

**THE EFFECT OF EDUCATIONAL ATTAINMENT ON CORRUPTION
PARTICIPATION IN SUB-SAHARAN AFRICA**

By

Michelle Kaffenberger

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Dr. Kathryn Anderson

Dr. Kamal Saggi

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Introduction

Petty corruption impacts daily life for most of the world's poor, making the public services necessary for day-to-day subsistence, such as water and sanitation, more costly and time consuming to obtain. A *New York Times* article from March, 2012¹, describes the myriad forms such petty corruption takes. Parents in Nairobi, Kenya must bribe to get their children into high school, even after the child meets the entrance requirements. A woman in Bangalore, India reports having to bribe to get a birth certificate for her daughter. Others report having to bribe to obtain a driver's license after passing the driving test and to receive a legitimate tax refund.

When considering poverty and economic development, it is this petty corruption that most affects the daily lives of the poor. While country level data have shown that high levels of corruption are strongly correlated with low GDP and GNP per capita, low average education attainment, and low achievement on most other development indicators (Husted, 1999; Getz and Volkema, 2001; Goldsmith 1999; Beets, 2005; Mauro, 1997), these macro-level studies shine very little light on the ways in which corruption impacts individuals. To examine the interplay between corruption, poverty and development in the lives of individuals, one must study it at the individual level.

To date the majority of corruption studies have used country level data, with Transparency International's (TI) Corruption Perceptions Index (CPI) the most commonly used dataset. The CPI ranks countries according to perceived corruption level based on the perceptions of outsiders such as international businessmen and other professionals. While a useful tool for separating

¹ Stephanie Strom, "Web Sites Shine Light on Petty Bribery Worldwide," *New York Times*, March 6, 2012.

very corrupt countries from very uncorrupt countries, such indicators cannot rank those in the middle range with meaningful accuracy (Rose-Ackerman, 2006). Because corruption can take so many different forms including tax evasion, embezzlement, and petty bribes and because it affects sectors differently in different countries, a single aggregate indicator cannot capture the full picture of a nation's corruption. Such measures and studies also do not reveal how corruption affects individuals in a country.

Firm level studies have filled in some of the gap, examining corruption in specific sectors within countries. Data for such studies can be gathered from firms' financial books or by surveying firm owners and operators (Svensson, 2003). These studies are based on the experiences of those who have been affected by corruption and can reveal specific aspects of corruption in a country, which is more detailed than aggregate country measures based on perceptions. However, they only reveal the effect on and experience of corruption for a specific segment of the population, business owners and managers, and therefore cannot shed light on the impact of corruption on the broader population.

Individual level studies are the least common in the corruption literature and yet reveal most about the impact of corruption on the people of a country. Data are difficult to collect, and people may fear reprisals if they identify corrupt officials. Since corruption is illegal in most countries, they could also fear punishment for participating in a crime, even if they were forced to do so by a public official in order to receive a public service.

An innovative information gathering and anticorruption tool which gets around these problems was discussed in the *New York Times* article mentioned above. The article describes websites that allow individuals to anonymously report corruption and officials who demand bribes. The sites have become popular; the original *ipaidabribe.com* which started in late 2010 has over 400,000 reports of corruption and petty bribery. The site has also been effective. In

Bangalore, India, hopeful drivers must now apply for their licenses online, and driving tests are conducted on automated test tracks. The transport commissioner pushed through these reforms as a result of data gathered through the I Paid A Bribe website.

Even more important for research purposes, many household surveys have begun to incorporate questions related to corruption. They also attempt to word questions in a way that avoids self-incrimination, asking, for example, “how often in the last year have you had to pay a bribe in order to receive xxx service?” which places blame on the officials. Most household surveys are also anonymous, which help moderate the fear of reprisals. Additionally, researchers have recognized that studying corruption at the country level misses much of its complexity, and interest in research at the individual level has increased.

I contribute to this small but growing body of literature by using a unique household survey to analyze the effect of education attainment on corruption participation in Sub-Saharan Africa. The survey I use asks bribery questions in a non-self-incriminating way and allows analysis of individual determinants of corruption participation. It covers over 27,000 individuals in 20 Sub-Saharan African countries.

Theoretically, education’s effect on corruption participation is ambiguous. Education has been shown to reduce illegal behavior, decrease arrest rates, improve social cohesion, and increase civic responsibility (Heyneman, 2002/2003; Heyneman, 2008; Oreopoulos & Salvanes, 2009). All of these outcomes suggest that education attainment should lead to less corruption participation.

However, more educated individuals are more likely to interact with public officials, providing more bribery opportunities. They also are more likely to have better paying jobs, increasing the value of the shorter wait time for public services that bribery can bring.

Additionally, in many developing countries the education systems themselves are corrupt. School children who must bribe for good grades, bribe to move to the next grade level, and bribe for admission into college may learn that corruption is the way to get ahead in their society. Spending more time in such an education system may increase an individual's propensity to bribe later in life.

Using both a hierarchical linear model and a linear probability fixed effects model, I find that education has a highly significant, positive effect on corruption participation. The positive effect also grows larger and more significant as individuals attain more education. The results are robust to the specification of the model; coefficients on all variables in the two specifications I develop are almost identical.

An individual who completed primary school is 2.3 percentage points more likely to bribe than an individual with no formal schooling, and this effect grows larger with each year. Individuals who have attended some secondary school are 3.9 percentage points more likely to bribe, and those who complete secondary school are 5.0 percentage points more likely to bribe than someone with no formal education, both significant at the 1 percent level. The propensity to bribe among those with technical education is more than double the propensity to bribe among those with secondary school only. Those who complete technical or other non-university post-secondary schooling are 10.2 percentage points more likely to bribe than someone with no formal education, and completing university increases the probability of bribery by 13.7 percentage points; both are significant at the 0.1 percent level.

The poor are more likely to bribe than the well-off; power relationships may dictate that the poor are easier to take advantage of. Those in rural areas bribe less than those in urban areas, and men are more likely to bribe than women.

The positive effect of education on bribery is likely due to two primary factors -- corrupt education systems and the higher returns to bribery that education brings; the higher return is largely due to a higher value of time and increased interaction with officials among those with more education. Institutional quality must improve to fight the corruption coming from corrupt education systems. If children are learning how to be corrupt instead of learning good citizenship and social cohesion, then it is no surprise that they grow up to be corrupt adults. Additionally, fighting corruption that comes from a high value of time and high opportunity costs could involve streamlining the receipt of government services, so that bribes are not necessary for quick service.

This paper is organized as follows. Section I discusses the literature on corruption, looking at studies at the country, firm, and individual levels. The section also examines the literature on education and corruption. Section II describes the economic theory that ties education attainment to corruption participation and underpins the empirical analysis. Section III describes the data, and Section IV explains the empirical model to be analyzed and concludes with a discussion of the results.

I. Literature Review

Corruption is a notoriously difficult phenomenon to study, and many of the problems inherent in its measurement and study are briefly discussed in the first part of this section. The section then continues with a description of the three primary approaches to studying corruption in the literature: cross-country studies, firm level studies and individual level studies. The section ends with a discussion of the literature tying education to corruption.

(A.) *Obstacles to studying corruption*

Other factors of development, such as education and health, have clear outcomes that can be measured. Are more school-aged children in school? Are more children completing primary

school? Are more infants being vaccinated, and are more pregnant women attending health clinics? Anti-corruption efforts have no obvious measurable outcomes. Asking a police officer, “How many bribes did you take in the last week?” is clearly folly. Additionally, questions such as, “Have there been more corruption prosecutions?” are likely to lead to answers with ambiguous interpretations. An increase in prosecutions could be because corruption became worse and there are more wrongdoers to prosecute, or it could be because the situation actually became better, as authorities began to prosecute offenders (Seligson, 2006).

In addition to measurement problems, it is also difficult to determine causal relationships; causation can often go in both directions (Rose-Ackerman, 2006). For example, it has been well-established that higher levels of corruption are associated with lower levels of economic development. Corruption can cause slow economic growth, poverty, an overly bureaucratic government as officials create regulations that produce more opportunities to require bribes, and more. But, each of those factors can also cause corruption; poverty and desperation drive people to offer bribes for basic services, and bureaucracy drives people to bribe to get through the red tape (Mauro 1997).

There is also a problem of definition when considering fault in corruption and corrupt acts. In the literature, researchers may call an individual who pays a bribe a “participant in corruption” or a “victim of corruption,” with each term being heavily loaded in its implied meaning (Seligson 2006). Referring to a bribe-payer as a participant in corruption implies shared fault on the part of both the bribe-payer and bribe-taker. The term “victim,” on the other hand, places virtually all blame on the bribe-taker, often an official demanding a bribe. Even with data on bribe-paying, which in and of itself is difficult to obtain, it is nearly impossible to determine who is more at fault. This distinction has important implications for the kinds of anticorruption policies researchers and practitioners may recommend and enact.

To get around problems of direct corruption measurement, many of the corruption measures used in empirical research are actually based on corruption perceptions. Transparency International's (TI) Corruption Perceptions Index (CPI) is the most well-known of these measures. It ranks over 150 countries based on the perceived level of corruption, as measured by survey responses largely from international businessmen and other experts. This methodology is subject to a number of problems. First, and most obviously, perceptions are not the same as actual corruption levels. The perceptions of the experts being surveyed can be subject to bias from international news reporting, stereotypes and other factors unrelated to corruption. For example, poor economic growth may negatively influence general perceptions of a country, improperly leading experts to assume that corruption must have increased, when in fact there is little evidence supporting the perceptions (Seligson 2006).

