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The Effects of Fiscal Decentralization on Health and Education Spending and Outcomes: Evidence from Ethiopia

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THE EFFECTS OF FISCAL DECENTRALIZATION ON HEALTH AND EDUCATION OUTCOMES AND BEHAVIORS: EVIDENCE FROM ETHIOPIA

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This thesis explores the impacts of fiscal decentralization on woreda level spending and local health and education outcomes in the Amhara region of Ethiopia. Using fiscal decentralization theory, we predict that local conditions will affect future local spending patterns because local governments possess superior information and respond to heterogeneous preferences. In similar fashion, we also predict that local spending patterns will impact future outcomes. Government collected household survey data and local government expenditure data are used to investigate this theory. While results indicate that some woreda conditions have an effect on future local spending behavior, the effect of local spending on future outcomes is ambiguous.

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Chapter 1

Introduction and Political History of Ethiopia

1.1 Introduction

If federalism refers to "... both centralized and decentralized levels of decision-making in which ... the provision of public services [is] determined largely by the demands for these services..." (Oates, 1972, p. 17), then fiscal decentralization refers to the process of devolving fiscal responsibility to lower levels of government in accordance with these local needs and preferences (as we will see, however, constituent preferences are not always the preferences used in decision making). These responsibilities include raising revenue—in the form of central government transfers or local taxes—for, and spending on, public goods. Public goods with benefits that are local in scope—such as local roads, primary healthcare, and sanitation—should be provided by local governments if they are not prohibitively costly. Nationally beneficial public goods, such as national defense and major roads, should be provided by central governments. And while local governments are best suited to allocate certain public goods, most agree the

central government should oversee redistribution efforts and macroeconomic stability programs (Tiebout, 1956; Oates, 1972; Smoke, 2001).

For the past 30 years, fiscal decentralization has been a frequently used policy prescription to combat underdevelopment, corruption, and inefficient use of money in developing countries. It is important, therefore, to understand how fiscal decentralization works and how it has affected the countries that have implemented it. The intuition behind decentralization is that a government closer to its constituents will have more accurate information about their tastes and preferences. By extension, but perhaps not as obvious, local governments should be able to use that information to produce public goods more efficiently than the central government. Additional purported benefits of fiscal decentralization include less possibility of corruption, greater participation in local government, and more equal distribution of wealth (Oates, 1972; Smoke, 2001). Results of the many empirical studies on the effects of fiscal decentralization in developing countries vary.

This thesis contributes to the growing body of empirical works studying the effects of fiscal decentralization on developing countries. It examines the effects of fiscal decentralization on health and education outcomes in Ethiopia. We test the responsiveness of local government to local needs by examining effects of local education and health conditions on future government spending decisions. Child immunization rates appear to significantly affect future government spending decisions. Extending the analysis, we also test whether changes in health and education spending affect health and education outcomes in the Amhara region. While the results of this specification are largely inconclusive with regards to spending, we find that several household characteristics affect outcomes.

The rest of this chapter gives an overview of the relevant political and institutional background of Ethiopia. Chapter 2 reviews the literature on fiscal decentralization theory, presents positive and negative aspects, sets forth institutional requirements and implementation strategies, and reviews relevant empirical work. Chapter 3 develops a brief theoretical model, and chapter 4

gives a detailed description of the data. Chapter 5 presents a formal data analysis. Finally, chapter 6 concludes with a review of the results and suggestions for further research.

1.2 Ethiopia Background: Federalism from Menelik II to present

Ethiopia is the only country in Africa that was never officially colonized by an outside force. That fact, however, has not insulated it from experiencing imperial rule by various ethnic groups within its own borders. For 2000 years Ethiopia has been dominated by a nearly continuous line of emperors, the majority of whom were either Axumite (from present day Tigray) or Amharan. Under two Amharan emperors, Ethiopia underwent a strong centralization process between 1889 and 1974. In 1974 the imperial rule was overthrown by a military junta, known as the Derg. Their attempts at decentralization were unsuccessful, and Ethiopia continued to be highly centralized until 1991, when a new era of so-called ethnic federalism (Koehn and Ojo, 1996; Zewde and Pausewang, 2002; Young, 1998) began. Since then elections have been held 6 times: in 1992, 1994, 1995, 2000, 2001, and 2005. Further fiscal decentralization was apparent during this period, although violent oppression of the opposition by the ruling party has increased since the most recent election.

1.2.1 Menelik II to Haile Selassie (1889 to 1974)

From 1889 until his death in 1913, the Amharan emperor Menelik II fought to expand the borders of Ethiopia to its present day political boundaries by uniting provinces in the south, east, and west of the Amhara region, finally defeating the Italians in Eritrea in 1896. An agreement between Britain, France, and Italy in 1906 solidified Ethiopia's legitimacy as a country (Tronvoll, 2000, p. 12). The next emperor, Haile Haile Selassie, further concentrated power toward the central government by usurping governing rights from regional nobility (Young (1998), p. 192, Cohen and Koehn (1974), p. 2). Because of Ethiopia's heterogeneous

population, Tronvoll (2000) suggests the reason for strengthened centralization was to act "as a counterweight to centrifugal—[moving or directed outward from the center]—forces that threatened Ethiopia's unity" (p. 13). In 1966, toward the end of his reign, Emperor Selassie submitted a plan to parliament granting a certain level of autonomy to 50 awraja[1] governments, but parliament failed to ratify that plan (Zewde and Pausewang, 2002, p. 134).

1.2.2 Mengistu and the Derg (1974-1991)

Opposition forces to Haile Selassie, led by a group of university students, pushed for an ethnic federalism that would promote self-determination of the many ethnicities in the country. This opposition was weary of both Amharan hegemony in government and Amharan students privilege in the job market. And while they were effective in promoting ideals related to ethnic federalism, this opposition group did not have the power to rule the country. A multi-ethnic group of military officers known as the Derg—literally translated as *committee* or *council* (Wikipedia, 2007)—broke away from the main body of the military and began to fulfill the mandate given them by the Haile Selassie opposition. The Derg initially encouraged non-Amharic language and cultures with the notion of a federalist Ethiopia in mind. Encountering stiff resistance from regional elites, however, the ideal of ethnic federalism was abandoned by 1977 and the group came under the control of Mengistu Haile Mariam. The Derg, under the Communist Mengistu, once again moved toward centralized government (Young, 1998, p. 192).

Concerned with the Derg's will and ability to enact a democratic agenda or represent the country's minority groups, the Tigrayan People's Liberation Front (TPLF) was formed in 1975. Their initial goal was to liberate the Tigray region from oppression by Amhara. Accomplishing that, they next focused on liberating other oppressed groups by toppling the Derg. Since a federalist government of many ethnicities was their goal, the TPLF insisted that the best way

[1] a geographically-based administrative unit, equivalent to a present day zone

to overthrow the Derg was with a multi-ethnic peasant movement. Enlisting peasants from other ethnicities and regions, the Ethiopian People's Democratic Movement (EPRDF) was born in 1989 (Tronvoll, 2000, p. 14). Among the groups under the umbrella of the EPRDF in 1991 were the TPLF, the Oromo People's Democratic Organization (OPDO), the Ethiopian People's Democratic Front (EPDF), and the Ethiopian Officers' Revolutionary Movement (EDORM) (Vaughan, 1994, p. 5). Adopted from Lenin's attempt to provide autonomy to minority groups in the former Russian Empire, the EPRDF's notion of a federalist country comprised of many ethnically divided states became a large part of the ethnic federalism that materialized when the Derg was overthrown (Young, 1998, p. 193) (Turton, 2006, p. 2).

1.2.3 The EPRDF and Ethnic Federalism (1991-2006)

After overthrowing the Derg in May, 1991, the EPRDF convened The National Conference on Peace and Reconciliation in July, where a transitional government was formed. Groups from many different ethnicities and nationalities were encouraged to participate. In order to participate, however, a group needed either to be ethnically-based or part of an armed military organization. Because of this requirement, groups that had not previously existed were thrown together for the occasion and were mostly headed by members of the local elite (Aalen (2002) p. 7; Vaughan (1994) p. 38). In total, 28 parties participated, although many groups were excluded because they did not meet the criteria. Though not a political organization, and to the dismay of the Oromo Liberation Front (OLF) and Eritrean People's Liberation Front (EPLF), a convoy from the University in Addis Ababa was invited to the conference after a member of its faculty, Mesfin Wolde Mariam, published a paper entitled *An Ethiopian Peace Initiative*. An outspoken critic of the conference, Mesfin is quoted as saying " 'The conference was comprised for the most part of weak individuals who could be manipulated by the EPRDF' " (Vaughan, 1994, p. 48). A similar criticism was leveled by the general populous of the southern regions, accusing the OPDO and EPDF of being a façade to cover the TPLF agenda of increased regional domination (Tronvoll, 2000, p. 15).

The Transitional Charter drafted at the conference asserted "the right to self-determination for nations, nationalities and peoples, the independence of Eritrea and the aim of establishing elected regional administrations based on ethnic lines" (Aalen, 2002, p. 7), although a clear distinction between "nations", "nationalities", and "peoples" was never made. Because the TPLF leader, Meles Zenawi, became president of the Transitional Government of Ethiopia (TGE), and because two thirds of the Council of Representatives were from the TPLF-EPRDF, "... the 1991 conference may not have resulted in a one party government [although] its convention reflects to a large degree a one party dynamic" (Aalen, 2002, p. 7).

Elections were held in 1992 to satisfy the transitional condition of empowering local ethnic and national groups by decentralizing authority, federalizing government structures, and giving local governments authority over local matters. Many called the elections unfair, however, and the oppression of the OLF serves as evidence. Discrimination against family members, beatings, and even killings of potential candidates from the OLF party were increasingly frequent leading up to the elections. The OLF decided to withdraw from the elections, and two days later they also withdrew from the TGE after most of its fighters were captured by the EPRDF army and imprisoned (Pausewang et al., 2002, p. 32-33). Other major opposition parties, including the All Amhara People's Organization (AAPO) and the Ethiopian Democratic Action Group (EDAG) also boycotted the 1992 election (Young (1998), p. 195; Pausewang et al. (2002), p. 33). After all of the pre-election mayhem, the results were hardly surprising. Although there were three parties in the election, the EPRDF won 96.6% of the vote, catalyzing protests that led to more members of the TGE being expelled, most notably the EPDF (Aalen, 2002, p. 7).

The 1994 elections and following constitutional convention were not much better. The major opposition parties once again boycotted the elections and there were reports of human rights abuses (Young, 1998, p. 195). An anonymous independent observer of the process remarked, " 'Constitution-making under the EPRDF has little in common with the bargaining, trade-offs, and compromises that usually typify such processes; rather it reflects the weakness of the

country's democratic institutions, the political objectives of the governing party, and its position of dominance within a state where serious opposition had been crushed or marginalized' " (Tronvoll, 2000, p. 17). Nevertheless, a constitution arose.

Ratified at the December, 1994 convention, the constitution formally established a decentralized government comprised of 9 regions[2] and 2 chartered cities[3]. Additionally, the constitution enumerated decision making powers for the central government, leaving regional and municipal governments to administer everything else. However, ultimate authority lies with the central government in the case of disputed law or practice. Elections then took place in May 1995. Characterized by very low participation, the elections prompted independent Norwegian observers to declare the voter apathy as " 'a form of popular resistance towards the non-competitive election and the derailed democratization process' " (Pausewang et al., 2002, p. 38).

National and regional elections next took place in 2000, with local elections occurring in 2001. Pausewang et al. (2002) observed, first-hand, many irregularities in the 2000 election including coercion, intimidation, and a mysterious absence of opposition candidates in some areas. Says one resident of the Tigray region, " 'If I don't vote on election day they [the TPLF] will come and ask me and even take me out of my house... The candidates are not elected to alleviate my problems. They are elected to be crowned [as kings]' " (Pausewang et al., 2002, p. 83). Accordingly, opposition withdrew from the 2001 local elections, insisting that the elections were rigged by the EPRDF and that it was pointless to participate in an election that was not possible to win (Aalen, 2002, p. 8). Officials elected in local elections are those that make woreda level spending decisions.

Four years passed before the next round of elections took place in 2005. Two new opposition parties were created and quickly rose to prominence months before these elections. These two parties, the Coalition for Unity and Democracy (CUD) and the United Ethiopian Democratic

[2] Afar, Amhara, Benishangul-Gumaz, Gambela, Harari, Oromia, Somali, SNNPR, and Tigray
[3] Addis Ababa and Dire Dawa

Forces (UEDF), were founded upon ethnic diversity. The focus of the CUD, in particular, was national in scope and concerned with equitable economic development for all ethnicities. The 2005 elections initially promised a much more democratic process than previously observed in Ethiopia. Pre-election debates were transparent and voter turnout was estimated at between 80 and 90 percent (Abbink, 2006, p. 183). Made public on September 5, 2005, the results revealed that the CUD and UEDF secured remarkable gains (from 12 to 174 members of parliament). Despite those gains, the CUD and UEDF were dissatisfied with the results and, with the support of international observers, contested the outcomes of 299 districts. Of those contested, only 39 were granted a recount because of dominant party influence in the judicial system. Even then "many reruns of the vote were...even more controversial than the first round" (Abbink, 2006, p. 184-185). When the EPRDF—the party of Prime Minister Meles Zenawi—realized they were losing seats in Parliament, the outgoing government quickly passed legislation minimizing the possible effects of opposition gains, including measures which significantly increased the difficulty of presenting agendas before the governing body. In addition, Zenawi banned public demonstrations for a month after elections. Defying this ban, student and protest groups took to the streets, urged by the CUD to carry out peaceful demonstrations. However, government soldiers were told to put down protests by any means necessary, which led to many student protesters being killed and jailed (Abbink, 2006, p. 186). With some facing facing the death penalty, those jailed were held captive until April 9, 2007, when Judge Adil Ahmed determined that Ethiopian prosecutors had failed to prove their case against them (BBC Online, April 9, 2007).

The political situation in Ethiopia has continued to deteriorate since the elections of 2005. The authoritarian nature of the Meles regime has become increasingly apparent as more foreign aid flows into the country. In the fall of 2005, 129 opposition members were jailed for treason and planning genocide. Nervous about the gains made in the 2005 elections, the Zenawi regime has been tightening central control in places such as Addis Ababa, where the opposition parties enjoy popular support and won most of their Parliamentary seats

(Economist Online, 2006). As of February 2007, there were still reports of dissidents being jailed; many of these dissidents are teachers and students. And because of Ethiopia's successful military campaign against Somalia, they are receiving conflicting incentives from major donor countries. The United States Congress, for example, is lambasting Ethiopia's human rights record while the Pentagon is funneling money to boost Ethiopia's army (Economist Online, Feb. 22, 2007). These questionable tactics by an increasingly iron-fisted regime has led to the assertion that "centralist authoritarianism is not gone but is perhaps being reinvented in a new form" (Abbink, 2006, p. 174).

1.2.4 Current Political Structure

While their tactics may seem authoritarian to much of the rest of the world, the current practices of the Ethiopian government appear democratic in comparison to the Derg. The capital in Addis Ababa houses the central government. The country is divided into 9, ethnically based, large regions, and 2 city regions. The administrative units within the large regions are zones, which are further divided into woredas. Because regions are generally multi-ethnic, woredas are assigned based on ethnicity to ensure the voices of all ethnic groups are heard. The lowest recognized level of government, below the woreda, is the kebele—a village level government in rural areas or a neighborhood level government in cities (Tronvoll, 2000, p. 20). The official functions of the central government, as defined in the 1994 Constitution, include national defense, foreign relations, monetary policy, and foreign investment. Power has been devolved to regional governments to establish most administrative policies. In addition to keeping a police force, regions are charged with maintaining the peace. Regional governments are also responsible for carrying out economic, social, and development policies, as well as forming their own budget, and caring for natural resources based on a nationally mandated plan. The regional government also levies taxes, although the majority of the tax revenue goes to the central government, where it is then redistributed back to the regions (Aalen, 2002, p. 55). Woreda level responsibilities are not well defined and differ among regions.

Fiseha (2006) suggests that the there is a large gap between those responsibilities set forth in the constitution and those actually in practice, making it difficult to generalize woreda government responsibilities (p. 158).

The EPRDF rose to power on lofty ideals. Their aim was to transform Ethiopia into an ethnically separate, but united government that promoted a progressive social agenda and religious freedom within the country's borders. They were determined to undermine narrow special and corporate interests. And while the 1994 constitution dictates democratic elections as the sole vehicle for bringing officials to office, nepotism is still widespread. Appointments from the federal level all the way down to the kebele level are largely based upon dominant party loyalty (Abbink, 2006, p. 177). Two years ago it appeared Ethiopia was heading toward the most free election the country had seen to date. The events that followed the election, however, have left in question the direction in which Ethiopia is headed.

On balance, Ethiopia is better suited for fiscal decentralization today than it was in 1991 during the conception of the constitution. However, recent trends toward a stronger central government, increased voter intimidation practices (which decreased participation), and suppression of political competition by the ruling EPRDF suggest steps away from both a democratic government and ethnic federalism, on whose principles Ethiopian fiscal decentralization relies. The strongest behavioral incentive packages, which could reverse the trend, come from wealthy western donor nations and have proven perverse. In order to further decentralize, Ethiopia must reverse the current trend of weakening institutions.

Chapter 2

Literature Review

2.1 Fiscal Decentralization Theory

The literature on fiscal decentralization touts many benefits to developing nations from devolving budgetary control, one of which is the promise of more sensitive treatment of local needs by increasingly local governments. Other potentially beneficial outcomes include increased participation in government leading to a healthier democracy, increased macroeconomic stability, increased autonomy in decision-making, and decreased corruption (Fisman and Gatti, 2002; Smoke, 2001; 2003). Although these outcomes are not guaranteed in every case, there are many theoretic arguments and examples of empirical support. However, there are also potential drawbacks to implementing fiscal decentralization. Excessive regulation, more restrictive movement of capital, increased corruption, decreased fiscal transparency, and increased regional disparities are all risks that must be weighed when implementing a decentralized fiscal system (Tanzi, 2001).

Theory regarding fiscal decentralization has been developing for many years, beginning with Tiebout (1956), Oates (1972), and Musgrave and Musgrave (1984). It has since evolved to

more accurately fit present day needs, with subsequent scholars examining political, economic, and institutional considerations (Besley and Coate, 2003; Lockwood, 2002; Bardhan and Mookherjee, 2000; 2006; Platteau and Abraham, 2002; Oates, 1999; 2005).

In addition to theory there are many empirical works illustrating how effective decentralized fiscal systems are. Faguet (2004) found that fiscal decentralization led to more sensitive treatment of local needs in Bolivia. In the Philippines, Schwartz et al. (2002) observed that fiscal decentralization led to increased allocation toward local healthcare budgets. Conversely, Zhang and Zou (1998) found that while fiscal decentralization in China varies between provinces, the net results have been negative.

