roads, schools, and

health facilities remain in poor condition,” and then establishes goals and a timeline for their improvement (Nimba County Development Committee, 2008). The following subsections discuss some of the stated needs as well as other observed areas for improvement.

### *Healthcare*

While Saclepea has better healthcare than surrounding villages, there remains significant room for improvement. Saclepea has three mid-sized health centers with pharmacies, but physicians’ assistants or nurses generally treat patients because doctors are not often present in any of the centers (Medical Centers Risk Closure, 2010). The nearest facility with a surgical capacity is in Ganta. In 2010 the publicly-funded Saclepea Health Center applied to the Liberian government to become a full-fledged hospital including an operating room, but the application was denied because funding was already being directed toward building a hospital in the city of Sanniquellie in Nimba, approximately 80 kilometers (by mostly-unpaved road) northeast of Saclepea.

### *Electricity and plumbing*

Availability of electricity and indoor plumbing in Saclepea has been the same since before the war: only wealthy community members are able to afford either. Most of Saclepea’s homes have no restrooms; some have outhouses with latrines and with or without toilets; a few have indoor restrooms with toilets and septic tanks but without running water for flushing or washing hands. Improving plumbing would doubtless improve sanitation and health.



Saclepea's industries lack the ability to operate with full efficiency because they do not have access to commercial electrical power. For example, both tailors and carpenters work exclusively with hand- or foot-powered machinery. Their other options are solar power or gasoline or diesel generators, none of which are considered financially feasible for most businesses. This issue could be solved through electrification or through establishment of trade cooperatives for sharing the cost of generators and electric equipment. In fact, carpenters in Saclepea have demonstrated that such cooperatives are feasible at least in some trades by joining together to purchase electrical equipment that is shared among the carpenters.

Hope is on the horizon for the electrification of Saclepea. Liberia's neighbor Côte d'Ivoire has an electric grid supplied by privately owned gas and hydroelectric generators, and Ivoirians export electricity throughout West Africa to countries including Benin, Togo, Burkina Faso, and Ghana (Electrical Power in Côte d'Ivoire, 2012). Liberia has begun to allow Côte d'Ivoire to extend its electric system across the border into Nimba County. Electricity poles and lines have been installed from the Ivoirian border, through Ganta, and into Saclepea. Power lines have not yet been run to individual homes or businesses in Saclepea, but Saclepeans anticipate being able to purchase Ivoirian electricity within the year.

### *Savings and finance*

Saclepea has no formal bank. Small loans are available through some businesses and organizations, but interest rates are extremely high. No long-term loans are offered, and the duration of available loans is so short the loans are often useless. Saclepeans who would start or expand businesses face these hurdles to financing initial or additional capital. Corruption in

the loan market exaggerates the hurdles. There is, therefore, a financing gap in Saclepea that could be filled by an organization – business or NGO – offering affordable and fair microcredit to would-be business owners.

A bank or other financial institution could also respond to a local market for savings opportunities. The success of the Women’s Center savings club is evidence not only that Saclepea has demand for savings plans but also that local opportunities for pooled savings investment and interest earnings exist.

### *Education*

One of the three stated goals of the Nimba County vision statement is that “all citizens of Nimba County will have access to education” (Nimba County Development Committee, 2008). As noted above, Saclepea has made strides to return its education system to pre-war standards, and by some measures, the current system has grown beyond the pre-war level, but the overall quality of educational opportunities available in Saclepea is so poor that it hampers development.

Unfortunately, schools do not seem to be on a trajectory of substantial improvement. We visited two private elementary schools in 2014 that had opened since 2011. These new schools do not differ much in quality from other schools we had visited. One encouraging difference, though, is that both of these newer schools offer a daycare program for children younger than typical school age. The daycare classes function much like daycare in the U.S., providing parents with a safe place to leave young children during the day. The children participate in constructive activities like music, story times, and structured physical education.

Young men and women in Saclepea want to learn. Even without attendance requirements, they crowd classrooms daily. But, textbooks are a rare find, and teachers without training in their subjects or in pedagogy are the norm. Many high school graduates are deficient in language and math skills, and they have little to recommend them for employment. The only two public (and affordable) colleges in Liberia are in Harper, in Maryland County, and in Monrovia, neither of which is within commuting distance from Saclepea. Most high school graduates, if they can afford tuition, cannot afford moving and living expenses. Fortunate students or graduates are taken as apprentices and taught a trade like carpentry, sewing, or commercial art. Others are offered positions as high school teachers, becoming yet another untrained educator.

A common observation among Saclepeans is that many high school graduates “roam around” or drive motorcycle taxis wishing for opportunities for higher education or training in a trade. Given better opportunities, more young Saclepeans could become contributors to the economic welfare of the city. Accordingly, Saclepea would benefit from regular teacher training, a trade school or technical college, or a four-year college in or near Saclepea.

### *Gender issues*

Saclepea’s economy suffers from a striking absence of females in education and in the workforce. Families seem stuck in a cycle that devastates the culture and economy: 1) in middle school, girls become pregnant and begin to drop out of school to care for children. 2) Children become an economic burden, and mothers trade sex for economic security. 3) These economically enslaved mothers have many children and cannot work to contribute to the local

economy or to pull themselves out of this cycle. 4) Young girls know they are financial burdens to their mothers and begin very early to sell themselves to alleviate that burden. 5) The cycle begins again for the next generation of girls.

Since Saclepea is without refrigeration, nursing mothers do not have the option of leaving their children with a caregiver. Thus, mothers of young children who would otherwise be able to work cannot leave home for extended periods. Almost half of Saclepea's labor force is incapacitated by unplanned, unwanted perpetual pregnancy.

Saclepea's Women's Center offers some hope of interrupting this cycle, but faster progress could be made with more forces dedicated to addressing gender issues in Saclepea. For example, offering night classes for young mothers may enable them to continue education they have missed due to pregnancy and motherhood.

#### *Postal service*

Saclepea is currently without a reliable means of shipping and receiving letters or packages from outside. A post office has been erected in Saclepea, but it is not yet operational. Residents hope to have access to local P.O. boxes in the near future. Meanwhile, some individuals and businesses have opened boxes at a post office in Ganta.

The Saclepea market depends on sales of goods brought in from Monrovia and cities in surrounding countries, but individual sellers routinely make long, dangerous trips across unpaved, potholed roads to gather goods. Merchants will benefit from privately or publicly provided delivery service to minimize the overall number of hours spent on the roads.

## **Current assessment**

### *Development plan*

The Nimba County Development Agenda was drafted in 2008 for implementation through 2012. Many of its goals have not yet been met. Still, with a couple of key exceptions – roads and education – Saclepea has progressed through both relief and rehabilitation and is on the cusp of significant development opportunities. Most current development efforts intentionally include local involvement; some even are spearheaded by local residents (e.g. church schools, the orphanage health center, and the Saclepea Women’s Center).

In 2012, President Johnson-Sirleaf appointed the Acting Superintendent of Nimba County, Hon. Teeko Tozay Yorlay, to be the Assistant Superintendent for Development of Nimba. In a press statement following his appointment, Yorlay thanked “the elders, women, paramount, clan and general town chiefs, statutory district superintendents, township and district commissioners, our development partners, international and local NGO’s, Civil Society Organizations, as well as the general public” and Nimba’s youth for past support of development in the county. He also called for the continued cooperation of “all [...] Nimbaians, development partners, local and international NGO’s, the CSO’s and CBO’s to support us, collaborate with us and cooperate with us every step of the way” in a renewed development effort in the county (Yorlay, 2012).

The evidence strongly suggests that the economy in Saclepea is, in fact, improving. While the quality of education has not made great strides, educational opportunities are expanding, especially for younger children. Saclepea’s domestic dispute cases are now tried under the authority of local caseworkers. Though the Saclepea Community Computer Center

has had a rocky beginning, the desire to make it work is still alive among the city's leaders. And perhaps most importantly, with improvements to infrastructure (roads and utilities), businesses face lower costs and higher prospects for growth. But, Saclepea is not fully out of the woods. If the city is to continue its transition from post-war recovery to development, all levels of government will need to work with inter-governmental organizations and NGOs to provide the appropriate amount of support while working toward giving local individuals and organizations increasing responsibility for local economic development. Table 2-2 summarizes progress that has been made, and the following section outlines recommended next steps.

#### *Recommended next steps for development*

Next steps in continuing development in Saclepea are two-fold: steps that should be taken by national and international organizations and those that should be locally concentrated. The national government, with help as necessary from the UN or other international organizations, should continue to focus on rebuilding Liberia's infrastructure, particularly roads. Adequate transportation throughout the country is absolutely necessary if Saclepea is to have viable access to other local markets and thus reach its full development potential. As roads are reconstructed, special attention should be given to involving, empowering, and employing local governments and individuals to insure that the projects are ordered by greatest local impact.

Saclepeans should direct their focus toward improving education and providing sources of microfinance to local entrepreneurs. School attendance should be enforced, and facilities

Table 2-2: Summary of development progress

AREA OF ANALYSIS	Pre-war (1980)	End of Civil War (2003)	Original Analysis (2012)	Current (2014)
	<i>GDP per capita</i> *: \$632	<i>GDP per capita</i> *: \$167	<i>GDP per capita</i> *: \$276	<i>2013 GDP per capita</i> *: \$299
<b>Schools</b>	adequate to meet Saclepea's demand and WAEC standards	effectively non-existent	14 schools but overcrowded and with undertrained teachers	At least 16 schools, problems from 2012 persist, but preschool now available
<b>Roads</b>	adequately maintained (2-3 hours to Monrovia)	totally destroyed	some progress but major routes not yet repaired (8 hours to Monrovia)	progress being made throughout Liberia, including on major routes (6 hours to Monrovia)
<b>Land Disputes</b>	harmony among tribes	major concern and cause of post-war violence	2 commissions to settle disputes; implementation not completed; short-term results are positive	situation has improved but is not resolved
<b>Healthcare</b>	accessible, sometimes inadequate	deteriorated	rehabilitated with aid from MSF; now government funded and locally staffed; better than pre-war	several workers from public health clinic quarantined during Ebola outbreak but returned to normal operation quickly
<b>Business</b>	dominated by business-savvy Mandingo tribe	nearly vanished; businesses burned; only fighters could trade	growing; one of Liberia's largest weekly markets; daily market and successful daily shops	continues to grow
<b>Electricity / Plumbing</b>	only wealthiest could afford	completely destroyed	only wealthiest can afford; electrification soon to be available from Côte d'Ivoire	power poles and electric lines throughout city but not yet run to homes or businesses
<b>Savings / Finance</b>	no banks; no formal savings or finance; limited availability of high-interest loans	limited financial support or micro-finance offered to former soldiers during reintegration	characterized by corruption; short-term, high-interest loans available; Women's Center offers savings	not observed in 2014
<b>Gender Issues</b>	traditional roles taught to young boys and girls; some polygamy; women generally uneducated; gender-based violence common	widespread gender-based violence; women uneducated and unemployed	still many unwanted pregnancies; women undereducated, economically enslaved; Women's Center works against these trends	authority to try civil cases of domestic violence has been transferred from the International Rescue Committee to local Saclepean women

\*Liberia's National GDP per capita in constant 2005 U.S. dollars, rounded to the nearest dollar (The World Bank, 2015b)

should be updated to accommodate demand. The DEO in Saclepea should work toward these improvements. Schools should commit to hiring qualified teachers or getting quality training for teachers currently in place. The presence of trained Peace Corps teachers in Saclepea should be exploited to provide mentorship or formal training to Saclepean teachers.

At first blush, Saclepea appears to have an excess demand for finance (borrowing). Many Saclepeans are even willing to borrow from individuals or enterprises with terms that include very high interest rates and very short payback periods. Others would borrow and invest if the cost of financing were not so high. However, the Women's Center savings club provides evidence that locally pooled savings can provide a viable source for microfinance to the benefit of both the borrowers and the lenders. Reliable, trustworthy, and stable financial intermediation, more than lack of funds, is what is largely absent in Saclepea. Saclepeans would benefit from more, and more reliable, financial intermediation opportunities.

### **Lessons learned from the Saclepea experience**

Our review of LED efforts in Saclepea has allowed us to draw several maxims that may provide useful guidance in other LED efforts, particularly those that follow a crisis.

*1) The necessary precursor to the LED efforts in Saclepea was strong external intervention.*

It was necessary for UNMIL, in coordination with the Liberian national government, to insure the peace by completing the disarmament and beginning the soldier reintegration program before other rehabilitation and development efforts could gain a foothold. This was an essential precondition to all that followed.



*2) The more successful rehabilitation efforts in Saclepea required the participation by and coordination of many external and local parties.*

The rebuilding of the schools is a good example, as this required the participation of the Liberian national government, international NGOs such as the Red Cross, UNHCR, and USAID, among others.

Furthermore, it is becoming increasingly clear that education in Saclepea needs continued external oversight. New schools are sanctioned by the local District Education Officer, but these new schools do not improve the level of education offered to Saclepean children. Liberia's ministry of education publishes rigorous standards, but these standards are not generally met by schools in Saclepea.

Lack of resources continues to be a complaint of educators, but better use of current resources would significantly improve educational outcomes. For example, students spend several days each week copying textbooks before they are taught the material; months of time during the school year would be saved if teachers would present material and teach students to take lecture notes rather than rely on copied textbooks. Teacher training should be offered and required across the school district so that changes like this one can be put into place.

*3) The greatest needs are addressed and hence the greatest impacts are had when rehabilitation efforts are conducted with input from and participation by local residents.*

UNMIL's initial road rebuilding efforts were primarily oriented to UNMIL's needs for access to its other centers of operation and only marginally improved and impacted the residents of Saclepea. It was only after local residents approached UNMIL with a cooperative plan to fix local roads that the children of Saclepea were able to get to schools in bad weather.

*4) Successful transition from rehabilitation to LED has involved relinquishing control to local residents after they have been properly trained and prepared.*

Medcins Sans Frontiers, an international NGO, re-established and directed the Saclepea Health Center immediately after the end of the war in 2003 and continued to run the Center until 2009. At that time, MSF deemed the Center capable of continuing without its assistance, with funding from the Liberian national government and operated by local personnel, which allowed MSF to withdraw without negative consequences.

The Saclepea Community Computer Center draws attention to the importance of the final clause of this lesson. LED requires that NGOs ultimately give control to local residents, but it is vital that NGOs not pull out too quickly. American NGO West Africa Crossroads Corporation (WACC) mentored Saclepeans as they organized and opened the community's first computer center. Within only a few months of the first opening of the SCCC, WACC left the local board and staff largely to their own devices. It soon became clear that SCCC board members were inexperienced, unskilled, and unprepared to manage the financial and human resources of the center. When problems began to surface, WACC remained hands-off, and the center's operation collapsed. This fate may have been avoided if WACC had offered more specific management mentoring prior to relinquishing all control of the center to local residents.

*5) Successful LED efforts have either originated with or transitioned to local control.*

The Saclepea Women's Center is a continued picture of success stemming from local involvement in LED. The Women's Center was established at the initiative of a strong local leader and has been successful due to local interest and support and because of interdependent (market based) business relationships with some international NGOs. The

Center has had marked success in areas that originated under local control: raising awareness of gender-based violence, providing opportunities to women for economic independence, and implementing a savings club. In 2014, the Center added legal services to its responsibilities when the IRC transitioned legal decisions in gender-related civil cases to the control of local Saclepeans. Having worked under IRC caseworkers for years, local leaders at the Women's Center are demonstrating positive results of a well-timed transfer of control from an international NGO to a local organization.

*6) Remaining rehabilitation issues in Saclepea will continue to threaten ongoing and future LED efforts until they are more fully resolved.*

The lingering need to fully resolve land disputes puts local business plans in limbo, at a minimum, and threatens new outbreaks of violence, in the worst case. This is one of the most serious issues for Saclepea and has the potential to overwhelm and completely derail other rehabilitation and LED efforts if it cannot be fully resolved. Resolution requires the participation of the national government or other outside parties; local parties, acting alone, cannot satisfactorily resolve land disputes.

In a similar, but less threatening vein, it will be difficult for LED efforts to successfully proceed in the absence of appropriate utility infrastructure. To some degree, the provision of utilities can proceed along with LED, but the continuing absence of the provision of adequate electrical service and sufficient water and sewer utility service will hamper all LED efforts, and particularly any medium to large scale industrialization.

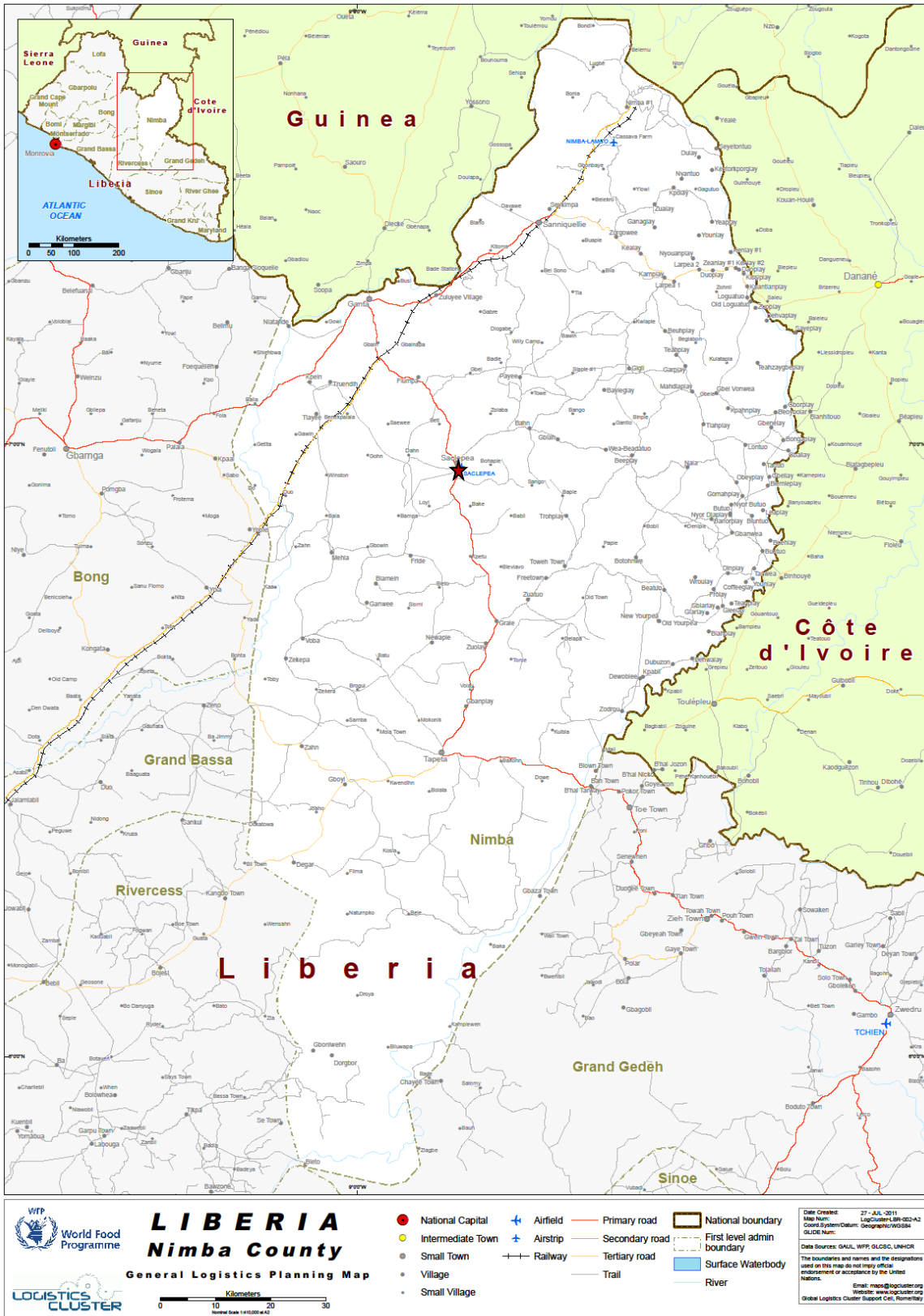
## Conclusions

In the eleven years since the end of Liberia's civil war, the process of restoring Saclepea's community and local economy serves as a useful case study of LED in rural Africa. Our discussion, summarized in Table 2-1, highlights how this case illustrates key themes from the LED literature.

Categorizing specific efforts and accomplishments into the stages of relief, rehabilitation, and development helps to define the appropriate roles of the various participants as well as clarify the optimal scope of the effort (Corbett and Fikkert, 2009). The case of Saclepea demonstrates the importance of collaboration among players from local government, local business, national government, international organizations, and NGOs as noted by both Corbett and Fikkert (2009) and Rogerson and Rogerson (2010). A few positive outcomes of particular note follow: the Women's Center has been built ground-up by local leaders; roads are being repaired through the national government's partnership with international organizations and some local participation; education is provided to Saclepean children with aid from NGOs, local business, and the national government; and Saclepea's Health Center was rebuilt by a French NGO but is now staffed by locals and funded by the Liberian national government. These successes are threatened by the lingering land disputes, slow provision of basic infrastructure, and the still somewhat fragile peace. Were tensions among various tribal groups to erupt in violence, either in Saclepea or surrounding communities, ongoing LED efforts could quickly be thwarted. Nevertheless, the prospects for sustainable development in Saclepea were much brighter in 2012 than they were at the

beginning of the peace in 2003 and were improving still in 2014; substantial progress has been made.

Figure 2-1. Map of Nimba County



[source: World Food Programme, 2011]

## Chapter III. Impacts of Child Soldiering Experiences on Education and Employment in Liberia

### Introduction

In 2003, Liberia, West Africa, finally saw the end of 14 years of civil conflict. The country was literally in pieces with only a fraction of its pre-war population remaining to struggle with picking up those pieces (Peace Direct, 2011). Of particular concern was the fact that nearly 70 percent of those combatants had been children (Integrated Regional Information Networks, 2003), and perhaps the most pressing issue facing the country was reintegration into society of the hundreds of thousands of Liberians, most of them children, who had been active combatants.<sup>3</sup>

Reintegrating children is a uniquely challenging task. Psychologist Klest (2014) reports that exposure to trauma during childhood is associated with a higher risk of adult trauma and trauma-related psychosocial issues, leading to lower income among adults who were victims of childhood trauma. Akbulut-Yuksel (2014) finds long-term negative impacts of war on education, health, and labor market outcomes for individuals who had been school-aged children in Germany during World War Two. Similarly, Akresh, Caruso, and Thirumurthy (2014) find adverse health outcomes for children exposed to the 1998-2000 conflict between Ethiopia and Eritrea.

Motivated by a desire to understand the most appropriate reintegration and development measures to employ in post-war Liberia and other countries with similarly violent

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<sup>3</sup> For a more complete history of Liberia's civil war, see Trussell, M., & Moore, R. (2012). Local economic development in Africa: The case of Saclepea, Liberia. *Journal of Sustainable Development in Africa*, 14(8), 15-33.

experiences, this paper seeks to answer questions of economic impact of child soldiering in Liberia.<sup>4</sup> Specifically, do former child soldiers experience lasting, negative impacts of war? Do they exhibit different post-war earnings than others, and if so, how do education, varying war experiences, or demographic characteristics affect these outcomes? The answers to these questions will be crucial in designing reintegration programs aimed at maximizing post-war success of former child soldiers.

## Background

The subject of child soldiering is relatively new to academic literature. In recent years, authors from an array of disciplines have addressed the impacts of soldiering on children's physical, social, and psychological development.<sup>5</sup> A few studies have addressed economic impacts of child soldiering, but even fewer existing studies – economic or other disciplines – have used statistical analysis. Instead, most use case studies of small samples to draw conclusions about effects of child soldiering. Studies that address education and employment are summarized below.

In three studies in West Africa, Chelphi-den Hamer (2010), Woodward and Galvin (2009), and Denov(2010) interview small groups of former child soldiers from Côte D'Ivoire, Liberia, and Sierra Leone, respectively. Chelphi-den Hamer's 21 subjects are interviewed during their

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<sup>4</sup> UNICEF (1997) defines *child soldier* as "Any person under 18 years of age who is part of any kind of regular or irregular armed force or armed group in any capacity, including but not limited to cooks, porters, messengers and anyone accompanying such groups, other than family members. The definition includes girls recruited for sexual purposes and for forced marriage. It does not, therefore, only refer to a child who is carrying or has carried arms."

<sup>5</sup> See, for example, Amone-P'Olak, Molemane Lekhutlile, Meiser-Stedman, & Ovuga (2014) and Vindevogel, Schryver, Broekaert, & Derluyn (2013).



participation in an NGO's reintegration program three to four years after their recruitment into war. She reports most of them had little interest in furthering their education or completing internships provided as part of the reintegration program. Woodward and Galvin interview only ten former soldiers, all of whom were refugees in Ghana. Their findings are opposite those of Chelpi-den Hamer with respect to former soldiers' desire to return to school or work. Their subjects express strong interest in education and employment but cite the dangers of returning to their homeland to seek opportunities for economic advancement. Denov's 76 subjects also reported difficulty finding jobs after war, even though many of them had received vocational training to compensate for war-interrupted education.

Özerdem and Podder (2011) conclude it is possible to improve outcomes for former child soldiers with reintegration programs designed with the children's war experiences in mind. They further posit that capitalizing on relationships formed during soldiering can lead to greater economic opportunities and outcomes for former child soldiers.

Finally, of particular relevance to this paper is Blattman and Annan's (2010) "The Consequences of Child Soldiering." These authors survey a random sample of 741 boys in Uganda and determine whether they were child soldiers or not. Though child soldiers are over-sampled, they include enough non-soldiers to form a suitable comparison group for econometric analysis. They use pre-war characteristics to control for selection bias, and they find that child soldiers have ten percent less schooling, are almost twice as likely to be illiterate, and are employed in lower quality jobs than non-soldiers. The authors further find that former soldiers who were involved in war for longer periods of time have less education and lower wages than other former soldiers or non-soldiers.

## Motivation

Much effort and funding are devoted yearly to rehabilitating post-war societies. Many programs aimed at such rehabilitation have mechanisms in place for evaluating their own effectiveness, but this paper steps back to examine overall results of post-war efforts in Liberia six years after the war's end. In light of previously cited literature that finds different outcomes for soldiers than for non-soldiers, it is particularly interesting to note whether collective recovery efforts have leveled the economic playing field for those who were directly involved in fighting factions and for those who were not. This analysis begins by examining post-war earnings of former child soldiers, former adult soldiers, and non-soldiers and subsequently delves into other outcomes that may be factors contributing to earnings differences. Earnings means in U.S. dollars (USD) indicate earnings are lowest for non-soldiers and highest for adult soldiers. Table 3-1 reports these means and shows results of several nonparametric tests for differences in monthly earnings among child soldiers, adult soldiers, and non-soldiers. Mann-Whitney (1947) tests whether two samples are drawn from identical random variables. The Epps-Singleton test measures similarities between empirical characteristic functions for two samples, and has been shown by Goerg and Kaiser (2009) to be a more powerful test than the Kolmogorov-Smirnov test, which looks for differences between two samples' cumulative distribution functions (Smirnov, 1948). Since Kolmogorov-Smirnov is more widely used than Epps-Singleton, both of these tests are included here.

Table 3-1. Group means and nonparametric tests<sup>†</sup>

Data	Monthly Earnings Mean	Means Test (unequal var)	Mann-Whitney Test	Epps- Singleton Test	Kolmogorov-Smirnov Test
Total Sample	50.39 [116.67] {1211}				
Child Soldiers (CS)	49.38 [68.10] {425}				
Adult Soldiers (AS)	55.25 [156.44] {557}				
Non-Soldiers (NS)	37.07 [57.12] {186}				
CS vs. NS		-2.31* (.0214)	-3.28** (.001)	11.91* (.0181)	.13* (.026)
CS vs. AS		.79 (.4284)	-.71 (.4757)	1.805 (.7715)	.06 (.291)
NS vs. AS		2.32* (.0207)	2.98** (.0029)	6.89 (.1418)	.13* (.022)

Standard deviations in brackets; number of observations in braces; p-values in parentheses;

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

<sup>†</sup>All tests are two-tailed.

With the exception of the Epps-Singleton test between non-soldiers and adult soldiers, all tests show that the differences in earnings between non-soldiers and either adult or child soldiers are significant with at least 95% confidence. All tests also conclude there is no statistically significant difference between earnings of adult and child soldiers.

Why do non-soldiers earn less than soldiers in post-war Liberia? Are differences in earnings driven by differing war experiences, differences in employment or education, or differences in demographic or geographic characteristics? The remaining analysis will help to answer these questions.