Despite the drawbacks, perceptions are still the most widely used measure of corruption, often for lack of alternatives. TI does deserve credit, though; before the development of the CPI, few plausible measures of corruption existed. The CPI at least provides a rough ranking of countries, where one otherwise might not exist, and it can be used to highlight the most general correlates with corruption such as levels of economic development, education, international trade, and more.

The use of country level indices such as the CPI has additional problems beyond the bias in the measures; such estimations miss many of the complexities of corruption. With only one aggregated score for each country, these measures must assume corruption is a constant, country-wide phenomenon. In reality, there is significant within-country variation in corruption. Corruption can differ drastically by sector, industry and geography and can affect different individuals in different ways (Seligson, 2006).

Additionally, according to Rose-Ackerman (2006), while country level indices likely distinguish the extremes with some accuracy, separating very corrupt from very clean countries, they cannot rank with much accuracy the middle ground where most countries lie. This means that the conclusions drawn from such indices are at best generalizations, but caution should be used when using such conclusions in determining policies. As Rose-Ackerman (2006, xxiv) states regarding this diversity of corruption, “cross-country work, however valuable in raising consciousness about the problem, cannot be used to design reasonable responses.”

The drawbacks to perceptions-based, cross-country methods of studying corruption have led researchers to examine other levels and dimensions more closely. Studies dealing with corruption at the firm level are quite common, and studying corruption at the micro, or individual, level is a small but growing field. My paper will contribute to this last and least developed genre of corruption studies. In the subsections below, I review the literature on firm level studies and individual level studies and then describe the literature connecting corruption to education. An overview of the remainder of this chapter is outlined in the figure below.

(B.) Cross-Country Corruption Studies

Despite the drawbacks of country level corruption data and rankings, the ability to distinguish the extremes of very corrupt and very uncorrupt countries has allowed researchers to determine country level corruption correlations. Using cross-country comparisons and indices such as those described above, it has been well established that higher levels of corruption are associated with lower achievement on many economic development indicators.

Many studies established the inverse relationship between GNP or GDP per capita and the level of corruption. Husted (1999) found GDP per capita to be the strongest determinant out of a number of cultural and economic factors in predicting corruption level, using the CPI measure.

Getz and Volkema (2001) reinforced the negative relationship between the CPI corruption measure and GDP per capita. Another study begins with a simple model, regressing CPI score on GNP per capita, as a baseline. It finds not only the same negative relationship, that lower GNP per capita is associated with higher levels of corruption, but that the adjusted R^2 is 0.64, meaning that GNP per capita alone explains about 64 percent of the variation in corruption score (Goldsmith, 1999). Goldsmith shows that greater economic liberalization and administrative centralization are also correlated with lower levels of corruption.

Mauro (1997) provides an example of a cross-country study using data other than the CPI. He uses two indices by firms which rank countries based on specific aspects of corruption, and he studies the effect of corruption on various economic outcomes. One index attempts to measure the likelihood of both high level and lower level government officials demanding special or illegal payments “in the allocation of import and export licenses, foreign exchange, tax assessments, credit, and the like,” (Mauro, 1997, 89). The other index measures the pervasiveness of corruption and special payments in business transactions in each country. He finds that a decline in a country’s corruption is associated with an increase in the GDP per capita growth rate, largely through increased private investment and changes in the composition of government expenditures. In particular, lower corruption is associated with higher spending on education.

Beets (2005) uses the CPI’s country level rankings to investigate the relationship between country level education aggregates and corruption. He shows that lower education levels, measured by literacy rates, enrollment rates and student-teacher ratios, are associated with higher levels of corruption. For example, countries with “low corruption” averaged a 90 percent enrollment rate, while countries in the “high corruption” category averaged only a 56 percent enrollment rate for school aged children. These findings align with Mauro’s (1997) finding above; in Mauro’s paper corruption is associated with lower levels of education inputs

(expenditures), and in Beets' paper corruption is associated with lower levels of education outcomes. Beets also finds that economic factors, including lower GNP per capita, higher inflation and higher levels of unemployment are correlated with higher levels of perceived corruption.

These general correlations are useful in framing the corruption discussion. Corruption is clearly worse in poorer, less developed countries. While the direction of causation cannot be explicitly established, it is known that corruption plays a substantial role in economic development. The next subsections evaluate studies of corruption at lower levels of aggregation and allow a deeper examination of some of corruption's complexities and a better understanding of the variation within countries.

(C.) Firm Level Corruption Studies

A second type of literature related to corruption deals with corruption at the firm level. Moving from country level to firm level measurements allows for more heterogeneity and specificity. Within countries, sectors and industries can be distinguished from each other, and it is not assumed that a single aggregate measure applies to each country as a whole. Firm level studies have fewer direct implications for the subject of this paper; however, because such studies are so commonly used to examine corruption, they are worth brief treatment here.

Data can be easier to collect and more reliable at the firm level than the country level, although this is not a guarantee. While cross-country indices largely rely on outsiders' perceptions of corruption levels, firm level measures are obtained from people directly affected by corruption. If they answer questions honestly, then these data can be more reliable. Survey questions can be worded in a way that avoids self-incrimination, in an effort to get more accurate answers (Svensson, 2003). Additionally, it is sometimes possible to use firms' financial books,

compared with official records or tax documents reporting costs and revenues, and deduce likely bribe amounts. This method has an obvious problem as the books themselves may be falsified.

Definitions of corruption at the firm level vary widely and can involve tax evasion, bribe paying to obtain permits or to speed the permit process, bribe paying to import/export and customs officials, and more. The most commonly used survey of firms is the World Bank's Enterprise Surveys. Combined, these surveys cover more than 130,000 business owners and top managers in 125 countries. The World Bank tries to avoid underreporting and the problem of self-incrimination by asking questions like, "how likely would you say it is that a firm in your sector would have to pay a bribe for xxx service?" Because firms are most familiar with their own practices and are probably not familiar with other firms' practices, it is likely that the answers to such questions are accurate, while allowing them not to self-incriminate (Joulfaian, 2009).

Using data from the World Bank's Enterprise Surveys, Gander (2011) finds that firm size is negatively associated with corruption and that "percent owned by largest shareholder" (13) is positively associated with corruption. This means that a firm with a single large stake holder is more likely to participate in corruption than a firm where ownership is shared by many smaller stake holders (Gander, 2011). Another study using similar data gathered by the World Bank and The European Bank for Reconstruction and Development finds significantly greater tax evasion in economies where bribing tax officials is commonplace (Joulfaian, 2009). The author suggests that the quality of governance, particularly in tax administration, significantly affects bribery participation of firms.

A benefit to studying corruption at the firm level is the ability to investigate some of the specific avenues through which corruption affects economic growth. Ayyagari et al. (2010) use the World Bank's Enterprise Surveys to determine whether corruption directly limits firm

innovation. They find that innovating firms are more likely to have to pay bribes, often in order to obtain new permits or documents, and as such bribery acts as a tax on innovation. By hurting innovating firms, corruption limits a significant potential engine for economic growth. This supports the country level findings that corruption is associated with lower economic development.

In an example from Africa, Svensson (2003) studies corruption participation among firms in Uganda, using an enterprise survey conducted by the World Bank and the Uganda Private Sector Foundation. He tries to determine which firms must pay bribes and how much they must pay, and he finds that firm operations requiring action by a public official, such as importing, exporting or infrastructure services, lead to more bribe paying. He also finds that, when it comes to the amount of a bribe, officials price (bribe) discriminate and require higher bribes from firms that are more able to pay.

(D.) Micro-level Corruption Studies

A growing number of studies examine corruption at the individual level. Data sources, often in the form of household surveys which incorporate bribery or corruption questions, increased in recent years making such studies possible. These studies are able to examine the determinants of individual corruption experiences, something previous data types did not allow. From a poverty alleviation and economic development perspective, such data can show the role corruption plays in poverty, as well as whether bribery disproportionately hurts the poor. Disparities exist, however, in the findings gathered thus far from micro-level data, highlighting the importance of context in drawing conclusions about corruption.

Hunt and Lazlo (2012) provides a noteworthy study using household surveys in Peru and Uganda to examine whether bribery is regressive or, in other words, whether bribery

disproportionately hurts the poor. She finds that, in fact, bribery is not regressive and might even be progressive by hurting the rich more than the poor. The rich must bribe more often, mostly due to greater use of public officials than the poor. Each bribe is a smaller proportion of the rich's income than each bribe paid by the poor, but the larger quantity of bribes leads to a net equitable or progressive effect of bribery.

Razafindrakoto and Roubaud (2007) present somewhat different findings. They use data from the 2005 Afrobarometer survey of 18 Sub-Saharan African countries, an earlier round of the same survey analyzed in this paper, to study whether the poor are disproportionately affected by corruption. They find that in dealings with public officials the poor are more often subject to bribery. They also show that, among those affected by corruption, the poorest groups often become discouraged, both giving in to bribery more readily and becoming politically disaffected. Their study did not include data on the payment size of bribes, however, so the regressiveness or progressiveness of bribery as it relates to income, as studied in Hunt and Lazlo's (2012) paper, is not established.

