Decentralization and Corruption: A Model of Interjurisdictional Competition and Weakened Accountability

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Decentralization and Corruption: A Model of Interjurisdictional Competition and Weakened Accountability

A thesis submitted in partial fulfillment of the requirement for the degree of Bachelors of Arts in Economics from The College of William and Mary

by

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Accepted for HONORS
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Williamsburg, VA
May 4, 2009
Abstract

Decentralization has the potential to lower corruption and alleviate poverty across the world. The true effects of this process are unclear since there are relatively few studies on decentralization and many of these studies, both theoretical and empirical, give conflicting results. One major problem in the literature for the effects of decentralization on corruption has been sample selection bias. The main cross-country dataset for decentralization, the IMF’s *Government Finance Statistics* (GFS), has data for only about 40 countries, and most of these are developed. I attempt to mitigate this sample-selection problem by first estimating a Heckman model for decentralization in order to predict values for unobserved countries and then using these predicted values to estimate decentralization’s impact on corruption. My results show that decentralization has an insignificant effect on corruption, suggesting that decentralization alone may not be a useful tool for mitigating corruption.

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1 Decentralization is the process of giving local governments more fiscal, political, or administrative autonomy.
2 I would like to thank Prof. Abegaz for being my Honors Thesis Adviser as well as getting introducing me to the topic of decentralization by being his Research Assistant during the Summer of 2007. I would also like to thank Prof. Pickering and Prof. McInerney for being on my honors committee, Casey Metheny at the Writing Resource Center for helping me edit my paper, and the Charles Center for awarding me a scholarship for the Summer of 2008 so I could start my honors research.
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1. Introduction

1.1 Overview of Decentralization, Corruption, and Economic Growth

Economic development has been shown to be the only way in history to save people from widespread poverty and discontent, as it empowers citizens economically as well as politically (CGD 2008 p.1). Unfortunately, many countries have failed to achieve the goal of sustained economic growth and countless people have suffered terribly because of it. Seeking to explain why some countries succeed in growth and why some fall short, the Commission on Growth and Development lists the following five general characteristics of economies that have achieved high levels of sustained growth in the postwar period:

1. They fully exploited the world economy
2. They maintained macroeconomic stability
3. They mustered high rates of saving and investment
4. They let markets allocate resources
5. They had committed, credible, and capable governments
   (CGD, 2008, p.21)

Of these characteristics, the one that can be most affected by only a few people is the fifth characteristic: governance. The concept of governance encompasses how power is exercised and by whom. Poor governance undermines civic and business groups, which can in turn lead to even worse governance as these members of civil society are ill-equipped to provide a proper check on governments. Because of this chain of events, it is no surprise that poverty and bad governance are highly correlated. This potential vicious cycle makes promoting better governance a vital goal for citizens as well as the international community. My interest in the fifth dimension of growth stems from these considerations.

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3 CGD: Commission on Growth and Development. I also take economic development as a concept that encompasses both economic growth and structural changes in the country.
Even though the quality of governance varies drastically from country to country, almost all political leaders say that they are committed to economic growth for their country. Sometimes, leaders back up these words with effective action. Singapore, for example, has made growth the centerpiece of its policies for the past 40 years. It promotes high levels of savings and investment through a mandatory savings program called the Central Provident Fund (GCD, 2008 p. 26). The government also spends almost 20% of its budget on education, which has helped the country acquire a highly skilled workforce (Singapore Budget 2009). These governmental policies have contributed to Singapore’s average annual GDP growth rate of 7% between 1967 and 2002 (CGD, 2008 p. 20).