## Data

Innovations for Poverty Action (IPA) and the UN Peacebuilding Fund have been involved with Landmine Action (LMA) since 2009, conducting a reintegration program through which former child soldiers were trained in agriculture, counseled, and given supplies and assistance in order to reintegrate them into Liberian society. Individuals were chosen within Gbarpolu, Sinoe, Bong, and Nimba Counties (see Figure 3-1) and assigned either to receive LMA's reintegration treatment or not. Researchers conducted periodic surveys of a sample of these participants in a program evaluation effort. Their surveys include (but are not limited to) demographic data, military experience data, and education and employment data. In order to maintain good relationships with community members, recruitment into the LMA program was not limited to former child soldiers, and the survey participants include child soldiers, adult soldiers, as well as non-soldiers. All participants are at least 18 years old. These survey data are available upon request from the authors. (Blattman & Annan, 2011)

For this paper, the LMA program's entrance survey provides useful data. The dataset includes surveys given to 1211 individuals in 2009, six years after the war's official end and before participants began the LMA reintegration program. Using the entrance surveys, one may derive information about education and work status of former child soldiers and others six years after disarmament.

Summary statistics for the LMA data are reported in Table 3-2. Though all three soldier types and all four violence levels are listed in the summary table, non-soldiers and those who only witnessed violence are omitted from regression models to avoid perfect collinearity. LMA

Figure 3-1. Map of Liberia's counties



Source: PeacebuildingData.org (2011)

participants were specifically chosen from areas considered to be “at risk” for unrest. They were largely recruited from communities near rubber tree plantations or mining operations, and almost all LMA participants were employed in the week prior to being surveyed (Blattman & Annan, 2011). The 2010 Liberia Labour Force Survey reports male employment rates in Gbarpolu, Sinoe, Bong, and Nimba counties to be 91.1%, 40.7%, 76.2%, and 63.0%, respectively (Liberia Institute of Statistics and Geo-Information Services, 2011). There was a financial cost of participation in the LMA program, so LMA subjects all had at least the means to pay. The data contain region dummies, which indicate the counties from which subjects were recruited as well as whether a subject was recruited from a rural or urban area or from an area with a plantation or mine. These dummies can be used to control for some of the variation attributable to regional differences in war intensity as well as regionally dependent employment opportunities.

## **Methods**

The following analysis looks separately at five education and employment dependent variables: years of schooling, ability to read, ability to read well, employment status, and earnings (in USD). Years of schooling is estimated using an ordered logit model. Literacy and employment status are binary outcomes and are estimated using standard logit models. Finally, the log of earnings is estimated for employed subjects using standard OLS regression. Each model is estimated twice – once to estimate differences among child soldiers, adult

Table 3-2. Summary of data

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>Dependent Variables</i>					
read	1211	0.694467	0.460823	0	1
read well	1211	0.258464	0.437971	0	1
years of schooling	1234	5.666937	3.838974	0	16
job (=1 if employed)	1234	0.961913	0.191485	0	1
monthly income (USD)	1211	50.39487	116.666	0	2787.457
<i>Independent Variables</i>					
child soldier dummy	1177	0.361088	0.48052	0	1
adult soldier dummy	1177	0.473237	0.499496	0	1
non-soldier dummy	1227	0.158924	0.365755	0	1
perpetrated violence (VL1)	1162	0.301205	0.458979	0	1
experienced violence (VL2)	1162	0.541308	0.498505	0	1
witnessed violence (VL3)	1174	0.149915	0.35714	0	1
no violence (VL4)	1174	0.016184	0.126236	0	1
<i>Demographic Control Variables</i>					
health or physical problem	1234	0.445705	0.497245	0	1
female	1234	0.119125	0.324067	0	1
age at time of survey	1234	29.8517	7.727588	18	57
married	1234	0.80389	0.397214	0	1
number of children	1211	1.981007	2.163286	0	13
<i>Parents' Highest Level of Education</i>					
mother elementary	1140	0.199123	0.399516	0	1
mother junior high	1140	0.128947	0.335289	0	1
mother high school	1140	0.073684	0.261371	0	1
mother university	1140	0.014035	0.117687	0	1
father elementary	1040	0.530769	0.499293	0	1
father junior high	1040	0.450962	0.497829	0	1
father high school	1040	0.335577	0.472419	0	1
father university	1040	0.069231	0.253968	0	1
<i>Tribes</i>					
Gio	1211	0.052023	0.222165	0	1
Gola	1211	0.056978	0.231896	0	1
Kpelle	1211	0.32948	0.470219	0	1
Krahn	1211	0.017341	0.130593	0	1
Kru	1211	0.085054	0.279077	0	1
Mandingo	1211	0.023947	0.152948	0	1
Mano	1211	0.121387	0.326712	0	1
Sapo	1211	0.103221	0.304372	0	1
Other	1211	0.21057	0.407882	0	1
<i>Regions</i>					
Bong	1234	0.08752	0.282711	0	1
Gbarpolu: Less stable, non-mining	1234	0.057537	0.232959	0	1
Gbarpolu: Mining communities	1234	0.19611	0.397214	0	1
Gbarpolu: More stable, non-mining	1234	0.269854	0.444064	0	1
Nimba: More rural	1234	0.077796	0.267959	0	1
Nimba: More urban	1234	0.073744	0.26146	0	1
Sinoe: More rural, non-plantation	1234	0.145057	0.352301	0	1
Sinoe: More urban, non-plantation	1234	0.012156	0.109625	0	1
Sinoe: Plantation communities	1234	0.080227	0.271754	0	1

soldiers, and non-soldiers and again to estimate differences among individuals who experienced different levels of violence during the war.<sup>6</sup> The form of each model is shown below. Vectors are indicated in bold type. Included in the soldiering status models in the vector  $\mathbf{X}_1$  are the variables *ChildSoldier* and *AdultSoldier*, indicators equal to one if a participant is a child soldier or adult soldier, respectively; non-soldiers are the omitted category. In each violence level model,  $\mathbf{X}_1$  is a vector of indicator variables used as measures of differing war experiences among former soldiers and non-soldiers. These variables are defined as violence levels 1, 2, 3, and 4 (VL1, VL2, VL3, VL4, respectively) and assigned in the following way: 1) perpetrated violence, 2) experienced violence, 3) witnessed violence, and 4) none of the above. Based on his responses to survey questions about war experiences, each participant (soldier or not) is assigned to exactly one violence level such that anyone who perpetrated violence is in class one, anyone who did not perpetrate violence but who experienced violence is in class two, anyone who witnessed violence but was neither a victim nor a perpetrator is in class three, and all others are in class four.<sup>7</sup> In each model, the VL4 indicator is omitted to avoid perfect collinearity.

Control variables included in the vector  $\mathbf{X}_2$  are gender, age at the time of the survey, age at the time of the survey squared, marital status, number of children living at home, an indicator for reported health problem or physical impairment, dummy variables representing

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<sup>6</sup> A correlation matrix including these variables and dependent variables is included in Appendix A, Table A1.

<sup>7</sup> Relaxing the mutual exclusivity requirement on violence levels does not change the results presented in this paper.



Table 3-3. Recruitment regions

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Bong
Gbarpolu: Less stable, non-mining
Gbarpolu: Mining communities
Gbarpolu: More stable, non-mining
Nimba: More rural
Nimba: More urban
Sinoe: More rural, non-plantation
Sinoe: More urban, non-plantation
Sinoe: Plantation communities

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tribes with which participants identify, and dummy variables for levels of mom’s and dad’s educational attainment.<sup>8</sup> All standard errors are clustered within regions of recruitment into the LMA program. These regions are listed in Table 3-3. The vector  $\mathbf{X}_{12}$  is only included in the soldiering status models and contains interaction terms between variables in  $\mathbf{X}_1$  and variables in  $\mathbf{X}_2$ . Tribe and parents’ education levels are not given interaction terms because doing so too finely subdivides the sample.

*Ordered logit model for years of schooling*

$$\ln(O_{y=i}) = \beta_0 + \mathbf{X}_1\boldsymbol{\beta}_1 + \mathbf{X}_2\boldsymbol{\beta}_2 + \mathbf{X}_{12}\boldsymbol{\beta}_{12} \quad (3-1)$$

The variable  $O_{y=i}$  is the odds that the years of schooling ( $y$ ) equals  $i$ .

$$O_{y=i} = \frac{\sum_{y=0}^i p_y}{\sum_{j=i+1}^{19} p_j}, \quad (3-2)$$

where  $p_k$  is the proportion of the population with  $k$  years of schooling. The value recorded for years of schooling is based on individuals’ reported level of school completed and can be zero if

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<sup>8</sup> Parents’ education dummies are used as a proxy for one’s own education. Appendix B provides an analysis of the relationship between one’s own years of schooling and his earnings.

a subject never attended school or can extend from preschool ( $y=1$ ) through four or more years of university ( $y=19$ ). Subjects were asked what grade they were in when they stopped going to school. Thus, a partial year of schooling is recorded as a full year.

*Logit models for literacy and employment*

$$\ln\left(\frac{\pi(y)}{1-\pi(y)}\right) = \beta_0 + X_1\beta_1 + X_2\beta_2 + X_{12}\beta_{12} \quad (3-3)$$

The dependent variables ( $y$ ) modeled using this equation are *read*, *read well*, and *job*. The value of  $\pi(y)$  is the probability that variable  $y$  is equal to 1. The variable *read* is equal to one if a participant reported that he is able to read English either a little bit or very well.<sup>9</sup> It equals zero if he reported he cannot read English at all. The variable *read well* is equal to one if a participant reported that he is able to read English very well. It equals zero if he reported he reads English only a little bit or cannot read English at all. The variable *job* is equal to one if a participant reported positive usual monthly earnings. It equals zero otherwise.

*OLS model for workers' earnings*

$$\ln(earn) = \beta_0 + X_1\beta_1 + X_2\beta_2 + X_{12}\beta_{12} \quad (3-4)$$

The variable *earn* is a participant's reported usual monthly earnings in USD. This model is applied only to those who report positive earnings.

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<sup>9</sup> English is the national language of Liberia, and all classes in school are conducted in English. Many tribal languages are also spoken by Liberians.

## Results

### Soldiering status models

Tables 3-4 through 3-8 show all statistically significant coefficients of the models that include soldiering status dummies, and Table 3-9 shows Wald test statistics for equality of coefficients for child soldiers and adult soldiers.<sup>10</sup> For all logit or ordered logit models, the tables report odds ratios, the exponentiated coefficients. A reported ratio less than one for a given independent variable should be interpreted as a negative relationship between that variable and the dependent variable; likewise, a ratio greater than one indicates a positive relationship. A dagger or double dagger in Tables 3-4 through 3-8 indicate that an interaction term is jointly significant with the coefficient for the soldiering status variable or the other interacted variable, respectively.<sup>11</sup>

Soldiering status alone does not significantly affect any of the regressed dependent variables. Soldiering experience does affect employment and education outcomes through interaction with other variables; however, as evidenced by the lack of any significance in Table 3-9, adult and child soldiers do not differ significantly from each other. Thus, for much of the remainder of this paper, the term soldier will be used to refer to both adult and child soldiers.

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<sup>10</sup> Full models including insignificant variables are included in Appendix A, Table A2.

<sup>11</sup> Results of these significance tests are included in Appendix A, Table A3.

Table 3-4. Job model, statistically significant coefficients only

VARIABLES	logit job
Child soldier (CS)	6.54 (35.537)
Adult soldier (AS)	3.72 (19.614)
Non-soldier (NS)	-
Female	0.15 (0.160)
Female × CS	2.60 <sup>††</sup> (4.314)
Female × AS	0.57 <sup>‡</sup> (0.900)
Observations	833

Coefficients are exponentiated and presented as odds ratios.  
Exponentiated robust standard errors in parentheses.

<sup>†</sup>The sum of the interaction term coefficient and the coefficient on CS or AS significantly different from zero at a 95% level.

<sup>‡</sup>The sum of the interaction term coefficient and the coefficient on the variable that is listed first in the interaction term's name is significantly different from zero at a 95% level.

Table 3-5. Earnings model for employed subjects,  
statistically significant coefficients only

VARIABLES	OLS ln(earn)
Child soldier (CS)	-0.36 (0.914)
Adult soldier (AS)	-0.17 (0.714)
Non-soldier (NS)	-
Age at time of survey (Age)	0.15** (0.044)
Age × CS	0.02 <sup>‡</sup> (0.039)
Age × AS	0.01 <sup>‡</sup> (0.028)
<u>Tribes</u>	
Kpelle	-0.32* (0.121)
Kru	-0.30* (0.120)
Mandingo	-0.73* (0.280)
Observations	950
R-squared	0.09
Adj. R-squared	0.06

Robust standard errors in parentheses.

\*\* p<0.01, \* p<0.05

<sup>‡</sup>The sum of the interaction term coefficient and the coefficient on the variable that is listed first in the interaction term's name is significantly different from zero at a 95% level.

Table 3-6. Model of ability to read at all, statistically significant coefficients only

VARIABLES	logit read
Child soldier (CS)	3.19 (3.050)
Adult soldier (AS)	1.37 (1.570)
Non-soldier (NS)	-
Health or Physical problem (HPprob)	1.06 (0.624)
HPprob × CS	0.60 <sup>‡</sup> (0.295)
HPprob × AS	0.60 (0.366)
Female	0.64 (0.198)
Female × CS	0.49 <sup>‡</sup> (0.232)
Female × AS	0.43 <sup>‡</sup> (0.242)
Age at time of survey (Age)	0.99 (0.089)
Age × CS	0.98 <sup>†</sup> (0.039)
Age × AS	1.03 <sup>†</sup> (0.024)
<u>Parents' education</u>	
Dad elementary	1.48* (0.265)
Dad high school	2.48** (0.707)
<u>Tribes</u>	
Gio	1.94* (0.635)
Kru	1.64*** (0.215)
Mano	4.21*** (0.923)
Observations	972

Coefficients are exponentiated and presented as odds ratios.  
Exponentiated robust standard errors in parentheses.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

<sup>†</sup>The sum of the interaction term coefficient and the coefficient on CS or AS significantly different from zero at a 95% level.

<sup>‡</sup>The sum of the interaction term coefficient and the coefficient on the variable that is listed first in the interaction term's name is significantly different from zero at a 95% level.

Table 3-7. Model of ability to read well, statistically significant coefficients only

VARIABLES	logit read well
Child soldier (CS)	1.28 (1.288)
Adult soldier (AS)	0.84 (0.553)
Non-soldier (NS)	-
Health or Physical problem (HPprob)	2.37** (0.722)
HPprob × CS	0.24***† (0.076)
HPprob × AS	0.30***† (0.094)
Married	1.76 (0.946)
Married × CS	1.40† (0.970)
Married × AS	0.87 (0.610)
<u>Parents' education</u>	
Dad elementary	2.17*** (0.488)
Dad junior high	0.50** (0.117)
Dad high school	1.90** (0.435)
<u>Tribes</u>	
Kpelle	0.81* (0.087)
Mano	3.64*** (0.859)
Constant	0.01** (0.014)
Observations	947

Coefficients are exponentiated and presented as odds ratios.

Exponentiated robust standard errors in parentheses.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

†The sum of the interaction term coefficient and the coefficient on CS or AS significantly different from zero at a 95% level.

‡The sum of the interaction term coefficient and the coefficient on the variable that is listed first in the interaction term's name is significantly different from zero at a 95% level.

Table 3-8. School years model, statistically significant coefficients only

VARIABLES	ologit school years
Child soldier (CS)	1.42 (1.295)
Adult soldier (AS)	1.15 (0.972)
Non-soldier (NS)	-
Health or Physical problem (HPprob)	1.88 (0.682)
HPprob × CS	0.34***† (0.117)
HPprob × AS	0.42***† (0.148)
Female	0.52* (0.161)
Female × CS	0.69‡ (0.365)
Female × AS	0.45‡ (0.234)
Married	1.41 (0.486)
Married × CS	1.07‡ (0.551)
Married × AS	1.26‡ (0.477)
<u>Parents' education</u>	
Dad elementary	1.70*** (0.250)
Dad junior high	0.65** (0.088)
Dad high school	1.91*** (0.260)
Dad university	1.77* (0.510)
<u>Tribes</u>	
Gio	2.51** (0.701)
Mano	3.91*** (0.546)
Observations	972

Coefficients are exponentiated and presented as odds ratios.

Exponentiated robust standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

†The sum of the interaction term coefficient and the coefficient on CS or AS significantly different from zero at a 95% level.

‡The sum of the interaction term coefficient and the coefficient on the variable that is listed first in the interaction term's name is significantly different from zero at a 95% level.



Table 3-9. Wald tests for equality of coefficients from soldiering status models

VARIABLES	(1) logit job ( $\chi^2$ )	(2) OLS ln(earn) (F)	(3) logit read ( $\chi^2$ )	(4) logit read well ( $\chi^2$ )	(5) ologit school years ( $\chi^2$ )
CS, AS	0.01 (0.9285)	0.10 (0.7640)	0.25 (0.6171)	0.11 (0.7348)	0.10 (0.7463)
HPprob × CS, HPprob × AS	0.01 (0.9289)	0.62 (0.4529)	0.00 (0.9715)	0.43 (0.5135)	2.27 (0.1319)
Female × CS, Female × AS	2.35 (0.1256)	3.10 (0.1163)	0.07 (0.7973)	0.10 (0.7567)	0.59 (0.4420)
Age × CS, Age × AS	0.01 (0.9103)	0.41 (0.5386)	1.12 (0.2892)	0.25 (0.6187)	0.28 (0.5985)
Married × CS, Married × AS	0.00 (0.9509)	1.31 (0.2860)	0.00 (0.9658)	0.58 (0.4451)	0.17 (0.6795)
Children × CS, Children × AS	0.18 (0.6721)	1.60 (0.2421)	0.76 (0.3828)	1.44 (0.2301)	2.43 (0.1193)

P-values in parentheses.

### *Effects through health or physical problems*

Significant interaction terms on Tables 3-6 through 3-8 reveal that health problems affect former soldiers differently than non-soldiers and that the effect of soldiering is different for those with disabilities than for those without health problems. Non-soldiers who reported having a health problem or physical disability are more than twice as likely to be able to read well than those who have no such problem. In contrast, former soldiers with persistent health problems are less likely to be able to read well than others. Child soldiers with disabilities even are less likely to be able to read at all than subjects without disabilities. In the schooling model, the coefficient for health problems is only significantly different from zero when the health problem variable is interacted with a soldier variable, and the coefficients indicate that soldiers with health problems attended significantly less schooling than others. On the flip side of the same coin, the interaction terms in both the read well model and the schooling model are also jointly significant with soldiering status variables. Thus, having been a soldier decreases odds of being able to read well and decreases the number of years of schooling achieved by one who has a disability.

A possible differentiation to explain these trends is severity of the health or physical problem. One who has a less severe health problem may pursue more education as a means of compensating for a physical setback. On the other hand, one whose injuries or health problems are more severe may be unable to attend school. It is reasonable to assume former soldiers may have more severe health problems than non-soldiers since their disabilities are more likely due to physical or psychological damages from battle.

### *Effects through gender*

Females fare worse than males, and for most outcomes, these results are amplified for former soldiers. In general, females attend fewer years of schooling than males. None of the female soldiers in the dataset were high school graduates, nor could any female child soldiers read well. Though non-soldier females do not differ significantly from males in either the job model or the read model, female soldiers do differ from males. Female soldiers are less likely to be able to read at all than males, and being female decreases an adult soldier's odds of having a job. Interestingly, though, being a female child soldier makes one more likely to be employed than any other category of soldier or non-soldier.

Since many female soldiers were victims of sexual violence during Liberia's war, it is possible they were psychologically unprepared to return to school after the war. Many of them also may have become pregnant as a result of their abuse, and motherhood is a significant barrier to gaining education or employment. These explanations are consistent with former girl soldiers' higher likelihood of employment than adult female soldiers since the younger girls would have been less likely to become pregnant. In addition, it is plausible that a female child soldier who was able to survive the war would have better odds of employment than other females. She could have been stronger prior to her war experiences than other women, and soldiering could have helped her develop skills and networks that would translate to better post-war job opportunities.

Why female child soldiers would have better odds of employment even than males is puzzling. Evidence from the psychology and criminology literatures on resiliency after victimization may shed some light on this finding. Gilligan (1993) writes that adolescent girls

develop and maintain more social connections than boys, a trend that Belgrave, et al. (2000) posit improves resiliency among girls. It certainly makes sense that a former girl soldier's connections with others who fought could positively influence her ability to gain employment after the war. In addition, Marsh, Evans, and Weigel (2009) find that resiliency models for males differ from models for females in that presence of formal, protective social constructs such as family, school, and supportive peer groups are linked to improvement in male resiliency but are not linked to female resiliency. Having lost these formal support structures during Liberia's war may have a more negative impact on men's ability to reintegrate and find jobs than on women's.

#### *Effects through birth cohort*

Age at the time of the survey – more precisely, one's birth cohort – affects one's earnings differently for child soldiers than for adult soldiers. Among employed participants, those who were older at the time of the survey had higher earnings, and this effect is slightly larger for soldiers than for non-soldiers. Figure 3-2 provides a visual representation of these differences.<sup>12</sup> The child and adult soldiers' lines are truncated to include only those birth cohorts that would have been the appropriate ages during the war to fit those soldiering categories. Earnings are quadratic in age for all soldiering types, but since the average age at

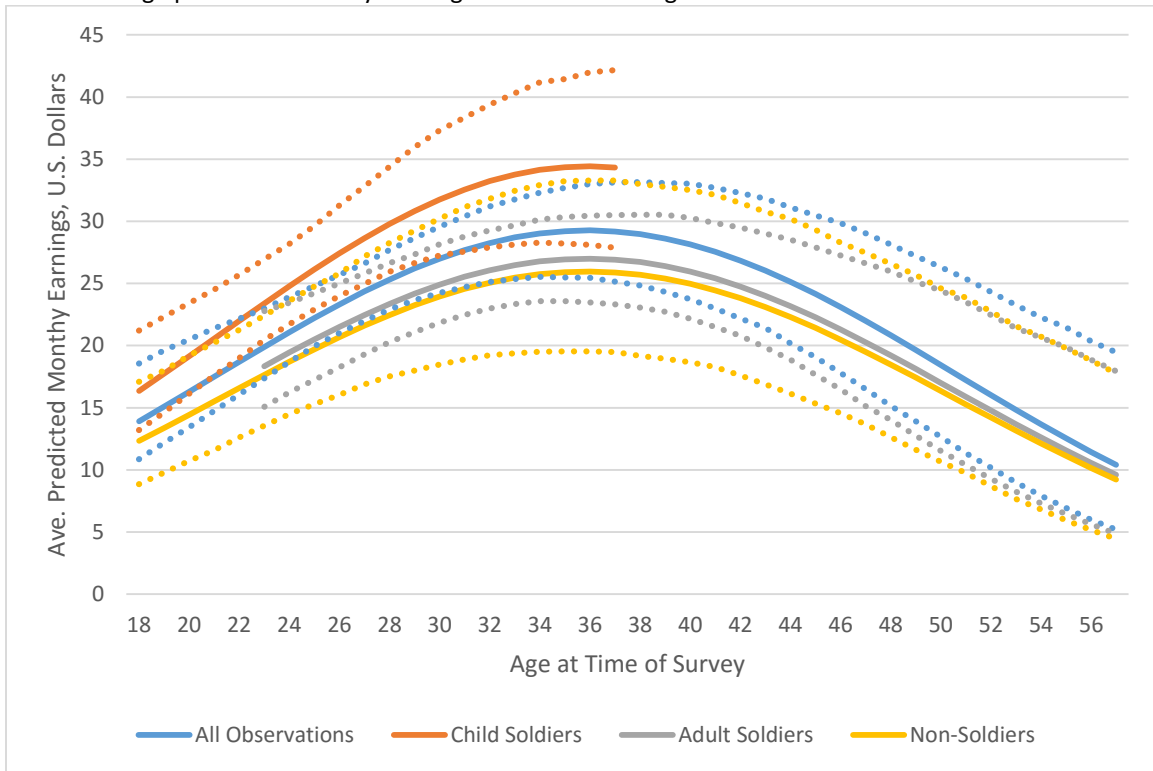
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<sup>12</sup> Predicted monthly earnings for each age in Figure 3-2 are generated by replacing all observations' age and soldiering status with the desired values and predicting the average monthly earnings using coefficients from the earnings model shown in Table 3-5. Thus, for each age and soldiering status, we have a prediction of average monthly earnings supposing all members of the sample were that age and status but varied on other control characteristics as they do in the actual sample. Figures throughout the remainder of this paper are constructed similarly.

the time of the survey is 29, it is clear that most subjects have not reached the peak of the curves in the figure and that the average participant's earnings truly do increase with age as indicated by the age coefficient on earnings in Table 3-5. Figure 3-2 also illustrates a steeper earnings increase with age for soldiers – particularly for child soldiers – than for non-soldiers, and it shows a widening of the earnings gap among soldiering groups at the peak of the curve. Confidence intervals for the groups overlap across the entire curve, so whether these gaps are statistically significant is not clear in the figure. However, performing t-tests across categories for each year of age in the figure reveals that child soldiers' earnings are significantly higher than adult soldiers' earnings for the cohorts who were ages 24 through 36 at the time of the survey.

The difference between earnings within a given age group for child and adult soldiers is likely explained by the fact that comparing a child soldier at a specific age to an adult soldier at that same age is to compare soldiers after different amounts of elapsed time since the war. For example, consider a soldier who was 15 years old at the end of the war in 2003 compared with a soldier who was 20 years old at the end of the war in 2003. Figure 3-2 compares the earnings of these soldiers when both are the same age, say 25. But, at 25, the child soldier has had 10 years to reintegrate into post-war society, while the adult soldier is 25 years old only 5 years after the war. It makes sense, then, that the soldier who is further removed from the war would have higher earnings. Higher earnings for child soldiers could also stem from their being taught during their formative years to follow orders of superiors or to be leaders among peers or from an additional strength required to become and survive as a child fighter in a war.

Figure 3-2: Average predicted monthly earnings as a function of age



Bootstrapped 95% confidence intervals shown with dotted lines.

### *Effects through marriage and children*

Married soldiers attended more school than others, and married child soldiers are more likely to be able to read well than other subjects. These coefficients may, in fact, be measuring reverse causality.<sup>13</sup> School affords opportunities to meet others in the marriage market, and more skills and education may make an individual a more attractive, more economically advantageous choice for a mate. If these explain why married people have had more years of

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<sup>13</sup> Indeed, using seemingly unrelated regression to solve the school years equation together with an equation with marriage as the dependent variable and years of schooling as independent causes the coefficient on marriage in the school years model no longer to be significant while the reverse relationship is significant.

schooling, it is possible that education could have a larger marriage effect for former soldiers, who may have innate or learned qualities that make them both better soldiers and better mates.

### *Effects of other control variables*

Among control variables are several other characteristics that have significant effects on education and employment. Tables 3-4 through 3-8 show only those variables with statistical significance for at least one of the outcome variables. A full table including all control variables is presented in Appendix A, Table A2.

Participants' outcomes are tied to their parents' education levels. Parents' education level dummies are ordinally defined, so the coefficient for each level represents the difference seen in the dependent variable when a parent's education improves from one level below. All whose moms or dads attended university were employed at the time of the survey. Their fathers' educational attainment has statistically significant implications for survey respondents' own education outcomes. Those whose fathers at least attended elementary school are 1.5 times as likely to be able to read and twice as likely to be able to read well as those whose fathers attended no school. These effects are partially cancelled when fathers attended junior high unless those fathers also attended high school. Those whose fathers attended high school are 2.4 times as likely to be able to read and almost twice as likely to be able to read well as those whose fathers stopped in junior high. These literacy trends are likely related to similar results in the years of schooling model. Those whose fathers at least attended elementary school attended almost 1.7 times the school years of those whose fathers did not attend

school; those whose fathers went on to junior high attended 36% less school than those whose fathers only attended elementary school; but, if a father went to high school, his child had almost twice as many school years as one whose father stopped in middle school.

Furthermore, an individual whose father went to university attended 1.77 times more school than one whose father went to high school but not university.

It is not surprising that parents with higher levels of education would have encouraged their children also to become more educated nor that these families' children would be more successful in finding jobs. But, why should children have better outcomes when their fathers stopped in elementary school than when their fathers attended junior high school? These results may indicate that fathers who stopped school before junior high felt limited and instilled in their children a desire to achieve more education, while fathers who dropped out in junior high may have had enough education economically to survive and thus may not have felt their children needed more. Interestingly, Figures 3-3 and 3-4, which show trends in earnings as a function of parents' education, seem to confirm that children of parents who stopped in junior high school did not choose badly when they also stopped school early. Their predicted earnings, in fact, appear higher than any other group, although the differences between earnings for those whose mothers or fathers have no education and earnings in any other parents' education category are not significantly different from zero for any soldiering type. Moreover, in these figures, the only statistically significant differences in earnings across soldiering category are for those whose mothers have no education and for those whose fathers have no education. For those levels of parents' education, child soldiers have significantly higher earnings than adult soldiers.