Another study examines the effect of one's ability to hold officials accountable on corruption experience (Deininger and Mpuga, 2004). They hypothesize that an increased ability to hold officials accountable, as measured by knowledge of where and how to report corruption incidents, will lead to less bribe paying. Their findings support the hypothesis; knowledge of how to report corruption does in fact lower bribe paying. They also find that wealthy individuals are more likely to pay a bribe, and female-headed-households are less likely to pay bribes.

Another approach is to examine the determinants of a specific kind of corruption. In a series of short papers, Orces (2008; 2009a; 2009b) investigates individual determinants of paying a bribe in different sectors. In examining who pays bribes to police officers (Orces, 2008), she finds that wealth, education, living in a bigger city and being male all increase the likelihood of

bribe paying, while age decreases the likelihood of bribe paying. She finds similar results for bribery of a public official (Orces, 2009a). Lastly, with regards to public health care workers, she finds similar results for all variables except education (Orces, 2009b). In this case, education is inversely related to the likelihood of bribery.

A number of studies use the World Values Survey, a large individual level data set, which asks for personal opinions about the justifiability of corruption on a 1-10 scale. Using these surveys researchers have shown that females are significantly less tolerant of corruption than males and that females are more likely to say that bribery can “never be justified” (Swamy et al., 2001; Torgeler & Valev, 2010; Gatti et al., 2003). Age also lowers an individual’s tolerance for corruption (Torgeler & Valev, 2006; Gatti et al., 2003). Tolerance towards corruption is not the same as experience with corruption, however; while females and older individuals are less tolerant of corruption, these findings do not necessarily indicate anything about specific corruption or bribery experiences.

Perceptions of corruption can also be studied at the individual level. One study looks at individuals’ perceptions of corruption among their government officials and finds that women perceive less corruption than men, those living in rural areas perceive less corruption than those in urban areas, those employed in public administration perceive higher corruption, and education has mixed effects depending on the type of corruption under consideration (Attile, 2008). Studies of corruption perceptions at the individual level fall prey to many of the same problems as cross-country perception studies, however. Just because a certain group perceives more corruption does not necessarily mean they are more affected by corruption. One group may be more sensitive to corruption so that a few small acts of corruption lead to high perceptions, while other groups think corruption is commonplace and may report little perceived corruption if they view it as “business as usual.”

Individual level studies allow researchers to probe the underlying values and norms associated with corrupt behavior. One study, for example, conducted interviews with 6,000 individuals and 1,300 “street-level” officials to investigate the connection between personal values and corruption (Miller, 2006). They asked questions related to values, hypothetical behavior if exposed to extortion or temptation, personal experience with extortion or temptation, and actual bribery behavior. They found that while most individuals and officials surveyed condemned the use of bribes, a majority also confessed to giving or taking a bribe if necessary or if the opportunity presented itself. They conclude that often external pressures are stronger than values, suggesting that individuals often have no choice in corruption, regardless of their values.

(E.) Education and Corruption

(1.) Education's Effect on Corruption

When education is discussed in the context of corruption, it is most commonly examined at the country level. Cross-country studies have well-established that higher levels of aggregate education in a country are associated with lower levels of corruption as measured by aggregate rankings (Lederman et al., 2005; Cheung & Chan, 2008). In fact, Cheung & Chan (2008) find that GDP per capita and gross enrollment in tertiary education alone explain 80 percent of the variance in CPI scores for a group of 56 developed and developing countries.

Beets (2005) shows that higher education rates are associated with lower levels of corruption for a range of education indicators. Using CPI country rankings, he separates countries into four categories: low, mid-low, mid-high, and high levels of perceived corruption. He uses seven education indicators including literacy rate, student-teacher ratios for primary grades, student-teacher ratios for secondary grades, and enrollment rates for all school-aged children, primary-aged children, secondary-aged children and tertiary-aged children. The results of his descriptive

analysis are remarkably consistent. All education indicators become progressively worse as one moves along the corruption spectrum from least corrupt to most corrupt.

At the individual level, the effect of education on corruption is complex. This paper is the first in the literature to explicitly examine the causal link between education and bribery participation. However, education has been linked with many other factors and outcomes which could point to a possible relationship between education and corruption participation.

In addition to the expected cognitive benefits of education, schooling is also associated with many non-cognitive outcomes. Some of the more tangible of these outcomes include increased likelihood to vote and to volunteer for a community organization, reduced likelihood of participating in crime and of being arrested, increased tendency to behave legally, and improved health outcomes (Oreopoulos & Salvanes, 2009; Heyneman, 2002/2003; Lochner, 2004). Intangible effects include a reduction in individuals' self-described tendencies to "live for today," increased trust in others, and increased tendency to exhibit good citizenship (Oreopoulos & Salvanes, 2009; Heyneman, 2002/2003).

These non-cognitive, positive outcomes of education could impact individuals' propensities towards corruption participation. A reduced tendency to "live for today" shows that education likely impacts individuals' marginal rate of time preference (Oreopoulos & Salvanes, 2009). Education may induce patience and the willingness to sacrifice today for a greater gain tomorrow, as students learn that work and study pay off through higher grades and better opportunities (Becker & Mulligan, 1997). This could matter for corruption, as more educated people may value the long term societal good, a less corrupt state, over immediate personal gratification which could be gained through bribe paying. Additionally, an increased tendency to volunteer one's time implies a willingness to make personal sacrifices for the societal good, which again in this context is a society free of corruption. Furthermore, increased tendencies to behave legally

and lower arrest rates clearly show a growing aversion to illegal activity with greater education attainment. This could very well affect one's willingness to participate in corruption.

On a societal level, education impacts social cohesion, which is the acceptance of and support for social norms and behaviors. By promoting social cohesion, education fosters adherence to a social contract. As Heyneman (2002/2003) states, the social contract can include components such as "a willingness to pay taxes and fulfill other public obligations...the willingness to participate in public affairs, maintain cleanliness of one's property, act responsibly, or be a good citizen." If good citizenship is associated with non-corrupt behavior, then education could reduce corruption participation at the societal level through improved social cohesion. This outcome is not assured, however, and the effect that education has on corruption through social cohesion is theoretically ambiguous. Additionally, by resolving issues between social groups regarding the content of curriculum, by recognizing different views of history and by providing fair opportunities to minorities, schools provide a vehicle for cohesion to grow between social groups (Heyneman, 2008b).

Social cohesion promotes adherence to societal norms, and in some countries or areas, corruption may be an accepted societal norm. If this is the case, then education and the resulting social cohesion may actually promote corrupt behavior rather than reduce it. An education system rife with corruption teaches corruption as rational behavior. If students can pay bribes in order to receive good grades, they learn that bribery is the way to get ahead in their society. The same is true if bribes are required to move to the next grade level, to take a standardized test, get into a university and more, all of which are standard practices in various African education systems (Hunt and Lazlo, 2012). The more time a student spends in a corrupt system, the more corruption becomes a part of their schema, and the more natural it is that they will participate in corruption later in life.

Despite the strong theoretical underpinnings connecting education and corruption, limited empirical work exists on the relationship between education and corruption participation. Studies have been done, however, tying education to aspects of corruption other than participation. Truex (2011) used an original survey of individuals in Kathmandu, Nepal to examine education's effect on attitudes towards corruption. He uses the literature to establish that social norms and practices contribute to corruption acceptance. He then seeks to establish whether education affects social norms, thereby affecting corruption acceptance, which could then affect corruption incidence. He finds that education is consistently the strongest determinant of corruption acceptance, as measured on a 5-point scale across seven different "dimensions," or types of corruption. More educated individuals were consistently more critical of corruption across the full range of dimensions. Interpreting these results, Truex concludes that education is "the key driver of social norms," (1140) and therefore will be a key element in turning attitudes from corruption acceptance to corruption rejection.

Views about the acceptability of corruption are not the same as statements regarding participation in corruption, however. Truex's (2011) paper establishes that education plays a significant role determining attitudes towards corruption, but further study is needed to determine if that change in attitudes carries over to changes in behavior. My analysis will take this next step, examining the effect education has on actual participation.

Some organizations, recognizing the potential of education to affect corruption attitudes and behaviors, use specific, targeted anticorruption education programs or campaigns. TI published a booklet in 2004, "Corruption Fighters' Tool Kit Special Edition: Teaching Integrity to Youth," showcasing eleven examples of such programs from around the world. TI argues that education is critical in the fight against corruption, primarily because of the role it plays in influencing citizens to "actively demand accountability from government and institutions" (TI, 2004, 3). One

of the programs it highlights, in Brazil, focuses on teaching fiscal education in public schools. It aims to raise “students’ awareness of their rights and duties as citizens and as taxpayers,” under the idea that “an informed citizenry is crucial to preventing corruption and waste in public finance” (11).

Another program in Zambia, run by the Network of African Youth Against Corruption-Zambia (NAYAC-Zambia), held courses, regional seminars and a national workshop targeting high school and college students with anti-corruption awareness messages (TI, 2004). In Cambodia, the Transparency Task Force developed a program aimed at improving moral values by integrating lessons on accountability and good governance into school curriculum for grades one through twelve (TI, 2004). While these programs demonstrate the potential for targeted education to reduce corruption incidence, the question remains whether the same would be true for general education.