The rest of the chapter examines some of the theoretical arguments and empirical evidence both for and against fiscal decentralization, in addition to looking at fiscal decentralization in terms of a process. We begin by surveying the foundational fiscal decentralization theories of Oates (1972), Musgrave and Musgrave (1984), and Tiebout (1956). Political economic theories by Besley and Coate (2003), Lockwood (2002), and Tanzi (2001) follow, after which we conclude the theory review with the institutional considerations of Bardhan and Mookherjee (2000), Bardhan and Mookherjee (2006), and Platteau and Abraham (2002). We then use the public expenditure theory of Musgrave and Musgrave (1984) to assign expenditure and taxation responsibilities to different levels of government. The chapter ends with a review of both general empirical studies and those that specifically pertain to the health and education sectors.

2.1.1 Early Theory

Wallace Oates developed the seminal work on fiscal decentralization in 1972. The major assumption underlying his theory is that a central government, due to imperfect information, will produce a uniform level of public goods across districts. While uniform provision is appro-

priate for goods with national benefits, such as national defense, it may be inappropriate for goods that are local in scope, such as school funding and health clinic construction. Uniform funding for health clinic construction, for example, may be inefficient because it ignores heterogeneous tastes and preferences across districts. Perhaps one community wants more funding for health related activities, while another prefers the money spent on local schools. Local governments can obtain better information about preferences, costs, and other idiosyncrasies unique to their constituency, at a lower cost (Oates, 1972).

It follows that allocative efficiency "is attained by providing the mix of output that best reflects the preferences of the individuals who make up society..." (Oates, 1972, p. 11). Further, by allowing many different local governments to provide certain public goods, more creative methods of provision at lower costs arise (Oates, 1972, p. 12). Many local governments will find a way to best produce public goods for their respective constituents. These different methods of production will be observed by neighboring districts, inducing competition to find the best technology with which to produce the good. This in turn lowers the costs of production.

From a public expenditure standpoint, Musgrave and Musgrave (1984) assert that public goods should be produced by the level of government whose constituents benefit from that provision. If the benefit is felt nationally, the public good should be produced by the central government. If the benefit accrues at the local level, local governments should provide the good. This is due not only to the informational advantage, but also because local governments are closer to real resource costs. In the event of a positive spillover—a situation in which one district benefits from the public goods provision of another district at no cost—the central government is able to internalize that spillover with the least amount of transaction costs (Smoke, 2001).

While Oates devised the first work on fiscal federalism, Charles Tiebout was certainly an influence on Oates' theory. Tiebout argues that residents will "vote with their feet" and move

to a district where their preferred basket of public goods exists, increasing welfare gains (1956). This theory is criticized as a phenomenon of the affluent American since the assumption of perfect mobility is unrealistic in developing countries. Bewley (1981) suggests that although Tiebout's theory is reasonable, it is only applicable under assumptions which are so strict that they essentially convert the public goods, to which residents will supposedly move, into private goods.

2.1.2 Recent Theory

A more recent body of political economic work challenges one of the basic assumptions about fiscal decentralization. That assumption suggests that the central government provides public goods uniformly across districts. Besley and Coate (2003) assert that positive spillovers between districts represent a major drawback of fiscal decentralization. Instead of focusing on the scope of a public good, they focus on the legislative process that allocates money to public goods. They suggest a game theoretic framework which begins with a national legislature comprised of local representatives. This legislature can be either non-cooperative—there are gains to be had by cooperating—or cooperative—one whose goal is to maximize the welfare of its constituents. If the legislature is non-cooperative, the winning coalition of legislators determines public goods spending, leading to two potential results that are sub-optimal. The first case is a misallocation of funds with the majority going to the winning coalition and its constituents. Uncertainty is the second potential outcome. Since each district's representative only affects policy if their policy is chosen, policy outcomes becomes random. Under a non-cooperative legislature, the winning coalition of legislators dictate policy. Uncertainty arises because voters do not know who will win when voting, so the quantity and quality of public goods provision is in question. A cooperative legislature, on the other hand, produces a sub-optimal level of public goods by providing more than the efficient amount of public goods. This outcome produces the surplus maximizing level of public goods for its members, but not the whole of the economy.

Further, a high level of positive spillovers and homogeneous tastes across districts makes centralized government increasingly desirable regardless of how legislatures behave. As positive spillovers decrease and tastes and preferences are increasingly heterogeneous, the case for decentralized public goods provision increases. Ultimately, Besley and Coate reach a conclusion similar to that of Oates—that is, fiscal decentralization provides beneficial gains in provision of locally accruing public goods. Extending the analysis, Lockwood (2002) concludes that increased heterogeneity will yield increased efficiency for decentralized governments not because of uniform public good provision, but because of "inefficient choice of projects due to cost-sharing and lack of responsiveness of the legislative process to benefits" (p. 333).

Fiscal decentralization is hardly a panacea. Excessive regulation, more restrictive capital movement, corruption, decreased fiscal transparency, and regional disparities are just a few of the potential risks of implementing fiscal decentralization. Excessive regulation in the form of high local taxes may be due to a lack of transfers from the central government. Conversely, districts may compete and lower taxes to an inefficient level to entice corporations to relocate. At the national level, excessive regulation can also lead to more restrictive movement of labor and capital, with districts imposing fees upon each other for things such as movement of products. Finally, excessive regulation tends to occur under local leaders who suddenly find themselves with more decision-making power than they are accustomed to (Tanzi, 2001).

While less corruption is a potential benefit of fiscal decentralization, increased corruption is also a potential downfall. Because of a lower level of human capital in developing countries, those with talent move to the private sector or the national government for higher wages. This is indicative of a larger "brain drain" phenomenon—where talented individuals are drawn away from less developed areas to more developed areas following promises of a better life or a larger salary—that is especially problematic in developing countries. Two other related contributors to corruption, enforcement and transparency in government, are also difficult when they are, by definition, generally missing in corrupt governments (Tanzi, 2001, p. 7).

Finally, regional disparities in ethnicity, language, and religion have the potential to persuade decentralized regions to view themselves as separate and autonomous from the central government. When a sea port (Eritrea) or a large discovery of oil (Niger Delta in Nigeria) are at issue, it can cause conflict or even separation from the central government to form an independent government. These disparities can also cause problems when the central government attempts to step in and redistribute wealth from affluent districts toward the poorer ones (Tanzi, 2001, p. 6).

Institutional Considerations

The common downfall of fiscal decentralization is that it is not as effective without proper institutions, such as competent government employees and some fiscal autonomy, in place. A developing body of literature concerning accountability and capture by the local elite provides counterpoints to one of the supposed benefits of fiscal decentralization (Bardhan and Mookherjee, 2000; 2006; Platteau and Abraham, 2002). Capture, in the context of fiscal decentralization, can be thought of as local elites or special interest groups manipulating elected officials' votes against the interest of the entire population. The touted benefit of locally elected officials having a better idea of constituent preferences is, therefore, complicated by the capture problem. This scenario is likely in Ethiopia and suggests that local governments have a set of criteria, other than voter preference, by which expenditure decisions are made.

Bardhan and Mookherjee (2006) explore the tradeoff between centralized and decentralized public good provision in the context of capture at both levels of government. With this in mind, welfare outcomes become dependent upon the avenues by which local governments receive their funding. A more fiscally autonomous local government will result in expanded public service levels, although inequality is also increased. The result is an ambiguous overall outcome dependent upon the level of capture. If the local government has authority to fund only those things through which benefit taxes—a tax whose burden is positively related to

the benefits from the services it finances (Carroll and Yinger, 1994)—can be collected, then welfare gains are restricted to the upper class and the poor are merely left just as well off as they were before. If local governments are totally dependent upon the central government for funding, then they are limited in their ability to cater to the elite, but they are also limited when responding to unforeseen events.

Platteau and Abraham (2002) suggest that endogenous community imperfections, such as entrenched tribalism and nepotism, outweigh the informational advantages gained by giving local leaders the responsibility to allocate public goods, especially in Sub-Saharan Africa (p. 2). Using a game theoretic model, they assert there is a multiple equilibria game played in local politics with just one of the outcomes being cooperation. To minimize capture, a certain level of institutional decentralization, such as training in how to run a government and participatory development programs, must be in place before fiscal devolution of any kind occurs. In addition, a central government needs to ensure that all the benefits of decentralization do not accrue to only the educated local elite. This is especially true in societies where elite members traditionally take their fill and distribute the leftovers to poorer members.

2.2 Fiscal Decentralization as a Process and a System

Prud'Homme (2003) suggests that " 'Decentralization' is an ambiguous word because it refers both to a system and a process" (p. 17). Because it is still young, decentralization in Ethiopia is still in the midst of a journey from centralized to decentralized government. However, because it has also been implemented, discussing it as a system is also relevant. We will therefore examine fiscal decentralization as a process and as a system. To this end, it is instructive to investigate the public expenditure work of Musgrave and Musgrave (1984) to determine what role the government should play in the provision of different public goods when markets fail. There are three key economic functions performed by the government:

allocation, distribution, and macroeconomic stability.

Determining the distribution of public goods is a contentious part of public policy because there is a tradeoff between efficiency and distributional equity. While efficiency is an innocuous term, the definition of distributive justice—the arrangement of capital such that individuals can attain some minimum standard, regardless of efficiency—hinges upon an inherently subjective definition of utility. Assuming that local governments display rational, utility maximizing, behavior, the central government is in a better position to engage in disinterested distribution of wealth among local governments (Musgrave and Musgrave, 1984; Smoke, 2001). Further, if redistribution programs are not uniform across districts, then mobile factors of production will nullify attempts to redistribute wealth; in other words if each region or locale had its own redistribution plan, factors of production would move to the location best suited to their interests (Oates, 1972; Tiebout, 1956). Additionally, local governments generally rely on income regressive revenue sources. These revenue schemes tend to tax the rich too little and over-tax the poor. To understand why, consider the case of a community that adopts a strongly redistributive, or progressive, tax structure. The rich—including both families and corporations—are taxed heavily in order to pay for public goods also used by the poor. The rich, being the most mobile members of society, will move to a jurisdiction where they will not be as heavily taxed. Theory says that the poor will move into the area; however, the poor, not being as mobile as the rich, will be left without a tax base.

For it to be successful, a fiscal decentralization policy eventually must include greater, albeit limited, autonomy in decision-making by local governments. Greater autonomy in decision-making encourages local governments to experiment with different methods of public goods provision. With a relatively large number of local governments providing public goods, potential technical improvements arise. As in a competitive market, neighboring districts will compete to adopt the most efficient production methods of public goods (Oates, 1972, p. 12). Greater autonomy also leads to the potential advantage of greater participation in local government. Greater participation decreases the potential for self-serving members of the central

government to misallocate funds (Smoke, 2001, p. 17).

There are three reasons macroeconomic stability is best handled by the central government. First, developing countries are subject to significant macroeconomic fluctuations due to erratic weather behavior and heavy dependence upon external sources for resources. Second, because local governments have a relatively small role in the grand scheme of many developing countries, they don't account for a very large proportion of public sector jobs and spending. Lastly, local governments are frequently dependent upon more fickle sources of income, such as business taxes, and, consequently, their ability to behave counter-cyclically is limited (Smoke, 2001, p. 4).

On the other hand, central governments are in a better position to implement counter-cyclical policies during bust and boom periods. There are two reasons that it is easier for national governments to engage in monetary and fiscal policy. The first is economies of scale: lower transactions costs are present when debt is issued on a larger scale. The second reason is that national capital is highly mobile, whereas local capital is not (Oates, 1972; Tanzi, 2001).

The allocation function concerns the assignment of public goods provision to the appropriate level of government based on efficiency. Musgrave and Musgrave (1984) and Oates (1972) argue that public goods should be produced by the level of government to whose constituents benefits accrue. If the benefit is felt nationally, the public good should be produced by the central government. If the benefit accrues at the local level and not prohibitively costly, local governments should provide the good.

2.3 Empirical Literature

2.3.1 General Empirical Literature

Empirical evidence in support of fiscal decentralization theory is as plentiful as the evidence against it. Drawing on evidence from a cross-country comparison between Brazil and China, Shah (2006) asserts that fiscally decentralized governments more effectively support macroeconomic stabilization policy. A decentralized federalist state, Brazil's superior political institutional structure enabled the central government to design macroeconomic policy with fiscal decentralization in mind. Conversely, China's unitary structure of government is in direct competition with decentralization, creating an adversarial relationship between the central government and decentralized governments. Foster and Rozenzweig (2004) note that decentralized local governments in India are significantly more responsive to local needs when they are given authority to collect income tax.

Although arbitrary, we begin our brief empirical observations by examining the fiscal decentralization experience of West Bengal, which was nearly unambiguously positive. Proof of increased participation by the poor in matters of local government exist, as well as household survey evidence of increased levels of responsiveness to the needs of the poor. And while Crook and Sverrisson (2001) also note improved social equality in West Bengal, they also suggest that decentralization outcomes cannot be generalized across countries and regions.

Bryson and Cornia (2000) present the case of fiscal decentralization in the former state of Czechoslovakia. Originating with similar institutions in place, their institutional similarities diverged after independence from one another. While local Czech Republic governments remain largely dependent upon the central government for funds, Slovakia has taken the opposite approach and devolved so much fiscal responsibility that local governments receive very little help from the central government. Ultimately, the Czech Republic economy is

fairing much better after decentralization than its Slovakian counterpart, largely due to better institutional planning.

China presents a good illustration of fiscal decentralization as a process. Beginning in the 1970s and continuing through the 1990s, fiscal decentralization in China is unlike the devolution frequently envisioned when fiscal decentralization is discussed. Decentralization is not uniform across provinces; some are extremely decentralized while some are still very much in the control of the center. Overall, fiscal decentralization negatively impacted provincial economic growth. (Zhang and Zou, 1998).

2.3.2 Health and Education Empirical Literature

Given the mixed results presented so far, it is unsurprising that closer examination of health and education outcomes due to decentralization are similarly ambiguous. While there is ample analysis regarding the effect of decentralization on health, empirical work regarding decentralization's effect on education is limited.

In Bolivia, Faguet (2004) shows that certain public goods, including education, water and sanitation, urban development, and water management, display different investment patterns after decentralization. Specifically, education local government spending rose by over 25% after decentralization while health spending decreased slightly. Using the change in investment patterns resulting from fiscal decentralization at both the national and local levels, he concludes that decentralization led to more sensitive treatment of local needs in the aforementioned sectors, while the effect on health spending was inconclusive. Further evidence shows the poorest districts allocating large percentages of spending toward their highest priority projects were the major driver behind these overall changes.

Extending the work of Akin et al. to the Philippines, Schwartz et al. (2002) found that although local health expenditures increased both in magnitude and budget share, the public types of

health care services decreased, implying that public spending on privately beneficial health care increased. Using data from over 1600 local governments they concluded that local public health spending decreased following decentralization and stayed below pre-decentralization levels for the three year period following decentralization which the study examined. Regarding health care behaviors, family planning was positively impacted at both the provincial and local level by public health spending. Child immunizations, however, showed less significant evidence of being positively impacted by increased public health spending.

A neighbor of Ethiopia and perhaps the most similar in terms of geographic location and institutional characteristics, Uganda has been relatively well-studied regarding the impacts of fiscal decentralization on public good provision, with emphasis on health. Akin et al. (2005) discovered that aggregate regional primary health care expenditures, over a period of three years, actually fell from nearly 33% of the total budget to less than 16%. Similarly, spending on non-illicit drugs fell by half. Spending on information, education, and communication doubled, while spending on comparatively private activities, such as government salaries and monitoring and evaluation rose during that time period as well. This study also concluded that districts will change their allocative health spending behavior based on the way neighboring districts behave due to the spillover effect. If a district is experiencing a positive spillover from another district, the first district has no incentive to keep providing the same level of public good provision. This free-rider problem appears to magnify over time and be especially evident in the health budgets of neighboring districts.

Also in Uganda, Hutchinson et al. (2003) found that decentralization led to increases in secondary—curative—healthcare with a potential price of decreased primary—preventative—healthcare. Similar to the first case, this outcome suggests that private benefits are being provided with public money. Two interesting explanations for why priorities in health spending may have changed post-decentrazliation arise from this study. The first is HIV/AIDS: more people need secondary and tertiary care. The second is donor preferences: donors may be earmarking more money toward this problem and others with strictly curative aims in mind.

Yet another reason for the under-provision of health care by local governments may be due to the free-rider problem associated with spillovers from neighboring districts.

Lastly, Jeppsson (2001) finds that decentralization may actually decrease funding allocation to healthcare unless that money is earmarked by the central government. This undermines decentralization by eliminating local decision making. Using the 1995/1996 fiscal year as a model, the Ugandan Ministry of Finance created a "shadow budget" for the 1996/1997 fiscal year whose purpose was to estimate how much money district governments would spend on primary health care. The shadow budget estimated that districts would spend nearly four times what they actually spent in 1996/1997. While districts allocated substantially more to primary health care for the 1997/1998 fiscal year, they still fell short of the shadow budget from the previous year.

2.4 Summary

This literature review began by discussing Oates' theory on fiscal decentralization. By assuming that central governments will provide a uniform level of public goods, Oates asserts that local governments will more efficiently provide local public goods because they have better information about heterogeneous tastes and preferences. This makes sense in the context of an ethnically diverse country such as Ethiopia. Next, we explored a more recent body of political economic literature that reaches a similar conclusion to Oates', but replaces the static central government with a dynamic, bureaucratic, legislature comprised of locally elected officials that solve inter-district spillover problems internally.

Each unique fiscal decentralization program depends heavily upon the institutions in which they are conceived. Competent and honest local government officials, a strong yet respectful central government, a limited ability to wage benefit-taxes for local spending, and a willingness to discard traditional and tribal methods of governance are all institutional components that

aid in a successful fiscal decentralization program. The theory section ended with a discussion on fiscal roles each level of government should play. Macroeconomic stability and inter-governmental distribution are best handled by the central government while allocative duties should be filled by local governments.

Empirical tests of fiscal decentralization programs around the world yield mixed results that are not easily generalizable. Results from China indicate a drag on economic productivity as a result of decentralization, while the West Bengal experience is unambiguously positive. Bolivia shows mostly positive, but mixed results, as does Uganda. The common theme among them all is the substantial role played by institutions in place when fiscal decentralization is implemented.

While there are many potential disadvantages and risks inherent in fiscal decentralization, policy makers generally believe that the benefits outweigh the risks, as is evidenced by the sustained prescription of fiscal decentralization by economists to developing countries. The promise of increased allocative efficiency, increased participation, increased political stability, increased autonomy in decision making, and decreased corruption outweigh the potential downfalls of excessive regulation, more restrictive capital movement, corruption, decreased fiscal transparency, and regional disparities.

Chapter 3

Theoretical Model

The previous chapter explored some of the fiscal decentralization and public finance theory relevant to this study and put it in the context of health and education outcomes. This chapter develops a theoretical model, beginning by laying a theoretical groundwork and proceeding to econometric specifications that model health and education outcomes as a result of fiscal decentralization. We conclude with a brief discussion of expectations.

Fiscal decentralization is the process by which local governments acquire greater control over taxing and spending from a higher level of government. With the theory of Oates (1972) as a basis, efficiency is the mix of public taxing and spending that maximizes utility for its constituents. Local governments will produce local public goods more efficiently than the central government because they have access to more complete information about constituents' heterogeneous tastes and preferences. Additionally, voting with their feet, constituents encourage greater efficiency from local governments. Greater experimentation and innovation through competition among local governments also contributes to efficiency, as does local governments' close proximity to real resource costs. Based on empirical works by Hutchinson et al. (2003) and Faguet (2004), we proxy for fiscal decentralization by developing a model to

examine whether existing conditions affect future local spending decisions, and also, whether local spending affects future local outcomes.