Unfortunately, the commitment to economic growth is frequently just lip service and is undermined by the desire for political stability, ignorance of economic principals, or self-seeking interests of the people in power. Often country leaders care more about political stability, which can become endangered by economic reforms that are unpopular in the short run. This phenomenon is most easily seen in protectionist policies that are usually favored by ordinary citizens but despised by economists. Sometimes, ignorance contributes to poor policy. Robert Mugabe, the president of Zimbabwe, has devastated his country with intense hyperinflation and food shortages due to his distaste for “bookish economics” (The Economist July 11th 2007). But other times, governments hinder growth when politicians and bureaucrats engage in purely self-seeking behavior and use their position to further enhance their own wealth and power. This practice is more commonly known as corruption. Mauro (1995) estimates that a one standard deviation

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4 When “corruption” is used by itself, I mean specifically “political corruption” rather than corruption in general which includes corruption of the private sector.
increase in a corruption index lowers investment by three percent and decreases annual GDP growth by one percent (cited in World Bank 2007).

As for why corruption undermines economic development, one of the most well-known costs of corruption is the creation of inefficient markets. In such markets, unnecessary fees and bribes are needed to obtain government services, which often are received by people with more money and connections rather than the ones who need the services the most. Rose-Ackerman (1999) describes corruption as “[Resulting] in an arbitrary and unfair pattern of payments” and “[favoring] haves and have nots…[leading] to less equitable income distribution” (p.3-16). There are some theories that state a market based on bribes can actually be more efficient because government services are often provided for above or under market price, thus bribes can help the market reach equilibrium in some circumstances. However, bribes rarely provide this improvement and often result in even more inefficiencies (Mark Philip p. 400 in Williams, 2000; Rose-Ackerman, 1999).

Other ways in which corruption can undermine economic growth are by discouraging foreign direct investment, hindering the entry of new firms into the market, and contributing to an uncertain business environment. Corruption also encourages too much unproductive investment and under-maintenance of past investments (Rose-Ackerman 1999). The loss of revenue and inefficient use of government money often force governments to raise taxes, which is yet another way corruption can undermine economic growth (Oskar Kurer in Jain 2001, p.66). Overall, one of the biggest problems with corruption is that it appears to be self-perpetuating, so the tolerance of corruption in
one agency can create a vicious cycle of corruption, spreading to other areas of the public sector, further exacerbating its harmful effects on development.

The means by which corruption undermines economic growth are fairly well established. The ways to prevent corruption, however, are less clear and more disputed. Some methods Rose-Ackerman (1999) suggests are the elimination of corruption-laden programs, privatization, reform of public programs, administrative reform, anticorruption laws, and improvement of the efficiency of government purchasing decisions. Williams (2000. p.128) suggests that economic progress and the adoption of Western legal standards can also reduce corruption. Finally, the writers of the World Bank’s *World Development Report 1997* advocate increasing judicial independence and effectiveness, streamlining laws to make them more understandable to an ordinary citizen rather than just officials, strengthening citizen check groups, and dividing the government horizontally as well as vertically as additional means for the international community to help make governments across the world more honest and efficient.5

Of these methods, one process that has not been studied in depth in the literature is the vertical division of the public sector, also known as decentralization. Because this method has not been fully analyzed, it is unclear whether decentralization tends to reduce or increase corruption. This is unfortunate since decentralization, though it is unlikely to be a panacea for corruption, has the potential to reduce rent-seeking behavior and thereby promote economic growth. Because so many people are negatively affected by poor governance and underdevelopment, it is paramount that all possible tools for combating

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5 By vertical division I mean the division of the government and its responsibilities into multiple layers. By the horizontal division of government I mean the division of one layer of government into multiple parts, such as with the incorporation of more towns and cities.
corruption are fully explored. The rest of this paper will focus on decentralization as one such tool that has the potential to improve the lives of people across the world.

1.2 Definitions

In order to further analyze decentralization and its effects on political corruption, it is important to realize that decentralization is a multidimensional concept. Much of the decentralization literature divides decentralization into three categories. Von Braun and Grote (2000) define the three types as follows:

- **Political (electoral) decentralization** gives citizens and their local representatives more power in any type of decision making, including setting standards and legal frameworks.
- **Administrative decentralization** re-distributes authority, responsibility and resources among different levels of government. Suitable capacities and institutional strength at all tiers are preconditions for the effectiveness of this type.
- **Fiscal decentralization** entails the definition of authority over raising revenues or access to transfers and making decisions on current and investment expenditures (p. 3).