Figure 3-3: Average predicted monthly earnings as a function of mother's education

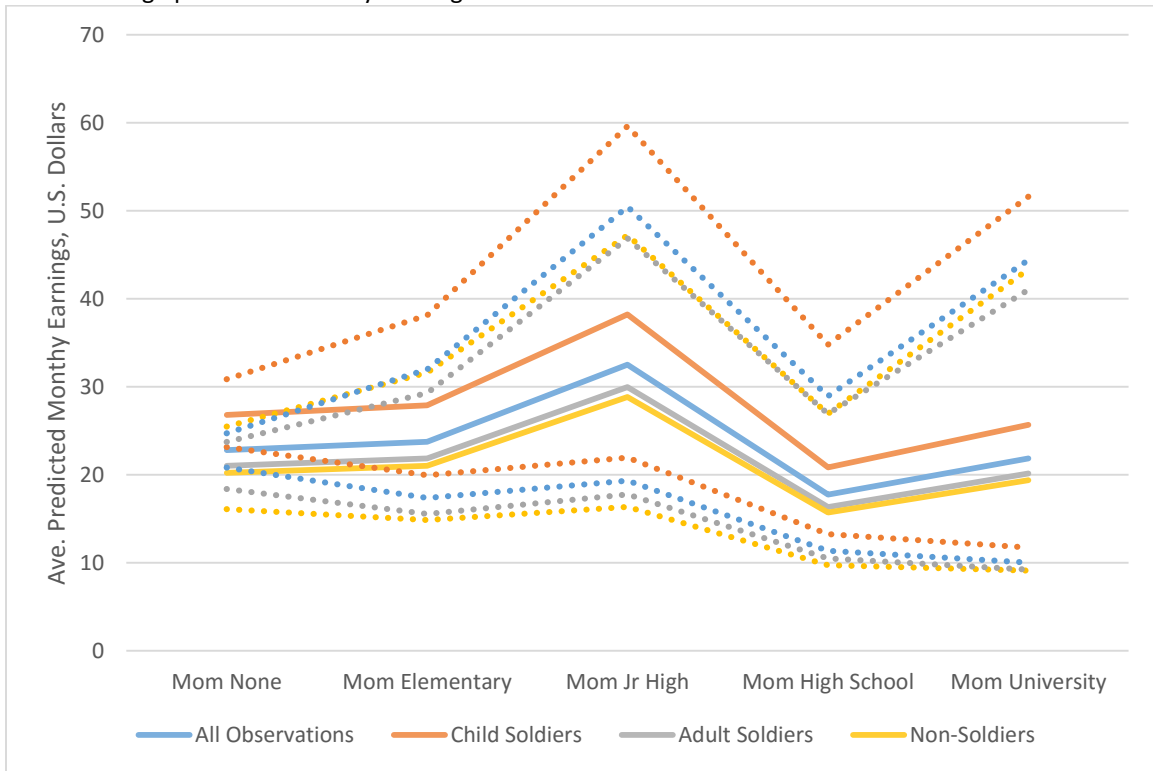
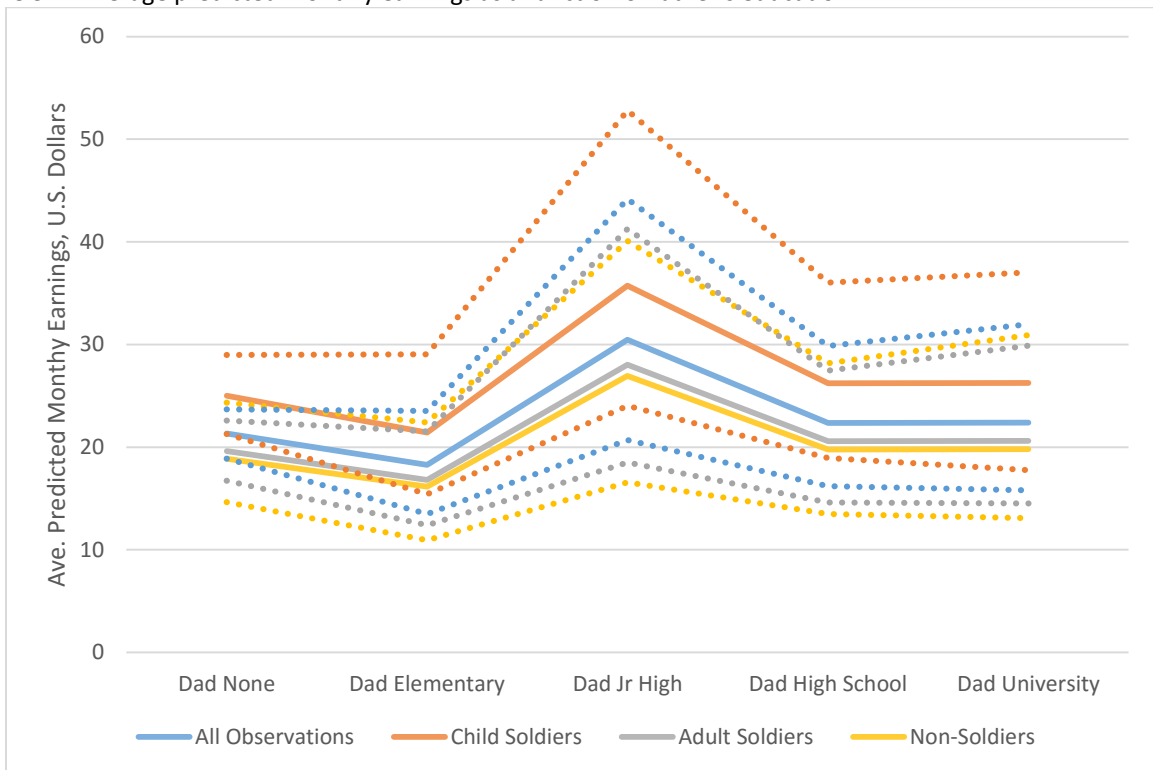


Figure 3-4: Average predicted monthly earnings as a function of father's education



Bootstrapped 95% confidence intervals shown with dotted lines.

In addition to the demographic and family variables discussed above, dummy variables for tribe affiliation are included as controls in all models. Liberia's war was fueled by tribal tensions; thus, it is plausible that one's tribe may affect his or her post-war outcomes. The war was primarily fought by the Krahn and Mandingo tribes on one side and the Gio and Mano tribes on the other. Members of other tribes were split between these two couplings (O. Toway, personal communication, 2014). Exact explanations for the tribal dummy results in Tables 3-4 through 3-8 are unclear, but it is interesting to note that of the primary four fighting tribes, the only statistically significant negative outcome is for Mandingos, whose workers earn significantly less than other workers. But, though they have lower earnings, all Mandingos in the sample reported positive earnings. Similarly, Gios were all wage earners at the time of the survey, and they reported having attained more schooling than other tribes as well as being more likely to read than other tribes. Manos fared better across all literacy and education measures than other tribes. The only tribe not in the primary four to have a significantly positive result are the Kru, who are more likely than other tribes to be able to read.

To further explore this relationship between tribe and post-war outcomes, all models are recalculated with two new tribe indicator variables – one for each side of the war, combining the major tribes who fought together. The omitted tribal variable is a pooled variable for members of all tribes other than the major four. Only 50 observations belong to the Mandingo-Krahn side of the war, so the models are estimated once more with all four major tribes combined. The coefficients and standard errors for these variables' impacts on each dependent variable are in Table 3-10. Combining tribes in this way more clearly shows the impact of having been in one of the major tribes. Survey participants on the Mano-Gio side are

Table 3-10. Coefficients on combined major tribe variables.

MODEL	Independent variables		
	Mano-Gio	Mandingo-Krahn	Major Tribes
logit job	1.28 (0.401)	1.07 (0.367)	1.23 (0.323)
OLS ln(earn)	-0.04 (0.200)	-0.17 (0.186)	-0.06 (0.173)
logit read	2.82*** (0.540)	0.88 (0.300)	2.07*** (0.359)
logit read well	3.06*** (0.710)	0.93 (0.288)	2.49*** (0.659)
ologit school years	3.47*** (0.665)	0.89 (0.324)	2.66*** (0.648)

Coefficients for logit and ologit models are exponentiated and presented as odds ratios.

Robust standard errors in parentheses, exponentiated for logit and ologit models

\*\*\* p<0.001

more likely than members of non-major tribes to be able to read or to read well and had attended more years of school at the time of the survey. These effects remain significant when all four major tribes are combined. All coefficients for the Mandingo-Krahn variable are statistically insignificant, which is not surprising with such a small proportion of the sample representing those tribes.

One possible explanation of these strong tribe results is that the tribes who played major roles in the war may have been stronger before the war and have maintained some dominance after the war. It is also plausible that the war may have intensified tribalism or feelings of brotherhood among the major tribes, and these strengthened bonds may have led to greater networking and educational or employment opportunities within those tribes.

Table 3-11. Violence level models, violence level coefficients only

VARIABLES	(1) logit job	(2) OLS ln(earn)	(3) logit read	(4) logit read well	(5) ologit school years
Perpetrated violence (VL1)	2.90 (1.613)	0.41 (0.347)	3.13 (2.544)	1.85 (1.721)	1.40 (0.403)
Experienced violence (VL2)	2.18 (2.126)	0.41 (0.401)	3.73 (2.564)	1.63 (1.549)	1.34 (0.353)
Witnessed violence (VL3)	2.25 (2.711)	0.27 (0.325)	3.06 (1.846)	1.33 (1.153)	1.43 (0.328)
No violence (VL4)	-	-	-	-	-
Observations	821	937	959	959	959
R-squared		0.08			
Adj. R-squared		0.06			
Wald test for VL1=VL2	$\chi^2 = 0.25$	F = 0.00	$\chi^2 = 1.36$	$\chi^2 = 0.29$	$\chi^2 = 0.09$
Wald test for VL1=VL3	$\chi^2 = 0.08$	F = 1.00	$\chi^2 = 0.01$	$\chi^2 = 0.80$	$\chi^2 = 0.01$
Wald test for VL2=VL3	$\chi^2 = 0.00$	F = 0.37	$\chi^2 = 1.01$	$\chi^2 = 1.05$	$\chi^2 = 0.14$

Coefficients for logit and ologit models are exponentiated and presented as odds ratios.

Robust standard errors in parentheses, exponentiated for logit and ologit models

## Violence level models

In addition to looking at effects of soldiering status or age, it is also interesting to ask whether level of involvement in the war affects outcomes. With this analysis, it is possible to consider effects of violent war experiences even for those who were never officially part of a fighting faction, and these results may contribute to an understanding of why non-soldiers have lower earnings than soldiers. Table 3-11 shows results for violence level coefficients when all subjects are pooled and violence level indicators are included as independent variables. The full models' results are given in Appendix A, Table A5. Violence level coefficients are not significant in any of the models.

Since only 19 subjects encountered no violence during the war, the omitted category in the violence level models represented in Table 3-11, the models were also estimated after

dropping those subjects. The new omitted category was VL3, those who witnessed violence but neither experienced it personally nor perpetrated it. Still, all coefficients in these models are insignificant, but there is evidence in these models that those who perpetrated violence are less likely to be able to read English than those who experienced it personally but did not perpetrate violence. No other models show a significant difference between these groups.

## **Discussion**

The motivation section of this paper presented the curious result that earnings for non-soldiers are lower than earnings for former adult or child soldiers. The analysis that followed shows that after controlling for characteristics other than soldiering status, this difference in earnings disappears. But, the models do not give much direction for determining avenues through which the earnings differences may be occurring. Birth cohort is shown to affect earnings, but non-soldiers' mean age at the time of the survey falls between the mean ages of former child soldiers and former adult soldiers. Thus, birth cohort is unlikely to explain the earnings difference between non-soldiers and soldiers. Tribe, on the other hand, could have an effect. Non-soldiers are slightly more likely than soldiers to identify with the tribes shown in the earnings model to have lower earnings than other tribes.

A little further investigation reveals that although only about 4% of the sample are high school graduates, former soldiers are more likely to have high school diplomas than non-soldiers.<sup>14</sup> A simple OLS regression of log earnings on high school graduation with errors

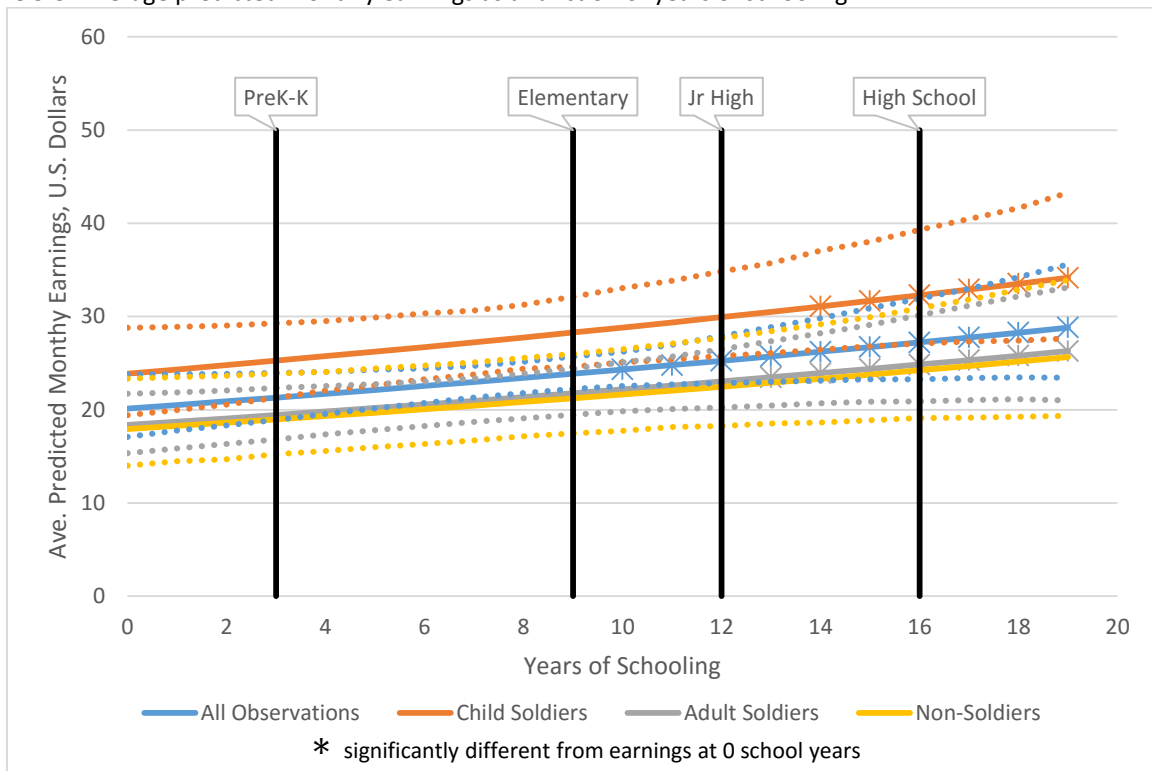
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<sup>14</sup> A logistic model of high school graduation is shown in Appendix A in table A2.

clustered around region shows that, in fact, high school graduates earn significantly more per month than non-graduates. Though groups do not differ significantly in school attainment overall, soldiers' coefficients are positive in the school years model. This difference may be because of innate or learned personality differences, post-war reintegration aid, or support networks formed during the war that benefit soldiers after the war. Soldiers in this dataset are less likely to have been refugees outside Liberia, and among refugees, soldiers' average time outside the country was half that of non-soldiers; thus, social networks are less likely to have been interrupted for soldiers than for non-soldiers, and soldiers may have been able to return to school sooner after the war than non-soldiers since they were not removed from the country.

Figure 3-5 shows the relationship between years of schooling and earnings using a log-earnings model that includes school years as an explanatory variable in place of parents' education. For each value of school years and for each soldiering status, the figure reports a prediction of average monthly earnings supposing all members of the sample had that value for school years and had that soldiering status. Participants vary on other control characteristics as they do in the actual sample. Observing the relationships of earnings and education in this way, child soldiers' earnings are significantly higher than adult soldiers' earnings over the range of one to sixteen years of schooling, and child soldiers' earnings are higher than non-soldiers' earnings from two to fourteen years of schooling. Adult soldiers' earnings are never significantly different from non-soldiers' earnings. There is also evidence that more years of schooling contributes to higher earnings. For the total sample, beginning at ten years of schooling, earnings are significantly higher than earnings for those with no schooling.

Figure 3-5: Average predicted monthly earnings as a function of years of schooling



Bootstrapped 95% confidence intervals shown with dotted lines.

For child soldiers, this difference begins to be significant at fourteen years, and for adult soldiers, the difference becomes significant at thirteen years. For non-soldiers, earnings never become significantly different from earnings with no education.<sup>15</sup>

Taken together, the positive coefficients for soldiers in the schooling regression and the finding that more school translates to higher earnings for soldiers but not for non-soldiers are quite likely indicative of a mode through which soldiers become higher earners than non-soldiers. Perhaps soldiers' additional schooling, increased odds of graduating, and higher

<sup>15</sup> For more on the relationship of school years and earnings, see Appendix B.

return on schooling either increase their earnings or indicate other qualities about soldiers (e.g. willingness or ability to learn) that lead to their higher earnings.

All told, the results presented above indicate that the war in Liberia had different effects on soldiers than on non-soldiers but that the effects for soldiers do not differ largely between those who fought as children and those who fought as adults. Moreover, contrary to intuition or to findings in previous studies, the lasting effects for former soldiers do not, in sum, seem to be negative. Though health problems or physical disabilities have more negative education impacts for soldiers than non-soldiers, after controlling for other relevant variables, former soldiers' employment outcomes are at least as good as non-soldiers, and in terms of returns to schooling, former soldiers are better off than non-soldiers.

### **Limitations**

A substantial limitation of this and any study of child soldiering is selection bias. Children who experienced more violence during the war may possess other characteristics that are different from children who experienced less violence during the war. Variables commonly shown in wage equations to account for differences in wages are included here to control for this bias as much as possible. Tribal affiliation is also included as a proxy for success or failure in the war or in post-war society in case members associated with particular tribes are more or less likely to have positive outcomes after the war.

A second type of selection bias, selection into the LMA reintegration program, may weaken the external validity of this study. The sample is not completely random. LMA data includes participants only from Gbarpolu, Sinoe, Bong, and Nimba Counties. Large populations



from each county were allowed to register for consideration in the LMA program, and a restricted sample were chosen to participate based on survey responses (Lundberg, Blattman, & Annan, 2010). Chosen participants had not received prior reintegration aid (Landmine Action, 2012), most of them were employed prior to participation in the LMA program, and all of them were able to find means to pay to participate. The subjects included in the dataset may either be 1) those with greater drive to succeed, which would underestimate outcomes or 2) those with greater need for assistance, which would overestimate outcomes. This analysis would be improved if use of a truly randomly generated sample of child soldiers could be obtained.

As Blattman and Annan (2010) point out, attrition may also affect data accuracy. Child soldiers with greater capacity to succeed may survive war in disproportionate numbers and bias data toward underestimating the effects of child soldiering, particularly among those former soldiers who experienced more violence. However, for purposes of informing reintegration, understanding effects of child soldiering on those who survive is of primary concern. This paper does shed light on those effects.

Finally, time is a certain factor in a study of this nature. The LMA data used here were collected five to six years after the civil conflict's end. The same questions asked in a different time frame relative to the war may yield different results. This analysis cannot predict outcomes for former child soldiers immediately after war nor in a more distant future.

## Implications and Conclusion

Finding that war experiences have more negative (or at least equally bad) effects on labor market outcomes for non-soldiers than for soldiers certainly is not expected, but it is neither unreasonable nor uninteresting. Liberia's civil wars were long and resulted in widespread devastation throughout the country. Before war's end, schools were closed, businesses were lost, and entire towns and their infrastructure were destroyed (Trussell & Moore, 2012). It is no surprise that only a small fraction of participants in the LMA dataset had not at least witnessed violence during the war, regardless of formal participation in a faction. The findings reported above indicate that a war as long and brutal as Liberia's leaves no one unaffected. Variation in effects of differing war experiences are small enough that most existing differences are not statistically significant with 95% confidence. The good news is that child soldiering itself has no significant, long-lasting negative effects on education and employment. Lingering negative effects of soldiering apply primarily to those who have persistent health or physical problems.

These results are underscored by findings in Chapter 4 of this dissertation, in which a new sample of Liberians participated in an experiment to measure trust and trustworthiness. Non-soldiers were found to be less trusting than either adult or child soldiers, a trait that can lead to worse economic outcomes for those individuals.

For policymakers, this means efforts to rehabilitate soldiers after Liberia's war were "successful" in that former soldiers do not have worse outcomes six years post-war than those who were not part of fighting groups. But, policymakers also should note that in many cases, and particularly when it comes to earnings, those who were not formally part of the fighting

have worse outcomes than those who were, which indicates non-soldiers may benefit from reintegration aid that previously has been offered only to soldiers. Policies aimed at rehabilitation and development after such a war should be broad enough to include all whose lives were affected, regardless of their soldiering status.

## Introduction

The Coalition to Stop the Use of Child Soldiers (2008) found 19 conflicts worldwide that involved child soldiers<sup>16</sup> between April 2004 and October 2007. The Coalition's report also notes that tens of thousands of former child soldiers were released from combat between 2004 and 2008. The tragedy of child soldiering, however, continues long past the end of armed conflict. Post-conflict societies are faced with the daunting task of reintegrating into regular life children who have experienced unspeakable physical, emotional, and psychological trauma.

Issues faced by children after such a traumatic event are often more severe than effects experienced by adults. Psychologist Klest (2014) finds a higher risk of trauma and trauma-related psychosocial issues among adults who were victims of childhood trauma. Those adults are also found to have lower incomes. Akbulut-Yuksel (2014) examines individuals who had been school-aged children in Germany during World War II and finds long-term negative impacts of the war on education, health, and labor market outcomes. Similarly, Akresh, Caruso, and Thirumurthy (2014) find adverse health outcomes for children exposed to the 1998-2000 conflict between Ethiopia and Eritrea.

The literature also suggests one of the lasting effects of child soldiering is an inability to trust others (O'Callaghan, Storey, & Rafferty, 2012). In addition, economists agree trust

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<sup>16</sup> UNICEF (1997) defines *child soldier* as "Any person under 18 years of age who is part of any kind of regular or irregular armed force or armed group in any capacity, including but not limited to cooks, porters, messengers and anyone accompanying such groups, other than family members. The definition includes girls recruited for sexual purposes and for forced marriage. It does not, therefore, only refer to a child who is carrying or has carried arms."

deficiencies can have significant implications for economic activity and outcomes (Arrow, 1972). Thus, as policymakers attempt to reintegrate former soldiers into post-conflict society, it is important they consider potential trust issues.

The flip-side of the trust coin is trustworthiness. This paper takes an experimental approach to understanding both trust and trustworthiness among former child soldiers in the West African country of Liberia with the goal of informing reintegration efforts. The experiment and subsequent analysis seek to answer three questions: 1) Do former child soldiers exhibit different trusting or trustworthy behaviors than others? 2) Do trusting or trustworthy behaviors of former child soldiers depend on the intensity of their war involvement? and 3) Do Liberian subjects behave differently than Americans in investment game experiments?

## **Background**

The country of Liberia, in West Africa, was founded in the 1840s by former slaves who had been freed and sent back to West Africa from the United States (Liberianlaw.com, n.d.). These former slaves and their descendants became known in Liberia as Americo-Liberians. In addition to its citizens with Americo-Liberian roots, Liberia has a large population with a rich tribal history. While members of Liberia's tribes have coexisted peacefully throughout most of the nation's history, tribal tensions in the 1980s led to fourteen years of brutal, nationwide civil war.<sup>17</sup> (BBC, 2012)

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<sup>17</sup> For a more detailed account of the history of Liberia's civil wars, see Trussell and Moore (2012).

The experiment in this paper takes place in Saclepea, Liberia, in the county in which the civil war began. Prior to the war, Saclepea was home to relatively large groups from three tribes, two on one side of the conflict and the third on the other side; thus, its culture and economy were significantly disrupted by the fighting. In fact, Saclepea became a training ground for child soldiers during the war and has yet to recover from effects of the conflict. (Trussell & Moore, 2012)

When the war ended, the Liberian government, with support from the U.N. and other international organizations, organized a nationwide disarmament and reintegration program. In all, the program recorded 101,495 individuals who had been involved in the conflict and were disarmed through the program (Agència Catalana de Cooperació al Desenvolupament, n.d.). Records show that 70% of Liberians who had taken part in the fighting were children (Integrated Regional Information Networks, 2003).

## **Literature Review**

### *Role of Trust and Trustworthiness in Economic Decision-making*

The implications of trust and trustworthiness, or reciprocity, for economic development is a topic of much research. This research is based on decades of non-experimental studies linking trust with economic activity. Knack and Keefer (1997) use surveys to measure both trust and cooperation and compare the survey results from 29 countries with economic growth in those countries. They find significantly higher growth rates in countries with more trust and cooperation. Zak and Knack (2001) produce a general equilibrium model that shows higher levels of investment in more trusting countries, and Guiso, Sapienza, and Zingales (2004, 2008,

2009; as cited in Fehr, 2009) show implications of trust for international trade as well as for microeconomic behavior of individuals in markets.

Cox (2004) finds that identifying trust and reciprocity requires disentangling these from other motivations for trust acts or trustworthy acts. Fehr (2009) also casts doubt on the existing literature's ability to establish a causal relationship between trust or cooperation and economic outcomes. Both Cox and Fehr acknowledge the likelihood that such a relationship exists and provide some avenues for testing for the relationship. This paper seeks to determine whether trust-related outcomes may differ between former child soldiers and others in post-war Liberia. Trusting or trustworthy behavior identified here may involve motivations other than trust or reciprocity themselves, and the terms *trust* and *trustworthiness* are used throughout the paper to encompass any motivations that lead to trust acts or trustworthy acts.

### *Effects of Child Soldiering on Trust Behavior*

While trust is not a central element of previous papers on child soldiering, several authors list it among factors to be considered when working with former soldiers and child soldiers. Child Psychologists O'Callaghan, Storey, and Rafferty (2012, p. 88) examine the existence and effects of Post-Traumatic Stress Disorder in former child soldiers in Uganda, and they list "loss of trust" as one of several possible effects of child soldiering. Dickson-Gómez (2002), an anthropologist, interviews four former child soldiers in El Salvador and concludes these children were deprived of formation of basic trust, which may be a reason for their choosing to join conflict. Loss of trust among child soldiers is a theme even among literary scholars and novelists (Moynagh, 2011). On the other hand, Jareg (2005) notes that distrust

among former child soldiers can be reduced through appropriately designed reintegration programs.

Cassar, Grosjean, and Whitt (2013) use the same investment game experiment used in this paper to assess lasting impacts of civil war on subjects' trusting and trustworthy behaviors. They work with individuals in Tajikistan several years after the end of the Tajik civil war. They observe subjects' trusting behavior in the investment game and administer a survey that is used to assign each participant either as a victim or non-victim. Victimization is defined as being personally injured during the war or having a family member killed or injured during the war. The authors specifically examine effects on trust within one's own village compared to effects when dealing with individuals from distant villages. They find that those who were victims of violence are less trusting toward their own community members than toward those in other villages but that their bonds within their own kinsmen are stronger than for those who did not experience violence. This study does not specifically focus on child soldiers, but as a robustness check, the authors reduce their sample to only those who were younger than 14 during the war, and they find that the pattern of effects of victimization persists and that the magnitude of these effects is larger on those individuals.

### *Effects of Child Soldiering on Education and Labor Outcomes*

Most existing studies of child soldiering focus not on economic impacts but on physical, social, and psychological impacts or political and legal ramifications of the practice, and almost all of these studies use anecdotal or case study approaches, rather than statistical analysis (see, for example, Betancourt et al., 2010; Breen, 2007; Klasen, et al., 2010; Rosen, 2010). A few



authors have touched on education and employment topics in their analyses. No studies were found that had explored these topics experimentally.

In her book *Youngest Recruits: Pre-war, War & Post-war Experiences in Western Côte D'Ivoire*, Chelpi-den Hamer (2010) reports findings from her interviews of 21 male and female child soldiers. She focuses on children who take part in an NGO post-war reintegration program, and she interviews them three to four years after their military recruitment. She finds mixed labor-market results for her interviewees. Most had no desire to go back to school, and upon follow-up a year after her initial interviews, Chelpi-den Hamer found few of her subjects were still in apprenticeship positions provided them by the reintegration program.