Hunt and Laszlo (2012) study the effect of bribe paying on the poor, and from their results, they recommend increasing literacy among the poor as a way to reduce corruption. They find much of the bribe paying among the poor is “unwitting,” meaning the poor often do not realize how much a service should cost, or they do not realize that paying a bribe should not be a normal part of the transaction. Hunt and Laszlo (2012) suggest that increased literacy combined with publicizing the official costs of services could lessen the poor’s susceptibility to corruption.

(2.) *Corruption in Education*

Other studies examine the level of corruption within education systems. Corruption within education systems changes the way in which education affects people. Many of the benefits of education, from cognitive learning to intangibles such as good citizenship and increased social

cohesion, can be obstructed by a corrupt system, and corruption can infiltrate education systems in multiple ways.

Heyneman (2004) describes many types of education corruption. In parts of South Asia, he states, students taking standardized tests can often purchase the questions prior to testing. In other cases there may be an established “price” for a passing score, and the students are expected to pay before the test (Heyneman, 2004, 4). Other forms of corruption include teachers requiring payment for a student to pass to the next grade and teachers offering after school tutoring for a fee, and then suggesting that students should attend in order to pass a class (Heyneman 2004). Bribery and corruption continue as students move from primary school to higher levels of education. It can be common for university admission to require paying bribes to the admissions committees. Once accepted, university students may have to “pay bribes to have access to university-owned housing, access to their personal transcripts or a book in the library of which there are only a few copies” (Heyneman, 2008a, 2).

Corruption in education can have severe consequences. Some believe that education corruption is worse than corruption in other areas, such as corruption among police and customs officials, because it has both illegal and immoral aspects (Heyneman, Anderson and Nuraliyeva, 2007). Education corruption harms young people and hurts their future prospects when, as minors, they have little to no recourse.

Corruption also reduces the quality of education outcomes. By allowing students to bribe their way through the education system, corrupt systems produce graduates who have no real knowledge of the material. Students who choose not to participate in corruption may suffer and not be allowed to proceed, preventing them from achieving their potential. Non-bribing students completing higher education can also be hurt through association with a corrupt institution. They may find it more difficult to obtain employment if their university has a reputation for corruption;

potential employers are likely to assume the graduates bribed for grades rather than learning (Heyneman, 2008a).

The quality of education provision is also hurt by corruption. One study in Uganda, for example, found that on average schools received only 20 percent of the funds that the central government disbursed to them through capitation grants, which cover nonwage expenditures. The rest of the funds were captured by local government officials and politicians (Reinikka and Svensson, 2004).

Other African countries face similar problems. Studies similar to the one of Uganda found that in Tanzania an average of 57 percent of non-salary funds was captured before reaching schools. In Ghana, an average of 49 percent of non-salary funding was captured. Zambia has a slightly different funding system, in which some funds are part of a rule-based program with a fixed grant amount for each school and other funds come from a discretionary funding program in which the district official determines how much each school receives. Most of the rule-based grants reached the schools, but only about 25 percent of the discretionary funds did (Reinikka and Svensson, 2004).

In a follow-on study to the Uganda analysis, Reinikka and Svensson (2005) explore methods for reducing funds capture and the effects of a reduction in capture. They examine an anti-capture effort which published information in newspapers regarding the amount of funding schools should be receiving. Local citizens could then use that information to hold officials accountable for the actual funds received. Reinikka and Svensson (2005) found that both school enrollment and test scores improved in areas with greater newspaper access and thus more funding.

Another study examines determinants of capture in different parts of Madagascar. Francken (2009) finds that the education levels of the intended beneficiaries significantly affect capture. More educated areas suffered less capture of cash grants, and to a lesser extent, less capture of in-kind transfers. These findings point to education as a tool for fighting corruption in certain circumstances.

Corruption is most often studied at the country level. While useful for highlighting general correlations such as the association between high levels of corruption and low levels of GDP per capita, education attainment, and overall development, measuring corruption at the country level is flawed and the direction of causation is difficult to determine. Firm level corruption can be easier to study and allow more accurate conclusions, as data on firm bribe paying can often be gathered from firms' bookkeeping. However, the conclusions are specific to the firms being studied, and do not provide information on the effect of corruption on average citizens.

To summarize, in recent decades study of corruption and its effects on nations and economic develop has increased dramatically. However, the literature still focuses primarily on country level studies. While firm level studies have become more common, individual level studies are still infrequent. To understand the way corruption affects the daily lives of individuals and to understand the interplay between corruption and poverty, one must study corruption at the individual level. My analysis contributes to this literature by examining the effect of education attainment on corruption participation.

II. Theory

When deciding whether or not to pay a bribe, an individual maximizes his utility. A bribe may be requested by an official or offered by an individual, but however initiated, in the context of my analysis, bribing is the means to quicker, more efficient service delivery. If the marginal

utility gained from behaving legally is greater than the marginal utility that would be gained from paying the bribe then an individual chooses not to pay a bribe. I assume individuals have a simple utility function defined as

$$U = U(S, L)$$

where utility is a function of service receipt (S) and moral reward for behaving legally (L). An individual gains utility by receiving a public service, and quicker and more efficient services provide greater utility. Individuals also gain utility by behaving legally; here I assume innate preferences for legal behavior over illegal behavior. I also assume that illegal bribery is the primary means for generating quicker, more efficient service provision, and therefore a tradeoff exists between these two goods. The marginal utility of service receipt and moral behavior are both assumed to be positive:

$$MU = \frac{dU}{dS} > 0$$

$$MU = \frac{dU}{dL} > 0$$

An individual maximizes utility subject to the budget constraint,

$$I = \pi_L L + \pi_S S$$

where π_L is the shadow price of behaving legally, which includes the cost of substandard or nonexistent service provision, and π_S is the shadow price of public services, which includes the cost of the service itself as well as the cost of bribes needed to obtain the service. I is the individual's full income, which incorporates both monetary income and the value of his time into the constraint. Within this framework an individual would ideally prefer less corrupt institutions and service providers. This would decrease both shadow prices, allowing the budget constraint to

expand outwards and the individual to gain greater service provision while behaving legally.

Without such an aggregate decline in corruption, he maximizes utility given his budget constraint.

In order to focus on the effect of education on corruption preferences, I assume a constant level of resources or income. I then examine preferences and the way those preferences can change. The indifference curves representing these possible preference combinations are illustrated in Figures 1-3.

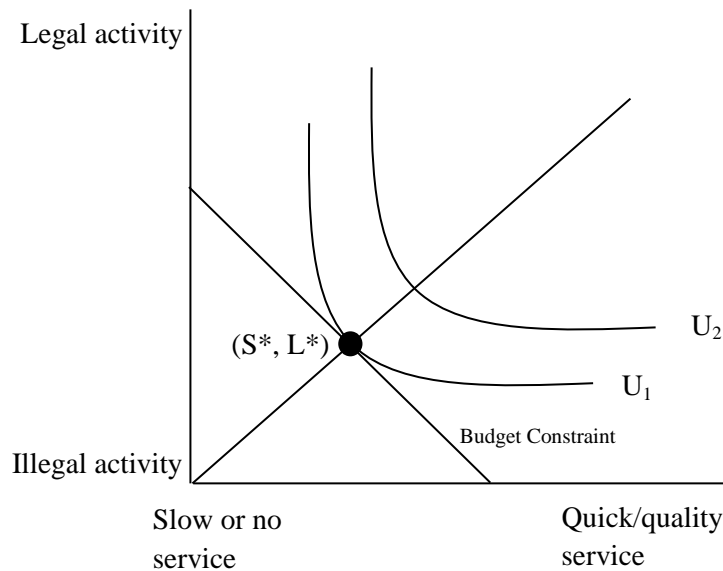
I assume that the individual utility function is Cobb-Douglas and that preferences for S and L are neutral with equal weights in utility.

$$U(S, L) = S^a * L^b$$

$$a = b.$$

These preferences are illustrated in Figure 1.