One reason local governments attain more efficient local public goods provision than higher levels of government is that they have an informational advantage. Because of their proximity to constituents, local governments can more cheaply and effectively collect information on local preferences and needs. To illustrate, think about a hypothetical situation in Amhara where primary educational attainment rates are decreasing in 5 woredas. Voters in the 2 of the 5 woredas exhibit a strong voter preference for high educational attainment, while the other 3 woredas are indifferent about educational attainment. A central government may look at these results and decide that all 5 woredas need increased educational money because they are underperforming, thus ignoring heterogeneous preferences. Even if they didn't ignore individual preferences, collecting this information would require the central government to expend additional resources, in the form of time and money, to collect, compile, and use this information to enact regulation similar to that of the woreda governments. Ideally, fiscally decentralized woredas would use this information to justify a corresponding increase or decrease in spending on education the following year, based on their respective voters' preference. However, (Fiseha, 2006, p. 136) suggests that in Ethiopia, preferences of local elites are expressed instead of voter preferences. The presence of large amounts of donor funding also increases the possibility of donor preference being revealed.

Another efficiency advantage of local governments in the provision of local public goods is that they are closer to real resource costs. A local government that collects its own revenue for a good through taxation is more likely to realistically consider the costs, as well as the benefits, of providing that good. Consider a rural village in Amhara. The nearest health clinic is 25 kilometers away, so the woreda government determines that a health clinic needs to be constructed. If the central government gives the woreda money and tells it to build a clinic, the woreda government has the incentive to use all of that money and health spending will increase independently of local preferences. However, if the clinic is funded through local

taxation, the residents of the woreda who are taxed for the clinic, through voting, will give the government a reason to build the clinic at the lowest possible cost, and spending will increase according to local preferences.

Funding local public works projects at the lowest possible cost induces competition among woredas to find the lowest cost method of production, increasing efficiency and welfare gains. For example, take educational attainment across woredas. Assume that the constituents of woreda A and woreda B have similar preferences and attainment goals for education. If woreda A meets its attainment goals at a lower cost than woreda B, the latter will most likely adopt the methodology of the former. Ultimately, woreda B is able to decrease its educational spending while enjoying improved educational attainment outcomes because of the competition that occurs under decentralization.

Finally, constituents will move to another woreda, or vote with their feet, if they do not like the public goods bundle in their present woreda. Consider a woreda whose main public spending goal is to build a hospital in the hope of lowering the incidence of diarrhea and fever among children. In order to raise money for the hospital, the government taxes its residents. Now suppose a family who lives in this woreda has a strong preference for education and an aversion to high taxes and hospitals. Taking only economic preferences into consideration, that family will move to a woreda that better suits its preference bundle. The families that remain will reap the benefits, in the form of lower diarrhea and fever rates among children, of their tax-funded hospital. While this scenario is highly unrealistic for a country like Ethiopia where mobility is unlikely and constituent preference is rarely expressed, it is nevertheless a useful illustrative tool.

3.1 Empirical Method

Using two different specifications, we measure whether local conditions have an effect on future woreda level spending and also whether woreda level spending has an effect on future local outcomes. This study builds off the model of Faguet (2004), who examines whether or not fiscal decentralization leads to more sensitive treatment of local needs. Specifically, we examine the education and health sectors in the context of spending and public goods provision. The first specification uses a fixed effects ordinary least squares regression to test whether local conditions, such as child vaccination rates and primary school attainment, affect future local government spending patterns. The second specification examines whether or not spending and household characteristics have any effect on future local outcomes.

3.1.1 The Effect of Local Conditions on Future Expenditure Decisions

Government spending on public goods should reflect public conditions and household characteristics at the local level from the preceding time period. In the context of health sector spending, these conditions may include things like the rate of vaccinations for children[1] and access to clean drinking water. In the context of education spending, conditions include primary and secondary school attainment as well as enrollment and literacy rates. These conditions are denoted by $C_{w\overline{1996}}$, with w representing a unique woreda. E_{wt} is spending by local governments on education and health as a percentage of the total budget. Again, w is a unique woreda and t is a particular year, assuming values from 1998-2001. Education spending is that money spent on things like teacher and administrator salaries, students, and facilities. Examples of health spending include money used toward clinics, malaria/vector-borne diseases, doctor and nurse salaries, and medicines. The first specification is:

[1] Ideally we would use actual rates of disease, but data limitations prevent this.

$$E_{wt} = \beta_1 + \beta_2 t + \beta_3 tC_{w\overline{1996}} + \varepsilon_{wt} \tag{3.1}$$

One of the World Bank's Millennium Development Goals (MDGs) is universal primary education (2006). Assuming that central government policy is influenced by the MGDs and a trickle-down effect to local government spending, if school enrollment targets for the year are not met, we expect education spending to increase the following year. Similarly, if enrollment targets are met or exceeded for the year, we expect the subsequent education budget share to stay constant or decrease. Additionally, we presume an increased adult literacy rate will positively affect healthcare spending as well as all levels of education spending. While household toilet access and access to drinking water are important to include in the model, we do not know what, if any, effect the two will have on healthcare or education spending at the local level. A full list of expectations is presented in table 3.1.

Table 3.1: Expected results

	independent variables								
Spending	Primary school	enrollment	second school	incidence diarrhea fever	BCG	DPT	literacy rate	toilet access	drinking water
Health	0	0	0	-	+	+	+	0	0
Clinic	0	0	0	-	+	+	0	0	0
malaria	0	0	0	-	+	+	0	0	0
Education	+	+	+	0	0	0	+	0	0
Primary	+	+	0	0	0	0	+	0	0
secondary	+	+	+	0	0	0	+	0	0

+: positively related, -: negatively related, 0: ambiguous expectation

Another of the World Bank's Millennium Development Goals is to "combat HIV/Aids, malaria, and other diseases" (2006). DPT and BCG vaccinations are given to children in Ethiopia to combat "other diseases"—tuberculosis, diphtheria, pertussis, and tetanus. Ideally, we would obtain actual disease rates, but limitations in data necessitate using vaccination rates as a proxy. Because a lower level of disease is partially a result of higher vaccination rates, we expect a positive relationship between DPT and BCG vaccination rates and health spending, assuming there is also a preference for DPT and BCG vaccinations. In other words, if disease is on the rise, vaccination rates should also rise along with health spending.

3.1.2 The Effects of Spending on Outcomes

If local government spending on public goods reflects voter preferences, it follows that behaviors and outcomes should change in response to that spending. In particular, behaviors and outcomes related to health and education should change in response to changes in spending within their respective sectors. M_{wt} is a condition such as the percentage enrollment among school aged children. E_{wt} again denotes spending within a specific sector. New to this specification is X, a vector of average household characteristics which could also possibly affect outcomes. These household characteristics include things such as proportion of the sample that is married and working, and average household size. The second specification is a simple ordinary least squares estimate, with outcome as the dependent variable and independent variables consisting of lagged expenditures and household characteristics.

The general form of this specification is expressed below as:

$$M_{wt} = \alpha_1 + \alpha_2 E_{w,(t-1)} + \beta' X_{wt} \tag{3.2}$$

We suppose that a change in local expenditure in the past will affect outcomes in the present.

For example, an increase in health spending should cause a decrease in the percentage of children experiencing diarrhea and fever. Similarly, an increase in educational spending should increase enrollment and the percentage of the population completing their primary or secondary education.

We can draw inferences about the true nature of the effectiveness of local government spending in Amhara, and by extension, Ethiopia, from these specifications. In particular, if there is a lack of, and preference for, something locally, and it is not receiving an increasing amount of funding over time, local government spending may not be an effective means toward achieving its goals. Alternatively, if the need is being met by increasing local spending in that area, local government spending is probably effective. Results from the two specifications just presented are revealed in chapter 5.

Armed with a firm grasp of how to apply fiscal decentralization theory to a messy data set, we proceed to the next chapter. Our data originated from the Amhara region of Ethiopia, and is useful in preparation for developing an empirical specification, and also for examining time trends of outcomes, conditions, and expenditures at the woreda level in both education and healthcare.

Chapter 4

Empirical Evidence: The Data

4.1 Data description

This study analyzes two different data sets. The first data set is composed of four surveys of thousands of Ethiopian households. The Ethiopian Welfare Monitoring Surveys (EWMS) were conducted by The Central Statistical Agency of Ethiopia (CSA) in 1996, 1998, 2000, and 2004. The 2004 survey, similar in structure to the others but chosen because it is the most exhaustive, begins on page 65. The subject of questions cover individual characteristics, household characteristics, education, health conditions, housing amenities, access to facilities, household assets, and living conditions. Since this study is concerned with educational and health related outcomes, those questions are the focus of the analysis.

Of the nine regions in Ethiopia, Amhara is analyzed because the second data set contains Amharan budget outlays for 1998 - 2001. Ethiopia's relatively young constitution, written in 1994, implicitly included fiscal decentralization, and it has been evolving since. There were no defining events in Ethiopian fiscal decentralization from 1998 - 2001; rather, like any new government process, we expect improvements and learning with the passage of time (Foster

and Rozenzweig, 2004). Therefore, spending should be more decentralized in 2001 than in 1998 because of local events and the passage of time.

The focus of this study, the Amhara region, is divided into 11 zones, one of them being a special woreda-zone (Bahir Dar Zuria). The special woreda-zone was created to protect minority groups within a hegemonic region. Within the remaining 10 zones lie 102 woredas (Aalen, 2002, p. 66). As of 2005, the population of Amhara was nearly 90% rural, accounting for nearly a quarter of Ethiopia's livestock output (Central Statistical Agency, 2007).

Table 4.1 shows individual and household characteristics and conditions from 60 Amharan woredas. Incidence of fever and diarrhea in children under the age of 5 increased from 29% in 1996 to 31% in 2000 and declined to 26% in 2004, with a net 3% decline over the 8 year period. Over the same time period, the percentage of children under 5 receiving the Bacille Calmette-Guérin vaccine (BCG)[1] and the Diphtheria, Pertussis, Tetanus vaccine (DPT)[2] increased substantially, from a 33% vaccination rate in 1996 to 55% and 60% in 2000 and 2004, respectively. The proportion of households with access to toilets increased substantially from 7.6% in 1996 to 26.5% in 2004[3]. Finally, household access to clean drinking water, the other health indicator, increased substantially over the 8 year period, up from 41.5% in 1996 to 67% during the dry season in 2000 and 77% during the dry season in 2004.

While overall health outcomes were unambiguously positive, educational outcomes showed mixed results. Grades 1-8 (ages 7-14) compose primary school in Ethiopia, while grades 9-12 (ages 15-18) are classified as secondary school (World Bank, 2003; Schaffner, 2004). Enrollment rates among children aged 7-18 years displayed impressive gains, increasing from 20% in 1996 to around 37% in 2004. Similarly, primary school completion rates doubled from 10.4% in 1996 to 19.7%in 2004. However, the proportion of the population having completed

[1]This is the most common vaccine against tuberculosis and also a common health indicator among children.
[2]DPT vaccine is a common health indicator among children.
[3]The proportion of households with access to a toilet briefly sank to 1.6% in 2000, while primary school completion rates also experienced a decline in 2000. Other education and health outcomes experienced similar setbacks in 2000, leading us to believe that there are problems with the survey data from that year.

secondary education was stagnant to slightly decreasing across the time period.

Table 4.1: Summary household behavior statistics by year

	1996					2000					2004				
Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**
diarrhea & fever	0.29	0.454	0	1	955	0.305	0.461	0	1	1401	0.258	0.438	0	1	2009
BCG vaccine	0.339	0.474	0	1	955	0.527	0.499	0	1	1402	0.547	0.498	0	1	2010
DPT vaccine	0.336	0.473	0	1	955	0.55	0.498	0	1	1418	0.595	0.491	0	1	1990
lavatory access	0.076	0.264	0	1	1455	0.016	0.125	0	1	1967	0.265	0.442	0	1	6750
drinking water	0.415	0.493	0	1	1455										
drinking water dry season						0.669	0.471	0	1	1966	0.77	0.421	0	1	6734
drinking water rainy season						0.644	0.479	0	1	1967	0.761	0.426	0	1	6746
enrollmentt	0.195	0.397	0	1	2417	0.241	0.428	0	1	3498	0.373	0.484	0	1	5389
primary school	0.104	0.305	0	1	6524	0.085	0.279	0	1	8985	0.197	0.397	0	1	13643
secondary school	0.019	0.137	0	1	6524	0.003	0.053	0	1	8985	0.016	0.124	0	1	13643
adult literacy	0.212	0.409	0	1	3547	0.164	0.37	0	1	4770	0.301	0.459	0	1	7526
marital status						0.551	0.497	0	1	5991	0.514	0.5	0	1	9403
average size of household						5.52	2.063	1	13	8985	5.365	2.064	1	12	13643
work status						0.696	0.46	0	1	5987	0.655	0.475	0	1	9405

*With the exception of household size, statistics are proportion of the population exhibiting the behavior

Because this analysis consists of examining behavioral changes with respect to expenditures, it is also instructive to examine woreda level spending patterns over time. Figure 4.1 displays, in a simplified manner, proportions of the total budget comprised by education spending, healthcare spending, and everything else. It is important to keep in mind that education spending, as a percent of total spending, is 5 times larger than that of healthcare spending, and that together they comprise over 60% of total budgetary outlays.

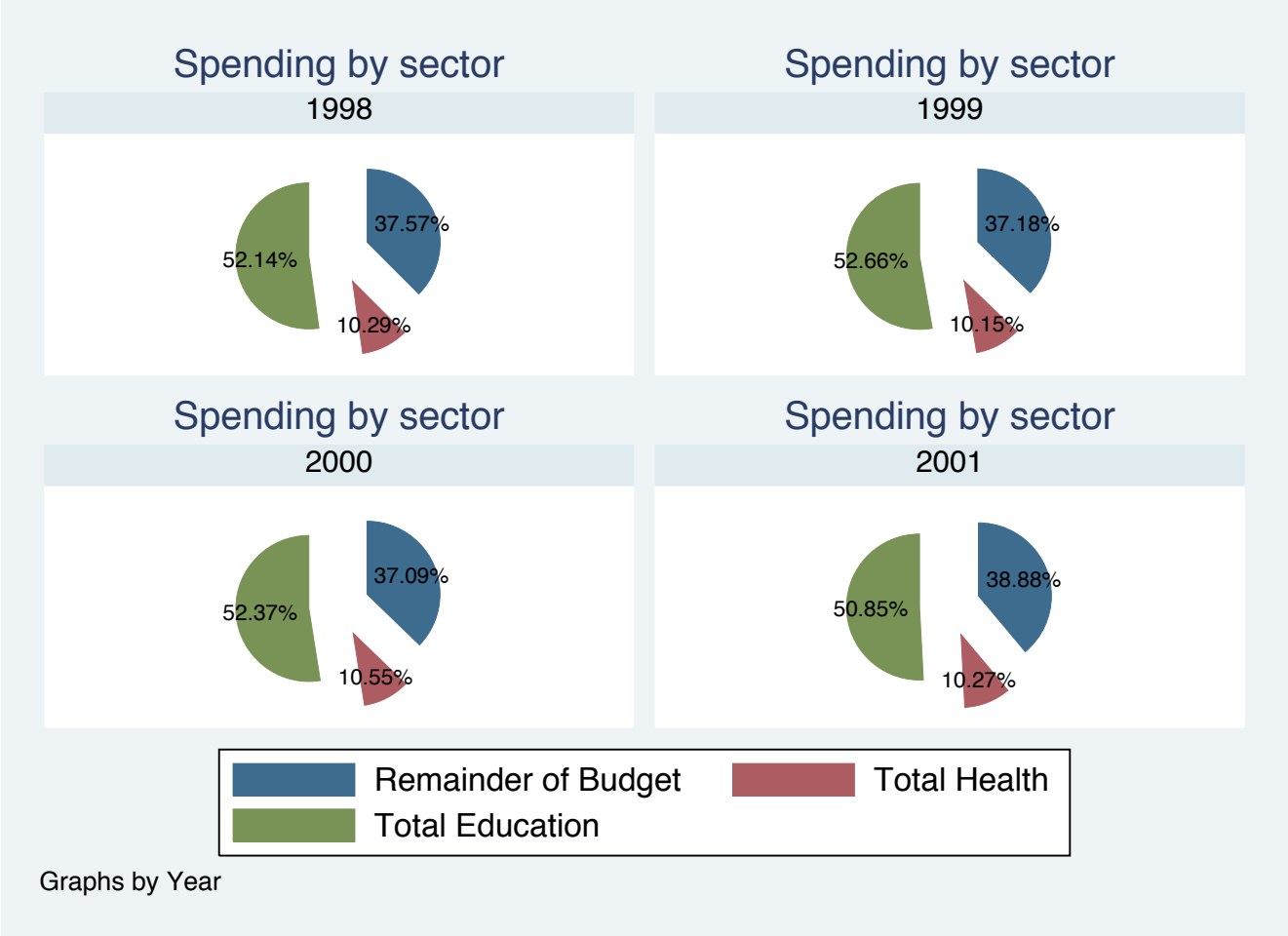

Figure 4.1: Woreda Budgets: Percent expenditure per sector by year

Figure 4.2 shows a density histogram of changes in education spending as a percent of the total budget over the period 1998-2001. The height of each bar represents the number of woredas that have spending changes corresponding with the range of values spanning the width of the

bar. For example, it appears that there were approximately 7 woredas whose percent change in education spending was between 0 and -.1, meaning that education spending as a percent of total woreda expenditures fell from 1998-2001. Similarly, figure 4.3 shows a histogram of changes in health spending as a percent of the total budget over the period 1998-2001. For both charts, a negative bar means that woreda governments within that range allocated less of its total budget toward that sector over the time period. Conversely, a positive bar indicates the local government increased the proportion of its budget allocated toward the sector. Finally, a woreda at zero suggests no change.