With a similar descriptive style and still without a comparison group of non-soldiers, Woodward and Galvin (2009) interview ten former Liberian child soldiers who, at the time of the interviews, were refugees in a camp in Ghana. In contrast to Chelpi-den Hamer's findings, all of Woodward and Galvin's ten interviewees expressed keen interest in returning to school and becoming employable. They highlight the difficulty of finding work for refugees. Many of their former soldiers were not legally classified as refugees, making employment hard to obtain in their host country, and most of them faced the reality that returning home to Liberia to find work would be incredibly dangerous after having deserted their soldiering units.

Denov (2010) interviews 36 boys and 40 girls in Sierra Leone and finds a significant impact on former soldiers of a war-torn national and local economy. A battered, post-war economy is particularly burdensome for child soldiers, who face considerable disadvantage in employment because their education was interrupted by war. The boys and girls, though many of them received vocational training, cited lack of available paying jobs as their primary reason

for not working. Denov does not include a comparison group against which to test effects of war on child soldiers, nor does she consider reverse effects of child soldiering on the economy.

Özerdem and Podder (2011) compile essays on child soldiering in their book *Child Soldiers: From Recruitment to Reintegration*. They emphasize the importance of tailoring reintegration programs to children based on their recruitment and war experiences. They find that maintaining ties formed during soldiering can improve post-war economic outcomes. In fact, the very act of joining war may, itself, be an economic decision for many children.

Blattman and Annan (2010) offer the first econometric analysis of child soldiers in the context of a relevant comparison group. They start with a random sample from a World Food Programme list of households in Uganda, and they survey 741 boys from that sample. They divide the boys into categories of *abducted* – former child soldiers – and *non-abducted* – children who did not take part in fighting; the former group is oversampled. Controlling for selection bias by including several pre-war characteristics for each boy, they find abducted children, on average, have ten percent less schooling than non-abducted and are “nearly twice as likely to be illiterate than nonabductees” (p. 889). Further, Blattman and Annan find that while abducted and non-abducted boys have similar employment rates, non-abducted youth perform significantly higher quality work than abducted youth. These authors also explore psychosocial outcomes associated with child soldiering in Uganda.

## **Experimental design and protocol**

### *Setting*

Saclepea, Liberia, has fewer than 20,000 residents and is located 375 kilometers from Monrovia, the nation's capital city (Trussell & Moore, 2012). Figure 3-1 in Chapter 3 shows a map of Liberia with Saclepea's location marked. Once per week, Saclepea hosts one of Liberia's largest outdoor markets, where clothing, household supplies, food, and other products are sold. In the center of town, small shops are open daily to sell food, clothing, electronics, and household items on a much smaller scale than the weekly market. Saclepeans buy and sell using both U.S. Dollars (USD) and Liberian Dollars (LD).

During parts of the war, education, healthcare, and economic activity were nonexistent in the city (Trussell & Moore, 2012). Saclepeans now have access to a public health clinic, and schools and businesses have resumed operation, but effects of the war are still felt in Saclepea. Economic growth has been hindered by slow rebuilding of infrastructure that was destroyed during the war. Homes and businesses lack electricity, plumbing, and reliable transportation. Liberia's schools have not caught up with other West African schools, and in Saclepea, effects of child soldiering further dampen education outcomes. Child soldiers have attained lower levels of education, and they face limited job opportunities (O. Toway, personal communication, September 20-21, 2011).

The experiment in this paper was conducted under the auspices of the Saclepea Women's Center in Saclepea, Liberia, and the experiment took place using the Center's facilities. The Center is centrally located in the city. It is run by local women and exists to fight

gender based violence and to empower women economically (Trussell & Moore, 2012). The women graciously allowed full use of the building for conducting this experiment.

### *Recruitment*

Subjects were recruited by the city mayor's office and by members of Refuge Baptist Church, a congregation that is active in the area and highly regarded by Saclepeans.

Recruitment was done by word of mouth and through a series of ads on the local radio station.

To control for the possibility of gender or age effects, only men between the ages of 22 (12 years old at war's end) and 35 (11 at war's beginning; 25 at war's end) were recruited. This word-of-mouth recruitment has potential to bias results, since the likelihood of choosing to participate could vary systematically across treatment groups. However, since forcing subjects to participate is unethical and unacceptable, random sampling is not possible for a study of this type.

At the recruitment stage, subjects came to the Women's Center to participate in a short interview that elicited the extent of their war experiences (see Appendix C). The recruitment interviews were conducted by the experimenters, not by volunteer recruiters. Subjects were not told the purpose of the experiment, so they had no incentive to falsify war experience information in the recruitment interview. At the time of recruitment, individuals were told that participation in the experiment would guarantee them at least 300 LD (approximately \$4 USD) and give them a chance to earn up to 2000 LD (approximately \$25 USD) more. Two versions of a bill before the Liberian legislature in 2013 would require a national minimum daily wage of \$6.40 or \$7.20 USD (Legislature of Liberia, 2013); thus, the experimental payoffs are deemed

economically significant amounts. Each subject who completed the recruitment process and qualified to participate in the experiment was given an appointment to return to the Women's Center for one of ten experimental sessions in the following two weeks.

The recruitment interview was used by the experimenters to sort subjects into four groups: child soldiers (CS), adult soldiers (AS), non-soldiers (NS), and mixed (M). During the experiment, a participant was considered a child soldier if and only if he reported having joined a warring faction or militia before age 18. Non-soldiers, however, must fall completely outside the UNICEF definition of child soldier; he or she must not have been "part of any kind of regular or irregular armed force or armed group in any capacity" (UNICEF, 1997). Adult soldiers joined a warring faction or militia after age 18. Category R contains all three types of subjects.

### *The Experiment*

On the day of the experiment, participants first played the standard investment game developed by Berg, Dickhaut, and McCabe (1995). The game involves a first mover (FM) and a second mover (SM), each with an initial endowment of 500 LD. The FM may choose to pass any amount of his endowment (0-500 LD) in increments of 50 LD to the second mover, after which thrice the amount chosen by the FM will be given to the SM. The SM then chooses to return to the FM any amount (from zero to all) in increments of 50 LD from what the SM received from the FM. The SM is instructed not to pass to the FM any of the SM's initial endowment. This game was chosen over other trust games because of the relative simplicity of play, minimizing issues of misunderstanding that could occur in a subject pool that may contain illiterate or less

Table 4-1. Groupwise pairings for investment game

Group	FM	SM
1	Child Soldiers (CS)	Mixed (M)
2	Non-soldiers (NS)	Mixed (M)
3	Adult soldiers (AS)	Mixed (M)
4	Mixed (M)	Child soldiers (CS)
5	Mixed (M)	Non-soldiers (NS)
6	Mixed (M)	Adult soldiers (AS)

educated participants. The 50 LD unit of divisibility was chosen so that FM subjects' choices would be integers from 0 to 10, as in previously administered versions of this experiment.<sup>18</sup> Subject instructions were adapted from those used by Cox (2004) in the investment game portion of his paper.

FMs and SMs were paired according to Table 4-1, with approximately 30 pairs participating in each experimental group. The mixed category included a mix of participants from each soldiering status, and individuals from this mixed group were used as pairs for subjects in the homogeneous groups so that each player has a chance of being paired with someone in the same category as himself or with someone from either of the other categories. This mixed pairing design is necessary so that any differences in first mover behavior between groups would not restrict observation of another group's choices as second mover. For example, if child soldiers were only paired with non-soldiers and child soldiers were found never to send any of their first-mover endowments, it would be impossible to measure non-soldiers' second-mover behavior. In the analysis of results, a participant from the "mixed"

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<sup>18</sup> See, for example, Berg, Dickhaut, and McCabe (1995) and Cox (2004).

experimental category is included as a child soldier, adult soldier, or non-soldier, depending on his reported war experiences.

Before the game began, FMs and SMs gathered in one room to be fully informed of the game, so each would know both his own choices and the choices of the other player. Subject instructions were read by a local Saclepean so there would be no issues with understanding experimenters' American accents. Then, players were separated into two waiting rooms, from which each player was called into a separate room to be informed of his role in the game and to make his decision privately, with only the experimenter.

The experimenter reviewed the game tasks and answered any questions the subject may have had about the game in the private room before a subject was asked to make his decision. A FM was then given an envelope with his initial endowment, or a SM was given his initial endowment and an envelope containing triple the amount passed to him by the FM. The subject was then asked to make his decision by placing in a second envelope the amount he wished to pass to the other player. Each subject played only once, and the experiment and payoffs were single-blind. Neither player in a pair was given any information about the other player. Subject instructions for the game are included in Appendix D.

After playing the game, participants privately completed an interview (see Appendix E) in which subjects were asked to answer questions about their soldiering experiences and, to improve policy relevance, to describe any previous participation in reintegration programs that may have impacts on their trusting or trustworthy behaviors. The post-game interview also included demographic questions. Evidence suggests an increased likelihood of illiteracy among former child soldiers, so all surveys and instructions for this experiment were administered

orally in English, which is Liberia's national language and the language of instruction in Liberian schools.

### *Record Keeping*

Record keeping is one of the more challenging aspects of conducting an experiment in a developing country with limited access to electricity, computers, and the internet. For recruitment and participation on the day of the experiment, subjects were asked to verify their identities with photo IDs. Two local women were hired to assist in identifying participants who did not have photo IDs. These same two women were present at each experimental session to ensure no subjects were allowed to participate more than once.

### **Conjectures**

The following conjectures are based on the literature that shows worse economic outcomes for former child soldiers and studies that indicate lack of trust may be a common characteristic among former child soldiers. Groups are referenced from Table 4-1.

#### *Conjecture A: Group 1 vs. Group 2*

As FMs, former child soldiers will exhibit less trusting behavior (pass less of their endowments) than non-soldiers.

#### *Conjecture B: Group 4 vs. Group 5*

As SMs, former child soldiers will exhibit less trustworthy behavior (return less of what is passed to them) than non-soldiers.



*Conjecture C: Group 1 vs. Group 3*

Former child soldiers will exhibit less trusting behavior as FMs than other soldiers.

*Conjecture D: Group 4 vs. Group 6*

Former child soldiers will exhibit less trustworthy behavior as SMs than other soldiers.

**Results**

*Child soldiers vs. other Liberian groups*

Child soldiers (CS) are compared with both other groups of subjects: adult soldiers (AS), and non-soldiers (NS). Non-soldiers are also compared with adult soldiers. For this analysis, child soldiers are any subjects who report having joined a faction or militia in any capacity younger than the age of 18. Non-soldiers are subjects who report never having been part of a fighting faction or militia. Adult soldiers are those who report having joined a faction or militia in any capacity when they were 18 years old or older. Descriptive statistics for each group of subjects are reported in Table 4-2, and histograms of first mover and second mover decisions are shown in Figures 4-1 and 4-2.

Table 4-3 shows results of nonparametric comparisons of group means and distributions. Means are reported as mean number of 50 LD notes passed by first movers and as mean percent returned by second movers from the tripled number of notes they received. Mann-Whitney (1947) tests the likelihood that two samples are drawn from identical random variables. Mann-Whitney results are reported since the test is capable of dealing with ties, which the data certainly include since subjects have a limited number of certificates with which to make their choices. Epps-Singleton test results, which measure similarities between

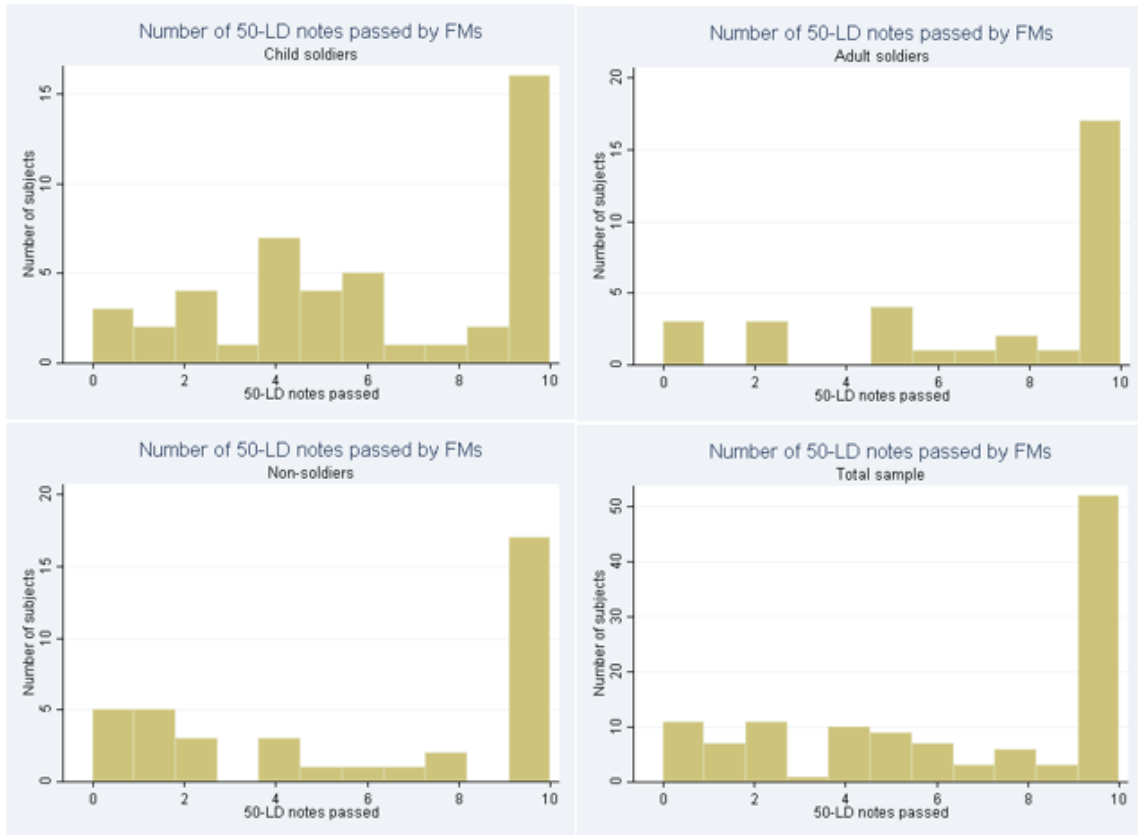
Table 4-2. Descriptive Statistics

All Observations					
Variable	Obs	Mean	Std. Dev.	Min	Max
Child soldier dummy	235	0.370	0.484	0	1
Other soldier dummy	235	0.238	0.427	0	1
Non-soldier dummy	240	0.383	0.487	0	1
Age joined war	143	16.448	4.868	4	31
FM amount sent	120	6.458	3.741	0	10
SM amount returned	120	10.075	10.183	0	30
SM percent returned	109	0.529	0.373	0	1
Age at experiment	233	29.996	5.869	19	50
Months fought	240	20.133	36.416	0	180
Reintegration program participation	144	0.521	0.501	0	1
HS grad	240	0.308	0.463	0	1
Worked last week	240	0.454	0.499	0	1
Child Soldiers					
Variable	Obs	Mean	Std. Dev.	Min	Max
Child soldier dummy	87	1	0	1	1
Other soldier dummy	87	0	0	0	0
Non-soldier dummy	87	0	0	0	0
Age joined war	87	13.345	2.765	4	17
FM amount sent	46	6.174	3.466	0	10
SM amount returned	41	8.683	10.039	0	30
SM percent returned	35	0.496	0.381	0	1
Age at experiment	87	29.368	4.668	19	39
Months fought	87	36.509	42.605	0	168
Reintegration program participation	86	0.453	0.501	0	1
HS grad	87	0.276	0.450	0	1
Worked last week	87	0.425	0.497	0	1

Table 4-2. Descriptive Statistics, continued

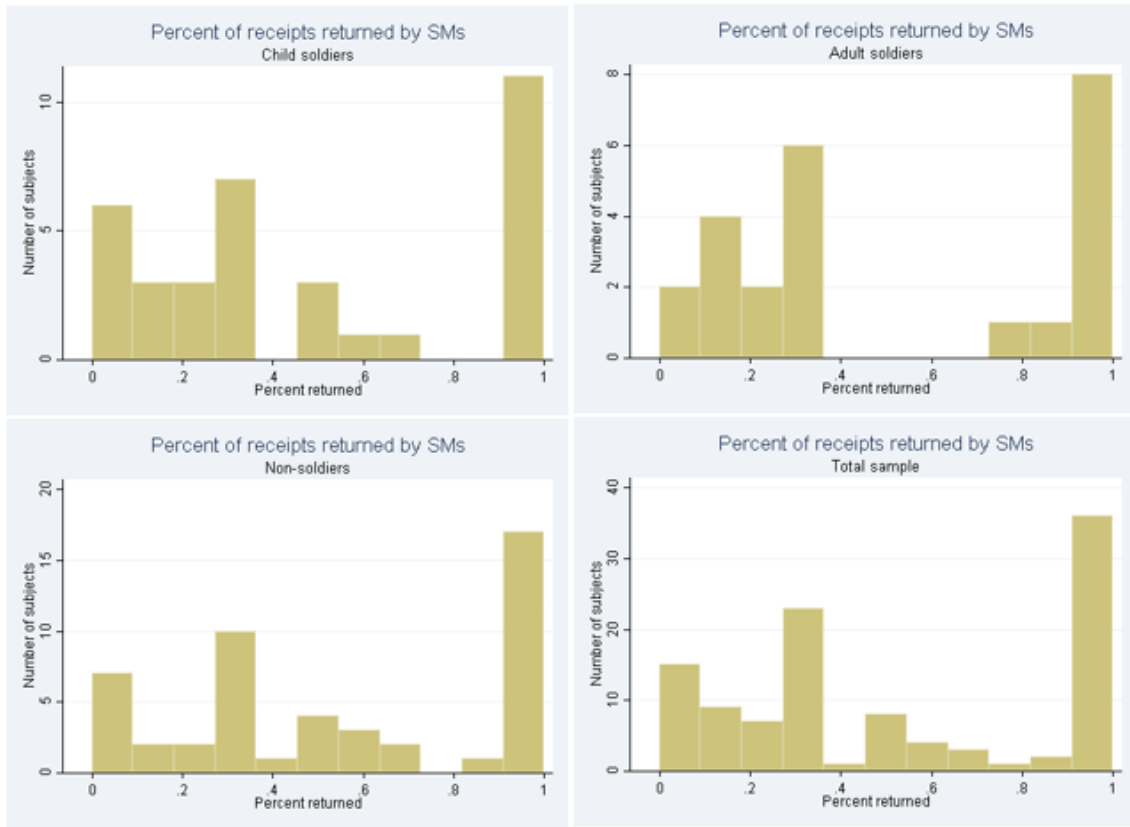
Adult Soldiers					
Variable	Obs	Mean	Std. Dev.	Min	Max
Child soldier dummy	56	0	0	0	0
Other soldier dummy	56	1	0	1	1
Non-soldier dummy	56	0	0	0	0
Age joined war	56	21.268	3.216	18	31
FM amount sent	32	7.313	3.569	0	10
SM amount returned	24	11.875	11.168	0	30
SM percent returned	24	0.522	0.386	0	1
Age at experiment	56	35.286	5.870	29	50
Months fought	56	27.334	41.585	0.233	180
Reintegration program participation	54	0.630	0.487	0	1
HS grad	56	0.250	0.437	0	1
Worked last week	56	0.500	0.505	0	1
Non-Soldiers					
Variable	Obs	Mean	Std. Dev.	Min	Max
Child soldier dummy	92	0	0	0	0
Other soldier dummy	92	0	0	0	0
Non-soldier dummy	92	1	0	1	1
FM amount sent	38	5.974	4.182	0	10
SM amount returned	54	10.296	9.977	0	30
SM percent returned	49	0.557	0.371	0	1
Age at experiment	90	27.311	4.706	20	40
HS grad	92	0.380	0.488	0	1
Worked last week	92	0.457	0.501	0	1

Figure 4-1. Amount passed by first movers



empirical characteristic functions for both discrete and continuous samples, are also shown (Goerg & Kaiser, 2009). Goerg and Kaiser (2009) have shown Epps-Singleton to be a more powerful test than Kolmogorov-Smirnov, which tests for differences between cumulative distribution functions (Smirnov, 1948), but since Kolmogorov-Smirnov is more widely used, both of these tests are included. These nonparametric tests and their relevant test statistics are described in more detail in Appendix F. When possible, tests involving child soldiers are one-tailed with the alternative hypothesis that child soldiers send or return less than other

Figure 4-2. Percent returned by second movers



groups. Lacking a conjecture about the relationships of decisions made by non-soldiers and adult soldiers, those tests are two-tailed.

Table 4-3 shows evidence of statistically significant differences between amounts sent by first mover child soldiers vs. adult soldiers and between second mover non-soldiers vs. adult soldiers. Child soldier FMs sent a mean of 6.17 notes, while other soldiers sent a mean of 7.31 notes. None of Mann-Whitney, Epps-Singleton, nor Kolmogorov-Smirnov show a significant difference in these two groups, but the t-test indicates that the mean amount sent by first movers is significantly lower for child soldiers than for adult soldiers. Epps-Singleton

Table 4-3. Group means and nonparametric tests

Data	Send Mean	% Returned Mean <sup>†</sup>	Means Test (t)	Mann-Whitney Test	Epps-Singleton Test	Kolmogorov-Smirnov Test
Total Sample	6.42 [3.75] {116}	52.94% [37.50%] {108}				
Child Soldiers (CS)	6.17 [3.47] {46}	49.56% [38.09%] {35}				
Adult Soldiers (AS)	7.31 [3.57] {32}	52.25% [38.62%] {24}				
Non-Soldiers (NS)	5.97 [4.18] {38}	55.70% [37.09%] {49}				
CS send vs. NS send			-.24 (.5945) <sup>a</sup>	-.139 (.491) <sup>a</sup>	7.224 (.1245)	-.10 (.662) <sup>a</sup>
CS %return vs. NS %return			.74 (.2310) <sup>a</sup>	.657 (.5110) <sup>a</sup>	3.261 (.5151)	-.13 (.498) <sup>a</sup>
CS send vs. AS send			1.41* (.0813) <sup>a</sup>	1.540 (.1235) <sup>a</sup>	5.016 (.2857)	-.22 (.157) <sup>a</sup>
CS %return vs. AS %return			.26 (.3962) <sup>a</sup>	.102 (.9185) <sup>a</sup>	3.653 (.4550)	-.10 (.742) <sup>a</sup>
NS send vs. AS send			1.43 (.1586)	-.139 (.8891)	3.65 (.4559)	.23 (.249)
NS %return vs. AS %return			-.37 (.7136)	.657 (.5110)	11.80** (.01893)	.15 (.765)

Standard deviations in brackets; number of observations in braces; p-values in parentheses; <sup>a</sup>indicates one-tailed test.

\*\* p<0.05, \* p<0.10

<sup>†</sup>Second movers who received zero certificates are excluded.

shows a statistically significant difference between non-soldier and adult soldier SMs. As SMs, non-soldiers returned 55.7% of what they received, and adult soldiers returned only 52.25%.

According to these nonparametric tests, there are no statistically significant differences

between child soldiers and non-soldiers either as first movers or as second movers, there is no difference in first mover behavior between non-soldiers and adult soldiers, and there is no difference in second mover behavior between child soldiers and other soldiers.

Since nonparametric tests show mixed results, it is desirable to perform parametric tests to control for other characteristics that may differ between groups. A left- and right-censored tobit model is used since the data are censored on the left at zero for both FMs and SMs and on the right at ten for FMs and at the tripled amount received for SMs. The estimated models are of the forms shown in equations 4-1 and 4-2, and all reported standard errors are adjusted to correct for heteroskedasticity. Both the FM model and the SM model are estimated three times, on three separate samples: child soldiers with non-soldiers, child soldiers with other soldiers, and non-soldiers with other soldiers. Variables in bold type are vectors.

#### First Mover Model

$$y_s = \alpha_0 + \alpha_1 \times treat + \mathbf{X}\alpha_2 \quad (4-1)$$

#### Second Mover Model

$$y_r = \beta_0 + \beta_1 \times treat + \beta_2 \times received + \beta_3 \times treat \times received + \mathbf{X}\beta_4 \quad (4-2)$$

The dependent variables are amount sent by first movers ( $y_s$ ) and amount returned by second movers ( $y_r$ ), each measured as number of 50-LD notes passed. Treatment variables are binary. *Treat* equals 1 for child soldiers in models that include child soldiers, and *treat* equals 1 for non-soldiers in the model comparing non-soldiers with adult soldiers. Control variables are included in the vector  $\mathbf{X}$ . These variables include age at the time of the experiment, an indicator for high school graduation, and an indicator for whether the subject did any work for

Table 4-4. Tobit models for first movers

VARIABLES	Dependent Variable: Amount sent by first mover		
	CS vs. NS	CS vs. AS	NS vs. AS
Treat (=1 if CS)	0.01 (1.563)	-4.07 (2.738)	
Treat (=1 if NS)			-5.50** (2.741)
Age at experiment	0.12 (0.156)	-0.13 (0.213)	-0.35* (0.193)
Age joined war		-0.12 (0.327)	
Months fought		0.01 (0.025)	
Reintegration dummy		1.60 (1.643)	
HS grad	1.48 (1.702)	2.25 (1.774)	2.49 (2.296)
Worked last week	1.01 (1.544)	-1.61 (1.619)	-1.30 (2.150)
Constant	3.06 (4.577)	15.62** (7.082)	23.06*** (7.573)
Observations	82	77	68

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.10

money during the week prior to the experiment. In Child Soldier vs. Adult Soldier models, controls also include age at the time one entered the war, number of months spent with a faction or militia, and an indicator for participation in post-war reintegration programs. None of these control variables are highly correlated with soldiering status. The second mover models add a variable for tripled number of 50 LD notes received and a term interacting treatment and amount received.<sup>19</sup>

Tables 4-4 and 4-5 show results of censored tobit regressions for observations divided for group comparisons of FMs and SMs, respectively. The first mover models (Table 4-4)

<sup>19</sup> This second mover model follows from Proposition 4 in Cox, Friedman, and Sadiraj (2008), which states that the amount returned by a trustworthy second mover with well-behaved preferences will increase with the amount received.



indicate there is no difference in trusting behavior between child soldiers and either comparison population. There is a significant difference, however, between non-soldiers and adult soldiers. Other things equal, non-soldier first movers send 5.5 50-LD bills less than adult soldier first movers. This is a difference of 275 LD, where the approximate cost of one cup of uncooked rice in the market is 20 LD (O. Toway, personal communication). The only other significant coefficient in all first mover models is the coefficient on age in the Non-Soldier vs. Adult Soldier model. Older players in these categories sent less than younger players, with the amount sent decreasing by 17.5 LD per year of age. Differences in age between adult soldiers and non-soldiers, then, must account for the fact that non-parametric tests found no difference between the two groups' trusting behavior.

Table 4-5 shows results of the censored tobit model for second movers. Treatment variables do not have significant coefficients, but in the Child Soldier vs. Adult Soldier model, the interaction of the treatment variable with amount received by the second mover indicates a difference in trustworthy behavior between child soldiers and adult soldiers. The tripled amount received affects the amount returned in both the Child Soldier vs. Adult Soldier and the Non-Soldier vs. Adult Soldier models. As seen from the coefficients on amount received, for each additional 50 LD certificate received by these second movers, the average amount returned increases by .64 or .65 50-LD notes, or about 32 LD. But, in the Child Soldier vs. Adult Soldier model, the interaction term also has a significant coefficient, meaning that when the child soldier variable equals one, the coefficient on the amount received decreases by .62. Child soldiers, then behave differently as second movers than adult soldiers. While adult

Table 4-5. Tobit models for second movers

VARIABLES	Dependent Variable: Amount returned by second mover		
	CS vs. NS	CS vs. AS	NS vs. AS
Treat (=1 if CS)	-0.69 (6.357)	8.97 (9.779)	
Treat (=1 if NS)			14.84 (8.968)
Amount received	0.19 (0.192)	0.64** (0.283)	0.65** (0.295)
Treat × received	-0.08 (0.280)	-0.62* (0.350)	-1.38 (1.058)
Age at experiment	0.70* (0.363)	0.34 (0.398)	0.58* (0.341)
Age joined war		-0.18 (0.633)	
Months fought		0.09 (0.068)	
Reintegration dummy		-7.99** (3.535)	
HS grad	-1.40 (3.249)	1.64 (3.974)	-0.71 (3.664)
Worked last week	-3.28 (3.245)	-5.00 (3.613)	-3.87 (3.418)
Constant	-7.39 (9.930)	-2.37 (17.060)	-19.15 (13.577)
Observations	95	63	78

Standard errors in parentheses

\*\* p<0.05, \* p<0.10

soldiers return an additional 32 LD for each added 50-LD bill received, child soldiers only return an additional 1 LD.