Figure 1. Neutral Preferences Regarding Bribe Paying



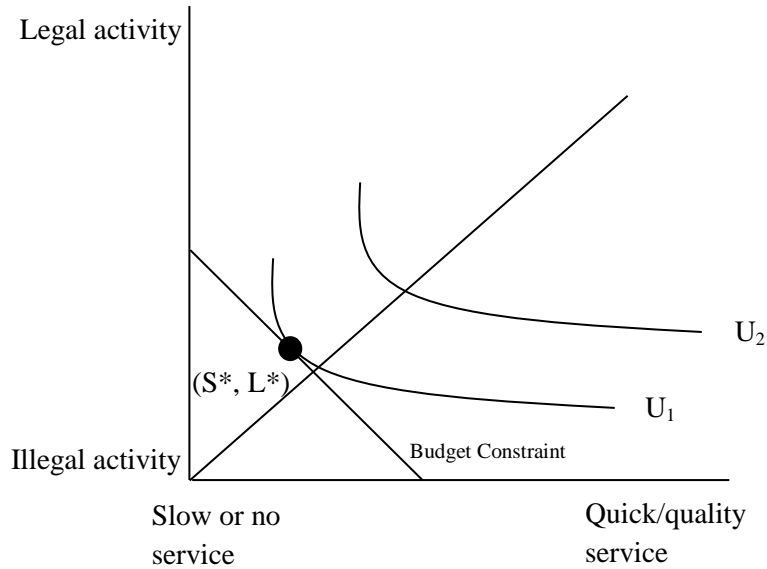
From this state, an individual's life experience, culture, education, and other factors affect preferences and change the shape of his utility curves. If these factors cause an individual to value legal behavior more highly than service delivery, then L receives a higher utility weight than S:

$$U(S, L) = S^a * L^b$$

$$a < b.$$

In this case, his utility curves will shift to those shown in Figure 2. These horizontally inclined utility curves lead to more legal behavior and less service delivery for a given level of income than the curves in Figure 1. This shift can happen if, for example, the individual's family places high value on legal behavior and associates shame or disdain with illegal behavior. Additionally, certain cultures value legal or moral behavior more highly, which could lead to these preferences. As discussed in Section *I.E.I.* education is a conduit for children to learn civic responsibility and social cohesion, and education tends to reduce the likelihood of illegal behavior (Oreopoulos & Salvanes, 2009; Heyneman, 2002/2003). Education "may also affect individual tastes for crime by directly affecting the psychic costs of breaking the law" (Lochner and Moretti, 2004, 158). These effects of education would also shift preferences towards legal behavior, as illustrated in Figure 2.

Figure 2. Anti-Bribery Preferences



Life experience, culture, education, and other factors can also have the opposite effect on preferences. Some cultures may tolerate illegal behavior more than others, particularly if corruption or other crimes are very common. Additionally, as discussed in Section *I.E.I.*, education can increase corruption tendencies if children are forced to bribe in school; they may learn at an early age that corruption is the way to get ahead in their society. The effect of education on civic responsibility, social cohesion, and illegal behavior might be reversed, as children learn that corruption is an acceptable social norm. These factors can lower the moral cost of participating in corruption and shift preferences away from legal behavior and towards service delivery as in Figure 3.

Education may also increase the potential benefits of bribery; individuals with higher education attainment may have more to gain from paying a bribe.² They are likely to have better jobs and value their time more highly, increasing the value of the reduced wait time for a public service. More educated individuals may also be more likely to own a business and thus the utility gained from a quicker permit process achieved through bribing may be greater. Preferences for quicker service delivery, by way of bribing, over behaving legally have a utility function in the form:

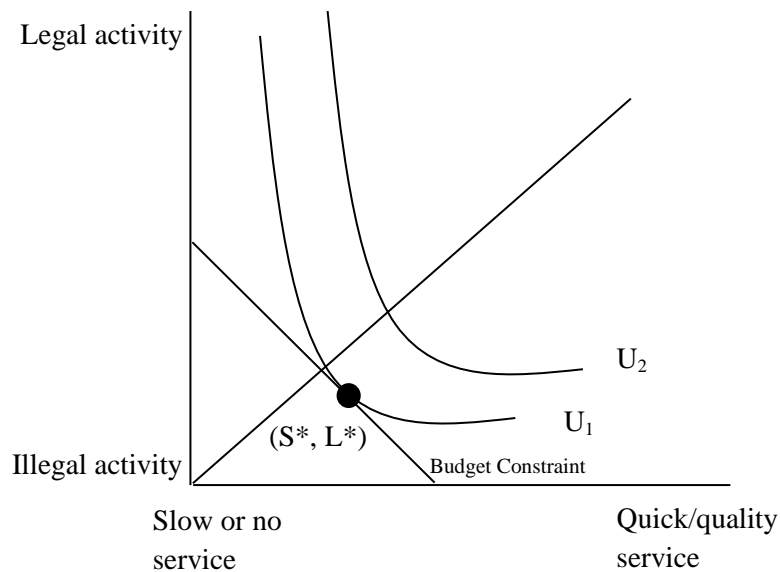
$$U(S, L) = S^a * L^b$$

$$a > b$$

which weights service delivery more highly than legal behavior. These preferences are illustrated in Figure 3.

² Lochner and Moretti (2004) show this for crime generally.

Figure 3. Pro-bribery Preferences



The ambiguous effect of education is conveyed in the theoretical and empirical literature. Lochner and Moretti (2004) predict, and find, that education has a negative effect on crime, demonstrating a shift in preferences towards legal behavior. They offer a few explanations including the possibility that education increases patience and risk aversion, making people less likely to participate in illegal activities. Conversely, Mocan (2008) predicts and finds that education increases corruption participation and theorizes that increased contact with and exposure to government officials drive this effect. He finds that the magnitude of the effect that education has on corruption participation is even greater in developing countries than it is in developed countries.

Many additional factors impact an individual's utility function with regard to corruption preferences and budget constraint. Geographical location likely affects the returns to bribery; returns may be greater in urban areas where, for example, there are more business opportunities than in rural areas. This leads to a lower shadow price for S , because the return to S is greater.

Employment is also a factor, as employed individuals may have both more opportunities and greater income with which to pay bribes, and the marginal returns to the bribes may also be greater. However, employment increases the opportunity cost of crime, thus reducing the expected return to corruption.

Income may impact corruption tendencies in different ways. Income may increase corruption participation as more wealthy individuals have more money with which to bribe, have greater exposure to officials (Mocan, 2008), and have more to gain from quicker, more efficient services. However, it may be easier for officials to take advantage of poorer individuals, who have limited alternatives when asked for a bribe. Power relations among agents are important in determining bribe payments and who bribes whom.

Gender likely impacts bribery participation in multiple ways. If women work in the home, they may have less exposure and fewer opportunities to pay bribes than men. Additionally, studies show that women are less prone to illegal behavior in general (see Swamy et al., 2001), meaning their preferences may be more in line with those in Figure 2 above. Women's opportunity costs of corruption are lower, though, because they earn less and are less likely to work. The lower opportunity cost could lower the shadow price of service delivery, as women have less to lose from paying a bribe. It is also possible that certain religious beliefs impact bribery preferences, as these beliefs could determine the value an individual places on legal behavior.

Country factors also impact an individual's corruption tendencies. Corruption is more common in some countries than in others, so it can be expected that all individuals regardless of education level and other factors are more likely to participate in corruption in more corruption-prone countries. GDP per capita may also impact corruption tendencies. Education likely has

different effects on corruption participation in countries with very high levels of average education attainment than in countries with low average attainment levels.

These theoretical underpinnings of corruption preferences are incorporated into my empirical model below. I control for each of the factors discussed in this section so that I can draw causal inferences regarding education's impact on corruption participation apart from other determinants.

III. Data

(A.) *The Survey*

To analyze the relationship between education and corruption participation, I use a household survey collected by the AfroBarometer project that covers 20 Sub-Saharan African countries and includes over 27,000 individuals.³ The data were collected between March 2008 and June 2009, and this is the most recent round of data collection at the time of my analysis. A number of institutes in Africa partnered to conduct the survey, and funders included the World Bank, USAID, the United Kingdom's Department for International Development (DfID), and other national development agencies. The survey sample is a randomly drawn, representative cross-section of citizens of voting age in each country. For most countries, the voting age requirement means adults aged 18 and over were eligible to be surveyed.

³ For more details on the project, see: <http://www.afrobarometer.org/>

The AfroBarometer measures public attitudes on social, political and economic issues in Africa. It includes a number of questions related to corruption, and the questions relevant to my analysis are in a series on bribe paying. Each participant was asked the following questions:

In the past year, how often (if ever) have you had to pay a bribe, give a gift, or do a favor to government officials in order to:

Get a document or permit?

Get water or sanitation?

Avoid a problem with the police (like passing a checkpoint or avoiding a fine or arrest)?

Using the words “had to” diminishes the self-incrimination inherent in this question, as respondents feel that they are reporting on the wrong-doing of an official rather than their own wrong-doing. This improves the validity of responses compared with other more direct ways of asking about corruption activities. Because my study focuses on the probability of participation in bribe-paying, I create a dummy variable equal to one if an individual paid any of the three types of bribes and a value of zero if they paid no bribes in the last year.

The other variable of interest is education which the survey measures as the level of education completed. The answer choices are on a scale from zero to nine and include: no formal education, some primary school, completed primary school, and so on through post-graduate school.

(B.) Descriptive Statistics

Just over 21 percent of the individuals surveyed participated in bribe-paying during the previous year, as shown in Table 1. A substantial percent of the population, 15.9 percent, have no formal schooling. Informal schooling, which includes Koranic schooling, is not very common with only 4.6 percent of the sample completing this type of education. Thirty-nine percent of the adult population has not completed primary school, and 61 percent has completed at least a

primary school education. Almost 26 percent has completed secondary schooling or higher, and only 2.1 percent has completed university or post-graduate studies.