In other words, political decentralization entails giving citizens more voting rights at the local level, administrative decentralization encompasses dividing the government bureaucracy into multiple parts, and fiscal decentralization involves giving more money to local governments and granting them more responsible for the government’s expenditures. Because I define decentralization to be only the shifting of responsibilities and money within the public sector, privatization is not included in this conceptualization since it reflects a different type of process. Of the three dimensions, fiscal decentralization is the form that has been studied most frequently in the literature. Fiscal decentralization is also referred to as fiscal federalism. Fiscal federalism has received special attention in taxation analysis, such as the Leviathan hypothesis by Brennan and Buchanan (1980). This theory states that fiscal decentralization should create
competition in tax rates between localities, thereby lowering the overall size of the public sector. When decentralization is applied to corruption, all three of its forms may affect corruption in different ways, thus they all deserve attention for possible inclusion in theoretical and empirical models.\(^6\)

To define political corruption, I will use Transparency International’s (TI’s) definition, “the abuse of public office for private gain.” This includes various forms of corruption such as bribery, kickbacks, embezzlement, patronage, nepotism, and some forms of gift giving. There are other definitions proposed by various scholars, but TI’s definition appears to capture the view of corruption that is predominant in the literature. Precisely defining corruption is inherently difficult because the idea of what corruption is has become entangled with public opinion and cultural perceptions. The concept of what is “normal” government is also unclear. As Paul Heywood (1997) states, “It would be impossible to develop one generalizable and uncontested definition of political corruption…[because] as Mark Hilip indicates…any definition of political corruption presupposes a notion of ‘uncorrupt’ politics.”

Other researchers and institutions have other classifications of the types of corruption, but some of these categories are more concerned with different degrees of corruption rather than different forms. Namibia’s Zero Tolerance for Corruption Campaign, for example, lists petty corruption and grand corruption, the former being corruption on a smaller scale and the latter on a larger scale.\(^7\) Grand corruption is just a higher degree of corruption which would lead to a worse score from TI. Therefore, decentralization should affect both petty and grand corruption. Shleifer and Vishny

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\(^6\) However, as I will mention later, I do not include indicators for administrative and political decentralization in my model due to data constraints.

\(^7\) Information received from their website.
(1993) also provide two classifications of corruption: organized, in which services are more guaranteed, and disorganized (or inefficient), in which there is uncertainty after a bribe is offered. However, the idea of corruption being efficient is not very well-founded since it is by nature secretive and undercuts information available to citizens, which should lead to inefficiency. Therefore, Shleifer and Vishny’s idea of efficient corruption may not exist in reality.

When discussing the specific forms of corruption, some can be analyzed together since they are the same in principle. Bribery and kickbacks, for example, are effectively the same form. Bribery is a citizen giving a politician money with the expectation of a service at that time or in the future, while a kickback is when a government official performs a government service for a citizen with the expectation that this person will give him or her money in the future. Therefore, their only difference is when the payment is given to the government official. Patronage, nepotism, and cronyism are also the same in practice since they all encompass awarding positions through connections rather than merit. These three forms of corruption also include power preservation practices such as voter manipulation.

Though some types of corruption are found specifically in the private sector, the corruption definition in this paper refers specifically to political corruption and does not include corruption that is found only within the private sector. Decentralization should not directly affect corruption in the private sector since this process focuses on reform of the public sector. Though these two broad forms of corruption are probably highly correlated, since public corruption often involves interaction with the private sector, it is
important to focus solely on public corruption in this paper because of decentralization’s more limited focus.

1.3. Literature Review

While the concepts of corruption and decentralization are fairly clear, the relationship between the two is theoretically ambiguous and the empirical research is still inconclusive. Even though research is limited, a few case studies and cross-national studies have been conducted that offer some insight into the corruption-decentralization relationship. In a series of case studies, Wade (1982, 1997) argues that over-centralization is responsible for corruption in India’s irrigation bureaucracy. Fisman and Gaetti (2002b) found that states in the United States with larger federal transfers were associated with having more government officials who were prosecuted for corruption. In the Philippines, decentralization was part of a 1991 reform package that included greater democratic representation at the lower level. Although corruption was lower after these reforms, it is unclear if the improvements can necessarily be attributed to decentralization (Azfar and Gurgur 2000, as cited by Joaquin 2004).