Among second movers, age at the time of the experiment is again a predictor of behavior, with older subjects returning more of their receipts than younger subjects in both the Child Soldier vs. Non-Soldier model and the Non-Soldier vs. Adult Soldier model. The coefficient on age is not significant in the Child Soldier vs. Adult Soldier model.

Among child and adult soldiers who participated as SMs, participation in post-war reintegration programs is a predictor of number of 50 LD notes returned to first movers. Adult

Table 4-6. Tobit models for child soldiers alone

VARIABLES	Dependent Variables:	
	Amount sent by First Movers	Amount returned by Second Movers
Violence perpetrated (VL1)	1.76 (1.937)	7.12 (4.612)
Violence witnessed (VL3)	-2.66 (3.079)	12.43** (5.505)
Amount received (SMs only)		0.01 (0.189)
Age at experiment	0.28 (0.293)	0.54 (0.459)
Age joined war	-0.06 (0.371)	-1.59 (1.042)
Months fought	0.01 (0.030)	0.05 (0.080)
Reintegration dummy	0.26 (2.003)	-6.74 (4.072)
HS grad	1.37 (2.194)	-0.29 (4.685)
Worked last week	-0.17 (1.832)	-2.38 (5.048)
Constant	-1.05 (6.736)	14.68 (19.035)
Sigma	5.07*** (0.796)	10.64*** (1.819)
Observations	45	40
Wald test for VL1=VL3	F = 2.08	F = 0.98

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05

and child soldiers who had gone through reintegration programs returned eight fewer 50-LD notes (400 LD less) than the amount returned by soldiers who had not participated in such programs.

### *Results among only child soldiers*

Table 4-6 shows a closer look at FM and SM decisions of former child soldiers alone.

Responses to post-experiment questions are used to classify three types of war involvement:

1) perpetrated violence, 2) experienced violence, and 3) witnessed violence. Each child soldier is assigned to exactly one violence class such that anyone who perpetrated violence is in class one, anyone who did not perpetrate violence but who experienced violence is in class two, and all others are in class three.<sup>20</sup>

Among child soldiers, level of violence encountered during the war did not affect first mover behavior, but it did affect second mover behavior. Child soldiers who witnessed violence but who were neither victims nor perpetrators of violence returned 12 more 50-LD notes (600 LD more) than those in other groups. Child soldiers who perpetrated violence did not behave differently than those who only experienced violence as victims. These results hold after controlling for amount received from the subject's FM pair.

#### *Liberian subjects vs. American and other African subjects*

The next step in this analysis is to examine whether differences exist between Liberian subjects and American subjects who have played the same investment game. Table 4-7 shows results when Liberian data from this experiment are compared with data combined from Berg, Dickhaut, and McCabe's (1995) original investment game experiment and the investment game treatment of Cox's (2004) triadic design experiment. Data in the two American samples are not significantly different from each other, indicating American trust and trustworthiness attitudes are relatively stable over time. Moreover, having used the 50 LD unit of divisibility in the Liberia experiment makes the comparison to the US experiments possible since players' feasible

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<sup>20</sup> Only two child soldier participants did not report at least having witnessed violence. These two subjects are excluded for this part of the analysis.

Table 4-7. Group means, non-parametric, and parametric tests- Liberia vs. USA

Data	Send Mean	% Returned Mean <sup>†</sup>	Means Test	Mann-Whitney Test	Epps-Singleton Test	Kolmogorov-Smirnov Test
Total Sample	6.15 [3.65] {184}	44.83% [36.11%] {165}				
Liberian subjects	6.46 [3.74] {120}	52.91% [37.32%] {109}				
USA subjects	5.56 [3.44] {64}	29.08% [27.76%] {56}				
Lib send vs. USA send			.90 (.0567) <sup>a</sup>	3308.5 (.569) <sup>a</sup>	12.49* (.0140)	-.21* (.024) <sup>a</sup>
Lib %return vs. USA %return			.23*** (.0000) <sup>a</sup>	1941 (.682) <sup>a</sup>	53.62*** (.0000)	-.33*** (.000) <sup>a</sup>
Censored Tobit (Dependent variable: Amount returned by second movers)						
	<u>USA × Received</u>	<u>Received</u>	<u>Cons</u>			
	-.40*** (.000)	.34*** (.000)	5.78** (.004)			

Standard deviations in brackets; number of observations in braces; p-values in parentheses;

<sup>a</sup>indicates one-tailed test.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

<sup>†</sup>Second movers who received zero certificates are excluded.

choices are integers from zero to ten in all three experiments. The one difference between the American experiments and the Liberian experiment is that the American studies were conducted using double-blind protocols, while the Liberian experiment was single-blind. Cox and Deck (2005) find that this protocol difference can elicit different subject responses in the trust game, which is similar to the investment game.

All tests other than the Mann-Whitney test confirm there is a statistically significant difference in both first mover data and second mover data between the two countries. Liberians send more as first movers and return a higher percent as second movers. The last line

of Table 4-7 shows results of a censored tobit model for second-mover behavior. After controlling for differences in amounts received by second movers, Liberian second movers return more than American second movers.

Johnson and Mislin (2011) conduct a meta-analysis of 162 investment game experiments and find that, on average, Africans from 5 sub-Saharan nations both send and return less than players from any other region of the world. This average is over 15 separate instances of investment game experiments in the countries of Cameroon, Kenya, Namibia, South Africa, Tanzania, and Uganda. However, Liberians in this study show greater propensity toward trust and trustworthiness than Americans, and FM and SM averages for Liberian subjects are higher than averages for any region included in the Johnson and Mislin analysis.

## **Discussion**

### *Second movers*

Second mover results will have bearing on the interpretation of first mover results, so second movers are discussed first. As second movers, all three groups showed a tendency to reciprocate progressively, returning more of their receipts to first movers who sent higher amounts to them. Even groups who were more reluctant to trust demonstrated willingness to reciprocate if the other player first extended a gesture of trust.

The age effects found in the Child Soldier vs. Non-Soldier and Non-Soldier vs. Adult Soldier models are not likely to reflect differences among soldiering groups since age at time of the experiment is not highly correlated with war experience. The model with both child and adult soldiers, however, may give some insight into war's effects on trustworthy behavior. This

second model found statistically significant effects on trustworthiness of being a child soldier and of participation in post-war reintegration programs. The effect on the interaction term suggests child soldiers are less trustworthy than adult soldiers in that the amount received from the first mover has a much smaller effect on the amount they return. This effect also holds within the child soldier sample, as shown in Table 4-6, where the coefficient on the amount received is not statistically significant at all. This is consistent with the literature that shows negative outcomes for child soldiers and with conjecture D of this paper.

The strong negative effect of reintegration programs on trustworthiness found in the Child Soldier vs. Adult Soldier model could have a couple of explanations: First, national reintegration programs, the most popular programs, required that soldiers disarm in order to participate; thus, those who participated would have been those who had carried arms and who may have had harsher war experiences than those who did not have arms and were not eligible to participate in the national program. Harsher war experiences may lead to less reciprocal tendencies. Secondly, several subjects reported never having received assistance that was promised them by reintegration programs. This experience could have had an effect on participants' behavior. The former explanation is more consistent with the result shown in Table 4-6. After controlling for level of violence encountered among former child soldiers, the coefficient on the reintegration variable is no longer significant. This suggests that intensity of war experiences may account for the significant negative relationship found on the reintegration variable in the Child Soldier vs. Adult Soldier model.

Finally, second movers who were child soldiers behaved differently depending on the level of violence encountered during the war. Subjects who only witnessed violence returned

more than those who experienced violence. This is not a surprising result. Many would expect that experiencing violence would negatively affect one's trustworthiness.

### *First movers*

First mover results show no statistically significant differences between Liberian child soldiers and other Liberian soldiers nor between child soldiers and non-soldiers. These results conflict with conjectures A and C, and they are somewhat surprising in light of the existing literature that suggests child soldiers experience trust deficiencies that result in more difficult reintegration into post-war society. The result for child vs. adult soldiers holds even without controlling for time spent in the war and age at which one began war involvement. In addition, the analysis of child soldiers alone shows that level of involvement in the war did not affect trust among these subjects.

While child soldiers do not differ from others, the Non-Soldier vs. Adult Soldier model shows there are differences between these groups' trusting behavior. Non-soldiers exhibit much less trusting behavior than those who fought as adults, which is consistent with the finding in Chapter 3 of this dissertation that showed non-soldiers have worse economic outcomes than former soldiers. In a society in which nearly everyone was negatively affected by civil war, it makes sense that someone not directly involved in fighting would emerge from the war with distrust towards others, perhaps feeling that harm was unjustly done to them by those who fought. One could expect this pattern of distrust to extend to child soldiers, most of whom were involuntarily conscripted into war. Indeed, in the Child Soldier vs. Adult Soldier model, the treatment coefficient, while not significant, is negatively signed. The adults who



fought, on the other hand, may feel they at least had a willful part in the damage that was done and so have less distrust for others, even if they also took part in the fighting. Moreover, since almost all subjects for this experiment were recruited from the same region, a participant likely assumes chances that his partner in the game is from the same tribe and fought on the same side of the war as he did are high. As shown by Cassar, Grosjean, and Whitt (2013), this kinship effect could increase trust among adult soldiers.

### *Liberians vs. Americans and other*

Most of the five countries in the Johnson and Mislin (2011) meta-analysis have experienced relatively recent war within their borders, so it is not possible to parse any war effect that may cause differences in behavior between these Africans and Liberians. But, in the next chapter of this dissertation, it is found that the Global Peace Index (GPI), calculated by the Institute of Economics and Peace (2015) as an index of overall peacefulness of a country, can help to explain differences in trusting and trustworthy behaviors of individuals in those countries. On average, subjects in more peaceful countries display more trusting behavior in the investment game. Indeed, the GPI for Liberia in 2014 showed the country to be more peaceful than any of the other African investment game studies published since the GPI was first calculated in 2008. This could at least partially account for Liberians' more trusting behavior than other Africans.

Moreover, in the explanation of their result for African subjects, Johnson and Mislin cite trust and trustworthiness deficiencies stemming from historical involvement in the slave trade. This theory is consistent with a different result for Liberian subjects, since Liberia's slave trade

history is unique among other African nations. Liberia was founded by freed slaves and is the only African nation founded by the United States (Trussell & Moore, 2012). From its beginning, Liberian culture has largely been shaped by American influence, and therefore it is plausible that Liberian subjects would behave differently than other Africans.

The question remains why Liberian subjects differ so significantly from American subjects. Indeed, the result that Liberians are more trusting than Americans does not seem consistent with the next chapter of this dissertation, which finds that lower levels of peace in a society are also associated with lower levels of trust.<sup>21</sup> According to the findings of Cox and Deck (2005), subjects in the Liberian single-blind experiment should be expected to demonstrate more trust and more trustworthiness than Americans participating under the double-blind procedure. Also, though theory does not directly address effects of changes in investment game endowment on subjects' behavior, the endowment may play a role in behaviors of Liberian and American subjects. In both the American studies, college student subjects began with an endowment of \$10 USD, while in the Liberian study, subjects began with 500 LD. Rice is a staple of every Liberian meal, and the Liberian endowment was enough to purchase between 20 and 25 cups of dry rice, which could feed a Liberian family for at least a week or two. On the other hand, the American student's endowment would buy him or her only three or four meals from Taco Bell.

In addition to these experimental design differences, two primary differences exist between Liberian and American cultures: 1) though Liberia was founded by the U.S., a majority

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<sup>21</sup> Both American studies used as comparison groups in this paper were published prior to the creation of the Global Peace Index, so it is not possible to compare the GPI for the American studies to that of the Liberian study.

of Liberians still claim roots to indigenous African tribes; and 2) Americans have not seen widespread destruction and war on their home soil in more than a century. Some of the differences between Americans' and Liberians' investment game behaviors are likely due to differences in experimental design in addition to a combined result of Liberians' historically tribal, community-driven society and community dependence developed out of necessity to survive during and after their wars, contrasted with Americans' tradition of individual independence and recent homeland peace.

Perhaps the most compelling explanation of these subjects' high levels of trust and trustworthy behavior is that the subjects were recruited from the same region. Although no subject knew who his paired player was, each experimental session began with subjects gathering in one room together. In this room, players saw the pool from which their partners would be drawn, and they likely recognized most of them as community members. This would tend to create an environment of higher trust than among total strangers.

## **Limitations**

### *Trust and Reciprocity or Other-regarding Preferences?*

Cox (2004) extends the investment game better to measure subjects' motivations. He shows that further experimentation is required in order to distinguish conclusively between behaviors attributable to trust and reciprocity and behaviors caused by other-regarding preferences such as altruism or inequality aversion. Cox presents a triadic experimental design that does allow for such a distinction. Due to constraints on time and resources, the two

additional treatments of Cox's design were not implemented for this study but are open for future research.

Indeed, some Liberian subjects indicated altruistic motives for their decisions during this experiment. Though this experiment cannot conclusively assign trust and reciprocity as motivating factors, it does provide interesting and useful insights into effects of war on trust and trustworthy acts and on economic investment decisions. Moreover, after controlling for other behavioral variables, Cox (2004) does find evidence of trust and reciprocity in investment game decisions by his subjects. It is reasonable to suspect that Liberian subjects' investment decisions may also be influenced by these qualities.

#### *Problems with Causal Inference: Which Comes First?*

It is unclear whether selection may affect results of a trust experiment with child soldiers. Do more or less trusting children choose or get chosen to fight, or do war experiences make children more or less trusting? This question hinders the ability to establish causal inference from this study, but it does not dampen the importance of the results. Regardless of cause, policymakers should consider trust-related differences when constructing reintegration programs for child and adult soldiers. In particular, this experiment finds lower levels of trustworthiness among soldiers who were younger when they became involved in war, and it finds lower trustworthiness in general among those who attend reintegration programs. These programs should be designed to counsel and encourage participants to be more reciprocal.

### *Selection into the Experiment*

Since the recruitment design depends on potential subjects' willingness to believe that the experimenter and community organizations involved are trustworthy, those who selected into this experiment may have been more trusting than those who did not. But, since all participants would be subject to this selection effect, ordinal differences found among groups stand even in the presence of this potential bias.

Another possible selection concern comes from attrition among potential subjects. Soldiers and non-soldiers included in this experiment are, obviously, those who survived the war and its resulting hardships. It is possible, particularly for soldiers, that those who learned best to trust, placate, or reciprocate were more likely to survive. On the other hand, unwillingness to trust may be positively correlated with survival if less trusting individuals are more vigilant or work harder to survive on their own without relying on others. Since it has not been shown what effect, if any, trust and trustworthiness may have on probability of survival in war, it is difficult to know whether subjects in this experiment are representative of all child soldiers. But, for policy relevance, it is necessary only to understand effects on survivors, since these are the individuals in need of rehabilitation and reintegration. Thus, this selection or attrition concern does not dampen the importance of results found in this experiment.

### **Conclusions and Implications**

This paper is the first experimental economic study specifically on the behavior of former child soldiers in Liberia or elsewhere. The results here differ significantly from those found in the previous literature, most of which did not use statistical analysis nor a control

group. Liberian subjects' decisions in the standard investment game indicate that former child soldiers do not differ in trusting behavior from either subjects who began fighting after age 18 or subjects who were never members of warring factions or militias. However, non-soldiers are less trusting than adult soldiers, and child soldiers are less trustworthy than those who started fighting as adults. Among former child and adult soldiers, those who participated in reintegration programs also exhibit less trustworthy behavior. In a sample of only former child soldiers, those who had only witnessed violence are more trustworthy than those who had been victims of violence. Level of violence encountered did not impact the trusting behavior of former child soldiers. As a whole, Liberians in this experiment tend to trust more than Americans who played the same investment game in previous studies.

Future research can refine the results of this study. First, motivations by trust or reciprocity could be identified by further studying the Liberian populations using the other two parts of the Cox (2004) triad. Second, the causal relationship between war experiences and differences in investment behavior could be developed through similar investment game studies conducted in other parts of Liberia and in African countries who have not experienced recent war but whose cultures are otherwise similar to the Liberian culture.

Finally, policymakers should note that participation in reintegration programs predicts differences in soldiers' investment behavior, specifically in terms of trustworthy acts. Former soldiers could experience better economic outcomes if these programs were designed to counsel them through war-related trust issues, bearing in mind that levels of violence experienced during the war may also contribute to these issues. Non-soldier results in this experiment indicate they could benefit from post-war trust-building programs. This result is

consistent with results from the previous chapter of this dissertation in which non-soldiers are found to have worse labor market outcomes than former soldiers. Reintegration programs targeting former soldiers may not be enough. In wars like the ones in Liberia, no one is unaffected, regardless of his level of direct involvement. Whole communities need help reinstating economic confidence and neighborly trust.

## Chapter V. The Cyclical Relationship of Peace and Trust

### **Introduction**

Previous chapters of this dissertation found that war experiences and post-war reintegration projects can significantly affect individuals' behaviors and economic outcomes. Specifically, chapter 4 addressed differences in trusting and trustworthy behaviors among former child soldiers, former adult soldiers, and non-soldiers. Using a standard investment game from the economics literature, the study found that non-soldiers are less trusting than adult soldiers, that child soldiers are less trustworthy than adult soldiers, and that those who experienced less violence are less trustworthy than others. This paper examines many instances of the same investment game to explore further the question of how violence affects trusting and trustworthy behaviors and vice versa. Average responses of players in the investment game are compared across countries experiencing varying degrees of peacefulness as measured by the Institute of Economics and Peace's (2015) Global Peace Index. The primary finding is that this macroeconomic peace index can predict trusting behavior but has no effect on trustworthy behavior. Trustworthiness, on the other hand, affects peacefulness.

### **Relevant Literature**

#### *Relationship between war and trust*

Blattman and Miguel (2010) provide a comprehensive overview of the literature pertaining to civil wars. They discuss articles on both causes and effects of war. The works cited give various and sometimes conflicting causes and effects of war, but on both the cause



side and the effect side there are those who argue that social dynamics and relationships are important factors. Similar, more recent studies are described below.

Rohner, Thoenig, and Zilibotti (2013) examine conflict in 174 countries during the period of 1949 to 2008, and they find that countries that engage in civil war tend to persist in cycles of civil conflict over long periods of time. They look particularly at the relationships between war and trust and between trust and trade. They theorize that civil conflict is perpetuated through a cycle in which lack of trust creates barriers to economic activity and in turn creates further unrest and violence. They submit that efforts to stop fighting are futile without some intervention to bolster trust and trade.

Cassar, Grosjean, and Whitt (2013) find, similarly, that individuals who have experienced violence exhibit less trusting behavior toward their neighbors than toward those in distant villages. They conduct trust-game experiments with individuals in Tajikistan over a decade after that country's 1992-1997 civil war. They find that those who experienced more violence are both less trusting of and less willing to participate in economic exchange with others in their communities.

Finally, mental health professionals Williams, Graham, McCurry, Sanders, Eiseman, Chiu, and King-Casas (2014) study rehabilitation techniques for former soldiers with posttraumatic stress disorder (PTSD). They cite loss of trust as a primary symptom among these soldiers, and they use trust outcomes as their means of measuring success of rehabilitation.

### *Measuring trust*

In 1995, Berg, Dickhaut, and McCabe developed an experimental procedure for measuring trusting acts as well as trustworthy behavior, dubbed the investment game. In their game, a first and second mover are paired, and each mover is given an endowment of \$10. The first mover is allowed to choose to pass any integer amount, from zero to all ten, of his endowment back to the experimenter, who will triple that amount and deliver it to the second mover. The second mover will then choose to return to the first mover any amount, from zero to the tripled amount he received, back to his paired first mover. The game ends, and each player keeps what he has earned in playing the game. The Berg, Dickhaut, McCabe game is conducted double-blind, and each player knows both his own feasible choices as well as his paired player's feasible choices before the game begins.

The Berg, Dickhaut, and McCabe investment game is often described as measuring trust – through the actions of the first mover – and reciprocity – through the actions of the second mover. But, Cox (2004) extended their work to distinguish more precisely trust and reciprocity from other possible motivations for trusting and trustworthy acts. Cox introduced a three-game series of experiments to disentangle trust and reciprocity from the other-regarding preferences altruism or inequality aversion. Since this paper deals only with instances of Berg, Dickhaut, and McCabe's (1995) original investment game and does not include other games in the Cox (2004) triad, measured outcomes are referred to as trusting and trustworthy acts, as opposed to trust and reciprocity.

## **Data and methodology**

In 2011, Johnson and Mislin published a meta-analysis of 162 repetitions of the Berg, Dickhaut, and McCabe (1995) investment game. They include in their study several differences in implementation of the game and find that subjects respond differently to those differences and that after controlling for them, subjects in different parts of the world behave differently. They model two dependent variables separately: 1) percent of initial endowment sent by first movers and 2) percent returned by second movers from the amount received. This paper uses both of these dependent variables, and the control variables in this analysis are the same experimental design features as those in the Johnson and Mislin paper. Control variables are listed and described in Table 5-1.

The contribution of this paper is to add an additional independent variable to test how violence might affect individuals' tendencies to be trusting or trustworthy and then also to look at reverse causality in the form of a cyclical relationship between distrust and conflict. Each year since 2008, the Institute of Economics and Peace (2014a) has published a Global Peace Index, which combines 22 indicators to assign to each of 162 countries a score between 1 and 5 of relative peacefulness, where 1 is the most peaceful and 5 is the least peaceful. The 22 criteria fit into three broad categories: domestic and international conflict, societal safety and security, and militarization. The data are collected by the Economist Intelligence Unit (EIU). Each of the 22 indicators is separately scored on a scale of 1 to 5, and those scores are weighted according to a scheme agreed upon by the Institute for Economics and Peace along with a third-party panel of experts. Two sub-indexes are calculated for each country: one for internal peacefulness and one for external peacefulness. The GPI is then formed by combining

Table 5-1. Control variables predicted by Johnson and Mislin (2011) to affect investment game behavior

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<b>Sender endowment</b>	The amount of money given to the first mover at the start of the experiment is adjusted to U.S. Dollars using a PPP index
<b>Receiver endowed</b>	Indicator equal to 1 if the second mover was given an initial endowment
<b>Anonymous</b>	Indicator equal to 1 if the first and second movers were anonymous to one another
<b>Rate return</b>	The amount by which the experimenter multiplies what is sent by the first mover
<b>Double blind</b>	Indicator equal to 1 if the experiment was double blind
<b>Student</b>	Indicator equal to 1 if subjects were students
<b>Both roles</b>	Indicator equal to 1 if participants played the game more than once, participating as both first mover and second mover
<b>Random payment</b>	Indicator equal to 1 if, rather than paying all subjects what they earned in the investment game, only a random subset of players were paid what they earned.
<b>Strategy method</b>	Indicator equal to 1 if the experiment was administered using the strategy method. The strategy method asks second movers to choose a response for each possible amount sent by the first mover. These responses are chosen prior to revealing the first mover's decision, and after the first mover decides, payouts are awarded according to the pre-recorded responses.
<b>Real person</b>	Indicator equal to 1 if participants were paired with real human counterparts as opposed to simulated counterparts. This variable is omitted from second mover models due to insufficient observations.

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these two indexes with the internal index given a weight of 60% and the external index a weight of 40%. These weights were agreed upon by the panel due to the thought that the internal state of a country has much to do with its external dealings. According to the Institute of Economics and Peace (2014a), this indicator is recognized and used by the World Bank, the OECD, the United Nations and other NGOs worldwide. A list of the separate internal and external indicators that are used to calculate the GPI may be found in Table 5-2, and a much more detailed description of each variable is available in Annex A of the 2014 Global Peace Index Report (Institute of Economics and Peace, 2014b).

The analysis of this paper mirrors that of the Johnson and Mislin (2011) meta-analysis. The logit transformation of percent sent and percent returned are calculated to map these percentage variables to the real line. The transformed values are then estimated using OLS regression with the Global Peace Index (GPI) for the country in which the experiment was conducted as the key independent variable and with experimental design features as control variables. The peace index used for a given study is the index for the year in which that study was published (Vision of Humanity, 2014). Though experiments were likely conducted prior to the publication year, it is assumed that the peace index for the publication year is highly correlated with the index for the year in which the study was conducted. Studies published prior to 2008, when the peace index was first published, are omitted from this analysis, and the two studies from 2009 that list a regional setting rather than a country are assigned the average peace index from that region (Institute for Economics and Peace, 2009).

Table 5-2. Indicators included in calculation of the Global Peace Index

Internal indicators			
Indicator	Percent of total index	Qualitative or quantitative	Description of ranking for qualitative variables
Level of perceived criminality in society	4	Qualitative	Ranking from 1 (very low) to 5 (very high)
Number of internal security officers and police per 100,000 people	4	Quantitative	
Number of homicides per 100,000 people	5.3	Quantitative	
Number of jailed population per 100,000 people	4	Quantitative	
Ease of access to small arms and light weapons	4	Qualitative	Ranking from 1 (very limited access) to 5 (very easy access)
Level of organized conflict (Internal)	6.7	Qualitative	Ranking from 1 (no conflict) to 5 (severe crisis)
Likelihood of violent demonstrations	4	Qualitative	Scored based on EIU country analysts answer to the question "Are violent demonstrations or violent civil or labour unrest likely to pose a threat to property or the conduct of business over the next two years?" 1 (strongly no) to 5 (strongly yes)
Level of violent crime	5.3	Qualitative	Scored based on EIU country analysts answer to the question "Is violent crime likely to pose a significant problem for government and/or business over the next two years?" 1 (strongly no) to 5 (strongly yes)
Political instability	5.3	Qualitative	Level of instability is ranked by EIU Country Analysis on a scale of 0 to 100 and then scored for the index as 1 (0-20.4), 2 (20.5-40.4), 3 (40.5-60.4), 4 (60.5-80.4), 5 (80.5-100)
Political terror scale	5.3	Qualitative	Ranking from 1 (countries under a secure rule of law, people are not imprisoned for their view, and torture is rare or exceptional. Political murders are extremely rare.) to 5 (Terror has expanded to the whole population. The leaders of these

societies place no limits on the means or thoroughness with which they pursue personal or ideological goals. )

Volume of transfers of major conventional weapons, as recipient (imports) per 100,000 people	2.7	Quantitative
Terrorist activity	2.7	Quantitative
Number of deaths from organized conflict (internal)	6.7	Quantitative

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External Indicators

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Indicator	Percent of total index	Qualitative or quantitative	Description of ranking for qualitative variables
Military expenditure as a percent of GDP	2.6	Quantitative	
Number of armed services personnel per 100,000 people	2.6	Quantitative	
Financial contribution to UN peacekeeping missions (as % of owed)	2.6	Quantitative	
Nuclear and heavy weapons capabilities	3.9	Quantitative	
Volume of transfers of major conventional weapons as a supplier (exports) per 100,000 people	3.9	Quantitative	
Number of refugees and displaced people as a percentage of the population	5.2	Quantitative	

Relations with neighboring countries	6.5	Qualitative	ranking from 1 (Peaceful: none of the neighbours has attacked the country since 1950.) to 5 (Very aggressive: frequent invasions by neighbouring countries.)
Number of external and internal conflicts fought in the last five years	6.5	Quantitative	
Number of deaths from organized conflict (external)	6.5	Quantitative	

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source: Institute for Economics and Peace. (2014b)



The first estimated model is shown below. The dependent variable  $y_i = \ln[p_i/(1 - p_i)]$  is the logit transformation of percent sent by first mover (trust) or percent returned by second mover (trustworthy), where  $p$  is the percent sent or returned.<sup>22</sup> The variable  $GPI_i$  is the Global Peace Index for study  $i$ , and the vector  $\mathbf{X}_i$  contains the study's design characteristics described in Table 5-1 and, where indicated,  $\mathbf{X}_i$  also contains a lagged value of GPI.<sup>23</sup> When the dependent variable is trustworthiness,  $\mathbf{X}_i$  also contains the trust variable, the logit transformation of the percent sent by the first mover. Since the dependent variable is calculated using averaged data, Johnson and Mislin (2011) weight the error term to account for sample sizes. The same weighting is used here, with the weight for a study with  $n$  participants defined by  $w = n/\sum n_i$ .

$$y_i = \alpha + \beta_1 GPI_i + \beta_2' \mathbf{X}_i + \frac{\varepsilon_i}{w_i} \quad (5-1)$$

Johnson and Mislin (2011) also estimate models with form shown in equation 5-2 below. The added variable  $\gamma_j$  is a dummy for region  $j$ . Johnson and Mislin include as regions North America, Europe, Asia, South America, and Africa. These same regions are used to replicate the Johnson and Mislin results, but for the new models, regions are defined using the World Bank's region classification, which allows a more precise categorization of countries. A list of all countries used and their World Bank regions can be found in Table 5-3.

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<sup>22</sup> Using percent sent or returned, as opposed to amounts, best follows the procedure used by Johnson and Mislin (2011), but, to my knowledge, this does not follow from any theory of reciprocity. Proposition 4 of Cox, Friedman, and Sadiraj (2008) states that the amount returned increases with the amount sent.