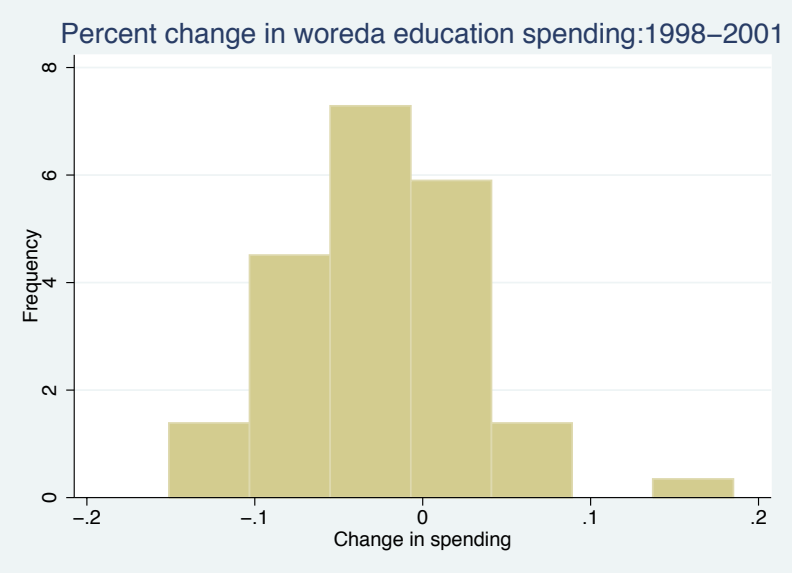

Figure 4.2: Percent change in education expenditure per woreda from 1998-2001

The majority of the area under the bars in figure 4.2 are negative and fairly close to zero, meaning that overall there was a net decrease in education spending as a percent of all woreda budgets in Amhara. If change in spending patterns acts as a proxy for decentralization, we can imagine a few reasons for the decrease in the portion of the budget allocated to education. Recall that one benefit of fiscal decentralization is that voter preferences are expressed more effectively. The decrease in educational spending, therefore, may be because voters want spending to be allocated to different sectors of the economy. More likely, it could also mean that the regional government is in control of the spending and has noticed a need for less

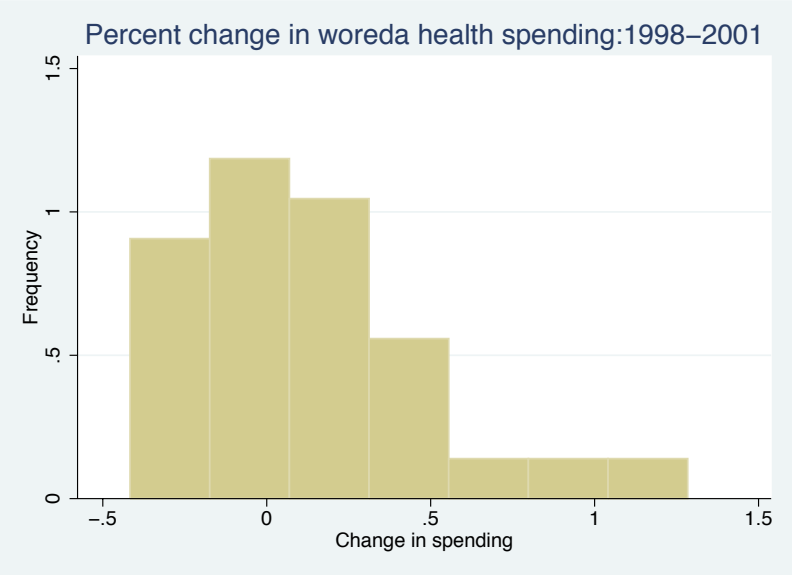

Figure 4.3: Percent change in health expenditure per woreda from 1998-2001

education spending, or it could be indicative of capture by local elites.

According to figure 4.3[4] and contrary to education spending, health spending as a percent of all total woreda budgets increased from 1998-2001, as is evidenced by observing that most of the area below the bars is positive. This could be due to the government's health clinic building boom.

4.2 Analysis

Having examined changes in outcomes and expenditures independently, it is now useful to explore how expenditures and outcomes interact. Table 4.2 is a correlation matrix between the percentage of the total woreda budgets spent on healthcare each year from 1998 - 2001 and local outcomes from 1996 interacted with a time variable. The interaction term, t, weights each outcome term based on the time period of expenditure with which it is interacting.

[4]There is a woreda that, due to the construction of a hospital, had a 4000% increase in spending, and will be addressed later. It was dropped for this chart because it obscured all trends.

While the values are arbitrary, t assumes the value of 1 for 1998, 2 for 1999, 3 for 2000, and 4 for 2001. The function of the time interaction term is to separate the correspondence of the outcome (which is the same value for every year within each woreda) with expenditure from each year. There are four observations for each woreda, one for each expenditure year interacted with the 1996 outcomes. This allows us to observe a spending trend over time correlated with the 1996 outcome. For example, BCG vaccination has a .1830 correlation with education spending. This means that 1996 BCG vaccination rates and the percentage of the total budget that comprises education spending from 1998-2001 vary positively together 18.3% of the time; in other words, they are weakly and positively correlated.

Table 4.2: Health spending correlated with outcomes

Variable	% Health spending	t	enrollment	adult literacy	diarrhea & fever	BCG vaccination	DPT vaccination	toilet access	drinking water	primary school	secondary school
% Health spending	1.0000										
t	0.0468	1.0000									
enrollment	-0.0695	0.3395	1.0000								
adult literacy	-0.0704	0.5204	0.7636	1.0000							
diarrhea & fever	0.0842	0.5542	0.1419	0.2063	1.0000						
BCG vaccination	**-0.0291**	0.4293	0.5566	0.5570	0.2944	1.0000					
DPT vaccination	-0.0195	0.4558	0.5333	0.5722	0.3358	0.9373	1.0000				
toilet access	0.1340	0.1625	0.6993	0.5895	0.1111	0.3714	0.3780	1.0000			
drinking water	0.2310	0.3994	0.3316	0.2844	0.4078	0.4211	0.4248	0.2194	1.0000		
primary school	**-0.1344**	0.3962	0.8000	0.8679	0.1023	0.4656	0.4496	0.5521	0.1986	1.0000	
secondary school	**0.1259**	0.1913	0.7672	0.6834	0.0995	0.3787	0.4018	0.8816	0.2983	0.6311	1.0000

Table 4.3 is a similar correlation matrix instead using the percentage of total woreda budgets spent on education. Health spending is actually negatively correlated with both BCG and DPT vaccination rates, while education spending is positively correlated with the two. Graphically, figures 4.4 & 4.5 suggest that as the proportion of the total budget allocated to education spending increases, so does the proportion of children under 5 years of age vaccinated against tuberculosis, but this holds nothing else constant.

Table 4.3: Education spending correlated with outcomes

Variable	% Education spending	t	enrollment	adult literacy	diarrhea & fever	BCG vaccination	DPT vaccination	toilet access	drinking water	primary school	secondary school
%Education	1.0000										
t	-0.0773	1.0000									
enrollment	0.2534	0.3395	1.0000								
adult literacy	0.2350	0.5204	0.7636	1.0000							
diarrhea & fever	-0.1545	0.5542	0.1419	0.2063	1.0000						
BCG vaccination	**0.1830**	0.4293	0.5566	0.5570	0.2944	1.0000					
DPT vaccination	0.2100	0.4558	0.5333	0.5722	0.3358	0.9373	1.0000				
toilet access	0.0636	0.1625	0.6993	0.5895	0.1111	0.3714	0.3780	1.0000			
drinking water	-0.1060	0.3994	0.3316	0.2844	0.4078	0.4211	0.4248	0.2194	1.0000		
primary school	**0.2981**	0.3962	0.8000	0.8679	0.1023	0.4656	0.4496	0.5521	0.1986	1.0000	
secondary school	**0.1319**	0.1913	0.7672	0.6834	0.0995	0.3787	0.4018	0.8816	0.2983	0.6311	1.0000

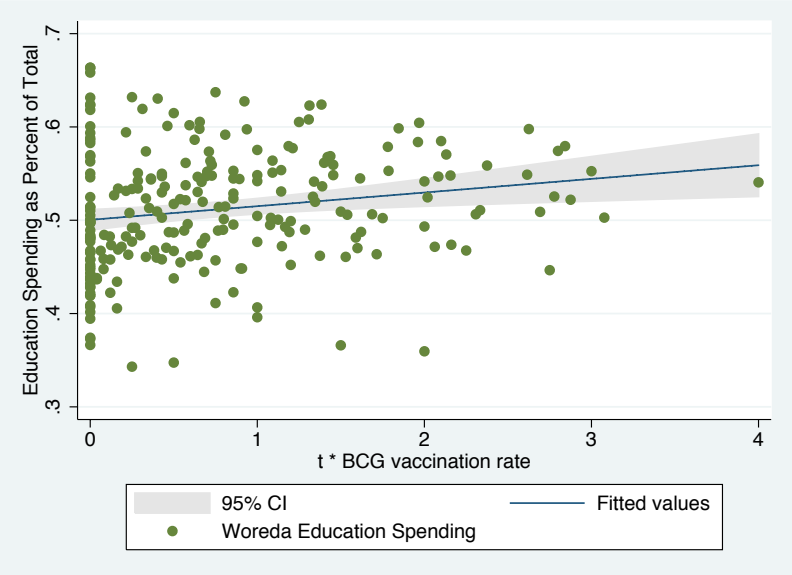

Figure 4.4: Correlation between percent woreda education spending (1998-2001) and 1996 BCG vaccination rates

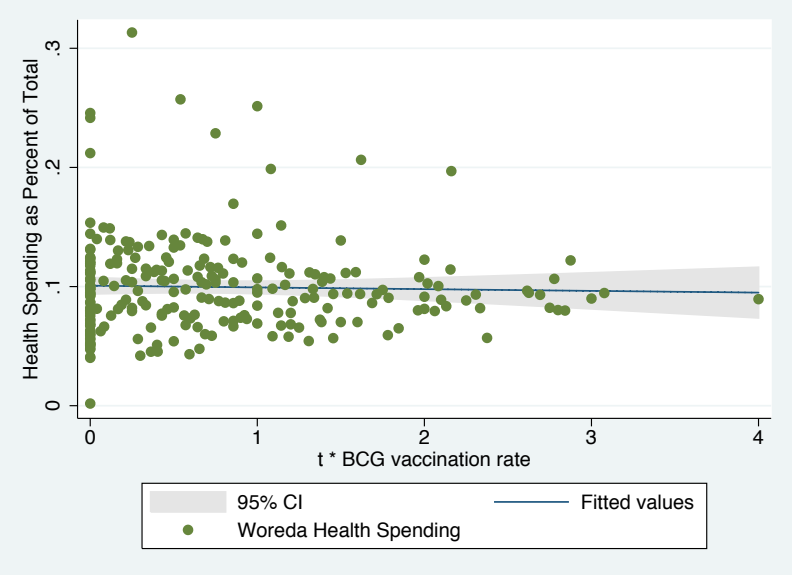

Figure 4.5: Correlation between percent woreda health spending (1998-2001) and 1996 BCG vaccination rates

Noting the high correlation between health outcomes, we can talk about them together. One explanation for the discrepancy in health and education spending effects may lie in the method by which vaccines are distributed. While there is no specific evidence for this, woredas may decide that schools are the best place to administer the BCG vaccine and may allocate a

portion of their education budget to purchasing and administering the vaccine. This would indicate the presence of a positive spillover from the education sector to the health sector. Another explanation is that the BCG vaccination program is not a large part of the health budget, rendering the interaction between the two small, albeit negative.

The correlation matrices also disclose some interesting information about educational attainment. Behrman (1996) suggests that not only do healthy children have higher enrollment rates, they also achieve more highly once they are at school. So it is a bit surprising to note that while education spending is positively correlated with both primary and secondary school attainment, health spending is negatively correlated with primary school attainment. One possible reason for this is that if vaccinations are administered at school, children will attend just to obtain the vaccine and then drop out.

Because it exhibits more irregularities than education spending, healthcare spending deserves further examination at this point. We can reasonably expect healthcare spending to be negatively correlated with future incidence of childhood fever and diarrhea rates. While that is indeed the case, it is initially difficult to discern because of a statistically anomalous woreda. Concurrent examination of figures 4.6 and 4.7 confirm this.

Figure 4.6 shows a correlation scatter plot of the percent change in incidence of diarrhea and fever in children under 5 from 2000-2004 on the percent change in healthcare spending from 1998-2001. In this plot, there appears to be an outlier. The woreda, Debay Tilatgen, had a large increase in spending over the expenditure time period for the construction of a hospital. This outlier makes it hard to distinguish what is occurring in the rest of the woredas and alters the trend line. With the outlier excluded, figure 4.7 shows a clear trend that looks as it should, suggesting that as percent change in health spending increases, the percent change in incidence of fever and diarrhea decrease in the future.

While a cursory data analysis is instructive, none of it holds other variables constant. This

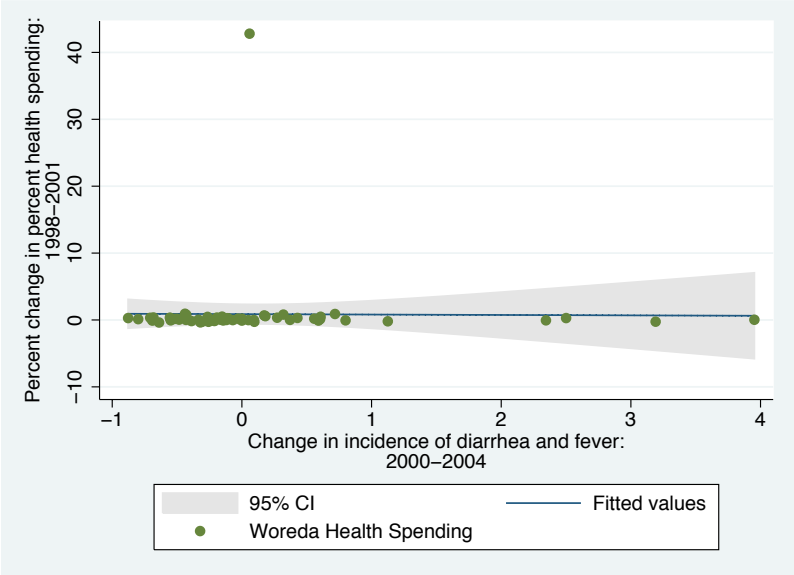

Figure 4.6: Correlation between percent change in health spending from 1998 - 2001 and percent change in incidence of childhood fever and diarrhea from 2000-2004: outlier present

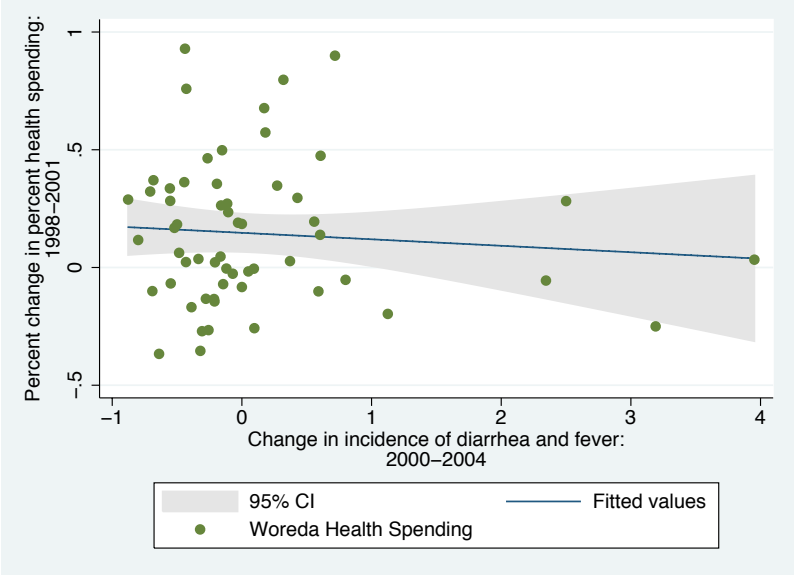

Figure 4.7: Correlation between percent change in health spending from 1998 - 2001 and percent change in incidence of childhood fever and diarrhea from 2000-2004: no outlier

chapter shows that while education spending as a percentage of total budget outlays is on the decrease, health spending as a percentage of total spending is slightly increasing. At the same time, most health and education outcomes, such as vaccination rates and primary school

completion rates, are on the increase. While voter preference may be the cause, it is more likely that Non Governmental Organization (NGO) preference is being expressed. There is also a negative relationship between incidence of childhood diarrhea and fever, and health spending. This may be indicative of effective health spending techniques and distribution. Finally, while there is a negative correlation between BCG vaccination rates and health spending, education spending and BCG vaccinations rates are positively related. The next chapter will develop an empirical method and apply the principle of *ceteris paribus* via regression analysis to present more rigorous results.

Chapter 5

Empirical Evidence: Method and Results

To continue the analysis from the previous chapter, we inspect the results reached by applying the theory presented in chapter 3 to the data explored in chapter 4. Primary specification results suggest that local conditions did not significantly affect local government spending, with a few notable exceptions in the health and education sectors. Secondary specification results were unambiguously disappointing and did not suggest significant effects of local spending on local outcomes. The chapter concludes with possible explanations for why results do not match expectations.

5.1 Results

5.1.1 Do present conditions affect future expenditure decisions?

Recall that equation 3.1 on page 29 tests whether observed conditions affect future woreda spending patterns. All conditions were interacted with a time variable, t, to isolate the effects of the condition on each individual year of spending. Consequently, each woreda has 4 terms for each condition, one for each year of spending, which explains why there are 240 (60 woredas times 4 conditions years per condition) observations. Each specification is run two different ways, which we will denote variation 1 and variation 2. The first variation includes all 9 independent variables from both education and health sectors. The second variation uses only those independent variables which correspond to the sector of the dependent variable. For example, given percent of education spending as the dependent variable, there are two variations. The first includes all 9 independent variables while the second variation includes only the education sector independent variables representing enrollment, literacy rates, and primary and secondary completion rates. Table 5.1 presents a comprehensive list of spending and condition variables.

Tables 5.2 and 5.3 present the full results of effects of fixed 1996 woreda conditions on woreda level spending decisions from 1998-2001. Table 5.2 shows the effects of 9 different health and education conditions on 3 different kinds of health spending as a percentage of the total budget. Table 5.3 shows how the same 9 health and education conditions affect 3 different types of education spending as a percentage of the total budget.

Table 5.2 on page 52 displays results that provide mixed support for local conditions affecting future government spending. Areas with low DPT vaccination rates suggest increased healthcare spending. A one percentage point decrease in children receiving the DPT vaccination results in a 1.8 percentage point increase in health spending as a percentage of the

Table 5.1: Variable descriptions for the first specification

Variable	Description
E_{wt}	**Expenditure at time t (1998-2001) for woreda w**
	Healthcare spending as a percentage of total budget
	Health clinic spending as a percentage of total budget
	Malaria spending as a percentage of total budget
	Education spending as a percentage of total budget
	Primary education spending as a percentage of total budget
	Secondary education spending as a percentage of total budget
$C_{w\overline{1996}}$	**Fixed 1996 conditions in woreda w**
	Percentage of population who completed primary school
	Percentage of school aged population enrolled in school
	Percentage of population who completed secondary school
	Percentage of children under 5 who were ill with diarrhea or fever in the two weeks prior to being surveyed
	Percentage of children under 5 who received the BCG vaccine
	Percentage of children under 5 who received the DPT vaccine
	Percentage of the population over 15 that can read and write
	Percentage of the population with access to a toilet
	Percentage of the population with access to clean drinking water

*Only a single variable in E_{wt} appears in each regression

total budget, holding all else constant. This is significant at the 5% level. Similar results are seen in variation 1, as well as for both variations of health clinic spending. Additionally, access to toilets seems to affect health spending as well. The first variation shows that a 1 percentage point increase in the proportion of the population with access to a toilet yields a 2.9 percentage point increase in health clinic spending as a percent of the total budget, all else constant and significant at the 10% error level. The results are even more significant (at the 1% level) under the second variation, exhibiting a 1 percentage point increase in the toilet access rate that yields a 2.3 percentage point increase in health clinic spending as a percent of the total budget, *ceteris paribus*. Caution should be taken in putting too much faith in the results involving toilet access, as we will see later.