Dillinger and Webb (1999) found that decentralization in Colombia has created enormous fiscal problems by creating unsustainable fiscal deficits for both the national and subnational governments. Decentralization has also been unable to mitigate corruption in the country caused by drug cartels. While the authors believe that decentralization has prevented corruption from getting any worse, at the same time, it has been unsuccessful in solving this political problem along with many others that continue to plague the country, such as guerilla warfare.
Russia is also a good country for studying decentralization, since local governments became more powerful after the collapse of the USSR. Treisman and Cai (2004) performed a case study on an oil company called Tatneft that was prosecuted by Moscow for tax evasion but was able to minimize its penalties through its connections in Tatarstan, its republic of origin in Russia. In an empirical study on Russia, Freinkman and Plekhanov (2009) found that regions with rent-seeking governments were associated with greater centralization. Although decentralization can be connected with changes in corruption for many case studies on this topic, there does not appear to be a specific country that has carried out a decentralization program with the intent of reducing corruption. This limits the possible benefits that could result from analyzing decentralization and corruption at the national level, since the lack of an exogenous change in decentralization makes causal conclusions harder to draw.

From a cross-national perspective, a consensus on decentralization’s effect on corruption has not yet emerged in the literature. Some studies have found that decentralization was associated with lower rates of corruption. Using simple Pearson’s correlation coefficients, Huther and Shah (1998) found that decentralization lowered corruption. However, these unconditional correlations do not control for other variables that happen to be associated with decentralization. Fisman and Gatti (2002a) also found that decentralization decreased corruption using OLS and a country’s legal origin as an instrument. However, La Porta et al. (1999) suggest that a country’s legal origin affects a country’s level of corruption directly, which is an issue even Fisman and Gaitti acknowledge undermines the validity of their instrument. Additionally, Arikan (2004) reached similar conclusions, but with much weaker results. Arikan’s variable for
decentralization was significant in an OLS regression but insignificant in a 2SLS regression that used land mass as an instrument, thus undermining the robustness of his results. Other studies which have found that decentralization decreases corruption are Wade (1997) and studies cited by Joaquin (2004) such as Bardhan and Mookherjee (2001), De Dios and Ferrer (2000), and Watt et al. (1999).

In contrast, other researchers have found decentralization to be associated with a higher rate of corruption. Treisman (2000), in an empirical study that encompassed many other potential determinants of corruption, found that federal systems, which are typically more decentralized, had greater levels of corruption. Goldsmith (1999), in a more narrow study, also found that federal states had higher rates of corruption. Treisman (2002) found that countries with more tiers of government and smaller local jurisdictions had higher perceived rates of corruption in a study that included many less commonly used variables for measuring decentralization, such as whether a country’s constitution gives subnational governments the exclusive right to legislate in one policy area. Other empirical studies cited in Joaquin (2004) which suggest that decentralization increases corruption are Doing (1999), Klitgaard et al. (2000), and Mendoza (2000).

2. Theoretical Model and Hypotheses

Before a statistical estimation can be carried out, a proper theoretical model needs to be developed. First, to put such a model in the broader context of governance and economic development, consider the following flow charts:
Chart 1: Centralized Economy

Economic Growth & Welfare

Households & Private Sector

Taxes, Accountability

Public Goods

Central Government

Revenue, Oversight

Local Government

Taxes, Accountability

Public Goods

Revenue, Oversight
Chart 2: Decentralized Economy

Note: Bolder arrows indicate strengthened connections as the result of decentralization.
These charts are meant to portray how households and the private sector interact with two different levels of government. In these general models, the governments provide public goods to residents and business in exchange for tax revenue. Because citizens want their tax money to be spent efficiently, they hold the governments accountable when they have the ability to do so. The two levels of government also monitor each other’s actions for possible abuse of power. The first chart represents a more centralized economy while the second represents a more decentralized economy with a larger local government.