<sup>23</sup> Since GPI is not available prior to 2008, including lagged GPI causes all 2008 investment game studies to be dropped from the model; thus, results are shown both with and without the lagged variable.

Table 5-3. List of countries and regions included in analysis

<b>COUNTRY</b>	<b>REGION</b>
Argentina	Latin America & Caribbean
Australia	East Asia & Pacific
Austria	Europe & Central Asia
Bangladesh	South Asia
Cameroon	Sub-Saharan Africa
Canada	North America
China	East Asia & Pacific
Columbia	Latin America & Caribbean
Costa Rica	Latin America & Caribbean
England	Europe & Central Asia
Europe	Europe & Central Asia
France	Europe & Central Asia
Germany	Europe & Central Asia
Hungary	Europe & Central Asia
India	South Asia
Israel	Middle East & North Africa
Italy	Europe & Central Asia
Japan	East Asia & Pacific
Kenya	Sub-Saharan Africa
Middle East	Middle East & North Africa
Netherlands	Europe & Central Asia
New Zealand	East Asia & Pacific
Peru	Latin America & Caribbean
South Africa	Sub-Saharan Africa
Sweden	Europe & Central Asia
Uganda	Sub-Saharan Africa
UK	Europe & Central Asia
Uruguay	Latin America & Caribbean
USA	North America
Vietnam	East Asia & Pacific

The model represented in equation 5-2 is estimated thrice: first, using standard OLS without lagged GPI; second, using standard OLS with lagged GPI; and finally, using robust regression to aid in treatment of outlier observations. The robust procedure repeatedly fits weighted least squares models with weights assigned using the differences between observed

and predicted values of the dependent variable. The procedure continues to estimate the model with updated weights until the maximum change in this difference falls below a given threshold.

$$y_{ij} = \alpha + \beta_1 GPI_i + \beta_2' X_i + \gamma_j + \frac{\varepsilon_{ij}}{w_i} \quad (5-2)$$

The models above are designed to test how conflict affects individuals' trust and trustworthy behavior. The next piece of this paper looks at the next logical question: how do trust and trustworthiness impact a country's level of peace? Collier and Hoeffler (2004a) find several macroeconomic variables that impact a country's likelihood of civil war. In subsequent papers by the same authors, they list GDP per capita, change in GDP per capita, exported primary commodities as a share of GDP, and population size as the most important determinants of war (Collier & Hoeffler, 2004b).

Equation 5-3 models the Global Peace Index as a function of trust or trustworthiness (estimated separately) and the variables listed above. For study  $i$  from the Johnson and Mislin (2011) analysis,  $T_i$  is the logit transform of percent sent by first mover or percent returned by second mover in that study. The vector  $M_i$  contains GDP per capita, change in GDP per capita from the year before, primary commodity exports as a fraction of GDP, the square of the primary commodity exports fraction, the natural log of population, and where indicated, GPI from the previous year. All country indicators are for the country in which the trust experiment was conducted and for the year in which the study was published. The data are from the World Bank's (2015b) database of World Development Indicators. GDP per capita is adjusted to 2011 US Dollars using an index of purchasing power parity, and commodities as a share of GDP is calculated as the ratio of value of raw agricultural and ore exports to GDP.

$$GPI_i = \alpha + \beta_1 T_i + \beta_2' M_i + \frac{\varepsilon_i}{w_i} \quad (5-3)$$

This equation is first solved using an instrumental variables approach. Predicted values for trust or trustworthiness from equation 5-2 are used in the place of  $T_i$  in equation 5-3 to find potential effects of trust and trustworthiness on a country's peace index. Then, to allow for the cyclical relationship between distrust and conflict as discussed by Rohner, Thoenig, and Zilibotti (2013), equations 5-2 and 5-3 are solved simultaneously using three-stage least squares with the original, not predicted, values for trust or trustworthiness. The results will show the simultaneous effects of peacefulness on trust or trustworthiness and of trust and trustworthiness on peacefulness.

## **Results**

### *Replication results*

Before adding the GPI variable, Johnson and Mislin (2011) models are replicated using the restricted sample of studies published since 2008. Figures 5-1 and 5-2 show distributions of percent sent by first movers and percent returned by second movers for this restricted sample, and Table 5-4 shows the regression replication results, which closely match results from the original analysis.

### *Adding Global Peace Index*

Table 5-5 gives results after adding the key independent variable Global Peace Index and with modified region definitions. The coefficient on the GPI in the first model is negative and statistically significant, meaning that less peaceful countries are also less trusting. This negative

Figure 5-1. Percent sent by first movers

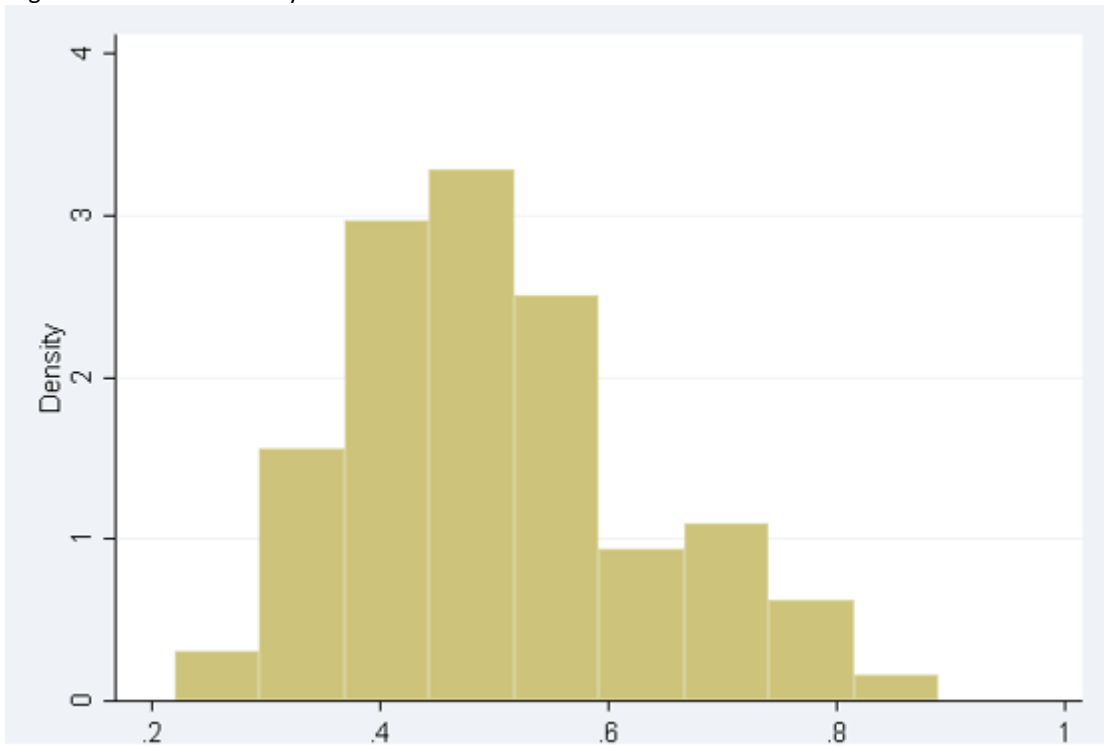


Figure 5-2. Percent returned by second movers

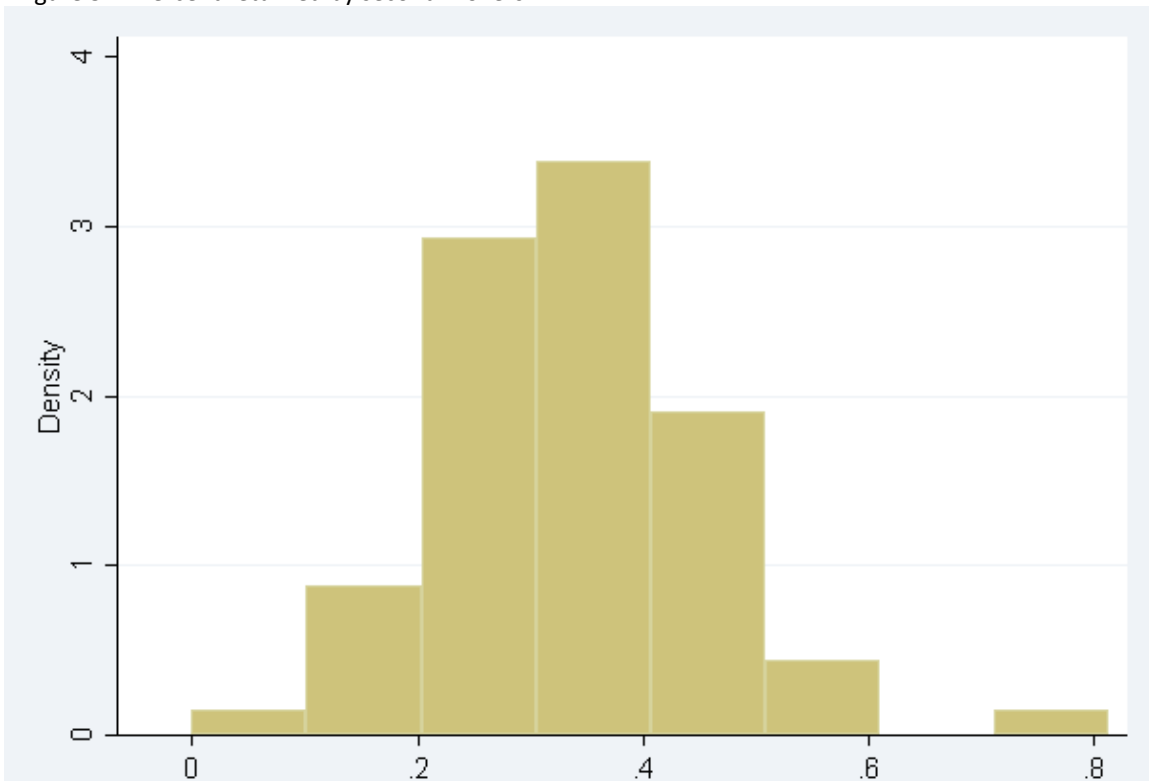


Table 5-4. Replication of Johnson and Mislin (2011) models

VARIABLES	Dependent Variable: Trust			Dependent Variable: Trustworthy		
	WLS	WLS	Robust OLS	WLS	WLS	Robust OLS
Sender Endowment	0.00 (0.005)	-0.00 (0.004)	-0.00 (0.006)	-0.01 (0.004)	-0.01 (0.005)	-0.01*** (0.004)
Receiver Endowment	0.03 (0.203)	-0.11 (0.169)	-0.25 (0.141)	0.33 (0.183)	0.41* (0.183)	0.18 (0.131)
Anonymous	0.21 (0.333)	0.15 (0.291)	-0.03 (0.329)	1.65*** (0.400)	1.85*** (0.423)	2.08*** (0.267)
Rate Return	0.66* (0.285)	0.43 (0.256)	0.17 (0.161)	-0.13 (0.250)	0.06 (0.171)	-0.13 (0.105)
Double Blind	-0.19 (0.194)	-0.14 (0.168)	-0.10 (0.168)	0.13 (0.129)	-0.06 (0.152)	-0.20 (0.111)
Student	-0.08 (0.214)	-0.34 (0.277)	0.34 (0.186)	-0.82*** (0.205)	-0.55* (0.234)	-0.39* (0.164)
Both Roles	0.19 (0.181)	0.12 (0.149)	-0.13 (0.146)	-0.44* (0.189)	-0.45** (0.166)	-0.66*** (0.104)
Random Payment	-0.33* (0.167)	-0.48* (0.202)	-0.05 (0.161)	0.63** (0.221)	0.74** (0.218)	0.50*** (0.134)
Strategy Method	-0.01 (0.175)	-0.04 (0.156)	-0.09 (0.135)	-0.01 (0.215)	0.10 (0.272)	0.43*** (0.116)
Real Person	0.39* (0.155)	0.53* (0.238)	0.41 (0.262)			
Trust				0.06 (0.134)	0.16 (0.130)	0.06 (0.087)
Europe		-0.07 (0.174)	-0.29 (0.145)		-0.06 (0.182)	-0.20 (0.107)
Asia		-0.67* (0.297)	-0.10 (0.227)		0.72* (0.287)	0.50 (0.269)
South America		-0.29 (0.225)	-0.06 (0.386)		0.32 (0.293)	0.51 (0.270)
Africa		-0.62 (0.367)	0.05 (0.281)		0.11 (0.268)	-0.19 (0.222)

Constant	-2.34*	-1.21	-0.73	-1.52	-2.64**	-1.91***
	(1.055)	(0.916)	(0.631)	(0.955)	(0.854)	(0.459)
Observations	86	86	86	65	65	65
R-squared	0.25	0.33	0.21	0.57	0.66	0.71
Adj. R-squared	0.15	0.20	0.05	0.49	0.56	0.63

Robust standard errors in parentheses  
 \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table 5-5. Trust and trustworthiness models with Global Peace Index

VARIABLES	Dependent Variable: Trust				Dependent Variable: Trustworthy			
	WLS	WLS	WLS	Robust OLS	WLS	WLS	WLS	Robust OLS
GPI	-0.41*	-0.64***	-3.38*	-0.53	-0.19	-0.02	0.33	0.43*
	(0.180)	(0.171)	(1.537)	(0.276)	(0.193)	(0.309)	(1.066)	(0.179)
Experimental Design	✓	✓	✓	✓	✓	✓	✓	✓
Controls								
Region Dummies		✓	✓	✓		✓	✓	✓
Trust Control					✓	✓		✓
GPI <sub>t-1</sub>			✓				✓	
Constant	✓	✓	✓	✓	✓	✓	✓	✓
Observations	85	85	59	85	64	64	42	64
R-squared	0.29	0.45	0.60	0.20	0.59	0.70	0.85	0.73
Adj. R-squared	0.19	0.31	0.42	0.00	0.50	0.59	0.75	0.63

Robust standard errors in parentheses  
 \*\*\* p<0.001, \* p<0.05

✓ This group of variables is included in the model

relationship holds and has greater statistical significance after controlling for region dummies, and it has greater magnitude while remaining significant when controlling for the previous year's GPI. In the robust model, however, the coefficient on GPI remains negative but is no longer significant at the 95% level. It is significant at the 94% level, which indicates the relationship remains statistically strong.<sup>24</sup> Full models including control variables and their coefficients are all presented in Appendix G.

The first three trustworthiness models agree that the GPI does not have a significant effect on subjects' behavior as second movers in the investment game. But, using the robust model to deal with outlier observations, a statistically significant relationship between peace and trustworthiness does emerge.<sup>25</sup> The positive coefficient indicates that trustworthiness is stronger in less peaceful countries. It seems that in less peaceful societies, individuals are less willing to make a first, trusting move, but once an interaction has been initiated, these same individuals prove themselves to be trustworthy. This suggests that conflict or unpeaceful societal norms may lead to irrationally low expectations of others' trustworthiness but to higher rewards for those who are willing to trust.

#### *Co-dependence of trust and peace*

While it is interesting that conflict leads to changes in trust and trustworthy behavior, policymakers may benefit more from a knowledge of whether trust and trustworthiness effect

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<sup>24</sup> The coefficient on GPI remains negative and significant when extreme values are dropped from the estimation.

<sup>25</sup> This relationship is only significant using this robust regression modeling. It is not significant if extreme observations are dropped and the model is fitted using standard OLS.



Table 5-6. Models of GPI on trust and trustworthiness

VARIABLES	Dependent Variable: Global Peace Index (GPI)							
	OLS		2SLS		OLS		2SLS	
TRUST	-0.08 (0.096)	-0.04* (0.015)	-0.18 (0.126)	-0.04 (0.024)				
TRUSTWORTHY					-0.32* (0.134)	-0.03 (0.037)	-0.43*** (0.103)	-0.11* (0.046)
Macroeconomic Variable Controls	✓	✓	✓	✓	✓	✓	✓	✓
GPI <sub>t-1</sub>		✓		✓		✓		✓
Constant	✓	✓	✓	✓	✓	✓	✓	✓
Observations	83	58	83	58	63	42	62	41
R-squared	0.45	0.98	0.44	0.98	0.64	0.98	0.62	0.98
Adj. R-squared	0.42	0.98	0.40	0.98	0.60	0.98	0.59	0.97

Robust standard errors in parentheses

\*\*\* p<0.001, \* p<0.05

✓ This group of variables is included in the model

peace in societies. Should post-conflict policies focus on improving trust as a means of staving off future conflict? Tables 5-6 and 5-7 help to answer this question.

Solved alone, the equation modeling the GPI as a function of trust show a statistically significant effect of trust on GPI after controlling for the persistence of peacefulness from the previous year. An increase in trusting behavior is accompanied by an increase in peacefulness. In addition, the equation modeling GPI as a function of trustworthiness shows a significant negative coefficient, implying greater trustworthiness leads to greater peace, but the statistical significance disappears when controlling for lagged GPI (see Table 5-6). Instrumenting to account for effects of experimental design differences on trust and trustworthy behaviors increases the magnitude of both the trust and the trustworthy coefficients, although the trust coefficient becomes insignificant both with and without lagged GPI, and the trustworthiness coefficient is significant in both IV models. There is evidence, then, that both trust and

Table 5-7. 3SLS systems of simultaneously solved equations

VARIABLES	3SLS Dependent Variables					
	Model I: Excluding lagged GPI			Model II: Including lagged GPI		
	TRUST	TRUSTWORTHY	GPI	TRUST	TRUSTWORTHY	GPI
GPI	-0.73*** (0.211)	0.15 (0.243)		-6.54*** (1.640)	-2.17 (1.877)	
TRUST		0.09 (0.214)	-0.10 (0.092)		0.38 (0.245)	-0.04 (0.026)
TRUSTWORTHY			-0.50*** (0.105)			-0.04 (0.037)
Experimental Design Controls	✓	✓		✓	✓	
Region Dummies	✓	✓		✓	✓	
Macroeconomic Variable Controls			✓			✓
GPI <sub>t-1</sub>				✓	✓	✓
Constant			✓	✓	✓	✓
Observations	62	62	62	41	41	41
R-squared	0.59	0.57	0.58	0.62	0.69	0.98

Standard errors in parentheses

\*\*\* p<0.001

✓ This group of variables is included in the model

trustworthiness affect peacefulness, but that evidence is somewhat weak in the trust models.

As an interesting aside, it is also apparent from the extremely high values of R-squared in models including lagged GPI and from the significant coefficients on GPI<sub>t-1</sub> shown in Appendix G that a country's level of peacefulness in a given year is highly related to that country's peacefulness in the prior year.

Since it is logical to expect that peace creates trust and trustworthiness at the same time that trust and trustworthiness foster peace, an equation with both trust and trustworthiness as independent variables affecting GPI is solved simultaneously with two other equations modeling trust and trustworthiness, respectively, as dependent variables with GPI as the key independent variable. Results in Table 5-7 are interesting, though not far different

from what one might expect.<sup>26</sup> From the first two equations of the first model, higher levels of peace in a country lead to higher levels of trusting behavior, but the reverse relationship is not statistically significant at the 95% level. The first and third equations in this system show the fascinating result that while peacefulness has no statistically significant effect on trustworthiness, the opposite relationship is significant. Higher levels of trustworthiness in a country lead to more peace or lower risk of conflict. In Model II, where lagged GPI is included as a control variable in each model, the only relationship that remains significant is that increasing peacefulness increases trusting behavior. Macroeconomic control variables behave as expected in each of these equations. Their coefficients are listed in tables in Appendix G.

### *Sensitivity analysis*

The macroeconomic control variables used in the GPI models throughout this paper are from Collier and Hoeffler's (2004a) analysis of causes of conflict. However, one could argue that other variables should be included in these models, especially since the GPI is itself determined by such an array of indicators for each country. An extreme bounds analysis similar to that introduced by Leamer and Leonard (1983) and used by Levine and Renelt (1992) to examine sensitivity of macroeconomic growth models is thus employed here.

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<sup>26</sup> These results are robust to solving the system using 3SLS, 2SLS, OLS, seemingly unrelated regression, and seemingly unrelated regression with OLS degrees-of-freedom adjustment.

Table 5-8. Additional macroeconomic variables used in sensitivity analysis

Population density (people per sq. km of land area)**	Infant mortality rate (per 1,000 live births)**	Birth rate (per 1,000 people)*
Agricultural land (% of land area)**	Foreign direct investment, net inflows (% of GDP)**	Labor force participation rate (% of total population ages 15-64)*
Forest area (% of land area)**	Foreign direct investment, net outflows (% of GDP)**	Females in labor force (% of total labor force)*
Total natural resources rents (% of GDP)**	Current account balance (% of GDP)**	Life expectancy at birth (years)*
GDP growth (annual %, t-1)**	Adolescent fertility rate (births per 1,000 women ages 15-19)*	Female population (% of total population)*

\*Data source: The World Bank, 2015a

\*\*Data source: The World Bank, 2015b

The sensitivity analysis involves estimating the 3SLS model from Table 5-7 many times with different lists of control variables in the GPI model each time. Every iteration of the model includes the Collier and Hoeffler (2004b) variables, and additional control variables are chosen from those listed in Table 5-8. The 3SLS system is estimated 32,768 times to include every possible combination of any number of the fifteen variables in Table 5-8. The coefficients on variables of interest are observed with each new combination of control variables, and both a lower bound – the coefficient minus twice the standard error – and an upper bound – the coefficient plus twice the standard error – are recorded.

For each variable of interest, the least lower bound (LLB) and the greatest upper bound (GUB) are reported in Table 5-9. For a given independent variable, if either the LLB or the GUB is insignificant or if the coefficient changes sign between the LLB and the GUB, then the relationship between that independent variable and the dependent variable for that model is considered, according to Leamer and Leonard (1983), to be fragile. Sala-I-Martin (1997) criticizes the Leamer and Leonard criteria for fragility as too strict and suggests instead to consider the entire distribution of estimated coefficients. Thus, Table 5-9 also reports the

Table 5-9. Results of sensitivity analysis for 3SLS system of simultaneously solved equations

Lagged GPI excluded from all iterations								
Dependent Variable	Independent Variable	$\beta$ Least Lower Bound	S.E. Least Lower Bound	$\beta$ Greatest Upper Bound	S.E. Greatest Upper Bound	% Significant	Leamer & Leonard Fragile	Sala-I-Martin Fragile
GPI	TRUST	-0.2326	0.0469	-0.0105	0.0488	70%	✓	✓
GPI	TRUSTWORTHY	-0.4324	0.1425	-0.0148	0.0415	62%	✓	✓
TRUST	GPI	-0.8257	0.1715	-0.64	0.1715	100%		
TRUSTWORTHY	GPI	-0.1692	0.19	0.229	0.2065	2%	✓	✓
Lagged GPI included in all iterations								
Dependent Variable	Independent Variable	$\beta$ Least Lower Bound	S.E. Least Lower Bound	$\beta$ Greatest Upper Bound	S.E. Greatest Upper Bound	% Significant	Leamer & Leonard Fragile	Sala-I-Martin Fragile
GPI	TRUST	-0.0566	0.0204	-0.018	0.0181	11%	✓	✓
GPI	TRUSTWORTHY	-0.0809	0.0296	-0.0012	0.0162	10%	✓	✓
TRUST	GPI	-7.473	1.4597	-3.9495	0.8741	99%		
TRUSTWORTHY	GPI	-4.3715	1.1049	-0.488	1.0557	38%	✓	✓

percent of models for which the interval from the LLB to the GUB does not include zero, indicating the coefficient of interest is significantly different from zero. If this number is lower than 90%, the relationship is considered Sala-I-Martin fragile.

With the exception of the coefficient on GPI in the trustworthiness model without lagged GPI, none of the coefficients change sign between the LLB and the GUB. However, only the coefficient on GPI in the trust model remains statistically significant on both ends of the spectrum. The result that more peacefulness leads to more trust is quite robust, but all other relationships remain weak and most become weaker with the inclusion of lagged GPI. The effects of trust and trustworthiness on GPI are fragile by the standards of this sensitivity analysis, but with statistically significant coefficients in 70% and 62% of the nearly 33,000 models without lagged GPI, the existence of these relationships should not be ruled out.

## **Conclusion**

Results of this paper help to inform results from previously cited studies and from previous chapters of this dissertation, which found differences in microeconomic behaviors and outcomes for individuals with differing personal experiences with violence. That the Global Peace Index, a macroeconomic indicator, also has significant bearing on trusting behaviors is telling. It implies that larger-scale cultures of violence or peace are as important as individuals' experiences in determining behavior.

This paper could help to explain some of the difference between Liberian subjects in Chapter 4 of this dissertation and other African subjects included in the Johnson and Mislin (2011) analysis. Liberians displayed substantially more trusting behavior than other Africans

had. The GPI for Liberia in 2014 was, in fact, lower (more peaceful) than the GPI for any of the other African nations at the time of the completion of their trust experiments included in the meta-analysis. This paper demonstrates that this higher level of peacefulness may at least partially explain Liberians' higher levels of trusting behavior. Liberians also were more trusting than Americans; consistently, the GPI for Liberia in 2014 was lower than the GPI for the USA in any year since the Index was first published in 2008. The data compared with Liberian data in Chapter 4, however, was from studies conducted in the U.S. prior to 2008, so the GPI cannot fully settle the difference.

The final result of this paper that trust and trustworthiness have a co-dependent relationship with peacefulness serves to bolster the argument of Rohner, Thoenig, and Zilibotti (2013) that post-war reconstruction cannot succeed without interventions in which trust and trustworthiness are addressed on both a macro and a micro level. Fostering trust and trustworthiness among individuals helps to maintain peace. Rebuilding macroeconomic institutions and reforming policies are equally necessary to restore trust, to repair communities, and to revitalize economies.

## Chapter VI. Conclusion

Restoring individuals, communities, and countries to economic stability after war is never a simple task. This dissertation has shown, in fact, that successful post-war community development requires planned cooperation among local, national, and international actors. Moreover, rehabilitating individuals requires targeted efforts designed to consider their specific and varying war experiences and post-war needs.

Liberia's fourteen years of civil war destroyed communities and economies, leaving them largely without infrastructure, education, or employment. In Chapter 2, we look at development activities and actors in the city of Saclepea, Liberia, in the decade following the war. We find that through coordinated efforts of national and international governments, international organizations such as the U.N., and non-governmental organizations and with invaluable input from local individuals and businesses, significant development progress has been made. Continued development will depend on outside actors' mentoring locals through a deliberately designed process of turning over control of organizations or development projects to those local citizens.

In Chapters 3 and 4, I find that individuals with different war experiences have different post-war outcomes. Those who fought as children are found in Chapter 3 to be less trustworthy than subjects who fought as adults, and among child soldiers, boys who had violence inflicted on them personally are found to have less trustworthy behavior than those who only witnessed violence. Contrary to findings in previous studies, I find also that those without any direct involvement in the war have the worst post-war outcomes in Liberia – worse



than those who fought either as adults or as children. Non-soldiers have lower earnings than soldiers, and they exhibit less trusting behavior in the investment game experiment.

Explanations of these results are not immediately clear in the data, as neither soldiering status nor level of violence experienced has significant effects on other measured outcomes. It is not difficult to theorize that the experience of being forced into war as a child should instill in one a desire to hold tightly to his possessions and thus to be less likely to reciprocate trust placed in him. It is also possible that a lack of trustworthiness is a quality that makes one more likely to become or to succeed as a child soldier.

That non-soldiers should have worse outcomes than soldiers is less intuitive. It is my theory that after Liberia's war, which lasted fourteen years and touched every part of the country, those who did not fight may be considered outsiders. They do not have the benefits of social networks or brotherhoods formed during the war. Evidence that these networks are valuable post-war is found in Chapter 3, where members of the four major tribes involved in the war have better outcomes than members of tribes that played less significant roles in the fighting. Effects of this social dynamic are amplified by non-soldiers' exclusion from post-war reintegration aid, much of which was provided only to former soldiers.

An additional finding of Chapter 4 is that Liberians' choices in the investment game experiment show them to be both more trusting and more trustworthy than Americans or other Africans who have played the same game in previous studies. I offer possible explanations that 1) Liberians behave differently in the game because they know the experimenter will see their choices, while Americans who played the game were assured their choices would be kept private even from the experimenter, or 2) Liberian subjects truly were

more trusting and trustworthy because the game was conducted in a small town and participants knew they had high probability of being paired in the game with someone from their own town and tribe.