Table 5.3 on page 53 displays some interesting results on education sector spending. A 1 percentage point increase in DPT vaccination rates yields a 2.5 percentage point decrease in education spending as a percent of the total budget, holding all else constant and significant at the 5% level. An identical increase in DPT vaccination rates yields a 1.7% decrease in primary education spending as a percent of the total budget at 5% significance, *ceteris paribus*. The effect of the BCG vaccination on spending, however, complicates these results. A 1 percentage point increase in BCG vaccination rates yield a 2.5 percentage point increase in education spending as a percentage of total budget outlays, all else constant and significant at 5%. This may be because an emphasis on meeting the Millennium Development Goal of universal primary education diverts attention and funding from secondary education. Alternatively, perhaps there is a societal norm that makes primary school a rite of passage, but secondary school a place for the wealthy. A more likely explanation is that primary education is too expensive for local governments Additionally, a 1 percentage point increase in the percentage of the population that has completed primary school yields a 3.7 percentage point decrease in secondary school spending under variation 1, *ceteris paribus*. This is significant at the 1% level, with a similar result under variation 2.

Nothing else was significant in the first variation of regressions. Recall that table 4.2 on

Table 5.2: Fixed Effects Results for Health Sector Spending

	% Health spending		% Clinic spending		% Malaria spending	
	(1)	(2)	(1)	(2)	(1)	(2)
time	0.00649**	0.00495**	0.00296	0.00421***	-0.0000275	0.0000871
	(2.56)	(2.35)	(1.25)	(2.65)	(-0.14)	(0.69)
enrollment rate	0.0146		0.00737		0.000565	
	(1.03)		(0.73)		(0.85)	
literacy rate	-0.0218		0.00502		-0.000977	
	(-1.43)		(0.38)		(-0.62)	
diarrhea & fever	0.00681	0.00678	0.00398	0.00333	-0.000326	-0.000480
	(1.08)	(1.10)	(0.85)	(0.71)	(-0.66)	(-1.06)
BCG vaccination	0.00187	0.00390	-0.00105	0.00185	-0.000724	-0.000393
	(0.25)	(0.70)	(-0.22)	(0.52)	(-1.11)	(-0.60)
DPT vaccination	-0.0157*	-0.0181**	-0.0123**	-0.0136***	0.000224	0.0000202
	(-1.91)	(-2.57)	(-2.22)	(-2.65)	(0.30)	(0.03)
toilet access	-0.00820	0.00260	0.0291*	0.0227***	0.000144	0.000776
	(-0.44)	(0.18)	(1.72)	(4.16)	(0.15)	(1.11)
drinking water access	-0.00434	-0.00328	-0.0000306	-0.000543	-0.000124	-0.000145
	(-0.85)	(-0.67)	(-0.01)	(-0.21)	(-0.51)	(-0.62)
primary school	0.00404		0.00275		0.00282	
	(0.17)		(0.15)		(1.44)	
secondary school	0.0313		-0.0674		-0.00154	
	(0.39)		(-1.02)		(-0.27)	
constant	0.0955***	0.0955***	0.0569***	0.0569***	0.00196***	0.00196***
	(28.13)	(28.03)	(25.39)	(25.38)	(8.78)	(8.77)
N	240	240	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

page 41 and table 4.3 on page 43 suggest that there is high correlation among some of the independent variables. Additionally, there is simply not much variation in spending over time, which adds a layer of complexity in obtaining significant results. To determine whether this is true, another set of regressions were run. We regress each independent variable separately against each level of spending. Table B.1 on page 78 shows the condensed results of these regressions, while tables B.2 through B.7 on pages 79 through 82 display the individual results by sector.

Table 5.3: Fixed Effects Results for Education Sector Spending

	% Education spending		% Primary Education spending		% Secondary Education spending	
	(1)	(2)	(1)	(2)	(1)	(2)
time	-0.00531**	-0.00355*	-0.00704**	-0.00486**	0.00351***	0.00364***
	(-2.11)	(-1.68)	(-2.46)	(-2.37)	(2.62)	(3.62)
enrollment	-0.0223	-0.0142	-0.0120	-0.0109	0.00666	0.00894
rate	(-1.65)	(-1.14)	(-0.89)	(-0.90)	(1.01)	(1.64)
literacy	0.0203	0.0172	0.0292	0.0197	0.000511	0.00330
rate	(1.08)	(0.96)	(1.23)	(0.92)	(0.05)	(0.34)
primary	-0.0232	-0.0246	-0.00372	-0.00312	-0.0373***	-0.0380***
school	(-0.80)	(-0.89)	(-0.12)	(-0.10)	(-2.65)	(-3.07)
secondary	-0.0199	0.0234	-0.0201	0.0157	-0.0256	-0.0260
school	(-0.22)	(0.34)	(-0.23)	(0.31)	(-0.54)	(-0.74)
diarrhea &	0.00634		0.00534		0.00232	
fever	(1.14)		(0.96)		(0.79)	
BCG	0.0248**		0.00901		0.00612	
vaccination	(2.44)		(1.30)		(1.20)	
DPT	-0.0247**		-0.0165**		-0.00285	
vaccination	(-2.23)		(-2.03)		(-0.48)	
toilet	0.0215		0.00851		0.00434	
access	(1.19)		(0.41)		(0.38)	
drinking water	-0.000104		0.00434		-0.00281	
access	(-0.03)		(1.21)		(-1.63)	
constant	0.523***	0.523***	0.387***	0.387***	0.0771***	0.0771***
	(180.10)	(175.64)	(112.72)	(112.37)	(52.74)	(52.41)
N	240	240	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.4 displays some interesting health sector results. The percentage of children receiving the BCG vaccination and the percentage of children receiving the DPT vaccination had similar results on subsequent health spending. A 1 percentage point increase in the BCG vaccination rate results in a 1.2 percentage point decrease in health spending as a percent of the total budget, *ceteris paribus* with significance at the 1% error level. Similar results appeared for health clinic spending. An identical 1 percentage point increase in the BCG vaccination rate and the DPT vaccination rate result in a .7 percentage point decrease and .8 percentage point

decrease, respectively, in the percent of total budget spent on health clinics, all else constant. Both are significant at the 5% level. Similar to the first iteration of the specification and significant at the 5% level, a 1 percentage point increase in access to toilets yielded a 1.3 percentage point increase health clinic spending as a percent of the total budget, everything else held constant.

Table 5.4: Fixed Effects Results for Health spending: condensed individual regressions

	(1) %health spending	(2) %clinic spending	(3) %malaria spending
diarrhea & fever	0.00301	0.00158	-0.000577
	(0.53)	(0.37)	(-1.33)
BCG vaccination	-0.0118***	-0.00653**	-0.000354
	(-3.03)	(-2.22)	(-1.30)
DPT vaccination	-0.0145***	-0.00824**	-0.000366
	(-3.36)	(-2.42)	(-1.14)
toilet access	-0.0100	0.0133**	0.000349
	(-0.72)	(2.27)	(0.65)
drinking water	-0.00514	-0.00134	-0.000254
	(-1.22)	(-0.56)	(-1.18)
N	240	240	240

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.5 displays some interesting results with respect to education. A 1 percentage point increase in the percentage of school aged children enrolled in school leads to a 1.1 percentage point drop in the percentage of the total budget spent on education, *ceteris paribus*, significant at the 10% level. Enrollment had a similar, yet smaller, effect on secondary education spending. A 1 percentage point increase in the enrollment rate results in a .8 percentage point drop in secondary education spending as a percentage of the total budget, all else constant, and significant at the 10% level. Also significant at the 10% error level—and counterintuitive—a 1 percentage point increase in the proportion of the population completing secondary school

yields a 4.3 percentage point decrease in the budget share spent on secondary school, everything else constant. Finally, a 1 percentage point increase in the primary school completion rates leads to a secondary education spending decrease of 2.6 percentage points, *ceteris paribus*, and significant at the 1% error level. The final result is consistent with the findings in table 5.3.

Table 5.5: Fixed Effects Results for Education spending: condensed individual regressions

	(1) %education spending	(2) %primary ed spending	(3) %secondary ed spending
primary education	-0.0206 (-1.45)	0.00724 (0.50)	-0.0263*** (-4.15)
enrollment	-0.0114* (-1.66)	0.000308 (0.04)	-0.00764* (-1.96)
secondary education	-0.0285 (-0.68)	0.0178 (0.59)	-0.0427* (-1.69)
adult literacy	-0.00777 (-0.78)	0.00946 (1.06)	-0.0149*** (-2.76)
N	240	240	240

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The first specification left us with the impression that present conditions do affect future woreda government spending patterns to some extent, perhaps suggesting a learning process involved with decentralization. Specifically, DPT and BCG vaccination rates consistently, and significantly, predict both health and education spending in the future. Further, DPT and BCG vaccination rates appear to be highly correlated, which is evident when they are both individually regressed against health and education spending. The results also suggest that completion of primary school significantly and negatively affects future government spending on secondary education. While this could be due to the MDG of universal primary education, it is also possible that the cost of primary education is rising relative to the cost of secondary education. Finally, it is important to note that while access to toilets significantly and positively affects health clinic spending, the questions about toilet access did not receive a large

number of responses and may be biased because of a limited sample size.

5.1.2 Does spending affect outcomes?

Recall that in equation 3.2 on page 31, we are regressing local government expenditures and average household characteristics on future outcomes to determine whether spending by woreda governments affects constituent outcomes. Full results are presented in tables C.1 through C.10 on pages 84 through 93, although some of the more interesting results are described in this section. This specification is a simplified version. Some values of X_{wt} are percentage changes from 2000-2004. The specification was run 12 times with the same dependent and independent variables, each time with one of the variables in a different form[1]. While the dependent variable, M_{wt}, was always an outcome, it took on three different forms, the full range of which is presented in table 5.6 on page 57.

Results and theory diverge at this point. While household characteristics significantly affect outcomes in many cases, government spending does not have as much influence. In table 5.7, for example, a 1 percentage point increase in the size of households yields a 2.9 percentage point increase (significant at the 1% level) and a 7 percentage point increase (significant at the 5% level) in the likelihood that a household would obtain access to clean drinking water, during rainy and dry seasons respecively, between 2000 and 2004, *ceteris paribus*. There are also a couple of cases where, at the 10% significance level, the health budget as a percent of total spending affects the incidence of children experiencing fever and diarrhea. Table 5.8 on page 59 shows that 1% increase in the health budget as a percent of total spending in 2000 indicates an increase in the incidence of children experiencing fever and diarrhea of 84% in 2004, *ceteris paribus*.

[1]For example, one iteration be: $\%\Delta enrollment_{00-04} = \%\Delta expenditure_{00-04} + \%\Delta hhchar_{00-04}$, while the second iteration would be: $\%\Delta enrollment_{00-04} = expenditure_{2000} + \%\Delta hhchar_{00-04}$.

Table 5.6: Variable descriptions for the second specification

Variable	Description
E_{wt}	**Expenditure at time t (1998-2001) for woreda w**
	Percent change in healthcare spending
	Percent change in education spending
	Difference in healthcare spending
	Difference in education spending
	Healthcare spending, as a percent of the total budget, in 2000
	Education spending, as a percent of the total budget, in 2000
M_{wt} & X_{wt}	**Average household characteristics and outcomes at time t for woreda w**
	Percent change in enrollment
	Difference in enrollment
	Percent change in lavatory access
	Difference in lavatory access
	Percent change in water source access during rainy season
	Difference in water source access during rainy season
	Percent change in water source access during dry season
	Difference in water source access during dry season
	Percent change in BCG immunization rate
	Difference in BCG immunization rate
	Percent change in DPT immunization rate
	Difference in DPT immunization rate
	Percent change in reported illness & diarrhea
	Difference in reported illness & diarrhea
	Percent change in adult literacy rate
	Difference in adult literacy rate
	Percent change in household size
	Percent change in marital status
	Difference in marital status
	Percent change in work status
	Difference in work status

*Only a single variable in E_{wt} appears in each regression

Table 5.7: Percent change outcome (2000-2004) vs. percent change expenditure (1998-2000) and percent change in HH characteristics (2000-2004)

	(1) %Δ BCG vaccination	(2) %Δ DPT vaccination	(3) %Δ diarrhea & fever	(4) %Δ toilet access	(5) %Δ water rainy season	(6) %Δ water dry season	(7) %Δ literacy rates	(8) %Δ enrollment
%Δhealth spending	0.00349	-0.00426	-0.00115	0.0571	-0.00117	-0.0412		
	(0.28)	(-0.34)	(-0.05)	(0.91)	(-0.04)	(-0.53)		
%Δ enrollment	0.0619	0.103**	0.0198	2.109*	0.0962	0.451		
	(1.41)	(2.30)	(0.24)	(1.93)	(1.04)	(1.63)		
%Δliteracy	0.104	0.0783	-0.0321	1.594**	-0.117	-0.0627		
	(1.61)	(1.19)	(-0.26)	(2.86)	(-0.85)	(-0.15)		
%Δhh size	-0.780	-0.657	-0.337	-16.24***	2.934***	7.015**	0.602	-2.087
	(-1.56)	(-1.29)	(-0.35)	(-3.45)	(2.78)	(2.02)	(0.61)	(-1.42)
%Δ marital status	-0.247	-0.221	-0.116	4.204	0.487	-1.037	0.0415	-1.091
	(-0.70)	(-0.62)	(-0.17)	(1.19)	(0.65)	(-0.45)	(0.06)	(-1.01)
%Δ work status	-0.316	-0.210	0.437	-1.774	0.825	2.867	-0.0641	-1.935**
	(-1.01)	(-0.66)	(0.73)	(-0.96)	(1.25)	(1.45)	(-0.10)	(-2.04)
%Δ education spending							4.078	-0.0429
							(1.40)	(-0.01)
constant	-0.0993	-0.0734	0.115	-1.212	0.584***	0.718	0.935***	0.768***
	(-1.05)	(-0.76)	(0.64)	(-1.49)	(2.92)	(1.17)	(6.70)	(3.68)
N	60	60	59	18	60	58	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.8: Static 2004 outcomes vs. static 2000 expenditure and percent change in household characteristics (2000-2004)

	(1) 2004 BCG vaccination	(2) 2004 DPT vaccination	(3) 2004 diarrhea & fever	(4) 2004 toilet access	(5) 2004 water rainy season	(6) 2004 water dry season	(7) 2004 literacy rates	(8) 2004 enrollment
2000 % health spending	-0.123	0.263	0.840*	-0.174	-0.186	-0.601		
	(-0.17)	(0.32)	(1.83)	(-0.37)	(-0.26)	(-0.87)		
%Δ enrollment	-0.0198	-0.0101	-0.0141	-0.00792	0.0000366	0.00265		
	(-1.17)	(-0.54)	(-1.32)	(-0.73)	(0.00)	(0.16)		
%Δ literacy rates	0.0517*	0.0499*	-0.0325*	0.0543***	0.0153	0.0122		
	(1.98)	(1.72)	(-1.97)	(3.25)	(0.60)	(0.49)		
%Δ hh size	-0.388**	-0.264	-0.0593	-0.366***	-0.820***	-0.559***	-0.0659	-0.105
	(-2.08)	(-1.27)	(-0.50)	(-3.07)	(-4.50)	(-3.13)	(-0.66)	(-0.81)
%Δ marital status	0.0605	-0.0821	-0.0368	-0.127	0.147	0.155	-0.0668	-0.211**
	(0.44)	(-0.54)	(-0.43)	(-1.46)	(1.11)	(1.19)	(-0.94)	(-2.29)
%Δ work status	-0.195	-0.117	-0.0241	-0.0405	-0.101	-0.132	-0.113*	-0.166*
	(-1.60)	(-0.86)	(-0.31)	(-0.52)	(-0.85)	(-1.13)	(-1.77)	(-2.00)
2000 % education spending							0.452**	0.259
							(2.04)	(0.90)
constant	0.520***	0.517***	0.218***	0.0621	0.699***	0.775***	0.0279	0.248*
	(6.67)	(5.96)	(4.42)	(1.25)	(9.21)	(10.41)	(0.25)	(1.68)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

One reason government spending does not affect outcomes is that the time frame that we examine may be too short. Both education and health results tend to take time to reveal themselves, and 4 years may not be long enough. The answers may also lie in studies already conducted. Collier et al. (2001) suggests that Ethiopians care a great deal about both quality and quantity of healthcare, but that the government is building large numbers of health clinics, often at the expense of the quality of healthcare, so increased expenditures may be negated by inattention to quality. Additionally, since 1994, the government has been shifting money toward administration costs and post-secondary education at the expense of other education expenditures, such as primary education. In fiscal year 2000-2001, Amhara's budget share for education spending was just 83% of what it was in 1994, in real terms (Nakhavanit, 2005).

Statistically, there are a couple reasons why the results may be insignificant. The first is a problem of small variance: when aggregated to the woreda level, some variables don't vary much. The second possibility is a sample size that is too small to yield anything significant. Indeed, only 18 of the 60 woredas in the sample had answers to the questions about toilet access. This could also lead to biased results when considering the outcomes regarding toilet access.

Of course, another reason that woreda level spending is not affecting outcomes may be due to the institutions in place. Indeed, recalling the recent increased control on power by the central government, the fiscal decentralization practiced by the government may simply not be effective in the health and education sectors. This could indicate that health and education are either not very decentralized and under control of the regional government. Additionally, participation in local government is a condition for successful fiscal decentralization, and voter intimidation does not give constituents much incentive to participate. Alternatively, entrenched tribalism may also be a reason for less effective fiscal decentralization. If local elites target education and health spending as the safest sectors from which to take money, spending will be less effective.

Many opportunities remain for further experiments. Ideally, we would have expenditure per capita measures with which to measure spending trends. In addition, expenditure and behavior data that spans both pre- and post-decentralization would be instrumental in obtaining an idea of how quickly fiscal decentralization is effective. Including data from other regions of Ethiopia could help fix the small variation problem, as well as bolster the model with a more representative cross-section of the country. Future studies could include some of Ethiopia's neighbors in a cross country study, or independent examinations of the fiscal decentralization attempts in other Sub-Saharan African countries.

Chapter 6

Conclusion

Ethiopia has undergone tumultuous changes in the past 15 years. Using the Leninist Russian model of ethnic federalism, it wrote decentralization into its constitution and struggled to implement these changes in the context of 2000 prior years of imperial rule and one of the most ethnically diverse countries to undertake decentralization to date. And while recent events by the ruling party have undermined its attempt to strengthen the practice of ethnic federalism, Ethiopia's institutional structure is more amenable than it was when it undertook the process in 1991.

Using the foundational work of Wallace Oates, this study began by examining the theoretical effects of fiscal decentralization on local public goods provision. The theory suggested that fiscal decentralization, undertaken with proper institutions in place, increases efficiency through increased information, closer proximity, and greater accountability to constituents. This increased efficiency indicates that local governments are more likely to allocate resources toward the needs of constituents. The theory also implies that because local governments are more informed during the budget process, changes in spending have a greater, and quicker, effect on local outcomes than would spending by the central government.