To illustrate the effect of decentralization, the arrows in bold in the second diagram represent a theorized strengthened connection as the result of decentralization. Initially, the decentralization process allows citizens to hold the local government more accountable. Because the local governments face the incentive to be more efficient, they in turn provide more public goods. In addition to the power received by the citizens, the local government is able to provide a better check on the national government. This in turn makes the central government more efficient and prevents it from decreasing its output of public goods, even though less tax revenue is going to the central government as the result of decentralization. Since households and business will overall receive a greater amount of public goods, this will in turn create greater levels of economic growth and development as portrayed by the larger box at the top of the diagram.

2.1. A Model of Decentralization and Corruption

The flow charts shown above rest on the assumption that decentralization will create greater opportunities for citizens to hold the government accountable. However, this assumption may not be true. Heterogeneity between countries is very difficult to
model, so the chain of events described above in the flowcharts may apply only to a subset of countries. To explore this issue in more detail, consider a model inspired by Arikan (2004), who shows that decentralization lowers corruption and increases the output of public goods using a model based on the tax competition literature. In this model, Arikan (2004) uses the number of jurisdictions as an indicator of decentralization and assumes that each jurisdiction has the same number of residents as well as that the economy has perfect capital mobility. In my model, on the other hand, I leave out capital entirely and use the mobility of utility-maximizing residents instead to model how decentralization affects corruption. My model, like many others, represents a simplified world that does not completely reflect reality. Unfortunately, I need to rely on some strong assumptions, such as perfect income equality as well as identical tax rates throughout the economy. My model is also more reflective of developed countries, in which property is more marketable and mobility between jurisdictions is higher. Because of this, it is unclear how easily the results of this model can be extended to developing countries. Nevertheless, it should provide a useful benchmark for evaluating how decentralization affects corruption, which can then be elaborated upon in an empirical setting.

To set up the model, suppose that there exists a closed economy with J jurisdictions, each with its own corruption rate. Let there be two types of jurisdictions, urban and rural. The urban jurisdictions provide better goods and services to their residents, so utility is naturally higher in these localities. $h(\lambda)$ will denote a function representing the difference between urban and rural jurisdictions. Each locality i has $n_i$ residents. The total population of residents $N$ is fixed, where $N=\sum n_i$. All residents have
an identical income I. A jurisdiction’s tax revenue $R_i$ comes solely from its residents and each family is taxed a proportion of their income at a rate $T$, where the tax rate is uniform across the economy. From the tax revenue, a fraction $D$ goes to the subnational governments and $1-D$ goes to the national government. Thus, $D$ represents the level of fiscal decentralization in an economy and is the key variable for this model. From these variables, I derive the total tax revenue for each jurisdiction and the central government as follows:

1. \[ R_i = n_i DT_i \]
2. \[ R_c = N(1-D)TI \]

The $i$ subscript represents a particular locality and the $c$ subscript represents the central government. Assume that the government is entirely self-interested and that each jurisdiction uses a fraction $P_i$ of $R_i$ for the production of public goods and a fraction $1-P_i$ for its own private benefit where $0 \leq P_i \leq 1$. Therefore, $1-P_i$ represents the corruption rate, a key variable for this model. Let $E_i$ be the expenditure on public goods and $C_i$ signify corruption income. These assumptions yield the following equations:

3. \[ E_i = P_i R_i \]
4. \[ E_c = P_c R_c \]
5. \[ C_i = (1-P_i) R_i \]
6. \[ C_c = (1-P_c) R_c \]

Next, let the production of the public goods be determined by a function $f(E_i)$ such that $f(1) > 0$ and $f(2) < 0$, implying that allocating more money to expenditures allows for greater production of public goods but with diminishing marginal returns. The output
of the public good is divided equally between all residents, forming the amount of public goods per resident \( Z_i \), yielding the following equations:

(7) \[ Z_i = f(E_i)/n_i \]

for subnational governments and

(8) \[ Z_c = f(E_c)/N \]

for the national government.