Table 1. Descriptive Statistics					
Variable	N	mean	std dev	min	max
paid any bribe (=1)	27703	0.212	0.409	0	1
edu_level_0 (No formal)	27703	0.159	0.366	0	1
edu_level_1 (Informal only)	27703	0.046	0.208	0	1
edu_level_2 (Some Primary)	27703	0.185	0.388	0	1
edu_level_3 (Complete Primary)	27703	0.141	0.348	0	1
edu_level_4 (Some Secondary)	27703	0.215	0.411	0	1
edu_level_5 (Complete Secondary)	27703	0.150	0.357	0	1
edu_level_6 (Technical/non-university)	27703	0.060	0.238	0	1
edu_level_7 (Some University)	27703	0.023	0.151	0	1
edu_level_8 (Complete University)	27703	0.018	0.134	0	1
edu_level_9 (Post-Graduate)	27703	0.003	0.058	0	1
hdi_edu (education index)	27703	0.474	0.136	0.19	0.7
hdi_income (income index)	27703	0.403	0.135	0.14	0.7
age_imputed	27703	36.367	14.441	18	110
head of household (=1)	27703	0.480	0.500	0	1
rural (=1)	27703	0.620	0.485	0	1
police nearby (=1)	27703	0.358	0.480	0	1
market nearby (=1)	27703	0.663	0.473	0	1
good roads (=1)	27703	0.410	0.492	0	1
access to news (=1)	27691	1.934	1.187	0	4
interest in politics	27706	1.765	1.112	0	3
voted (=1)	27703	0.703	0.457	0	1
relig_Catholic (=1)	27703	0.226	0.418	0	1
religion: Christian (=1)	27703	0.134	0.340	0	1
religion: Muslim (=1)	27703	0.165	0.371	0	1
religion: other (=1)	27703	0.476	0.499	0	1
employed (=1)	27703	0.338	0.473	0	1

unemployed (=1)	27703	0.343	0.475	0	1
no work (=1)	27703	0.319	0.466	0	1
gender (1=male)	27703	0.499	0.500	0	1
minority (=1)	27703	0.053	0.223	0	1
pca_quint_dv1 ^a	27703	0.201	0.400	0	1
pca_quint_dv2 ^a	27703	0.203	0.402	0	1
pca_quint_dv3 ^a	27703	0.214	0.410	0	1
pca_quint_dv4 ^a	27703	0.198	0.399	0	1
pca_quint_dv5 ^a	27703	0.185	0.388	0	1

^aWealth index by quintile, derived from a principal components analysis. dv1 means the lowest quintile; dv5 means the highest quintile.

As a country level education variable, I create the *hdi_edu* variable using the values from the United Nation's Human Development Report's (UNHDR) Education Index for each country.⁴ The Index is based on expected years of schooling and mean years of schooling for each country. The index ranges from zero to one, with one being the highest level of education,; the index scores and ranks 187 countries worldwide. Table 1 shows that the highest Index score of the 20 countries under examination is 0.7, which is considered a medium-to-high level of educational development. The lowest score is 0.19, which is a very low level of development. The mean, 0.47, is in the low-to-medium development range.

I also create the *hdi_income* variable as a country level income variable using the UNHDR's Income Index values, which is based on the countries' GNI per capita. The Income Index is similar to the Education Index, scoring countries on a scale of zero to one. The descriptive

⁴ For more details, see <http://hdrstats.undp.org/en/indicators/103706.html> for the Education Index, and <http://hdrstats.undp.org/en/indicators/103606.html> for the Income Index.

statistics for income are similar to those for education; the maximum of 0.7 is associated with a high level of development, the minimum of 0.14 is a very low level of development, and the mean of 0.40 is in the low to medium range when compared to the 187 countries the UNHDR ranks. The *hdi_edu* and *hdi_income* variables are used in the hierarchical linear model as country-level variables.

The variable *age_imputed* contains 333 imputed age values for observations with missing age data (variable *age*). These 333 values represent only 1.2 percent of the sample size, and age contains more missing data than any of the other variables in the survey. *Edu_level* is missing for ten individuals, and those observations are dropped from the analysis. *News_access* is missing on 22 values, and *interest_politics* is missing seven values; at less than .01 percent of the sample, the observations with these missing values are also dropped.

Forty-eight percent of those surveyed are household heads and 49.9 percent are male. Sixty-two percent live in rural areas. Individuals seem to be relatively involved in politics; 70.3 percent voted in the last election in their country. Additionally, the highest level of political interest, “very interested,” is also the most common response; 33 percent of respondents answered that they are “very interested” in public affairs. An additional 29 percent said that they were “somewhat interested,” leaving only 38 percent answering that they are “not very interested” or “not interested at all.” Of the three major religions, Catholic, Christian and Muslim, Catholicism has the greatest representation with 22.6 percent. However “other” religions have a plurality, with 47.6 percent, and include traditional religions and specific religious sects.

Employment is almost equally divided between “employed,” those who are working; “unemployed,” those who are not working but are seeking a job; and “no work,” those who are not working and are not looking for work (housewives, the disabled, and so forth) make up a

slightly smaller percent. The *minority* variable represents all those who define their race as something other than “Black/African.” It makes up only 5.3percent of individuals.

The “pca” variables are created using principal component analysis (PCA) and represent a wealth or well-being index. PCA is preferable to income for measuring well-being, as income measures tend to be unreliable and have high non-response rates in household surveys (Cordova, 2008). In this survey, income data were not even collected. I conduct PCA with nine dummy variables each representing either ownership of an asset or an indicator of well-being. The ownership variables include ownership of a radio, television, and motor vehicle, and using an indoor water source. The well-being variables indicate whether, in the past year, anyone in the individual’s household had gone without food, clean water, medication or medical treatment, cooking fuel, or income. The first principal component of the PCA is used to give each individual a score which allows ranking by well-being.⁵

This method provides a relative measure of wealth; a higher ranking indicates that an individual is better off than those ranked below him. The ranked individuals are then divided into quintiles, and dummy variables are used to represent those in each quintile, as shown in Table 1. *pca_quint_dv1* is a dummy variable representing the poorest fifth of the sample, *pca_quint_dv5* represents the wealthiest quintile, and the other three *pca* variables represent the other three quintiles, respectively.

IV. Empirical Analysis and Results

(A.) Empirical Model

⁵ For more detailed descriptions of PCA, see Filmer & Pritchett, 2001, and McKenzie, 2005.

I estimate several different empirical models to examine the relationship between education attainment and bribery participation. The first specification is a two-level hierarchical linear model (HLM). HLM is a multilevel model which controls for the nesting of individuals within countries; in other words it controls for the non-independence of the error terms of individuals within each country (Albright & Marinova, 2010). The model treats the intercept as random, allowing it to differ by country, and includes country level variables in the Level 2 equation. Additionally, as the outcome variable is binary, a linear probability version of HLM is used. The model is specified as follows:

$$\text{Level 1: } Y_{ij} = \beta_{0j} + \beta_1 \mathbf{E}_{ij} + \beta_2 \mathbf{X}_{ij} + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01} \mathbf{Z}_j + \mu_{0j}$$

$$\text{Combined: } Y_{ij} = \gamma_{00} + \gamma_{01} \mathbf{Z}_j + \beta_1 \mathbf{E}_{ij} + \beta_2 \mathbf{X}_{ij} + \mu_{0j} + e_{ij}$$

The subscript i indexes the individual, and j indexes the country. Beginning with Level 1, Y_{ij} is the probability that individual i in country j participated in bribery in the past year. β_{0j} is the average probability of bribery participation in country j ; HLM allows this intercept to differ by country in this model. \mathbf{E}_{ij} are the dummy variables representing levels of education; the level of education attained by individual i will take the value of one, and the other levels will take the value of zero. \mathbf{X}_{ij} are the other individual characteristics that are described in Table 1, and e_{ij} is the individual level error term for person i in country j .

Level 2 allows the intercept term in Level 1, β_{0j} , or the average probability of participating in bribery in country j , to differ by country. γ_{00} is the “grand mean,” the average probability of participating in bribery in the full sample. The variables \mathbf{Z}_j are variables controlling for specific

country level characteristics, including average education level and average income. μ_{0j} is the country level error term.

The final model combines the two levels into one equation. The coefficients on E_{ij} are the coefficients of interest. They describe the effects that different levels of education attainment have on the individual's propensity to bribe, controlling for both the country level and individual level characteristics included in the two levels of the model.

As a comparison, a linear probability model is also run, controlling for country fixed effects. It is specified as follows:

$$Y_{ij} = \beta_0 + \beta_1 E_{ij} + \beta_2 X_{ij} + \alpha_j + e_{ij}$$

where, again, i indexes the individual and j indexes the country. The other variables have the same interpretation as above, except β_0 is a fixed intercept rather than random. α_j represents country j 's fixed effects and controls for the similarities within each country that could affect the propensity to bribe among residents of country j . The fixed effect includes overall prevalence of corruption within each country, as that clearly impacts an individual's probability of bribing. Both the HLM and the linear probability models are adjusted for heteroskedasticity.

The HLM allows me to attribute country level impacts on corruption participation to specific factors; I can pinpoint the different effects that various country level variables have on corruption. In the above model, for example, I can pinpoint the separate effects that average income and average education attainment within a country have on corruption participation. In contrast, in the linear probability fixed effects model all country level effects are in essence captured in a blackbox of "fixed effects," which I am unable to identify more precisely. The results of the two models should be similar, with the HLM providing additional country level information not

provided in the fixed effects model. Using both allows me to check the robustness of the HLM specification.