Chapter 5 was born from this question of why Liberians behaved so differently in the investment game than subjects in other iterations of the same game. In Chapter 5, I use a compilation of over eighty instances of the investment game that were run in countries from every region of the world between 2008 and 2011.<sup>27</sup> I compare average responses by first and second movers across countries and analyze those responses in light of each country's level of peacefulness, as measured by the Institute of Economics and Peace's (2014) Global Peace Index (GPI). The GPI includes measures of both internal and external peacefulness. Controlling for differences in how the investment game was administered, I find that subjects in countries with higher levels of peacefulness displayed greater trust in the investment game. Additionally, I find that countries in which investment game participants are more trustworthy experience higher levels of peacefulness.

At first glance, the conclusions of Chapter 5 seem contrary to the finding in Chapter 4 that Liberians, who are recovering from a severe civil war, would be more trusting and trustworthy than Americans or other Africans. But, as a measure of overall culture of peacefulness, the GPI includes factors such as militarization, police protection, crime, and terrorism in addition to actual engagement in conflict. Having existed in peace and relative political stability since its war ended in 2003, Liberia's GPI measures higher (more peaceful)

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<sup>27</sup> Dataset compiled by Johnson and Mislin (2011).

than that of the United States or of any of the other African nations included in my dataset in Chapter 5. The GPI was first calculated in 2008, after the data from the American experiments compared with Liberia in Chapter 4, so the analysis of Chapter 5 cannot solve the mystery of differences between Liberians and others in Chapter 4, but it can provide hints toward an explanation.

Taking results from Chapters 2 through 5 together, it is clear that not only should post-war rehabilitation and development plans be tailored to meet individualized needs within a country but that these needs may also vary with the war's context. Within Liberia, we see different outcomes between soldiers and non-soldiers and among soldiers with differing intensity of war experience. And comparing Liberia to other countries, we find that Liberian outcomes are different – sometimes even opposite – from those found in other countries. Policymakers cannot take for granted that post-war recovery looks the same for everyone.

The journey of writing this dissertation began with the intention of understanding war's lasting effects on child soldiers. The results are not the destination I envisioned. That non-soldiers fare as bad as, and often worse than, either adult or child soldiers was not a conclusion I anticipated. However, this finding – and that it persists across two separate datasets and both in econometric and experimental analyses – has struck me as quite profound.

In collecting data for this dissertation, I interviewed hundreds of former child soldiers and heard first-hand of their experiences. There is no doubt that children who are conscripted into war experience unimaginable atrocities and are left with life-long scars. To find that these scars have not left child soldiers with a permanent economic disadvantage in Liberia is indicative of the type of devastation inflicted on the country through its fourteen years of

brutality and of relative success of post-war reintegration efforts. All Liberians, regardless of their roles or non-roles in the war, were deprived of education, employment, and quality of life for over a decade. Post-war reintegration measures have done well to reintroduce former child and adult soldiers into society on an economic playing field that is level with that of non-soldiers. As discussed in Chapter 2, the challenge that remains is to elevate that field to a level that is competitive regionally in West Africa and more broadly in the global market. With impressive levels of demonstrated trust and trustworthiness and with a Global Peace Index higher even than that of the United States, Liberians have shown themselves to have great potential and a collective desire to work toward meeting that challenge.

## Appendix A. Additional Tables for Chapter III

Table A1. Correlation matrix for key variables

VARIABLE	read	read well	schooling	job	income	CS	AS	NS	VL1	VL2	VL3	VL4	health	female	age	married	children
read	1.00																
read well	0.39	1.00															
years of schooling	0.69	0.69	1.00														
job (=1 if employed)	0.00	-0.05	0.02	1.00													
monthly income (USD)	0.07	0.07	0.08	0.06	1.00												
child soldier dummy (CS)	-0.05	-0.12	-0.10	0.04	-0.01	1.00											
adult soldier dummy (AS)	0.12	0.12	0.14	0.11	0.04	-0.71	1.00										
non-soldier dummy (NS)	-0.09	-0.01	-0.05	-0.15	-0.05	-0.34	-0.42	1.00									
perpetrated violence (VL1)	0.00	0.02	0.02	0.03	0.02	0.13	-0.01	-0.16	1.00								
experienced violence (VL2)	0.05	0.02	0.02	0.01	-0.04	-0.04	0.08	-0.05	-0.71	1.00							
witnessed violence (VL3)	-0.05	-0.05	-0.05	-0.16	0.04	-0.09	-0.07	0.20	-0.27	-0.44	1.00						
no violence (VL4)	-0.06	-0.01	-0.02	-0.02	-0.02	-0.05	-0.08	0.17	-0.08	-0.14	-0.05	1.00					
health or physical problem	-0.07	-0.07	-0.07	-0.09	0.00	0.03	0.01	-0.06	0.04	0.06	-0.08	-0.06	1.00				
female	-0.15	-0.10	-0.18	-0.20	-0.05	-0.09	-0.17	0.32	-0.11	0.00	0.17	0.00	0.06	1.00			
age at time of survey	0.06	0.19	0.18	0.15	0.02	-0.45	0.48	-0.06	-0.06	0.12	-0.09	-0.03	-0.02	-0.18	1.00		
married	0.08	0.10	0.12	0.23	0.02	-0.10	0.16	-0.07	-0.02	0.05	-0.09	-0.01	0.00	-0.10	0.20	1.00	
number of children	0.03	0.11	0.06	0.06	0.01	-0.25	0.25	-0.01	-0.04	0.08	-0.05	-0.02	-0.01	-0.10	0.57	0.28	1.00

Table A2. Soldiering status models

VARIABLES	(1) logit job	(2) OLS ln(earn)	(3) logit read	(4) logit read well	(5) ologit school years	(6) logit HSgrad
Child soldier (CS)	6.54 (35.537)	-0.36 (0.914)	3.19 (3.050)	1.28 (1.288)	1.42 (1.295)	1,140,621.07** (6058881.011)
Adult soldier (AS)	3.72 (19.614)	-0.17 (0.714)	1.37 (1.570)	0.84 (0.553)	1.15 (0.972)	77375205.19*** (3.180e+08)
Non-soldier (NS)	-	-	-	-	-	-
Health or Physical problem (HPprob)	0.94 (0.757)	-0.01 (0.477)	1.06 (0.624)	2.37** (0.722)	1.88 (0.682)	13.51*** (10.585)
HPprob × CS	2.65 (2.912)	0.04 (0.470)	0.60 (0.295)	0.24*** (0.076)	0.34** (0.117)	0.03 (0.056)
HPprob × AS	3.08 (4.913)	-0.07 (0.504)	0.60 (0.366)	0.30*** (0.094)	0.42* (0.148)	0.05*** (0.036)
Female	0.15 (0.160)	-0.36 (0.316)	0.64 (0.198)	0.66 (0.199)	0.52* (0.161)	0.19* (0.140)
Female × CS	2.60 (4.314)	-0.06 (0.230)	0.49 (0.232)		0.69 (0.365)	
Female × AS	0.57 (0.900)	0.56 (0.380)	0.43 (0.242)	1.16 (0.567)	0.45 (0.234)	
Age at time of survey (Age)	0.96 (0.432)	0.15** (0.044)	0.99 (0.089)	1.13 (0.118)	0.97 (0.066)	1.17 (0.193)
Age × CS	1.01 (0.170)	0.02 (0.039)	0.98 (0.039)	1.00 (0.049)	1.00 (0.041)	1.00 (0.128)
Age × AS	1.04 (0.211)	0.01 (0.028)	1.03 (0.024)	1.02 (0.036)	1.01 (0.036)	0.85 (0.077)
Married	3.99 (3.720)	0.13 (0.223)	1.68 (0.756)	1.76 (0.946)	1.41 (0.486)	1,945,583.38*** (2363258.578)
Married × CS	0.29 (0.590)	0.14 (0.256)	0.87 (0.467)	1.40 (0.970)	1.07 (0.551)	0.00*** (0.000)
Married × AS	0.31 (0.418)	-0.03 (0.243)	0.85 (0.572)	0.87 (0.610)	1.26 (0.477)	0.00*** (0.000)
Number of Children	1.53 (0.641)	0.01 (0.066)	1.03 (0.103)	1.03 (0.109)	0.97 (0.102)	0.65*** (0.082)
Children × CS	0.54 (0.473)	-0.09 (0.111)	1.03 (0.145)	0.90 (0.147)	1.06 (0.127)	1.24 (0.406)
Children × AS	0.69 (0.290)	-0.00 (0.089)	0.94 (0.077)	0.99 (0.100)	0.96 (0.092)	1.56*** (0.198)
(Age at time of survey) <sup>2</sup>	1.00 (0.007)	-0.00* (0.001)	1.00 (0.001)	1.00 (0.001)	1.00 (0.001)	1.00 (0.002)
Mom elementary	1.19 (1.136)	0.04 (0.231)	0.96 (0.160)	0.86 (0.266)	1.06 (0.315)	0.44 (0.495)
Mom junior high	1.63 (2.488)	0.36 (0.283)	1.04 (0.425)	1.36 (0.699)	0.99 (0.324)	2.77 (3.387)
Mom high school	1.03 (1.773)	-0.28 (0.169)	2.10 (0.979)	0.86 (0.237)	1.35 (0.341)	2.92 (1.648)
Mom university		-0.06 (0.190)	1.73 (2.657)	1.64 (1.307)	1.49 (1.076)	0.26 (0.329)
Dad elementary	0.96 (1.425)	-0.15 (0.133)	1.48* (0.265)	2.17*** (0.488)	1.70*** (0.250)	2.88* (1.205)
Dad junior high	0.72 (1.289)	0.35 (0.196)	0.73 (0.183)	0.50** (0.117)	0.65** (0.088)	0.39 (0.316)
Dad high school	0.66 (0.786)	0.05 (0.148)	2.48** (0.707)	1.90** (0.435)	1.91*** (0.260)	0.84 (0.895)
Dad university		0.06 (0.129)	1.55 (1.114)	1.75 (0.589)	1.77* (0.510)	2.43 (1.317)
Gio		-0.04 (0.426)	1.94* (0.635)	1.60 (0.659)	2.51** (0.701)	2.74 (1.910)
Gola	1.72 (1.458)	-0.09 (0.122)	1.02 (0.253)	0.95 (0.169)	1.00 (0.258)	
Kpelle	1.06 (0.714)	-0.32* (0.121)	1.19 (0.250)	0.81* (0.087)	0.96 (0.123)	0.45** (0.127)

Krahn	0.23 (0.280)	0.12 (0.281)	1.32 (0.526)	0.89 (0.395)	0.91 (0.463)	0.61 (0.715)
Kru	1.35 (0.605)	-0.30* (0.120)	1.64*** (0.215)	1.47 (0.337)	1.31 (0.205)	0.38 (0.285)
Mandingo		-0.73* (0.280)	0.86 (0.324)	0.87 (0.436)	0.83 (0.385)	0.75 (0.657)
Mano	0.92 (0.568)	-0.27 (0.161)	4.21*** (0.923)	3.64*** (0.859)	3.91*** (0.546)	3.39** (1.578)
Sapo	1.41 (1.030)	0.15 (0.279)	1.26 (0.239)	0.77 (0.287)	0.76 (0.167)	0.37 (0.350)
Constant cut1					0.29 (0.351)	
Constant cut2					0.35 (0.437)	
Constant cut3					0.36 (0.448)	
Constant cut4					0.39 (0.482)	
Constant cut5					0.50 (0.624)	
Constant cut6					0.59 (0.740)	
Constant cut7					0.92 (1.156)	
Constant cut8					1.53 (1.933)	
Constant cut9					2.12 (2.700)	
Constant cut10					3.45 (4.349)	
Constant cut11					5.44 (6.866)	
Constant cut12					7.83 (9.890)	
Constant cut13					12.09 (15.582)	
Constant cut14					18.29* (23.747)	
Constant cut15					28.82* (38.736)	
Constant cut16					915.19*** (1,419.221)	
Constant cut17					1,834.82*** (3,051.860)	
Constant cut18					3,676.86*** (6,110.403)	
Constant	5.17 (40.942)	0.60 (0.751)	0.80 (1.129)	0.01** (0.014)		0.00*** (0.000)
Observations	833	950	972	947	972	868
R-squared		0.09				
Adj. R-squared		0.06				

Coefficients for logit and ologit models are exponentiated and presented as odds ratios.

Robust standard errors in parentheses, exponentiated for logit and ologit models

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table A3. Wald test for joint significance of coefficients

Coefficients	(1) logit job ( $\chi^2$ )	(2) OLS ln(earn) (F)	(3) logit read ( $\chi^2$ )	(4) logit read well ( $\chi^2$ )	(5) ologit school years ( $\chi^2$ )	(6) logit HSgrad ( $\chi^2$ )
Health prob × CS, CS	1.61 (0.4475)	0.08 (0.9251)	2.19 (0.3348)	<b>20.46</b> <b>(0.0000)</b>	<b>19.68</b> <b>(0.0001)</b>	<b>6.89</b> <b>(0.0319)</b>
Health prob × AS, AS	0.54 (0.7641)	0.11 (0.8977)	0.73 (0.6956)	<b>29.30</b> <b>(0.0000)</b>	<b>8.38</b> <b>(0.0151)</b>	<b>23.63</b> <b>(0.0000)</b>
Female × CS, CS	<b>24.67</b> <b>(0.0000)</b>	0.23 (0.7997)	2.27 (0.3221)	0.06 (0.8054)	0.50 (0.7776)	<b>6.89</b> <b>(0.0087)</b>
Female × AS, AS	0.13 (0.9375)	1.48 (0.2840)	2.25 (0.3239)	0.22 (0.8937)	2.37 (0.3053)	<b>19.54</b> <b>(0.0000)</b>
Age × CS, CS	2.43 (0.2964)	0.23 (0.7971)	<b>6.41</b> <b>(0.0406)</b>	0.18 (0.9156)	0.62 (0.7351)	<b>110.28</b> <b>(0.0000)</b>
Age × AS, AS	1.37 (0.5049)	0.03 (0.9722)	<b>39.66</b> <b>(0.0000)</b>	0.32 (0.8520)	1.12 (0.5706)	<b>44.44</b> <b>(0.0000)</b>
Married × CS, CS	0.44 (0.8018)	0.32 (0.7371)	1.58 (0.4545)	0.27 (0.8738)	0.15 (0.9268)	<b>168.47</b> <b>(0.0000)</b>
Married × AS, AS	1.01 (0.6039)	0.03 (0.9733)	0.08 (0.9627)	0.19 (0.9100)	0.37 (0.8301)	<b>60.49</b> <b>(0.0000)</b>
Children × CS, CS	5.63 (0.0599)	0.36 (0.7060)	2.09 (0.3517)	0.69 (0.7090)	0.27 (0.8716)	<b>9.65</b> <b>(0.0080)</b>
Children × AS, AS	2.36 (0.3066)	0.03 (0.9699)	0.54 (0.7627)	0.08 (0.9603)	0.23 (0.8930)	<b>21.91</b> <b>(0.0000)</b>
Health prob × CS, health prob	1.73 (0.4202)	0.07 (0.9320)	<b>6.55</b> <b>(0.0379)</b>	<b>20.32</b> <b>(0.0000)</b>	<b>21.76</b> <b>(0.0000)</b>	<b>17.03</b> <b>(0.0002)</b>
Health prob × AS, health prob	0.53 (0.7673)	0.25 (0.7826)	4.37 (0.1122)	<b>14.67</b> <b>(0.0007)</b>	<b>12.41</b> <b>(0.0020)</b>	<b>16.03</b> <b>(0.0003)</b>
Female × CS, female	<b>41.24</b> <b>(0.0000)</b>	2.54 (0.1397)	<b>19.52</b> <b>(0.0001)</b>	1.91 (0.1673)	<b>55.12</b> <b>(0.0000)</b>	<b>5.10</b> <b>(0.0240)</b>
Female × AS, female	<b>12.94</b> <b>(0.0016)</b>	1.08 (0.3849)	<b>16.60</b> <b>(0.0002)</b>	2.12 (0.3471)	<b>14.50</b> <b>(0.0007)</b>	<b>5.10</b> <b>(0.0240)</b>
Age × CS, age	0.02 (0.9917)	<b>7.58</b> <b>(0.0142)</b>	0.57 (0.7536)	2.05 (0.3585)	0.39 (0.8208)	2.53 (0.2820)
Age × AS, age	0.05 (0.9775)	<b>5.94</b> <b>(0.0262)</b>	4.00 (0.1356)	3.69 (0.1578)	0.19 (0.9112)	3.24 (0.1978)
Married × CS, married	3.10 (0.2122)	2.68 (0.1285)	2.04 (0.3600)	<b>6.33</b> <b>(0.0422)</b>	<b>7.46</b> <b>(0.0239)</b>	<b>143.66</b> <b>(0.0000)</b>
Married × AS, married	2.51 (0.2853)	0.27 (0.7736)	2.50 (0.2864)	2.55 (0.2788)	<b>6.71</b> <b>(0.0350)</b>	<b>142.21</b> <b>(0.0000)</b>
Children × CS, children	1.27 (0.5301)	0.52 (0.6135)	2.38 (0.3043)	1.32 (0.5177)	0.44 (0.8012)	<b>12.64</b> <b>(0.0018)</b>
Children × AS, children	1.05 (0.5924)	0.06 (0.9464)	0.70 (0.7059)	0.17 (0.9178)	2.47 (0.2904)	<b>13.12</b> <b>(0.0014)</b>

P-values in parentheses. Statistically significant values bold.



Table A4. Soldiering status models with combined tribe variables

VARIABLES	(1) logit job	(2) OLS ln(earn)	(3) logit read	(4) logit read well	(5) ologit school years	(6) logit HSgrad years
Child soldier (CS)	3.77 (16.301)	-0.27 (0.898)	3.50 (3.376)	1.33 (1.322)	1.50 (1.412)	648,654.27** (2754973.708)
Adult soldier (AS)	1.44 (7.312)	0.05 (0.694)	1.65 (2.077)	0.95 (0.535)	1.30 (1.155)	45645495.32*** (1.299e+08)
Non-soldier (NS)	-	-	-	-	-	-
Health or Physical problem (HPprob)	0.77 (0.458)	0.07 (0.465)	1.05 (0.601)	2.24** (0.667)	1.83 (0.671)	8.20*** (3.646)
HPprob × CS	3.13 (2.738)	-0.06 (0.467)	0.60 (0.294)	0.25*** (0.078)	0.35** (0.118)	0.05 (0.077)
HPprob × AS	4.81 (7.411)	-0.16 (0.483)	0.59 (0.347)	0.30*** (0.083)	0.42* (0.149)	0.08*** (0.046)
Female	0.15* (0.132)	-0.31 (0.347)	0.63 (0.193)	0.66 (0.175)	0.53* (0.157)	0.22** (0.107)
Female × CS	2.75 (3.685)	-0.15 (0.236)	0.47 (0.213)	-	0.68 (0.342)	-
Female × AS	0.52 (0.687)	0.44 (0.377)	0.44 (0.243)	1.28 (0.528)	0.47 (0.232)	-
Age at time of survey (Age)	0.95 (0.391)	0.16* (0.048)	0.99 (0.084)	1.13 (0.107)	0.97 (0.065)	1.14 (0.195)
Age × CS	1.00 (0.141)	0.02 (0.039)	0.98 (0.039)	1.00 (0.046)	0.99 (0.041)	1.03 (0.116)
Age × AS	1.05 (0.221)	0.00 (0.025)	1.03 (0.027)	1.02 (0.036)	1.00 (0.036)	0.87 (0.064)
Married	2.95 (2.352)	0.09 (0.232)	1.80 (0.813)	1.77 (0.862)	1.44 (0.486)	3,359,378.36*** (2874989.748)
Married × CS	0.49 (0.833)	0.20 (0.271)	0.82 (0.430)	1.33 (0.818)	1.02 (0.524)	0.00*** (0.000)
Married × AS	0.55 (0.614)	-0.02 (0.268)	0.78 (0.534)	0.84 (0.543)	1.20 (0.427)	0.00*** (0.000)
Number of Children	1.49 (0.495)	0.02 (0.063)	1.03 (0.101)	1.02 (0.107)	0.96 (0.102)	0.64** (0.094)
Children × CS	0.55 (0.416)	-0.09 (0.105)	1.05 (0.150)	0.92 (0.160)	1.08 (0.131)	1.25 (0.456)
Children × AS	0.69 (0.205)	-0.01 (0.081)	0.96 (0.079)	1.01 (0.099)	0.98 (0.096)	1.59** (0.236)
(Age at time of survey) <sup>2</sup>	1.00 (0.007)	-0.00* (0.001)	1.00 (0.001)	1.00 (0.001)	1.00 (0.001)	1.00 (0.002)
Mom elementary	0.97 (0.810)	0.08 (0.245)	0.96 (0.158)	0.87 (0.278)	1.08 (0.312)	0.47 (0.537)
Mom junior high	1.93 (2.718)	0.33 (0.299)	1.05 (0.401)	1.35 (0.711)	0.97 (0.307)	2.45 (2.912)
Mom high school	1.83 (2.714)	-0.26 (0.160)	2.00 (0.857)	0.83 (0.220)	1.36 (0.359)	2.89 (1.577)
Mom university	-	-0.08 (0.162)	1.73 (2.572)	1.65 (1.255)	1.45 (1.029)	0.38 (0.359)
Dad elementary	0.83 (1.104)	-0.11 (0.167)	1.60** (0.277)	2.27*** (0.512)	1.71*** (0.269)	2.53** (0.795)
Dad junior high	0.66 (1.043)	0.31 (0.204)	0.70 (0.178)	0.51** (0.127)	0.65** (0.100)	0.38 (0.300)
Dad high school	0.72 (0.689)	0.06 (0.148)	2.43** (0.700)	1.85* (0.455)	1.90*** (0.280)	0.95 (0.979)
Dad university	-	0.07 (0.122)	1.47 (1.002)	1.71 (0.551)	1.79* (0.506)	2.61 (1.304)
Mano-Gio	1.28 (0.401)	-0.04 (0.200)	2.82*** (0.540)	3.06*** (0.710)	3.47*** (0.665)	6.07*** (2.137)
Mandingo-Krahn	1.07 (0.367)	-0.17 (0.186)	0.88 (0.300)	0.93 (0.288)	0.89 (0.324)	1.37 (1.239)
Constant cut1					0.30 (0.375)	
Constant cut2					0.37	

Constant cut3					(0.469)	
					0.38	
Constant cut4					(0.481)	
					0.40	
Constant cut5					(0.517)	
					0.52	
Constant cut6					(0.670)	
					0.61	
Constant cut7					(0.793)	
					0.96	
Constant cut8					(1.233)	
					1.59	
Constant cut9					(2.055)	
					2.19	
Constant cut10					(2.863)	
					3.56	
Constant cut11					(4.591)	
					5.58	
Constant cut12					(7.209)	
					8.02	
Constant cut13					(10.347)	
					12.36	
Constant cut14					(16.217)	
					18.65*	
Constant cut15					(24.664)	
					29.36*	
Constant cut16					(40.185)	
					933.08***	
Constant cut17					(1,439.150)	
					1,871.18***	
Constant cut18					(3,083.956)	
					3,750.36***	
					(6,175.577)	
Constant	11.34	0.22	0.89	0.01***		0.00***
	(71.885)	(0.745)	(1.198)	(0.012)		(0.000)
Observations	897	950	972	947	972	919
R-squared		0.07				
Adj. R-squared		0.04				

Coefficients for logit and ologit models are exponentiated and presented as odds ratios.

Robust standard errors in parentheses, exponentiated for logit and ologit models

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table A5. Violence level models.

VARIABLES	(1) logit job	(2) OLS ln(earn)	(3) logit read	(4) logit read well	(5) ologit school years	(6) logit HSgrad
VL1	2.90 (1.613)	0.41 (0.347)	3.13 (2.544)	1.85 (1.721)	1.40 (0.403)	260,948.00*** (185,236.458)
VL2	2.18 (2.126)	0.41 (0.401)	3.73 (2.564)	1.63 (1.549)	1.34 (0.353)	182,285.06*** (114,697.073)
VL3	2.25 (2.711)	0.27 (0.325)	3.06 (1.846)	1.33 (1.153)	1.43 (0.328)	139,800.13*** (122,796.349)
Health or Physical problem	1.47 (0.702)	-0.06 (0.081)	0.69 (0.145)	0.75 (0.149)	0.81 (0.093)	0.88 (0.336)
Female	0.11*** (0.033)	-0.34 (0.150)	0.34*** (0.049)	0.60 (0.203)	0.37*** (0.073)	0.23 (0.222)
Age at time of survey	1.07 (0.294)	0.14** (0.039)	1.03 (0.069)	1.10 (0.073)	1.01 (0.044)	1.22 (0.134)
(Age at time of survey) <sup>2</sup>	1.00 (0.005)	-0.00** (0.001)	1.00 (0.001)	1.00 (0.001)	1.00 (0.001)	1.00 (0.002)
Married	1.89 (1.068)	0.18 (0.119)	1.47** (0.198)	1.83** (0.392)	1.59*** (0.219)	4.67* (3.379)
Number of children	1.01 (0.217)	-0.01 (0.040)	0.98 (0.037)	0.99 (0.047)	0.95 (0.043)	0.98 (0.095)
Mom elementary	0.88 (0.939)	0.06 (0.226)	0.93 (0.132)	0.80 (0.223)	1.00 (0.290)	0.39 (0.379)
Mom junior high	2.23 (3.172)	0.31 (0.321)	1.05 (0.373)	1.25 (0.570)	0.92 (0.315)	2.60 (3.087)
Mom high school	0.94 (1.612)	-0.25 (0.139)	1.87 (0.889)	1.06 (0.196)	1.49 (0.311)	3.92* (2.471)
Mom university		0.05 (0.185)	1.83 (2.888)	1.76 (1.362)	1.40 (1.059)	0.56 (0.764)
Dad elementary	1.38 (1.853)	-0.20 (0.136)	1.72*** (0.251)	2.07** (0.536)	1.72*** (0.253)	2.24* (0.840)
Dad junior high	0.56 (0.878)	0.36 (0.178)	0.64 (0.169)	0.52** (0.132)	0.61** (0.104)	0.49 (0.341)
Dad high school	0.63 (0.522)	0.04 (0.154)	2.46** (0.722)	1.95* (0.522)	1.96*** (0.290)	0.88 (0.887)
Dad university		0.04 (0.115)	1.42 (0.904)	1.56 (0.517)	1.68* (0.405)	2.12 (0.946)

Gio		-0.07 (0.429)	2.06* (0.739)	1.59 (0.719)	2.55** (0.807)	2.46 (1.840)
Gola	1.98 (1.239)	-0.02 (0.120)	1.09 (0.298)	0.96 (0.198)	0.98 (0.292)	
Kpelle	1.25 (0.841)	-0.32* (0.120)	1.25 (0.324)	0.78* (0.090)	0.95 (0.150)	0.40*** (0.102)
Krahn	0.30 (0.255)	0.15 (0.268)	1.17 (0.430)	0.83 (0.358)	0.86 (0.409)	0.67 (0.704)
Kru	1.19 (0.606)	-0.22 (0.127)	1.63** (0.248)	1.47 (0.361)	1.32 (0.237)	0.40 (0.282)
Mandingo		-0.69* (0.259)	0.68 (0.257)	0.86 (0.359)	0.69 (0.325)	1.25 (0.911)
Mano	0.82 (0.449)	-0.29 (0.165)	3.77*** (0.693)	3.33*** (0.824)	3.54*** (0.536)	2.92* (1.233)
Sapo	1.22 (0.969)	0.15 (0.310)	1.23 (0.244)	0.86 (0.305)	0.81 (0.157)	0.41 (0.392)
Constant cut1					0.53 (0.465)	
Constant cut2					0.66 (0.570)	
Constant cut3					0.68 (0.589)	
Constant cut4					0.73 (0.628)	
Constant cut5					0.94 (0.809)	
Constant cut6					1.11 (0.946)	
Constant cut7					1.75 (1.515)	
Constant cut8					2.85 (2.454)	
Constant cut9					3.94 (3.423)	
Constant cut10					6.42* (5.698)	
Constant cut11					10.19* (9.185)	

Constant cut12					14.36**	
					(12.881)	
Constant cut13					22.22***	
					(20.216)	
Constant cut14					34.01***	
					(30.488)	
Constant cut15					52.71***	
					(47.843)	
Constant cut16					2,152.92***	
					(2,678.223)	
Constant cut17					6,477.70***	
					(9,296.424)	
Constant	1.53	0.57	0.20	0.01*		0.00***
	(6.551)	(0.731)	(0.329)	(0.019)		(0.000)
Observations	821	937	959	959	959	899
R-squared		0.08				
Adj. R-squared		0.06				

---

Coefficients for logit and ologit models are exponentiated and presented as odds ratios.