Adapting Faguet's model of government sensitivity to local public good provision under decentralization to the Amhara region of Ethiopia, we built an econometric specification to measure effectiveness of local government spending over time. We also created a specification with which to measure whether or not that local spending led to different behavior among the constituency. We expected education spending, as a percent of the total budget, to be positively affected by increased primary and secondary school completion rates, and similarly by increased enrollment and literacy rates. Presuming increased BCG and DPT vaccination rates would lead to increased health spending, as a percent of the total budget, we also expected a similar positive effect from the literacy rate. In addition, we anticipated an increased incidence of diarrhea and fever among children under the age of 5 would positively affect health spending. These expectations set the stage for application of the theory to our data to see if fiscal decentralization has had an effect on local government spending patterns and local constituent behavior.

Data containing household surveys and woreda expenditures in the Amhara region of Ethiopia were used to test this theory. These tests studied how changes in local government spending affect outcomes and, somewhat tangentially, how local conditions affect future spending patterns. Using a fixed effects ordinary least squares model, this study found that DPT and BCG immunization rates—highly correlated—negatively affected both health and education spending in the future. This result could indicate that woreda level governments are listening to their constituency and increasing spending in response to a local demand for immunizations. When examined in context with the institutions in place, however, the most likely explanation is that these results reflect the level of public good provision that would have occurred regardless of voter preference—perhaps reflecting donor preference.

Using a standard ordinary least squares model to examine how changes in spending affect local outcomes gave inconclusive results. One reason for this may be the result of a time frame that was too short to observe any noticeable changes in outcomes for either of theses sectors. Another possible explanation is that the health and education sectors are not very

decentralized, or the decentralization in place is not effectively practiced. Yet another, and much more likely explanation, is that local spending is trivial compared to regional and national spending on healthcare and education. Additional studies may also include other sectors of public goods provision, such as infrastructure and public transportation.

Perhaps the most interesting result of this study is that, on balance, fiscal decentralization did not seem to have much of an effect on local outcomes or spending patterns. This is particularly surprising when examined in context with how widely fiscal decentralization is prescribed in the developing world. Ethiopia's aggregate local spending patterns did not change substantially, and when they did, were not influential in changing outcomes. Using raw spending changes instead of changes in budget share per sector could improve results in future studies. However, Ethiopia's decentralization is fairly young, its institutions are still developing, and the effects of fiscal decentralization display substantial lag time. It is likely that many of the results observed were influenced more heavily by institutional factors than by the changes in government spending. Support for this view can be seen in the 2005 elections where voter intimidation and opposition oppression was rampant.

There are many implications of fiscal decentralization theory, only a few of which were explored in this thesis. While this study used expenditures for testing purposes, the assignment of expenditure decisions in the context of fiscal decentralization was only briefly touched upon in the review of the literature. Future studies could include an examination of just where governments draw the lines between local, regional, and national provision of goods. As fiscal decentralization becomes a more prevalent policy tool, this too is likely to become a more important topic.

Appendix A

The Survey

A.1 Questionnaire

CENTRAL STATISTICAL AUTHORITY

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004 **FORM 1**

FORM 1 : ECONOMIC AND DEMOGRAPHIC CHARACTERSTICS

SECTION 1 : AREA IDENTIFICATION

1 Job ID		2 Region			3 Zone		4 Wereda		5 Town		6 Kefele Ketema /k/		7 Kebele/FA			8 EA code	9 H/H Ser.No		10 Household Size			11 Agri. Holding		12 Head of household
1	2	3	4	5		6	7	8	9		10		11	12	13	14	15		18	19		20	21	Yes=1	22	
W	0	2																						No =2		

SECTION 2 : ECONOMIC AND DEMOGRAPHIC CHARACTERSTICS (All household members)

13	14	15	16	17	18	19	20	21	22	23
	For All Household Members				From column 18 - 23 ask members aged 10 years and above					
					Marital status	was ----- engaged in productive work during the last 7 days ?	If code 2 in column 20	If code 1 in Column 19 or Column 20		
Ser. No	List of household members (Listing Order) Head, spouse, childern not married, children married, Other relatives, Domestic servant, Employed guard, Non relatives	Relation to head of household: Head =00; Spouse =01; Son /daughter of head and spouse =02; Son/daughter of head =03; Son/daughter of spouse =04; Father/mother of head/ spouse =05; Brother/Sister of head / spouse =06; Other relatives =07; Employed domestic Serva=08; Employed Guard =09; Non -relative =10	Sex: Female=2, Male=1	Age (In Completed Years)	Never married =1; Currently married =2; Divorsed =3; Separated =4; Widowed =5	Yes=1 → skip to column 21; No =2	Reason for not working: Absent from work =01; unemployed (active) =02; Unemployed (inactive) =03; Student =04; Domestic service =05; Pensioner =06; Old age =07; Illness =08; Others =09	Employment Status: Employer =01; Self employed (formal) =02; Self Employed (informal) =03; Employed, Private (formal) =04; Employed, private (informal) =05; Employed, public enterpris =06; Employed, other public organization =07; Empolyed, by NGO =08; Employed by household =09; Unpaid family worker =10; Others =11	What was your main occupation during the Last 7 days ?	Sector of Employment: main activity of the organization you mainly work for (Refer to industrial classification code)

23	24			25	26	27	28	29		30		31		32		33	34		35	36		37	38
0	1																						
0	2																						
0	3																						
0	4																						
0	5																						
0	6																						
0	7																						
0	8																						
0	9																						
1	0																						
1	1																						
1	2																						
1	3																						
1	4																						
1	5																						

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004

FORM 2 : EDUCATION

FORM 2

SECTION 1 : AREA IDENTIFICATION

1			2 Region			3 Zone			4 Wereda		5 Town		6 Kefele Ketema /k/w			7 Kebele/FA			8 EA code	9 Household s		10 Household Size			11 Agr.Holding		12 Head of household
Job ID																										
1	2	3		4	5		6	7	8	9		##		11	12	13	14	15		##	##		20	21	Yes=	22	
W	0	2																						No=2		

SECTION 2 : EDUCATIONAL STATUS (For all household members aged five years and over)

##	14	15	16	17	18	19	20	21	22	23								24	25	26	27	28	
		Can (NAME read and write ?	Does (NAM have capac to perform simple arithmetic ? (+,-,x, ÷)	Has (NAM ever attended school? (Formal education	What is the Main reason for not attendir School ? (Select from the choices below)	What is the highest grade completed ? (Refer to education code)	Has (NAME currently registered attend school ?	If code 1 in column 20										Has (NAME) registered to attend scho last year ? (formal education)	If registered last year which grade ? Refer to education code	If registered Did NAME took final exam last year?	If (NAME) took final exan last year did he/she pass the exam ?	If code 2 in column 26
	List of household members aged 5 years & over (transfer from form 1)							If currently registered which grade ? Refer to education code	What type of school is it ?	What is the main problem of the school you are attending ? If any ?												Reason for not completing ?
Serial No									Governmental =1													Need to work	=01
									Private religious fee payable =2													Too expensive Sch. fee	=02
									Private religious without fee =3	Yes=1 No =2								Yes =1 No =2				Lack of educational materials	=03
									Private non-Religious organ. =4											Yes = 1 No = 2	Yes = 1 No = 2	School Too far	=04
									Community - run =5													Deteriorated quality	=05
(transfer from Form 1)		Yes=1 No =2		Yes=1 No =2			Yes=1 No =2		Others =6													Failed in exam	=06
																						Married (formally)	=07
																						Married (forced)	=08
																						Sickness	=09
																						Pregnancy/ maternity le	=10
																						Natural calamities	=11
																						Human caused calamiti	=12
																						Belief to have acquired enough education	=13
																						Reception of lack of job after school	=14
																						Others	=15
										Shortage of books	Poor teaching Method	lack of teachers	over crowding of class	Poor / absence of facilities	Insecurity	Others							
##	24	25	26	27	##	29	30	31	32	33	34	35	##	##	##	39	##	##	42	43	44	45	46	47	##	49

Need to Work	-01	Marriage	-05	Under School age	-09
Family not willing	-02	illness	-06	To old to go to School	-10
Too Expensive	-03	Disabled	-07	Other	-11
No school arround	-04	Do not know the value of education	-08		

WELFARE MONITORING SURVEY QUESTIONNAIRE - 2004

FORM 3 : HEALTH

FORM 3

SECTION 1 : AREA IDENTIFICATION

1	2 Region	3 Zone	4 Wereda	5 Town	6 Kefele Ketema /k/w	7 Kebele/F	8 EA code	9 House Hold ser. No	10 House Hold Size	11 Agr. Holding	12 Head of household
Job ID											
1 2 3	4 5	6 7	8 9	10	11 12	13 14 15		18 19	20 21	Yes=1 22	
W 0 2										No =2	

SECTION 2: HEALTH (For all household members)

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
			If code 1 incloumn 15			If code 1 incloumn 18		If code 1 in column 20	If code 2 in column 18		For women aged 15 years and Over		For household members aged below 18 years			
Ser. No (transfer from Form 1)	List of household members	Has (NAME) faced any health problem during the last 2 months? Yes=1 No =2 → Go to col. 18	What sort of sickness/injury ? Malaria =1 Diarrhea =2 Injury =3 Dental =4 Opthalmic =5 Skin disease =6 ENT =7 Tuberclousis =8 Others =9	For how many days were you absent from your usual activity due to your health problem during the last 2 months?	Has (NAME) consulted any health instituion or traditional healer during the last 2 months? Yes=1 No =2 → Skip to Column 22	If consulted for medical assistance mainly from where ? Traditional healer =1 Hospital(gov't) =2 Health center (gov't)=3 Health clinic(gov't) =4 Health post (gov't) =5 Private health instit. =6 Mission (NGO) =7 Private health personnel =8 Pharmacy =9 Others =10	Have you realized/ faced any problem with the health Institution visited? Yes=1 No =2 → Skip to Column 23	What was the problem encountered in the health institution visited? Yes = 1 N0 = 2 Institution not hygenic / Long waiting time / Shortage of health professionals / Service charege too expensive / Shortage/unavilability of medicines / Lack of laboratory / Shortage of medical equipment / Staff not coperative / Others	Why didn't you consult health institutions/ traditional healer during the last two months ? No need to consu =1 Financial incapability =2 Expensive servic =3 Service too far =4 Inconfident with the quality level of the institution =5 Do not belive in medical treatment at all =6 Lack of qualified health personnel =7 Poor service/ equipment =8 Others =9	How many times has (NAME) consulted for Medical assistance during the last 12 months?	Has (NAME) been pregnant over the last 12 months ? Yes = 1 No = 2	If code 1 in Column 24 Has (NAME) received Pre-natal care during the last 12 months ? Yes = 1 No = 2	Is (NAME'S) father alive ? Yes =1 No =2 Don't know =3	Is father living with the household ?	Is (NAME'S) mother alive ?	Is mother living with the household?
23 24		25	26	27 28	29	30	31	32 33 34 35 36 37 38 39 40	41	42 43	44	45	46	47	48	49
0 1																
0 2																
0 3																
0 4																
0 5																
0 6																
0 7																
0 8																
0 9																
1 0																
1 1																
1 2																
1 3																
1 4																
1 5																

Form-3

Section 3 :- For Households with Orphan children

Section 4:-For ask Household having Members that were Sick for at least 3 consecuetive months

30	31	32	33	34	35	36	37	38	39	40	41	42
Orphan children under 18 years of Age (If code 2 in section2 Column 26 or column 28)					**Household members who were Sick for at least 3 consecuetive months over the last 12 months**							
						If 'Yes' in Column 35						
List of Orphan Children		Is there any free support given to the Household to help the Orphans over the last 12 Months? Yes =1 No =2	If Yes in Column 32: What type of free Support was given to the household?	If Yes in Column 32: What was the source of the free support? # Yes =1 No =2	Has any member of the Household been sick for at least 3 consecuetive months? (Exclude Injury) Yes =1 No =2 (Question ends)	List of Household members who were Sick for at least 3 consecutive months				Did the household received free support on accoun of the sick membe Yes =1 No =2 (Question ends)	If 'Yes' in Column 40: What type of free Support was given to the Household to help the member? Yes =1 No =2	If 'Yes' in Column 40: What was the source of the free support? Yes =1 No =2
Serial No.	Full Name	(Ask for each of the Childrens)				Serial No.	Full Name	Sex Female =2 Male =1	Age			
(Transfer from Form 3 Section 2 Column 13)	(Transfer from Form 3 Section 2 Column 14)	Yes =1 No =2 → Skip to Col 35	Medical treatment for the last 12 months; Councelling Service for the last 3 months; Support related to education for the Last 3 Months; Other Social Service (clothing, food, financial support,...etc)	Government; N.G.O.; Religious Institutions; HIV/AIDS related assiciations; Other social/community associations (Edir, ...); Others							Medical treatment at least once in a month during sickness; Councelling Service over the last 30 days of sickness; Social Service over the last 30 days of sickness	Government; N.G.O.; HIV/AIDS related associations; Other social/community associations (Edir, ...); Others
50	51	52	53 54 55 56 57 58 59 60 61 62		63	64	65	66	67	68	69	70 71 72 73 74 75 76 77

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004

FORM 4

FORM 4 : ANTHROPOMETRY, IMMUNIZATION AND CHILD CARE (Under 5 Children)

SECTION 1 : AREA IDENTIFICATION

1 Job ID	2 Region	3 Zone	4 Woreda	5 Town	6 Kefele Ketema Keftegna/	7 Wereda Kebele FA	8 EA Code	9 Household Ser. No	10 Household size	11 Agri. Holding	12 Head of household
1 2 3	4 5	6 7	8 9	10	11 12	13 14 15		18 19	20 21	Yes = 1 No = 2 22	
W 0 2											

SECTION 2 : ANTHROPOMETRY, IMMUNIZATION AND CHILD CARE (Children aged 00 - 59 months)

13	14	15	16	17	18	19	20	21	#	23							24	25	26		27	28		29
				From column 17 - 28 ask For children aged 00 - 59 months																				For children aged 3-59 months
				Where was	Who assisted		Is the child immunized against --------- ?												Was the	If the				
Ser. No of child	List of all children under 5 years of age	Serial No of natural mother?	How old is the child (in months)	the child born ?	during delivery ?	Do you have the Child immunization Card with you ?	Measles	BCG	DPT	Polio							How many times has the child ever taken Vit. A dozes?	Does the child participate in diet / weigh-ins program?	child sick of diarrhea, fever or cough during the last 2 weeks	child was sick of diarrhea, how did you assist the child?		Weight (in gram)		Height (in c.m.)
(Transfer from Form 1)	(Transfer from Form 1 section 2 column 13)	(Transfer from Form 1) If the mother is not member of the HH, enter 00		Hospital =1 Clinic =2 Health cente =3 Health post =4 At home =5 Other =6 Don't know =7	Medical personn =1 Delivery nurse =2 Trained TBA =3 TBA (Not Trained =4 Self assisted =5 Other =6 Don't know =7	Yes =1 Lost =2 Kept with the Health Instiiution =3 No Card at all =4	Yes =1 No =2	Yes =1 No =2	DPT 1 DPT 2 DPT 3	POLIO 0	POLIO 1	POLIO 2	POLIO 3	POLIO Camp.				Yes =1 No =2	Yes =1 No =2	Sick of Diarrhea Sick of Fever Sick of Cough	Given clinical ORS =1 Given home-made ORS =2 Given Other fluids =3 consulted modern health institution =4 Treated traditionally =5 Not assisted =6					
23 24		25 26	27 28		29	30 31	32	33	34 35 36	37	38	39	40	41		42		#	44 45 46		47 48	49 50	51 52	53 54 55

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004

FORM 5 : HOUSING AMENITIES

FORM 5

SECTION 1 : AREA IDENTIFICATION

1 Job ID	2 Region	3 Zone	4 Woreda	5 Town	6 Klfle Ketema/ Keftegna/ Wereda	7 Kebele FA	8 EA Code	9 Household Ser. No	10 Household size	11 Agri. Holding	12 Head of household
1 2 3	4 5	6 7	8 9	10	11 12	13 14 15		18 19	20 21	Yes = 1 22	
W 0 2										No = 2	

SECTION 2 : HOUSING AMENITIES

13	14	15	16	17	18	19	20	21	22
Ser. No	Does this household exist 12 months ago? Yes = 1 No = 2	How long has this household been living in this dwelling unit? Year Month	On what basis does the household occupy the dwelling unit? owned = 0; From employer (Free of charge or subsidized) = 1; From relative (Free of charge or subsidized) = 2; Rented from employer = 3; Rented from Gov't Rent Agency = 4; Rented from Kebele = 5; Rented from other NGO'S = 6; Rented from Relatives = 7; Rented from non-relative household = 8; Others = 9	How many rooms does the dwelling unit has ? (Excluding kitchen and toilets)	Main construction material of the wall ? Wood & mud =1; Wood & Grass =2; Reed & Bamboo =3; Mud & Stone =4; Cement & Stones =5; Hollow Blocks =6; Bricks =7; Others =8	Main construction material of the roof ? Corrugated iron shee =1; Thatch & Grass =2; Wood & Mud =3; Reed & bamboo =4; Clay =5; Others =6	What is the main source of light? Kerosine = 1; Electricity(Private) = 2; Electricity(shared) = 3; Firewood = 4; Candle = 5; Others (specify) =6	Was there any electric power interrupt (Lasting for more than an hour) during the past week ? Do not use electric power = 1; No interruption = 2; Only once = 3; Twice = 4; Three or more times = 5	What is the main source of cooking fuel ? Mainly collected fire wood =1; Mainly purchased fire wooc = 2; Charcoal = 3; Kerosene = 4; Butane gas = 5; Electricity = 6; Crop residue = 7; Don't use cooking fuel = 8; Other /specify/ = 9
23 24		25 26 27 28 29	30	31 32	33	34	35	36	37
0 1			Now	Now	Now	Now	Now		Now
0 2			12 months ago				12 months ago		12 months ago
0 3			5 years ago				5 years ago		5 years ago

SECTION 2 : HOUSING AMENITIES (Cont' d)

23	24	25	26	27	28	29
Ser. No	What is he main source of drinkin water in rainy season? Tap inside the house =1; Tap in compoud (private) = 2; Tap in compound (shared) = 3; Tap water outside the compound (shared = 4; Protected well/Spring = 5; unprotected well/Spring = 6; Rain water =7; River, lake, pond ... etc =8	What is the main source of drinking water in dry season ? Tap inside the house = 1; Tap in compoud (private) = 2; Tap in compound (shared) = 3; Tap water outside the compound (shared) = 4; Protected well/Spring = 5; unprotected well/Spring = 6; River, lake, pond ... etc =7	Does the Household have a habit of boiling water before drinking ? Yes = 1; No = 2	Does the household use lodated salt ? (Test the salt) Yes =1; No =2	What type of toilet facility does the household use ? Flush toilet (private) = 1; Flush toilet (shared) = 2; Pit latrine (private) = 3; Pit latrine (shared) = 4; Container (household utensils) = 5; Field /forest = 6; Others(specify) = 7	What type of waste disposal facility does the household use ? Use waste disposal vehicle/ = 1; Use container = 2; Uses dug-outs = 3; Throw away = 4; Use as fertilizer = 5; Burning the waste = 6; Others(specify) =7
38 39	40	41	42	43	44	45
0 1	Now	Now	Now	Now	Now	Now
0 2	12 months ago	12 months ago	12 months ago		12 months ago	12 months ago
0 3	5 years ago	5 years ago	5 years ago		5 years ago	5 years ago