Two logit models are also run, with the same specifications as the linear probability HLM and linear probability fixed effects model. With a binary outcome variable, the predicted values from the models represent the probability of participating in bribery, and probabilities can only take values between zero and one, inclusive. Linear probability models, however, allow predicted values outside the range of possible real outcomes, which can be problematic. The logit versions of the two models restrict the models' predicted values to the range of zero to one. The results are very similar to the linear probability models, suggesting that the restriction is not necessary. Because they are so similar, the results of the logit models are not reported here.

(B.) Results

The empirical analysis in Table 3 shows that many levels of education have highly significant, positive effects on bribery participation. The linear probability fixed effects model and the HLM give very similar results; no education level coefficient differs by more than 0.001 between the two models. The coefficient for each education variable is the increased probability of bribing over someone with no formal education.

Completing university has the largest effect; the individual's probability of participating in bribery is 13.7 percentage points higher on average than those with no formal education. Those with some university education have a 12.2 percentage point greater probability of participating in bribery, and those with post-secondary training, such as attending a technical college, have an increased probability of 10.2 percentage points. All of these effects are significant at the one percent level.

Completing secondary school has only half the effect of post-secondary schooling; individuals who complete secondary school are 5.0 percentage points more likely to bribe than those with no education. Completing some secondary education increases an individual's likelihood of bribing by 3.9 percentage points. These effects are significant at the five percent level in the linear probability fixed effects model, and at the one percent level in the HLM.

The effect of lower grade levels is less significant. Completing primary school increases an individual's bribery probability by 2.3 percentage points, significant at the 10 percent level, and attaining only some primary school has no significant effect. Completing some informal education has a larger effect; it increases the likelihood of bribery by 3.7 percentage points.

Aside from informal education, the effect of education attainment on bribe paying grows progressively larger as one advances through the grade levels. The effect also grows in significance as one progresses, with one large exception. Post-graduate school has no significant effect. This category contains only 0.3 percent of those surveyed; it is possible that those who go on to post-graduate studies have something in common that other university graduates lack. With such a small number of people in this category, the category lacks sufficient variation to produce a significant effect on corruption.

The positive effect of education on corruption participation is in line with Mocan's (2008) empirical results, which find that education has a positive impact on corruption participation, particularly in developing countries. The results do not support theories and empirical results related to the indirect, negative effect education could have on corruption participation through increased tendencies to behave legally, reduced arrest rates, and improved social cohesion and social responsibility, which are discussed in section *E.i.* (Oreopoulos & Salvanes, 2009; Heyneman, 2002/2003).

Table 3 gives the results for all variables in both models. As the table shows, the coefficients for all variables are similar under the two specifications, with only small differences in coefficient magnitude and significance levels. The similarity between the specifications suggests that the results are quite robust.

Table 2. Modeling Bribe-Paying		
Dependent variable: <i>bribe_any</i>		
Variable	Linear f.e.	HLM
edu_level_1 (Informal only) ^a	0.037*	0.037**
edu_level_2 (Some Primary)	0.011	0.011
edu_level_3 (Complete Primary)	0.023*	0.023*
edu_level_4 (Some Secondary)	0.039**	0.040***
edu_level_5 (Complete Secondary)	0.050**	0.051***
edu_level_6 (Technical/non-university)	0.102***	0.103***
edu_level_7 (Some University)	0.122***	0.122***
edu_level_8 (Complete University)	0.137***	0.138***
edu_level_9 (Post-Graduate)	0.020	0.021
hdi_edu (education index)		-0.089
hdi_income (income index)		-0.441***
age_imputed	-0.001**	-0.001**
head of household (=1)	0.017*	0.017*
rural (=1)	-0.032**	-0.032**
police nearby (=1)	-0.003	-0.003
market nearby (=1)	0.008	0.007
good roads (=1)	0.017	0.017
access to news (=1)	0.039***	0.039***
interest in politics	0.007*	0.007*
voted (=1)	-0.001	-0.001
religion: Christian ^b (=1)	0.011	0.011
religion: Muslim (=1)	-0.005	-0.005
religion: other (=1)	-0.002	-0.002

unemployed ^c (=1)	-0.006	-0.006
no work (=1)	-0.043**	-0.043***
gender (male=1)	0.048***	0.048***
minority (=1)	-0.054	-0.054
pca_quint_dv2 ^d	0.015	0.015
pca_quint_dv3	-0.024	-0.024*
pca_quint_dv4	-0.055***	-0.056***
pca_quint_dv5	-0.084***	-0.084***
constant	0.152***	0.362***
N	27675	27675
legend: * p<0.05; ** p<0.01; *** p<0.001		

^a*edu_level_0*, no formal education, is the omitted education variable

^b*relig_catholic* is the omitted religion variable.

^c*employed* is the omitted employment variable.

^dThe first quintile, *pca_quint_dv1*, representing the poorest fifth of the sample, is the omitted variable

In addition to education having a significant effect, income or poverty level plays a significant role in bribery participation. The poor are more likely to pay bribes than the wealthy, holding all else constant. These results are in line with those of Razafindrakoto and Roubaud (2007), who analyze an earlier round of AfroBarometer data and find that the poor are more often subject to bribery than the well-off. The results also correspond with those of Kaufmann et al. (2008) who find that in Peru the poor are more often affected by corruption than wealthy individuals.

These results are contrary to those of Hunt and Lazlo (2012), however. Hunt and Lazlo's study of Peru and Uganda find that the wealthy pay bribes more frequently than the poor primarily because of increased interaction with officials. Looking more closely at the studies, however, shines some light on these seemingly contradictory results.

Kaufmann et al. (2008) find that the areas in which the poor's bribery experience is most different from the wealthy are basic services such as education, water and health. My study focuses on petty bribery in many of these same areas; my bribery participation variable incorporates bribing for water or sanitation services, bribing for a document or permit and bribing to avoid a problem with the police. The same is true of Razafindrakoto and Roubaud (2007) who use bribery variables related to school enrollment, water and electricity supply, police and health services. Hunt and Lazlo (2012) study many of these same bribery types as well, including education, health, utilities and police. However, Hunt and Lazlo (2012) also include bribes to the judiciary, bribes to municipal government (in Peru) and bribes to the local council (in Uganda), as well as a catch-all category of "other" types of bribes in each country. Given these differences and the differences in results, it seems that the poor are more affected by the pettiest bribery, bribing for every day goods and services, while the wealthy bribe more frequently when higher level bribes are taken into account.

One possible explanation for the higher incidence of petty bribery among the poor is that it may be easier for an official to take advantage of the poor and demand bribes, particularly when it comes to necessary, every day services such as water supply and sanitation. The wealthy, however, may be better connected, harder to take advantage of, and have greater resources with which to purchase alternative sources for basic services. The rich may be subject to more bribery when higher level bribes are taken into account, such as bribes to the judiciary, because they use such services more often and cannot purchase alternatives.

Living in a rural area decreases one's likelihood of bribe-paying, which could be because rural areas have fewer public services to begin with, and people in rural areas may interact with officials less frequently. Having regular access to news increases one's likelihood to bribe. None of the religions have a significant effect on bribing behavior, and neither does voting behavior.

The variable *no_work* has a large, significant, negative coefficient, meaning those who are neither working outside the home nor searching for work are significantly less likely to bribe than those who are employed. This likely represents many housewives who may have fewer opportunities to pay bribes. Males are significantly more likely than females to bribe, which could be for multiple reasons. Males are more likely to work outside the home, so they may interact with officials more often and have more opportunities to bribe. Additionally, males likely have more control over household income and therefore have the financial ability to bribe.

The variable *hdi_income* has a highly significant, negative coefficient, meaning that rich countries are less prone to bribery than poor countries. The *hdi_edu* variable also has a negative coefficient, though it is not statistically significant.

V. Conclusions

Cross-country studies have shown that high levels of corruption are strongly correlated with low GDP per capita, slow economic growth, and low average education attainment. Limited empirical research has been done, however, on the ways in which corruption affects individuals, and this is largely due to a lack of data.

This paper uses a unique household dataset which asks questions about bribery participation in a way that limits self-incrimination and thereby encourages honest responses. The survey covers 20 Sub-Saharan African countries and over 27,000 individuals. I use this dataset to examine the effect that education attainment has on corruption participation and find that education has a significant, positive effect on corruption participation, robust to two different specifications.

Theoretically, the outcome is ambiguous. In the literature, education has been shown to promote legal behavior, social cohesion, and civic responsibility, all of which would lead to a

negative relationship between education and corruption participation. However, education could also have the opposite effect. In countries where corruption is rampant, including many of the countries in Sub-Saharan Africa, the education systems are often corrupt. If school children must pay bribes for good grades and to pass to the next grade level, and can purchase test questions prior to standardized exams, they learn that bribery is acceptable and appropriate behavior. The more years they spend in such a system, the more they may come to accept corruption as a social norm and hence the more likely they may be to bribe. Education could also increase the benefits of bribery as more educated individuals are likely to interact with officials more often, have higher incomes, and value their time more highly.

I find that education has a positive effect on bribery participation, meaning that more highly educated individuals are more likely to pay bribes. The effect is strongest for the highest achievement levels, with an exception for post-graduate work. Completing university has the largest effect; these individuals are 13.7 percentage points more likely to participate in corruption than those with no formal education. The effect of education also grows larger as individuals progress through the education system; achieving some primary education has no significant effect, completing primary school increases bribery likelihood by 2.3 percentage points, some secondary by 3.9 percentage points and completing secondary by 5.0 percentage points. The effect doubles when one completes non-university post-secondary education, such as a technical degree, which increases bribery propensity by 10.2 percentage points.