Robust standard errors in parentheses, exponentiated for logit and ologit models

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

## Appendix B: Notes on the relationship between school years and earnings in Chapter III

The motivation section of this paper finds that earnings differ significantly between non-soldiers and soldiers. I then examine education variables to determine whether differences in education may explain these differences in earnings. Throughout the analysis, however, it becomes less clear whether one's number of years of formal education has a significant effect on his earnings. Figure 5 shows the relationship between school years and earnings using a parametric analysis that predicts monthly earnings for each member of the sample if he had the relevant school years but maintained his other demographic and family characteristics. For the total sample and for each soldiering status sub-sample, the 95% confidence intervals for the highest level of education overlap with the confidence intervals for the lowest level of education. This calls into question whether a significant relationship exists between years of schooling and earnings in my sample. I test this relationship both non-parametrically and parametrically.

### *Non-parametric tests*

I create dummy variables representing each of the milestones of education shown in Figure 5: kindergarten, elementary school, junior high school, and high school. I assign each participant to the highest milestone he completed, so that one who started the next level of schooling but did not complete it is assigned to the lower, completed level. Finally, I test for significant differences in earnings among the education groups. Table B1 contains the p-values

from these t-tests of means. All tests are one-tailed, using the alternative hypothesis that those with the higher level of education have higher earnings.

There are too few high school graduates to draw any conclusions about graduation's effects on earnings. But, non-parametric tests do indicate significant earnings increases for elementary school graduates compared with kindergarteners and for junior high school graduates compared with either those with no education or those who stopped before elementary school graduation. Thus, at least through junior high school, it seems more education is better than less.

Table B1. P-values for one-tailed t-tests of means

HIGHEST COMPLETED EDUCATION	Test variable: monthly income			
	None $\bar{x} = 42.34; n = 188$	Kindergarten	Elementary	Jr. High
Kindergarten $\bar{x} = 42.56; n = 382$	0.4847			
Elementary $\bar{x} = 52.07; n=325$	0.0808	0.0441*		
Jr. High $\bar{x} = 62.72; n=311$	0.0477*	0.0398*	0.1886	
High School $\bar{x} = 76.38; n=5$	0.1776	0.1782	0.2487	0.3532

\*  $p < 0.05$

*Parametric tests*

The next step in testing for a relationship between school years and earnings is to use school years as an independent variable in my earnings model. Since my earnings model and my school years model contain the same independent variables, and since I expect the unexplained portions of the two models to be correlated, I put school years into my earnings

model and solve this new model simultaneously with the school years model itself using the seemingly unrelated regression technique. The results are shown in Table B2.

Having solved the equations simultaneously, years of schooling shows no effect on monthly earnings. Moreover, coefficients on control variables in the models do not differ significantly from those in the body of the paper. This result may seem strange, but it is consistent with my intuition having observed Liberian society. The civil wars so disrupted opportunities for formal schooling for all Liberians that schooling is not the most reliable signal to an employer of an employee's value. The significance of the positive age coefficient in the earnings model indicates that experience, not education, is a better predictor of earnings.

Table B2. Coefficients from simultaneously solved equations

VARIABLES	Seemingly Unrelated Regression	
	Ln(earnings)	School years
Child soldier (CS)	-0.37 (0.686)	0.85 (2.375)
Adult soldier (AS)	-0.18 (0.668)	0.67 (2.315)
Non-soldier (NS)	-	-
School years	0.02 (0.009)	-
Health or Physical problem (HPprob)	-0.03 (0.224)	1.21 (0.776)
HPprob × CS	0.07 (0.261)	-2.18* (0.903)
HPprob × AS	-0.04 (0.250)	-1.77* (0.863)
Female	-0.33 (0.237)	-2.08* (0.818)
Female × CS	-0.05 (0.347)	-0.64 (1.203)
Female × AS	0.58 (0.344)	-1.59 (1.189)
Age at time of survey (Age)	0.15** (0.049)	-0.03 (0.168)
Age × CS	0.02 (0.024)	-0.00 (0.083)
Age × AS	0.01 (0.019)	0.02 (0.065)
Married	0.12 (0.296)	0.99 (1.025)



Married × CS	0.14 (0.336)	0.15 (1.164)
Married × AS	-0.03 (0.346)	0.30 (1.199)
Number of Children	0.01 (0.059)	-0.04 (0.206)
Children × CS	-0.09 (0.077)	0.02 (0.266)
Children × AS	-0.00 (0.066)	-0.10 (0.227)
(Age at time of survey) <sup>2</sup>	-0.00** (0.001)	0.00 (0.002)
Mom elementary	0.04 (0.162)	-0.12 (0.563)
Mom junior high	0.35 (0.224)	0.08 (0.777)
Mom high school	-0.29 (0.230)	0.71 (0.795)
Mom university	-0.07 (0.386)	0.97 (1.338)
Dad elementary	-0.17 (0.149)	1.22* (0.514)
Dad junior high	0.36* (0.179)	-1.02 (0.617)
Dad high school	0.02 (0.141)	1.59** (0.485)
Dad university	0.05 (0.168)	1.29* (0.581)
Gio	-0.07 (0.189)	2.15*** (0.652)
Gola	-0.08 (0.181)	-0.10 (0.628)
Kpelle	-0.32** (0.109)	-0.07 (0.376)
Krahn	0.12 (0.289)	-0.06 (1.000)
Kru	-0.31 (0.160)	0.90 (0.552)
Mandingo	-0.72** (0.274)	-0.54 (0.949)
Mano	-0.31* (0.146)	3.15*** (0.495)
Sapo	0.15 (0.156)	-0.32 (0.539)
Constant	0.52 (0.862)	5.51 (2.979)
Observations	950	950
R-squared	0.10	0.19

Standard errors in parentheses  
\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Appendix C. Recruitment Instrument for Chapter IV<sup>28</sup>

**Informed Consent:** Thank you for coming today to sign up to participate in our study. I want to ask you some questions to be sure you qualify for the study. I will keep your answers to these questions in a password-protected file on my computer until after the study is over. I will then destroy any document that links you or your name to your responses.

You will not receive payment for answering these questions today, but if you qualify for the study, you will earn at least 300 LD and will have a chance to earn up to 2000 LD.

I want to ask you about war experiences. Sometimes the war may be disturbing to talk about. Feel free not to answer any question. Just say, "I prefer to go to the next question."

If you feel uncomfortable after the interview is over, you may choose to talk with a professional counselor. I will give you a card with information to contact a counselor, Bob R. Sayon, Sr., who works for the Nimba County Child Protection Program based in Saclepea.

If you are willing to volunteer for this research, please indicate below with your signature or fingerprint.

Participant: \_\_\_\_\_ Date: \_\_\_\_\_

Researcher Obtaining Consent: \_\_\_\_\_ Date: \_\_\_\_\_

**Demographic Information**

Q1: Do you know your age? (If no, move on to Q2)

Q1a: What is your age? (exact or approximate is acceptable)

Q2: How many years of school have you completed?

\_\_\_\_\_

<sup>28</sup> Questions adapted from questions asked by Lundberg, Blattman, and Annan (2010)

### **Soldiering Experiences**

Q3: Since Doe time, were you ever part of an army or faction, either as a soldier or any other role? This could be a Liberian faction, or even a faction in another country. (If no, move to conclusion)

*Can I ask you about these experiences, or do you want to move on to other questions?*

Q4: Were you forced to join?

Q5: Did you join willingly?

Q6: In what year did you first join this faction?

Q7: How long did you stay with this faction?

Q8: Did you carry a gun in this faction?

Q9: Were you ever on the front line?

### **Conclusion**

Thank you for taking time to answer my questions. [Instruction of where and when to show up for the experiment.]

## Appendix D. Subject Instructions for Chapter IV

### **Group Instructions: Groups X and Y Together**

#### **No Talking Allowed**

Now that the experiment has begun, we ask that you do not talk. If you have a question after I finish reading the instructions, please raise your hand and I will approach you and answer your question in private.

#### **Two Groups**

You have all been divided into two groups, Group X and Group Y. After we have gone over these instructions, I will assign you to one of two rooms and will inform you which group you belong to.

#### **Anonymity**

Each person in Group X will be randomly paired with a person in Group Y. No one will learn the identity of the person he is paired with. You will make all of your decisions in private, and only the experimenter will know your choices.

#### **Group Y Show-Up Fees**

Each person in Group Y will be given ten 50-LD certificates as a show-up fee to put in his pocket.

#### **Group X Show-Up Fees**

Each person in Group X will be given ten 50-LD certificates as a show-up fee. As I will explain, each Group X person will have a decision to make about what to do with his show-up fee.

#### **Group X Decision Task**

After Group X and Group Y people move into separate rooms, I will call each Group X person individually into a private room with no one else besides the experimenter present. Then, each person in Group X will decide whether to keep all ten of his 50-LD show-up fee certificates or give some or all of them to his paired person in Group Y. Every certificate given by a person in Group X to a person in Group Y will be tripled by the experimenter. For example, if a Group X person gives 150 LD to a Group Y person, the experimenter will give the Group Y person a total of 150 times 3, which is 450 LD. I will now give each of you a table that shows how this works.

After a Group X person has made his decision, he will place the amount he wishes to give to his paired Group Y person into an envelope to be given to the Group Y person. Then, the Group X person will return to the Group X room to wait until all participants have made their decisions.

#### **The Group Y Decision Task**

I will call each Group Y person individually into a private room with no one else besides the experimenter present. In the private room, each Group Y person will receive an envelope containing the tripled number of certificates given to him by his paired Group X person. The Group Y person will decide whether to return some, all, or none of the tripled number of certificates to the same person in Group X who gave them.

After a Group Y person has made his decision, he will place the amount he wishes to return to his paired Group X person into an envelope to be given to the Group X person.

**Post-Game Interview**

After the game has been played, I will ask all Group X and Group Y people to participate in an interview in private with only the experimenter present. After the interview has been completed, you will receive your final payment, and your participation in the study will be completed.

Please raise your hand if you have any questions.

What Happens to LD Given by Group X to Group Y

If the Group X Person Gives	The Experimenter Triples the Amount	And the Group Y Person Receives
0	$0 \times 3$	0
50	$50 \times 3$	150
100	$100 \times 3$	300
150	$150 \times 3$	450
200	$200 \times 3$	600
250	$250 \times 3$	750
300	$300 \times 3$	900
350	$350 \times 3$	1050
400	$400 \times 3$	1200
450	$450 \times 3$	1350
500	$500 \times 3$	1500

**Individual Instructions: Group X**

First, do you have any questions about the Consent Document I read to the group?

Please sign or mark the Consent Form indicating that you agree to participate in today's tasks and interview.

Thank you. We will now proceed to the task portion of the experiment.

You are in Group X. Inside the envelope I am giving you now are ten 50-LD certificates. Your task is to decide whether to keep all ten of the 50-LD certificates or give some or all of them to the Group Y person with whom you are paired. Every certificate you give to your paired Group Y person will be tripled by me. The table I have given you shows how this works. Your paired Group Y person will later decide to return some, all, or none of the tripled number of certificates to you.

Please place the amount you wish to give to your paired Group Y person into this envelope to be given to the Group Y person.

Thank you. Please return to the Group X room to wait until all participants have made their decisions. Please do not talk to anyone about the decision you have made.

After all participants have made their decisions, I will call you back into this room to ask you a few short questions and give you your final payment.

**Individual Instructions: Group Y**

First, do you have any questions about the Consent Document I read to the group?

Please sign or mark the Consent Form indicating that you agree to participate in today's tasks and interview.

Thank you. We will now proceed to the task portion of the experiment.

You are in Group Y. Inside the envelope I am giving you now are ten 50-LD certificates. Please place these certificates in your pocket now. They are yours to keep.

I will now give you a second envelope containing the tripled number of certificates given to you by the person in Group X with whom you are paired. Your task is to decide whether to return some, all, or none of the tripled number of certificates to the same person in Group X who gave them to you. You may keep what you do not return.

Please place the amount you wish to return to your paired Group X person into this envelope to be given to the Group X person.

Thank you. Now I would like to ask you a few short questions about yourself.

## Appendix E. Post-Experiment Interview for Chapter IV<sup>29</sup>

**Introduction:** I want to ask you about yourself and about your war experiences. Sometimes the war may be disturbing to talk about. Feel free not to answer any question. Just say, "I prefer to go to the next question."

### Demographic Information

- 1- Do you know your age?
  - a. **Yes:** What is your age? (exact or approximate is acceptable)
  - b. **No:** move on to #2.
- 2- What year were you born?
- 3- Were you born in Liberia?
  - a. **Yes:** What county?
  - b. **No:** What country?
- 4- What is your tribe?
- 5- What is your religion?

### Education

- 6- In school, what class did you stop in?
  - a. **HS Graduate:** What level of university did you complete?
- 7- Are you able to read letters and books in English?
- 8- Have you ever received any skills training or apprenticeships?
  - a. **Yes:** What skills?

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<sup>29</sup> Questions adapted from Lundberg, Blattman, and Annan (2010)



## Work & Income

9- Last week, how many days did you do any kind of work for money (e.g. farming, selling goods, small business, driving/motorcycle taxi, tapping rubber)?

10- So in the last week, how much profit did you get from these activities (in LD)?

11- How much money can you usually get in a month for all your regular jobs and small work (in LD)?

## Family

12- When you were small, who took care of you: your born mother, another mother, or no mother?

13- That mother, what class in school did she stop in?

14- Is she still alive?

a. **Yes:** Move on to #15.

b. **No:**

i. I'm sorry. Was she killed during the war or die by herself?

ii. About how old were you when she died?

15- When you were small, who took care of you: your born father, another father, or no father?

16- That father, what class in school did he stop in?

17- Is he still alive?

a. **Yes:** Move on to #18.

b. **No:**

i. I'm sorry. Was he killed during the war or die by himself?

ii. About how old were you when he died?

18- Do you currently have a wife or partner?

19- How many partners do you support?

20- How many children do you have in your whole life?

### Trust and Reciprocity Questions<sup>30</sup>

21- Would you say that most people can be trusted, or that you can't be too careful dealing with people? (Possible answers include Most people can be trusted/can't be too careful/don't know)

22- Do you think that most people would take advantage of you if they got a chance, or would they try to be fair? (Possible answers include most people would take advantage/they would try to be fair/don't know)

### Risk Attitude

23- Suppose you have money to do business. Which business will you take? A business that can give plenty of profit, but there is a chance you can lose your money anytime, or a business with low profit, but you can't lose your money?

### Soldiering Experiences

24- Since Doe time, were you ever part of an army or faction, either as a soldier or any other role?

This could be a Liberian faction, or even a faction in another country.

a. **No:** Skip to Conclusion section

*Can I ask you about these experiences, or do you want to move on to other questions?*

25- Were you forced to do labor by a faction?

26- Did someone shoot bullets at you?

27- Did someone attack you with a cutlass or other weapon?

28- Did you see someone get beaten or tortured?

29- Did you see someone get killed?

a. **Yes:** How many people did you see get killed: Plenty, some, or few?

30- Did you see someone forced to have sex with someone else?

---

<sup>30</sup> Trust and Reciprocity questions from Cox, et al. (2009)

31- Were you forced to have sex with someone?

32- Were you on the frontline or witness battles?

33- Was a family member or close friend killed during the war?

34- Did you receive a serious beating to the body by non-family members?

35- Did you receive a serious physical injury in a battle or attack?

36- Were you forced to commit a violent act?

a. **Yes:** How many violent acts were you forced to commit: Plenty, some, or few?

37- Were you a refugee outside Liberia?

38- Were you displaced within Liberia?

### **Factions & Reintegration**

*Can I ask about the armies or factions you were part of?*

39- What was the first faction or army that you were part of?

40- Were you forced to join?

a. **Yes:** Were you abducted?

b. **No:** Did you join willingly?

41- Why did you join?

42- In what year did you first join this faction?

43- How long did you stay with this faction?

44- Did you carry a gun in this faction?

45- Were you ever a member of another fighting force?

a. **No:** Skip to Reintegration section.

46- Were you forced to join?

a. **Yes:** Were you abducted?

b. **No:** Did you join willingly?

47- Why did you join?

48- In what year did you first join this faction?

49- How long did you stay with this faction?

50- Did you carry a gun in this faction?

### **Reintegration**

51- Did you go through any part of the first DDRR program in 1996/1997?

- a. **No:** Continue to next question
- b. **Yes:** Briefly describe your experiences in that program.

52- Did you go through any part of the DDRR program in 2004/2005?

- a. **No:** Continue to next question.
- b. **Yes:** Briefly describe your experiences in that program.

53- Were you involved with any other reintegration program after the conflict ended?

- a. **No:** Skip to Conclusion
- b. **Yes:**
  - i. Which program were you in?
  - ii. Briefly describe your experiences in that program.

### **Conclusion**

Thank you for taking time to answer my questions. I would like you now to count your payment and sign a payment receipt before you leave. Please remember not to talk to anyone about your decisions or payment during this experiment.

## Appendix F. Descriptions of non-parametric tests used in Chapter IV

**Mann-Whitney (1947)** tests the hypothesis that two samples are drawn from equivalent random variables. Observations from the two samples are combined, ordered, and assigned rankings. The samples are re-divided, and each sample is given a score equal to the sum of the rankings of all observations in that sample. Mann-Whitney's U-statistic is defined below and should be interpreted as the number of pairs  $(x_1, x_2)$  with  $x_1$  from the first sample,  $x_2$  from the second sample, and  $x_1 > x_2$ .

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - T,$$

where  $n_1$  is the number of observations in the first same sample,  $n_2$  is the number of observations in the second sample, and  $T$  is the rank sum for the first sample.

**Epps-Singleton** tests the probability that two samples are drawn from the same distribution. The test compares the characteristic functions of the two samples, the Fourier transforms of their empirical distribution functions. The reported test statistic is a standardized measure of the distance between the characteristic functions. The Epps-Singleton test works for both continuous and discrete variables and has been found to have more power than the Kolmogorov-Smirnov test. (Goerg & Kaiser, 2009)

The **Kolmogorov-Smirnov** test is similar to the Epps-Singleton test but measures the distance between cumulative distribution functions (CDFs) of samples, rather than between the characteristic functions (Smirnov, 1948).

## Appendix G. Additional tables for Chapter V

Table G1. Trust and trustworthiness models with Global Peace Index

VARIABLES	Dependent Variable: Trust				Dependent Variable: Trustworthy			
	WLS	WLS	WLS	Robust OLS	OLS	OLS	WLS	Robust OLS
GPI	-0.41* (0.180)	-0.64*** (0.171)	-3.38* (1.537)	-0.53 (0.276)	-0.19 (0.193)	-0.02 (0.309)	0.33 (1.066)	0.43* (0.179)
Sender Endowment	0.01 (0.006)	-0.00 (0.004)	0.01 (0.004)	-0.00 (0.006)	-0.01 (0.004)	-0.01 (0.005)	-0.01* (0.004)	-0.01*** (0.004)
Receiver Endowment	-0.05 (0.202)	-0.17 (0.188)	-0.02 (0.162)	-0.36* (0.164)	0.24 (0.166)	0.21 (0.195)	0.07 (0.129)	0.08 (0.132)
Anonymous	0.14 (0.278)	-0.26 (0.200)	0.07 (0.197)	-0.00 (0.434)	1.72*** (0.384)	2.58*** (0.101)	-	2.41*** (0.340)
Rate Return	0.60* (0.230)	0.41 (0.260)	0.41 (0.217)	0.23 (0.179)	-0.11 (0.239)	-0.05 (0.143)	-0.14 (0.135)	-0.14 (0.101)
Double Blind	-0.16 (0.201)	-0.01 (0.210)	0.39** (0.133)	0.11 (0.205)	0.10 (0.131)	0.15 (0.216)	-0.07 (0.130)	-0.10 (0.116)
Student	-0.15 (0.222)	-0.46 (0.280)	-0.51* (0.228)	-0.16 (0.219)	-0.85*** (0.201)	-0.60** (0.182)	-0.44** (0.136)	-0.43** (0.148)
Both Roles	0.14 (0.208)	0.07 (0.181)	0.17 (0.179)	-0.05 (0.172)	-0.53* (0.203)	-0.47** (0.159)	-0.52* (0.198)	-0.65*** (0.107)
Random Payment	-0.28 (0.193)	-0.32 (0.220)	-0.10 (0.205)	-0.02 (0.192)	0.72** (0.240)	0.64* (0.262)	0.30 (0.213)	0.36** (0.133)
Strategy Method	-0.15 (0.170)	-0.22 (0.161)	-0.48** (0.175)	-0.12 (0.162)	-0.07 (0.226)	-0.01 (0.247)	0.27 (0.182)	0.37** (0.113)
Real Person	0.34 (0.181)	0.53* (0.242)	0.42 (0.236)	0.44 (0.311)			-	
Trust					0.02 (0.128)	0.15 (0.110)	0.30** (0.097)	0.06 (0.091)
GPI <sub>t-1</sub>			2.73 (1.676)				0.32 (1.130)	
Sub-Saharan Africa		-0.60 (0.353)	-0.40 (0.333)	-0.15 (0.325)		0.05 (0.267)	-0.27 (0.229)	-0.27 (0.209)
South Asia		-1.02** (0.315)	-1.29*** (0.248)	-0.65 (0.500)		0.26 (0.386)	0.40 (0.244)	0.11 (0.311)
Middle East & North Africa		0.64 (0.577)	1.51** (0.483)	0.69 (0.461)			-	
Latin America & Caribbean		-0.82 (0.419)	-0.68 (0.348)	-0.46 (0.530)		1.27*** (0.301)	1.59*** (0.320)	1.14** (0.383)
Europe & Central Asia		-0.36* (0.176)	-0.04 (0.265)	-0.43 (0.217)		0.10 (0.288)	0.16 (0.181)	0.11 (0.147)
East Asia & Pacific		-0.78* (0.322)	-0.50 (0.300)	-0.54 (0.290)		0.64* (0.263)	0.62** (0.171)	0.42 (0.230)
Constant	-1.17 (0.811)	0.74 (0.908)	0.21 (1.309)	0.59 (1.005)	-1.16 (0.902)	-2.82** (0.941)	-1.21* (0.572)	-3.03*** (0.658)
Observations	85	85	59	85	64	64	42	64
R-squared	0.29	0.45	0.60	0.20	0.59	0.70	0.85	0.73
Adj. R-squared	0.19	0.31	0.42	0.00	0.50	0.59	0.75	0.63

Robust standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table G2. Models of GPI on trust and trustworthiness

VARIABLES	Dependent Variable: Global Peace Index (GPI)							
	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS	2SLS
TRUST	-0.08 (0.096)	-0.04* (0.015)	-0.18 (0.126)	-0.04 (0.024)				
TRUSTWORTHY					-0.32* (0.134)	-0.03 (0.037)	-0.43*** (0.103)	-0.11* (0.046)
Ln(GDP per capita)	-0.13** (0.045)	0.02* (0.007)	-0.11** (0.042)	0.02* (0.007)	-0.20*** (0.048)	0.01 (0.013)	-0.21*** (0.033)	-0.01 (0.015)
Commodities Exports/GDP	-5.11 (6.358)	-2.76 (1.511)	-2.53 (5.423)	-2.56 (1.823)	-2.11 (4.438)	-2.43 (3.192)	-1.55 (3.900)	1.01 (2.990)
(Commodities Exports/GDP) <sup>2</sup>	49.35 (41.127)	31.43 (16.722)	32.68 (37.757)	29.36 (20.721)	23.71 (29.815)	27.18 (36.333)	19.02 (28.307)	-14.20 (35.195)
Ln(population)	0.11** (0.033)	0.01 (0.010)	0.11*** (0.024)	0.01 (0.007)	0.17*** (0.025)	0.02 (0.017)	0.18*** (0.026)	0.04** (0.016)
GPI <sub>t-1</sub>		0.96*** (0.027)		0.96*** (0.027)		0.93*** (0.040)		0.91*** (0.045)
Constant	1.27 (0.839)	-0.17 (0.181)	0.97 (0.697)	-0.18 (0.160)	0.64 (0.624)	-0.36 (0.246)	0.43 (0.561)	-0.57* (0.247)
Observations	83	58	83	58	63	42	62	41
R-squared	0.45	0.98	0.44	0.98	0.64	0.98	0.62	0.98
Adj. R-squared	0.42	0.98	0.40	0.98	0.60	0.98	0.59	0.97

Robust standard errors in parentheses

\*\*\* p&lt;0.001, \*\* p&lt;0.01, \* p&lt;0.05

Table G3. Systems of simultaneously solved equations

VARIABLES	3SLS Dependent Variables					
	Model I: Excluding lagged GPI			Model II: Including lagged GPI		
	TRUST	TRUSTWORTHY	GPI	TRUST	TRUSTWORTHY	GPI
GPI	-0.73*** (0.211)	0.15 (0.243)		-6.54*** (1.640)	-2.17 (1.877)	
GPI <sub>t-1</sub>				5.84*** (1.737)	3.10 (1.797)	0.94*** (0.040)
Sender Endowment	-0.01 (0.005)	-0.01 (0.005)		0.00 (0.004)	-0.01* (0.003)	
Receiver Endowment	-0.54** (0.166)	0.21 (0.184)		-0.26 (0.144)	0.13 (0.131)	
Anonymous	0.53 (0.295)	1.13*** (0.296)		-	-	
Rate Return	0.28 (0.222)	-0.03 (0.200)		0.33 (0.201)	-0.24 (0.194)	
Double Blind	-0.01 (0.199)	0.05 (0.171)		0.33 (0.195)	-0.13 (0.164)	
Student	-0.37* (0.172)	-0.45* (0.180)		-0.44** (0.159)	-0.20 (0.185)	
Both Roles	-0.03 (0.149)	-0.41** (0.131)		0.12 (0.137)	-0.43*** (0.104)	
Random Payment	-0.58** (0.186)	0.45* (0.195)		-0.17 (0.177)	0.27* (0.133)	
Strategy Method	0.18 (0.174)	0.07 (0.154)		-0.30 (0.160)	0.24 (0.144)	
Real Person	1.35 (0.981)	-		1.24 (0.964)	-	
Sub-Saharan Africa	-0.79*** (0.236)	0.00 (0.276)		-0.77** (0.269)	-0.38 (0.280)	
South Asia	-1.16*** (0.322)	0.52 (0.394)		-1.47*** (0.325)	0.57 (0.432)	
Middle East & North Africa	-	-		-	-	
Latin America & Caribbean	-	-		-	-	
Europe & Central Asia	-0.43* (0.178)	0.27 (0.182)		-0.16 (0.199)	0.25 (0.150)	
East Asia & Pacific	-0.73** (0.240)	0.81** (0.273)		-0.51* (0.228)	0.71*** (0.201)	
TRUST		0.09 (0.214)	-0.10 (0.092)		0.38 (0.245)	-0.04 (0.026)
TRUSTWORTHY			-0.50*** (0.105)			-0.04 (0.037)
Ln(GDP per capita)			-0.20*** (0.041)			0.01 (0.013)
Commodities			2.06 (4.611)			-1.62 (2.328)
Exports/GDP			-12.53 (32.175)			17.69 (25.342)
(Commodities Exports/GDP) <sup>2</sup>			0.19*** (0.026)			0.02 (0.013)
Ln(population)						
Constant	-	-1.91* (0.891)	0.05 (0.601)	-	-1.69* (0.752)	-0.29 (0.211)
Observations	62	62	62	41	41	41
R-squared	0.59	0.57	0.58	0.62	0.69	0.98

Standard errors in parentheses  
 \*\*\* p<0.001, \*\* p<0.01, \* p<0.05



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## VITA

Melissa Rose Trussell was born on October 9, 1984, and has lived in Georgia since birth. Melissa earned her B.S. in Discrete Mathematics from the Georgia Institute of Technology in 2007 and earned a Masters of Public Administration from the Andrew Young School of Policy Studies (AYSPS) at Georgia State University (GSU) in 2010.

Melissa's research interests include the application of Labor and Experimental Economics methods to issues in Development. To date, most of her research projects have formed out of her passion for Liberia, where she has maintained strong ties since living there in 2010. She has also worked jointly on a project assessing the impact of the changing male-female wage gap on family welfare in the United States. Her work has been funded through the Andrew Young Fellowship, the GSU Dissertation Grant, the AYSPS Dissertation grant awarded by the Dean's Office, and a research grant from the Experimental Economics Center of AYSPS. In 2014, Melissa was also awarded one of very few Outstanding Graduate Research Assistant awards for her work in the School.

In 2014 and 2015, Melissa presented her research at the Allied Social Science Associations / American Economic Association Meetings in Boston, the Southern Economic Association Meeting in Atlanta, the Southeastern International / Development Economics Workshop (cosponsored by Georgia Tech and the Atlanta Federal Reserve Bank) in Atlanta, and the International Atlantic Economic Conference in Savannah.

Melissa will graduate from Georgia State with a Ph. D. in Economics in December 2015 and has begun teaching economics full-time at Georgia Perimeter College in Atlanta.