WELFARE MONITORING SURVEY QUESTIONAIRE - 2004

FORM 6 : BASIC FACILITIES ACCESS , UTILIZATION AND SATISFACTION

FORM 6

SECTION 1 : AREA IDENTIFICATION

1 Job ID	2 Region	3 Zone	4 Woreda	5 Town	6 Klfle Ketema/ Keftegna/ Wereda	7 Kebele FA	8 EA Code	9 Household Ser. No	10 Household size	11 Agri. Holding	12 Head of household
1 2 3	4 5	6 7	8 9	10	11 12	13 14 15		18 19	20 21	Yes = 1 22	
W 0 2										No = 2	

SECTION 2 : ACCESS AND UTILIZATION OF BASIC FACILITIES

13	14	15	16	17	18	19	20
Serial No	Type of facility	How far is the nearest facility ? (if the distance is less than a k.m enter '00')	To what extent does the household use this facility ? Ask for each Do not use at all = 1 Use occasionally = 2 Use often = 3 Use always = 4	If code 1 or 2 in column 16 Main reason for non-use or occasional use of the facil Yes= 1 No = 2	If the household utilizes the service (if code 2, 3 and 4 in column 16) Are you satisfied with the service? Yes = 1 No = 2 Don't know = 3	How does the quality of the service compare with that of 12 months ago? Worse now =1 Same =2 Better now =3 Don't know =4	What mode of transport does the household mostly use to reach the nearest facility ? On foot =1 Bicycle =2 Motor cycle =3 Private car =4 Public transport =5 Office Transport =6 Animal transport =7 Others/ specify =8
		Kilo Meter / Hours / Minutes		Too far away; Too expensive; Poor service; No staff/equipment; Inadequate facilities; No need of it/not applic.; Other			
23 24		25 26 27 / 28 29 / 30 31	32	33 34 35 36 37 38 39	40	41	42
0 1	Primary school						
0 2	Secondary school						
0 3	Health post						
0 4	Clinic						
0 5	Health center						
0 6	Hospital						
0 7	prenatal/postnatal care						
0 8	Telecommunication						
0 9	postal service						
1 0	Public transport						
1 1	Milling service						
1 2	Drinking water (dry season)						
1 3	Drinking water (rainy season)						
1 4	Food market						
1 5	All weather road						
1 6	Dry weather road						
1 7	Agricultural extension service						
1 8	Veternary service						
1 9	Fertilizer provider						
2 0	Improved seeds provider						
2 1	Pesticides/Herbicides/Insecticides provider						
2 2	Police station						
2 3	Primary court						
2 4	Micro finance						
2 5	Source of fire wood						

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004 **FORM 7**

FORM 7: ASSET OWNERSHIP

SECTION 1 : AREA IDENTIFICATION

1 Job ID			2 Region			3 Zone		4 Woreda		5 Town		6 Kefetegna Wereda (K/ Ketema)			7 Kebele FA			8 EA Code			9 Household Sr. No		10 Household Size		11 Agri. holding		12 Head of household
1	2	3	4	5		6	7	8	9	10		11	12	13	14	15				18	19	20	21	Yes = 1	22	
W	0	2																						No = 2		

SECTION 2: OWNERSHIP OF LAND, DWELLINGS AND OTHER BUILDINGS

13	14	15	16	17	#	19										20										21
						If code 1 in column 17																				
Serial Number	Does this household exist 12 months ago? Yes = 1 No = 2	Does any member of the household (including the head of the household) own dwellings or other buildings ? Yes = 1 No = 2 → skip to column 17	How many dwellings or other buildings are owned in all ?	Does any member of the household (including the head of the household) own any land holding ? Yes = 1 No = 2	How many plots / piece of land does the household own ?	Total area of the land										How does the size of land / plots compare to the amount 12 months ago/ 5 years ago? Less now =1 Same now =2 More now = 3 Don't know = 4										
						In local unit						In standard unit														
						Name	Code	Area				Name	Code		Area											
23	24	25	26	27 28	29	30 31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46					
0	1		Now	Now	Now	Now	Now														Now					
0	2		12 months ago	12 months ago	12 months ago	12 months ago															12 months ago					
0	3		5 years ago	5 years ago	5 years ago	5 years ago															5 years ago					

SECTION 2: OWNERSHIP OF LAND, DWELLINGS AND OTHER BUILDINGS (Cont'd)

22	23	24	25	26
	If code 2, 3, and 4 in column 22			
How does the household use land it does not own ? Do not use = 1 Rented = 2 Share cropped = 3 Rent free = 4 Others = 5	How many plots / piece of land that is not does the household owned use that it doesn't own ?	How does the size of land/plots that is not owned by the household compare with the amount 12 months ago ? Less now = 1 Same now = 2 More now = 3 Don' t know = 4	Total area of the land	
			In local unit	In standard unit
			Name Code Area	Name Code Area
47	48 49	50	51 52 53 54 55 56	57 58 59 60 61 62 63 64
Now	Now	Now	Now	
12 months ago	12 months ago			
5 years ago	5 years ago			

FORM 7

FORM 7: ASSET OWNERSHIP

SECTION 3: OWNERSHIP OF OTHER HOUSEHOLD ASSET

27		28	29		30				31	
Serial Number		Household assets	Does the household currently own _____ ? Yes = 1 No = 2 Go to col.31 Not applicable =3		If yes in column 29 How many does the household own ?				How does the amount currently owned compare with 12 months ago ? More now =1 Same now =2 Less now =3 Not applicable = 4	
65	66			67		68	69	70		71
0	1	Cattle								
0	2	Ploughing animals								
0	3	Pack-animals								
0	4	Equine animals								
0	5	Sheep and goats								
0	6	Poultry/chicken								
0	7	'Mofer & Kember'								
0	8	Sickle/ 'Mecha'								
0	9	Axe/ 'Gejera'								
1	0	Pick axe/ 'Geso'								
1	1	Plough								
1	2	Stoves /Gas,electric/								
1	3	Blanket/"Gabi"								
1	4	Mattersses and/or beds								
1	5	Watches or clocks								
1	6	Iron (electric or charcol)								
1	7	Telephone(Landline/Mobile/								
1	8	Radio								
1	9	Television								
2	0	Video deck								
2	1	Sofa set								
2	2	Table and chair								
2	3	Bicycle								
2	4	Cart								
2	5	Sewing machine								
2	6	Loom								
2	7	Refrigrator								
2	8	Car (Private or commercial)								
2	9	Jewellery (Gold/Silver)								

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004

FORM 8: SELECTED INDICATORS OF HOUSEHOLDS LIVING CONDITIONS

FORM 8

SECTION 1 : AREA IDENTIFICATION

Job ID	2 Region	Zone	4 Woreda	5 Town	6 Kefetegna	7 Kebele FA	8 EA Code	9 Household Sr. No	10 Household Size	11 Agri. holding	12 Head of household
1 3	4 5	6 7	8 9	#	11 12	13 14 15		18 19	20 21	Yes = 1 22	
W 2										No = 2	

SECTION 2: INDICATORS OF HOUSEHOLDS LIVING CONDITIONS

13	14	15	16	17	18	19	20	21	22	23	24	25	
Serial Number	Has this household suffered food shortage during the last 12 months? Yes=1 No=2	If Yes in Column 14 For how many months has this household suffered food shortage during the last # months? (If less than one month enter 00)	How is this household's current living standard with respect to food compared with 12 months ago ? Much worse =1 Worse now =2 Same =3 A little better now =4 Much better now =5	How is this household's current living standard with respect to clothing compare with 12 months ago ? Much worse =1 Worse now =2 Same =3 A little better now =4 Much better now =5	How is the overall living standared of the household compare with 12 months ago? Much worse =1 Worse now =2 Same =3 A little better now =4 Much better now =5	How is the overall living standared of the community compare with 12 months ago ? Much worse =1 Worse now =2 Same =3 A little better now =4 Much better now =5 Don't know =6	For how many months do you think your current year crop production lasts in subsisting the household ?	Is the household capable to raise 100 Birr within a week time incase of any emergency emergency need? Yes = No =	If "yes" in column 21 How would the household obtain the 100 Birr? Sale of animals/products=01 Sale of crops =02 Sale of forest products=03 Own cash =04 Withdrawal from Bank/Saving =05 Equb' =06 Edir' =07 Loan from Bank or other institutions =08 Loan from Relatives =09 Gift from Relatives =10 Loan from non-relatives=11 Gift from non-relatives=12 Sale of household assets =13 Sale of personal items (Jewelleries , etc.) 14 Others (specify) 15	What is the main source of income of the household ? (In cash or in kind)	Major Shocks During the last 12 months Yes = 1 No = 2	If code 1 in column 24 How did the household cope with the shock ? Yes = 1 No = 2	How many times does this household experienced the Major Shock over the last 5 years? (Ask for each of the Specified Major Shock In Col. 24)
23	25	26 27	#	29 #	31	32	33 34	#	34 36	37 38		39 40 41 42 43 44 45	46 47
0													

Major Shocks During the last 12 months	Yes=1	No =2	Food aid	Sale of livestock and livestock products	Sale of other agricultural products	Sale of household assets	From own cash	Other (Specify)
Death of household member								
illness of huosehold member								
Loss of job of household member								
Food shortage								
Draught								
Flood								
Crop damage								
Loss / death of livestock								
Price shock								
Other (Specify)								

Codes for column 23 :

From own agricultural enterprise	=01	Collected free (wood,Water, ...etc)	=07	Income from house rent	=13
From household enterprise other than agriculture	=02	Wages salaries,bounes,overtime and allowances	=08	Income from rent other than house rent	=14
Gift and remittance received from gov. organization	=03	Pension and other social security benefits	=09	From Sale of household fixed assets and personal care goods	=15
Gift and remittance received from NGOs	=04	From saving (Bank and other, saving account)	=10	Other current transfers	=16
Gift and remittance received from households/individuals	=05	Interests and royalties received	=11		
Gift and remittance received from abroad	=06	Dividends	=12		

WELFARE MONITORING SURVEY QUESTIONNAIRE 2004

Form-9

FORM 9: HIV/ AIDS RELATED INDICATORS

SECTION 1 : AREA IDENTIFICATION

1 Job ID			2 Region		3 Zone		4 Woreda		5 Town		6 Kefetegna		7 Kebele FA			8.EA Code	9 Household Sr. No		10 Household Size		11 Agri. holding		12 Head of household
1	2	3		4		6	7	8	9	10		11	12	13	14	15		18	19	20	21	Yes = 1	22	
W	0	2																				No = 2		

SECTION 2: HIV/AIDS (ALL HOUSEHOLDS)

13	14	15				16	17							18			19	20	
Serial Number	DO You know the existence of HIV/AIDS? Yes=1 No=2 (End Questions)	If Yes in COL.14 Do you know HIV/AIDS Transmisson ways? Yes =1 No =2				Did you realize any person (sick / dead) of HIV/AIDS in your village during the last twelve months? Yes =1 No =2 I don't Know =3 Not willing to answer =4	If 'yes' in Column 16 Would you please specify the number of persons whom you think were Sick /Dead of HIV/AIDS in your Village during the last 12 Months?							Which HIV/AIDS Protection Methods do you know ? Yes =1 No =2 Not willing to Answer =3			If yes in Column 18 Have you ever used any of the protection methods in the last twelve months ? Yes =1 No =2 Not willing to Answer=3	If code1 (Yes) in Col 19 To what extent did you use the protection methods ? Always =1 Most of the time =2 Some times =3 (Please ask for each of the method stated below)	
		Sexual Intercourse	Blood	Mother to Child			Age	Sick Male		Sick Female		Dead Male		Dead Female		Being Faithfull	Absteinance	Using Condom				
23	24	25	26	27	28	29		30	31	32	33	34	35	36	37	38	39	40		41		42
0	1						Below age 15														Being Faithfull	
0	2						15-64														Absteinance	
0	3						65 and above														Condom	

Appendix B

Regression Tables for Specification 1

Table B.1: Fixed Effects Results for Health and Education spending: condensed individual regressions

	(1) % Health spending	(2) % Clinic spending	(3) % Malaria spending	(4) % Education spending	(5) % Primary Educ spending	(6) % Secondary Educ spending
primary school	-0.0143	0.00978	0.00172**	-0.0206	0.00724	-0.0263***
	(-0.89)	(0.89)	(2.20)	(-1.45)	(0.50)	(-4.15)
enrollment rate	-0.00585	0.00481	0.000517	-0.0114*	0.000308	-0.00764*
	(-0.71)	(0.82)	(1.65)	(-1.66)	(0.04)	(-1.96)
secondary school	-0.0355	0.0276	0.00136	-0.0285	0.0178	-0.0427*
	(-0.68)	(1.05)	(0.73)	(-0.68)	(0.59)	(-1.69)
diarrhea & fever	0.00301	0.00158	-0.000577	0.00696	0.00479	0.00351
	(0.53)	(0.37)	(-1.33)	(1.39)	(0.88)	(1.08)
BCG vaccination	-0.0118***	-0.00653**	-0.000354	0.00123	-0.000990	0.000394
	(-3.03)	(-2.22)	(-1.30)	(0.34)	(-0.26)	(0.17)
DPT vaccination	-0.0145***	-0.00824**	-0.000366	-0.00174	-0.00265	-0.000100
	(-3.36)	(-2.42)	(-1.14)	(-0.43)	(-0.61)	(-0.04)
literacy rate	-0.0182	0.00423	0.000574	-0.00777	0.00946	-0.0149***
	(-1.53)	(0.53)	(0.95)	(-0.78)	(1.06)	(-2.76)
toilet access	-0.0100	0.0133**	0.000349	-0.00211	0.00523	-0.00869
	(-0.72)	(2.27)	(0.65)	(-0.20)	(0.74)	(-1.20)
drinking water access	-0.00514	-0.00134	-0.000254	0.0000293	0.00331	-0.00170
	(-1.22)	(-0.56)	(-1.18)	(0.01)	(1.04)	(-0.94)
N	240	240	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.2: Fixed Effects Results for Health spending: individual regressions

	(1) % Health spending	(2) % Health spending	(3) % Health spending	(4) % Health spending	(5) % Health spending
time	0.000788	0.00525***	0.00598***	0.00207*	0.00351**
	(0.40)	(2.98)	(3.21)	(1.70)	(2.27)
diarrhea & fever	0.00301				
	(0.53)				
BCG vaccination		-0.0118***			
		(-3.03)			
DPT vaccination			-0.0145***		
			(-3.36)		
toilet access				-0.0100	
				(-0.72)	
drinking water access					-0.00514
					(-1.22)
constant	0.0955***	0.0955***	0.0955***	0.0955***	0.0955***
	(26.90)	(27.86)	(28.04)	(27.02)	(27.26)
N	240	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.3: Fixed Effects Results for Health Clinic spending: individual regressions

	(1) % Clinic spending	(2) % Clinic spending	(3) % Clinic spending	(4) % Clinic spending	(5) % Clinic spending
time	0.00199	0.00443***	0.00489***	0.00189**	0.00293**
	(1.44)	(3.38)	(3.50)	(2.26)	(2.18)
diarrhea & fever	0.00158				
	(0.37)				
BCG vaccination		-0.00653**			
		(-2.22)			
DPT vaccination			-0.00824**		
			(-2.42)		
toilet access				0.0133**	
				(2.27)	
drinking water access					-0.00134
					(-0.56)
constant	0.0569***	0.0569***	0.0569***	0.0569***	0.0569***
	(24.25)	(24.97)	(25.08)	(24.35)	(24.28)
N	240	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.4: Fixed Effects Results for Malaria spending: individual regressions

	(1) % Malaria spending	(2) % Malaria spending	(3) % Malaria spending	(4) % Malaria spending	(5) % Malaria spending
time	-0.0000188	-0.0000777	-0.0000768	-0.000200**	-0.0000940
	(-0.16)	(-0.81)	(-0.78)	(-2.19)	(-0.86)
diarrhea & fever	-0.000577				
	(-1.33)				
BCG vaccination		-0.000354			
		(-1.30)			
DPT vaccination			-0.000366		
			(-1.14)		
toilet access				0.000349	
				(0.65)	
drinking water access					-0.000254
					(-1.18)
constant	0.00196***	0.00196***	0.00196***	0.00196***	0.00196***
	(8.76)	(8.72)	(8.71)	(8.67)	(8.70)
N	240	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.5: Fixed Effects Results for Education spending: individual regressions

	(1) % Education spending	(2) % Education spending	(3) % Education spending	(4) % Education spending
time	-0.00267	-0.00279*	-0.00397***	-0.00308
	(-1.61)	(-1.94)	(-3.37)	(-1.57)
primary school	-0.0206			
	(-1.45)			
enrollment rate		-0.0114*		
		(-1.66)		
secondary school			-0.0285	
			(-0.68)	
literacy rate				-0.00777
				(-0.78)
constant	0.523***	0.523***	0.523***	0.523***
	(174.83)	(174.75)	(172.25)	(172.94)
N	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.6: Fixed Effects Results for Primary Education spending: individual regressions

	(1) % Primary Education spending	(2) % Primary Education spending	(3) % Primary Education spending	(4) % Primary Education spending
time	-0.00375**	-0.00319**	-0.00340***	-0.00472**
	(-2.21)	(-2.08)	(-2.66)	(-2.54)
primary school	0.00724			
	(0.50)			
enrollment rate		0.000308		
		(0.04)		
secondary school			0.0178	
			(0.59)	
literacy rate				0.00946
				(1.06)
constant	0.387***	0.387***	0.387***	0.387***
	(112.44)	(112.46)	(112.60)	(112.69)
N	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.7: Fixed Effects Results for Secondary Education spending: individual regressions

	(1) % Secondary Education spending	(2) % Secondary Education spending	(3) % Secondary Education spending	(4) % Secondary Education spending
time	0.00410***	0.00299***	0.00253***	0.00440***
	(5.42)	(3.91)	(3.93)	(4.53)
primary school	-0.0263***			
	(-4.15)			
enrollment rate		-0.00764*		
		(-1.96)		
secondary school			-0.0427*	
			(-1.69)	
literacy rate				-0.0149***
				(-2.76)
constant	0.0771***	0.0771***	0.0771***	0.0771***
	(52.56)	(50.56)	(50.43)	(51.54)
N	240	240	240	240

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix C

Regression Tables for Specification 2

Table C.1: Percent change outcome (00-04) vs. percent change expenditure (98-00) and static 2000 HH char.