The positive effect of education on bribe paying is likely the result of the two factors established above: corrupt education systems and increased returns to bribery due to greater interaction with officials and higher value of time. Furthermore, all of these are in line with the increasing effect of education as one moves through the education system.

An individual with a university degree likely interacts with officials more often, increasing opportunities to bribe. Such individuals may be more likely to own a business, be involved in public affairs, or be involved in other activities that would bring them in contact with government officials. Additionally, the more educated an individual is, the more likely he is to have a well-paying job. A higher value of time could lead individuals to place a higher value on quick service delivery, making bribe paying more worthwhile and more likely.

The results also point to the importance of institutional quality. Bribery likelihood increases steadily as children progress through primary and secondary school. Children learn societal norms and behaviors through their schooling, and these results indicate that they may be learning that corruption is an acceptable behavior. The jump in corruption likelihood from secondary school completion to any level of post-secondary education (other than post-graduate) suggests that technical schools and universities may have even larger problems with institutional quality.

Children learn much more than reading, writing, and arithmetic in school. Fighting corruption in education systems and ensuring that the social norms being taught are in line with social cohesion, legal behavior, and civic responsibility may go a long way towards fighting corruption in society.

References

- Albright, Jeremy J., and Dani M. Marinova. 2010. "Estimating Multilevel Models Using SPSS, Stata, SAS, and R." Indiana University Stat/Math Center Working Paper.
- Attile, Gbewopo. 2008. "How Do African Populations Perceive Corruption: Microeconomic Evidence from Afrobarometer Data in Twelve Countries." Centre D'Etudes et de Recherches Sur le Developpement International Working Paper 200811.
- Ayyagari, Meghana, Asli Demirguc-Kunt, and Vojislav Maksimovic. 2010. "Are Innovating Firms Victims or Perpetrators? Tax Evasion, Bribe Payments, and the Role of External Finance in Developing Countries." World Bank Policy Research Working Paper 5389.
- Becker, Gary S., and Casey B. Mulligan. 1997. "The Endogenous Determination of Time Preference." *The Quarterly Journal of Economics* 112 (3): 729-758.
- Beets, S. Douglas. 2005. "Understanding the Demand-Side Issues of International Corruption." *Journal of Business Ethics* 57: 65-81.
- Cheung, Hoi Yan, and Alex W.H. Chan. 2008. "Corruption Across Countries; Impacts form Education and Cultural Dimensions." *The Social Science Journal* 45: 223-239.
- Cordova, Abby. 2008. "Methodological Note: Measuring Relative Wealth using Household Asset Indicators." AmericasBarometer Insights 6.
- Deininger, Klaus, and Paul Mpuga. 2004. "Does Greater Accountability Improve the Quality of Delivery of Public Services? Evidence from Uganda." World Bank Policy Research Working Paper 3277.
- Filmer, Deon, and Lant H. Pritchett. 2001. "Estimating Wealth Effects With Expenditure Data—Or Tears: An Application to Education Enrollments in States of India." *Demography* 38 (1): 115-132.
- Francken, Nathalie. 2009. "Reducing Corruption in Public Education Programs in Africa: Instruments and Capture in Madagascar." *Review of Business and Economics* 3: 383-397.
- Gander, James P. 2011. "Microeconomics of Corruption Among Developing Economies." University of Utah Department of Economics Working Paper 2011-01.
- Gatti, Roberta, Stefano Paternostro, and Jamele Rigolini. 2003. "Individual Attitudes Toward Corruption: Do Social Effects Matter?" World Bank Policy Research Working Paper 3122.
- Getz, Kathleen A., and Roger J. Volkema. 2001. "Culture, Perceived Corruption, and Economics." *Business and Society* (40) 1: 7-30.

- Goldsmith, Arthur A. 1999. "Slapping the Grasping Hand: Correlates of Political Corruption in Emerging Markets." *Journal of Economics and Sociology* (58) 4: 865-883.
- Heyneman, Stephen P. 2002/2003. "Defining the Influence of Education on Social Cohesion." *International Journal of Educational Policy, Research and Practice* 3&4: 73-97.
- Heyneman, Stephen P. 2004. "Education and Corruption." *International Journal of Educational Development* 24 (6): 637-648.
- Heyneman, Stephen P. 2008a. "Buying your way into Heaven: The corruption of education systems in global perspective." *Perspectives on Global Issues* 2 (1): 1-8.
- Heyneman, Stephen P. 2008b. "Education, social cohesion and ideology. In *Right to Education: Policies and Perspectives*, edited by Emin Karip, 89-104. Ankara: Turkish Education Association.
- Heyneman, Stephen P., Kathryn H. Anderson, and Nazym Nuraliyeva. 2007. "The Cost of Corruption in Higher Education." *Comparative Education Review* 52 (1): 1-25.
- Hunt, Jennifer, and Sonia Laszlo. 2012. "Is Bribery Really Regressive? Bribery's Costs, Benefits, and Mechanisms." *World Development* 40 (2): 355-72.
- Husted, Bryan W. 1999. "Wealth, Culture, and Corruption." *Journal of International Business Studies* (30) 2: 339-59.
- Joulifaian, David. 2009. "Bribes and Business Tax Evasion." *The European Journal of Comparative Economics* 6 (2): 227-44.
- Kaufmann, Daniel, Judit Montoriol-Garriga, and Francesca Recanatini. 2008. "How Does Bribery Affect Public Service Delivery? Micro-Evidence from Service Users and Public Officials in Peru." World Bank Policy Research Working Paper 4492.
- Lederman, Daniel, Norman V. Loayza, and Rodrigo R. Soares. 2005. "Accountability and Corruption: Political Institutions Matter." *Economic & Politics* 7 (1): 1-35.
- Lochner, Lance, 2004. "Education, Work, and Crime: A Human Capital Approach." *International Economic Review* 45 (3): 811-43.
- Lochner, Lance, and Enrico Moretti. 2004. "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports." *The American Economic Review* 94 (1): 155-89.
- Mauro, P. 1997. "The Effects of Corruption on Growth, Investment, and Government Expenditure: A Cross-Country Analysis." In *Corruption and the Global Economy* edited by K. A. Elliot, 83-107. Washington, DC: Institute of International Economics.

- McKenzie, David J. 2005. "Measuring Inequality with Asset Indicators." *Journal of Population Economics* 18: 229-60.
- Miller, William L. 2006. "Corruption and Corruptibility." *World Development* 34 (2): 371-80.
- Mocan, Naci. 2008. "What Determines Corruption? International Evidence from Microdata." *Economic Inquiry* 46 (4): 493-510.
- Orces, Diana. 2009b. "Corruption Victimization in the Public Health Sector." *AmericasBarometer Insight* 30.
- Orces, Diana. 2009a. "Corruption Victimization by Public Employees." *AmericasBarometer Insights* 13.
- Orces, Diana. 2008. "Corruption Victimization by the Police." *AmericasBarometer Insights* 3.
- Oreopoulos, Philip, and Kjell G. Salvanes. 2009. "How Large are Returns to Schooling? Hint: Money Isn't Everything." NBER Working Paper 15339.
- Razafindrakoto, Mireille, and Francois Roubaud. 2007. "Corruption, Institutional Discredit, and Exclusion of the Poor: A Poverty Trap." *Afrobarometer Working Paper* 86.
- Reinikka, Ritva, and Jakob Svensson. 2004. "Local Capture: Evidence from a Central Government Transfer Program in Uganda." *Quarterly Journal of Economics* 119 (2): 679-705.
- Reinikka, Ritva, and Jakob Svensson. 2005. "Fighting Corruption to Improve Schooling: Evidence from a Newspaper Campaign in Uganda." *Journal of the European Economic Association* 3 (2-3): 259-67.
- Rose-Ackerman, Susan. 2006. "Introduction and Overview." In *International Handbook on the Economics of Corruption*, edited by Susan Rose-Ackerman, xiv-xxxviii. Northampton, Massachusetts: Edward Elgar Publishing, Inc.
- Seligson, Mitchell A. 2006. "The Measurement and Impact of Corruption Victimization: Survey Evidence from Latin America." *World Development* 34 (2): 381-404.
- Svensson, Jakob. 2003. "Who must pay bribes and how much? Evidence from a cross section of firms." *The Quarterly Journal of Economics* 118 (1): 207-30.
- Swamy, Anand, Stephen Knack, Young Lee and Omar Azfar. 2001. "Gender and Corruption." *Journal of Development Economics* 64: 25-55.
- Torgler, Benno and Neven T. Valev. 2010. "Gender and Public Attitudes Toward Corruption and Tax Evasion." *Contemporary Economic Policy* 28 (4): 554-68.

Torgler, Benno, and Neven T. Valev. 2006. "Corruption and Age." *Journal of Bioeconomics* 8: 133-45.

Transparency International. 2004. "Teaching Integrity to Youth: Examples from 11 Countries." Transparency International Corruption Fighters' Tool Kit Special Edition.

Truex, Rory. 2011. "Corruption, Attitudes, and Education: Survey Evidence from Nepal." *World Development* 39 (7): 1133-42.