	(1) %Δ BCG vaccination	(2) %Δ DPT vaccination	(3) %Δ Diarrhea & fever	(4) %Δ Toilet access	(5) %Δ Water rainy season	(6) %Δ Water dry season	(7) %Δ Literacy rate	(8) %Δ Enrollment rate
Δ % Health spending	0.00959	0.00279	0.0155	-0.0126	0.00810	0.0261		
	(0.73)	(0.21)	(0.66)	(-0.14)	(0.30)	(0.33)		
enrollment rate	-0.963	-1.176*	-0.166	-1.934	-2.708*	-5.199		
	(-1.46)	(-1.72)	(-0.14)	(-0.21)	(-1.99)	(-1.24)		
literacy rate	-0.450	0.212	-0.0880	-3.454	4.149*	-0.254		
	(-0.45)	(0.20)	(-0.05)	(-0.37)	(2.00)	(-0.04)		
hh size	0.315**	0.300**	0.398	3.562*	-0.643**	0.0933	0.0276	0.452
	(2.26)	(2.08)	(1.57)	(1.86)	(-2.23)	(0.10)	(0.10)	(1.16)
marital status	0.0543	0.0934	-0.430	3.867	-1.237	9.358	1.170	2.996
	(0.05)	(0.09)	(-0.24)	(0.29)	(-0.60)	(1.38)	(0.62)	(1.09)
employment	0.718	0.664	2.016	-1.757	-2.794*	2.552	-2.062	6.453***
	(1.04)	(0.93)	(1.61)	(-0.27)	(-1.96)	(0.59)	(-1.50)	(3.23)
Δ % Educ spending							6.228**	-4.119
							(2.04)	(-0.93)
constant	-1.550	-1.482	-2.847	-14.40	6.079***	-5.500	1.569	-7.329***
	(-1.50)	(-1.39)	(-1.52)	(-1.40)	(2.85)	(-0.75)	(0.88)	(-2.84)
N	60	60	59	18	60	58	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.2: Percent change outcome (00-04) vs. static 00 expenditure and percent change in HH char (00-04)

	(1) %Δ BCG vaccination	(2) %Δ DPT vaccination	(3) %Δ Diarrhea & fever	(4) %Δ Toilet access	(5) %Δ Water rainy season	(6) %Δ Water dry season	(7) %Δ Literacy rate	(8) %Δ Enrollment rate
% Health spending 2000	-0.508	0.356	5.737	5.047	-2.693	-2.010		
	(-0.27)	(0.19)	(1.64)	(0.36)	(-0.68)	(-0.17)		
Δ enrollment rate	0.0617	0.103**	0.0180	1.609	0.0975	0.456		
	(1.41)	(2.31)	(0.22)	(1.61)	(1.06)	(1.65)		
Δ literacy rate	0.111	0.0725	-0.0961	1.483*	-0.0882	-0.0611		
	(1.65)	(1.05)	(-0.75)	(2.13)	(-0.62)	(-0.14)		
Δ hh size	-0.747	-0.699	-0.307	-13.45***	2.903***	6.509*	0.544	-2.282
	(-1.55)	(-1.42)	(-0.34)	(-3.36)	(2.86)	(1.95)	(0.54)	(-1.54)
Δ marital status	-0.248	-0.211	-0.298	2.301	0.583	-0.778	0.223	-1.085
	(-0.71)	(-0.59)	(-0.45)	(0.73)	(0.79)	(-0.34)	(0.31)	(-1.03)
Δ employment status	-0.287	-0.237	0.248	-1.519	0.909	2.786	-0.253	-2.102**
	(-0.91)	(-0.74)	(0.42)	(-0.80)	(1.37)	(1.39)	(-0.39)	(-2.22)
% Education spending 2000							0.203	-2.495
							(0.09)	(-0.76)
constant	-0.0484	-0.110	-0.429	-1.318	0.838*	0.872	0.849	2.041
	(-0.24)	(-0.54)	(-1.14)	(-0.95)	(1.98)	(0.68)	(0.74)	(1.21)
N	60	60	59	18	60	58	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.3: Percent change outcome (00-04) vs. static 00 expenditure and static 00 HH char.

	(1) %Δ BCG vaccination	(2) %Δ DPT vaccination	(3) %Δ Diarrhea & fever	(4) %Δ Toilet access	(5) %Δ Water rainy season	(6) %Δ Water dry season	(7) %Δ Literacy rate	(8) %Δ Enrollment rate
% Health spending 2000	-0.866	0.275	5.463	29.06*	0.299	2.480		
	(-0.45)	(0.14)	(1.61)	(1.95)	(0.08)	(0.21)		
enrollment rate 2000	-0.898	-1.151*	0.0290	-4.598	-2.641*	-4.975		
	(-1.37)	(-1.71)	(0.02)	(-0.61)	(-1.96)	(-1.20)		
literacy rate 2000	-0.700	0.237	0.780	1.158	4.129*	0.00432		
	(-0.66)	(0.22)	(0.42)	(0.14)	(1.89)	(0.00)		
hh size 2000	0.291**	0.292**	0.349	3.964**	-0.665**	0.0158	0.00707	0.472
	(2.14)	(2.09)	(1.45)	(2.92)	(-2.38)	(0.02)	(0.03)	(1.18)
marital status 2000	0.112	0.165	0.385	2.909	-1.082	9.967	0.500	3.436
	(0.11)	(0.16)	(0.22)	(0.28)	(-0.52)	(1.47)	(0.26)	(1.25)
employment status 2000	0.634	0.629	1.746	-3.144	-2.886**	2.218	-0.891	5.685***
	(0.93)	(0.90)	(1.45)	(-0.58)	(-2.06)	(0.52)	(-0.69)	(3.11)
% Education spending 2000							0.148	-0.410
							(0.07)	(-0.13)
constant	-1.294	-1.500	-3.638*	-17.77*	6.115***	-5.590	1.177	-6.940**
	(-1.20)	(-1.35)	(-1.90)	(-2.01)	(2.75)	(-0.75)	(0.57)	(-2.40)
N	60	60	59	18	60	58	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.4: Static 04 outcomes vs. percent change in expenditure (98-00) and percent change in HH characteristics (00-04)

	(1) 2004 BCG vaccination	(2) 2004 DPT vaccination	(3) 2004 Diarrhea & fever	(4) 2004 toilet access	(5) 2004 water wet season	(6) 2004 water dry season	(7) 2004 literacy rate	(8) 2004 enrollment rate
%Δ Health spending	-0.00400	-0.00511	0.000382	-0.00162	0.00302	0.00238		
	(-0.84)	(-0.96)	(0.12)	(-0.53)	(0.65)	(0.52)		
%Δ enrollment rate	-0.0204	-0.0106	-0.0137	-0.00819	0.000321	0.00269		
	(-1.21)	(-0.57)	(-1.24)	(-0.76)	(0.02)	(0.16)		
%Δ literacy rate	0.0523**	0.0551*	-0.0236	0.0532***	0.0119	0.00456		
	(2.10)	(1.99)	(-1.45)	(3.33)	(0.49)	(0.19)		
%Δ hh size	-0.346*	-0.213	-0.0693	-0.348***	-0.850***	-0.580***	-0.105	-0.127
	(-1.80)	(-0.99)	(-0.55)	(-2.82)	(-4.52)	(-3.12)	(-1.04)	(-0.99)
%Δ marital status	0.0355	-0.0999	-0.00667	-0.141	0.157	0.147	-0.0554	-0.207**
	(0.26)	(-0.66)	(-0.08)	(-1.63)	(1.19)	(1.13)	(-0.74)	(-2.19)
%Δ employment status	-0.185	-0.0898	0.00184	-0.0403	-0.118	-0.160	-0.154**	-0.187**
	(-1.53)	(-0.67)	(0.02)	(-0.52)	(-1.00)	(-1.38)	(-2.35)	(-2.25)
%Δ Educ spending							-0.222	-0.0717
							(-0.74)	(-0.19)
constant	0.512***	0.546***	0.297***	0.0469*	0.679***	0.716***	0.259***	0.381***
	(14.03)	(13.46)	(12.44)	(2.00)	(19.06)	(20.34)	(17.98)	(20.78)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.5: Static 04 outcomes vs. percent change in expenditure (98-00) and static 2000 HH char.

	(1) 2004 BCG vaccination	(2) 2004 DPT vaccination	(3) 2004 Diarrhea & fever	(4) 2004 toilet access	(5) 2004 water wet season	(6) 2004 water dry season	(7) 2004 literacy rate	(8) 2004 enrollment rate
%Δ Health spending	-0.00399	-0.00482	0.000615	-0.00134	0.00215	0.00244		
	(-0.77)	(-0.85)	(0.19)	(-0.37)	(0.45)	(0.49)		
enrollment rate 2000	0.306	0.223	-0.0233	0.235	0.0342	0.296		
	(1.18)	(0.78)	(-0.14)	(1.28)	(0.14)	(1.18)		
literacy rate 2000	-0.120	0.143	0.0701	0.160	0.549	0.567		
	(-0.30)	(0.33)	(0.28)	(0.57)	(1.48)	(1.49)		
hh size 2000	0.0650	0.0456	0.0444	0.0668*	0.128**	0.185***	0.0463	0.0465
	(1.18)	(0.75)	(1.27)	(1.72)	(2.48)	(3.50)	(1.56)	(1.17)
marital status 2000	-0.200	0.198	-0.0803	0.192	-0.338	-0.177	-0.0123	0.0152
	(-0.51)	(0.46)	(-0.32)	(0.69)	(-0.92)	(-0.47)	(-0.06)	(0.05)
employment status 2000	0.355	0.126	-0.115	0.157	0.198	0.403	0.0395	0.0526
	(1.30)	(0.42)	(-0.66)	(0.82)	(0.77)	(1.54)	(0.26)	(0.26)
%Δ Educ spending							-0.113	-0.0433
							(-0.34)	(-0.10)
constant	0.0627	0.109	0.182	-0.507*	0.113	-0.483	0.0389	0.143
	(0.15)	(0.24)	(0.70)	(-1.76)	(0.30)	(-1.24)	(0.20)	(0.54)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.6: Static 04 outcomes vs. static 00 expenditure and static 00 HH character

	(1) 2004 BCG vaccination	(2) 2004 DPT vaccination	(3) 2004 Diarrhea & fever	(4) 2004 toilet access	(5) 2004 water wet season	(6) 2004 water dry season	(7) 2004 literacy rate	(8) 2004 enrollment rate
2000 Health spending	0.0192	0.706	0.646	0.259	-0.402	0.207		
	(0.03)	(0.85)	(1.37)	(0.49)	(-0.57)	(0.29)		
enrollment rate 2000	0.276	0.194	-0.0108	0.228	0.0462	0.317		
	(1.06)	(0.68)	(-0.07)	(1.26)	(0.19)	(1.28)		
literacy rate 2000	-0.0791	0.319	0.184	0.220	0.455	0.583		
	(-0.19)	(0.69)	(0.70)	(0.75)	(1.16)	(1.45)		
hh size 2000	0.0754	0.0573	0.0419	0.0700*	0.123**	0.178***	0.0358	0.0380
	(1.41)	(0.97)	(1.26)	(1.86)	(2.46)	(3.48)	(1.25)	(0.96)
marital status 2000	-0.259	0.197	-0.00388	0.198	-0.347	-0.118	0.00714	0.0257
	(-0.66)	(0.45)	(-0.02)	(0.71)	(-0.94)	(-0.31)	(0.04)	(0.09)
employment status 2000	0.397	0.163	-0.134	0.166	0.183	0.373	0.00780	0.0361
	(1.48)	(0.55)	(-0.80)	(0.88)	(0.73)	(1.45)	(0.06)	(0.20)
Education spending 2000							0.536**	0.428
							(2.43)	(1.40)
constant	0.0159	-0.0668	0.0762	-0.567*	0.207	-0.493	-0.179	-0.0338
	(0.04)	(-0.14)	(0.29)	(-1.90)	(0.52)	(-1.21)	(-0.86)	(-0.12)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.7: Differences in outcomes (00-04) vs. differences in spending (98-00) and differences in HH characteristics (00-04)

	(1) BCG vaccination	(2) DPT vaccination	(3) Diarrhea & fever	(4) Toilet access	(5) Water access wet season	(6) Water access dry season	(7) Literacy rate	(8) Enrollment rate
Health spending	0.000000159	9.22e-08	-1.08e-09	0.000000184	-0.000000193	-0.000000202		
	(0.56)	(0.32)	(-0.01)	(1.43)	(-0.68)	(-0.65)		
enrollment rate	0.168	0.326	0.0311	0.103	-0.0606	0.147		
	(0.71)	(1.36)	(0.20)	(0.95)	(-0.26)	(0.57)		
literacy rate	0.349	0.330	-0.0549	0.625***	0.509	0.220		
	(1.08)	(1.02)	(-0.26)	(4.28)	(1.59)	(0.63)		
hh size	-0.0788	-0.0709	-0.00833	-0.0833***	0.0454	0.115**	-0.00912	-0.0262
	(-1.55)	(-1.39)	(-0.25)	(-3.62)	(0.90)	(2.09)	(-0.40)	(-0.87)
marital status	-0.102	-0.0798	0.0170	-0.0527	0.0472	0.0616	-0.0767	-0.590***
	(-0.31)	(-0.24)	(0.08)	(-0.36)	(0.15)	(0.17)	(-0.57)	(-3.29)
employment status	0.0181	0.0436	0.0610	0.0353	0.333	0.188	-0.111	-0.285**
	(0.08)	(0.18)	(0.39)	(0.33)	(1.42)	(0.73)	(-1.07)	(-2.06)
Education spending							1.36e-08	0.000000240*
							(0.13)	(1.68)
constant	-0.0840*	-0.0785	-0.0354	-0.0185	0.0590	0.0774	0.0972***	0.0425
	(-1.68)	(-1.57)	(-1.07)	(-0.82)	(1.19)	(1.43)	(3.30)	(1.09)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.8: Differences in outcomes (00-04) vs. differences in spending (98-00) and static 2000 HH char.

	(1) BCG vaccination	(2) DPT vaccination	(3) Diarrhea & fever	(4) Toilet access	(5) Water access wet season	(6) Water access dry season	(7) Literacy rate	(8) Enrollment rate
Health spending	3.03e-08	-6.22e-08	2.06e-08	0.000000117	-0.000000151	-0.000000177		
	(0.11)	(-0.22)	(0.11)	(0.70)	(-0.53)	(-0.57)		
enrollment rate	-0.305	-0.417	0.132	0.196	-0.197	-0.437		
	(-0.98)	(-1.32)	(0.65)	(1.06)	(-0.62)	(-1.27)		
literacy rate	-0.555	-0.290	-0.176	0.152	0.0824	0.315		
	(-1.17)	(-0.60)	(-0.57)	(0.54)	(0.17)	(0.60)		
hh size	0.103	0.0927	0.0457	0.0863**	-0.0232	-0.0968	0.0356	0.0540
	(1.58)	(1.40)	(1.09)	(2.23)	(-0.35)	(-1.34)	(1.20)	(1.27)
marital status	0.348	0.397	-0.0998	0.148	-0.0833	-0.0142	0.0395	0.467
	(0.75)	(0.84)	(-0.33)	(0.53)	(-0.18)	(-0.03)	(0.19)	(1.58)
employment status	0.233	0.279	0.354*	0.192	-0.540	-0.448	-0.0405	0.368*
	(0.72)	(0.85)	(1.70)	(1.01)	(-1.64)	(-1.25)	(-0.29)	(1.83)
Education spending							3.47e-08	0.000000224
							(0.32)	(1.42)
constant	-0.659	-0.664	-0.448	-0.607**	0.652	0.919*	-0.0550	-0.688**
	(-1.35)	(-1.34)	(-1.42)	(-2.09)	(1.31)	(1.69)	(-0.28)	(-2.45)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.9: Differences in outcomes (00-04) vs. static 00 spending and static 00 HH char.

	(1) BCG vaccination	(2) DPT vaccination	(3) Diarrhea & fever	(4) Toilet access	(5) Water access wet season	(6) Water access dry season	(7) Literacy rate	(8) Enrollment rate
2000 Health	-0.320	0.284	0.937	0.327	-0.227	-0.769		
spending	(-0.35)	(0.31)	(1.64)	(0.61)	(-0.24)	(-0.77)		
enrollment	-0.311	-0.409	0.141	0.192	-0.189	-0.433		
rate	(-1.00)	(-1.30)	(0.72)	(1.04)	(-0.60)	(-1.26)		
literacy	-0.615	-0.235	-0.00281	0.209	0.0459	0.179		
rate	(-1.23)	(-0.46)	(-0.01)	(0.70)	(0.09)	(0.32)		
hh size	0.102	0.0946	0.0438	0.0816**	-0.0175	-0.0894	0.0287	0.0421
	(1.59)	(1.45)	(1.08)	(2.14)	(-0.27)	(-1.26)	(0.98)	(0.98)
marital	0.318	0.419	-0.000120	0.196	-0.125	-0.115	0.0420	0.461
status	(0.67)	(0.87)	(-0.00)	(0.69)	(-0.26)	(-0.22)	(0.21)	(1.56)
employment	0.239	0.274	0.335	0.184	-0.533	-0.429	-0.0391	0.408**
status	(0.74)	(0.84)	(1.65)	(0.96)	(-1.62)	(-1.20)	(-0.29)	(2.07)
2000 Education							0.328	0.485
spending							(1.44)	(1.46)
constant	-0.597	-0.726	-0.608*	-0.643**	0.664	1.021*	-0.187	-0.856***
	(-1.17)	(-1.40)	(-1.88)	(-2.11)	(1.27)	(1.80)	(-0.88)	(-2.75)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C.10: Differences in outcomes (00-04) vs. static 00 spending and differences in HH characteristics (00-04)

	(1) BCG vaccination	(2) DPT vaccination	(3) Diarrhea & fever	(4) Toilet access	(5) Water access wet season	(6) Water access dry season	(7) Literacy rate	(8) Enrollment rate
2000 Health spending	-0.0308	0.356	1.007*	-0.0545	-0.844	-1.284		
	(-0.03)	(0.40)	(1.74)	(-0.13)	(-0.95)	(-1.34)		
enrollment rate	0.157	0.313	0.0139	0.0898	-0.0318	0.184		
	(0.66)	(1.31)	(0.09)	(0.82)	(-0.14)	(0.72)		
literacy rate	0.351	0.310	-0.110	0.628***	0.555*	0.290		
	(1.07)	(0.95)	(-0.52)	(4.17)	(1.72)	(0.83)		
hh size	-0.0729	-0.0676	-0.00866	-0.0764***	0.0385	0.108**	-0.00478	-0.0202
	(-1.46)	(-1.36)	(-0.27)	(-3.33)	(0.78)	(2.03)	(-0.21)	(-0.65)
marital status	-0.127	-0.123	-0.0607	-0.0804	0.146	0.196	-0.0755	-0.596***
	(-0.38)	(-0.37)	(-0.28)	(-0.53)	(0.45)	(0.55)	(-0.57)	(-3.27)
employment status	0.0232	0.0222	-0.00456	0.0425	0.384	0.268	-0.0847	-0.271*
	(0.10)	(0.09)	(-0.03)	(0.38)	(1.60)	(1.03)	(-0.81)	(-1.89)
2000 Education spending							0.307	0.316
							(1.32)	(1.00)
constant	-0.0705	-0.108	-0.136**	-0.000967	0.131	0.193*	-0.0558	-0.0629
	(-0.70)	(-1.07)	(-2.09)	(-0.02)	(1.31)	(1.78)	(-0.47)	(-0.39)
N	60	60	60	60	60	60	60	60

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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