For simplicity, I assume that \( Z_i \) is homogenous, where all units provide the same amount of utility for each residents of the economy, holding the quantity of such goods constant. Finally, let each resident have a utility function that is determined by three factors: their consumption of public goods \( Z_i + Z_c \), their after tax income \((1-T)I\), and whether they are in an urban or rural jurisdiction. These components yield the following utility function:

(9) \[ U_i = g(Z_i + Z_c, (1-T)I, h(\lambda_i)) \]

where the utility function \( U_i \) is concave with diminishing marginal returns. For algebraic ease, I assume that \( n_i \) is a continuous variable.\(^8\) I assume that residents move throughout the economy until their utility cannot be increased by moving into another jurisdiction. Therefore, in equilibrium:

(10) \[ U_i = U_k \quad \forall i, k \] where \( U_i \) and \( U_k \) represent the utility of residents in jurisdictions \( i \) and \( k \) respectively.

The equation above implies that residents will move to another jurisdiction whenever their utility can increase, even if the increase is minimal. This would happen if there is no cost to moving. However, if there are restrictions on labor mobility, then these

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\(^8\) If \( n_i \) is large this assumption should not be too restrictive. Also, a resident can be thought of as a family unit where one spouse works in a different jurisdiction from the other, allowing \( n_i \) to take on non-integer values.
constraints should be included in the model. To improve the model, instead of letting equation (10) represent true utility equality, let $U_i$ represent a resident’s current utility and $U_k$ represent the same resident’s utility if they move to a different jurisdiction $k$. In addition, I incorporate a function $L(\phi)$ into the utility equations to capture limited labor mobility. Since $L(\phi)$ encompasses the loss in utility from moving, the values of this function should be such that $L(\phi)=0$ for $U_i$ and $L(\phi)<0$ for $U_k$. $L(\phi)$ could also vary across jurisdictions. For example, the cost of moving may be less in urban jurisdictions where residents might not own property and have fewer communal ties. This implies that residents will move to different jurisdictions as long as the gain in utility from moving to a new jurisdiction outweighs the cost of moving there. Therefore, the utility function described in (9) becomes

$$(11) \quad U_i = g(Z_i + Z_c(1-T)I, h(\lambda), L(\phi))$$

while (10) is left unchanged but now represents an equilibrium where residents move until the gains from moving to a different jurisdiction equal the cost endured for leaving their current jurisdiction.

From (10), the number of residents in each jurisdiction can be derived, making it possible to formulate an equation for the total level of corruption revenue in an economy, $\sum C_i + C_c$. Partial derivatives can be taken from this equation to calculate how the variables listed above affect the level of corruption in an economy. The main variable of interest is $D$, the level of fiscal decentralization in an economy. When $D$ increases, citizens in a very corrupt jurisdiction will have more of their taxes go to the locality which uses their money less efficiently. Thus, an increase in $D$ should increase the incentive for these residents to move to a less corrupt jurisdiction. This phenomenon of
competition between different local governments is called interjurisdictional competition and is a main focus of this paper. An increase in interjurisdictional competition should help to lower overall corruption.

In addition to $D$, the variable $J$ represents administrative decentralization. When $J$ increases, citizens have more opportunities to move to less corrupt localities. To understand how this variable also encompasses the concept of interjurisdictional competition, consider a simple economy with two jurisdictions, one that is very corrupt and another that is not. In this economy, not every resident would move to the less corrupt locality because, eventually, the less corrupt government would not be able to provide services more efficiently due to the production of public goods being subject to the law of diminishing marginal returns. However, if another locality was created that had corruption levels just as low as the previously mentioned locality, then some of the residents from the corruption jurisdiction who did not move before could then relocate to this new jurisdiction for a gain in utility.\(^9\)

The concept of interjurisdictional competition represents how decentralization can lower corruption. However, $1-P_i$ may increase with decentralization if there is weaker accountability for lower levels of government.\(^10\) Since $D$ and $J$ represent forms of decentralization, the equation to represent weakened accountability is as followed:

\[
(12) \quad P_i = p(D, J) \text{ where } \frac{\partial P_i}{\partial D} \leq 0 \text{ and } \frac{\partial P_i}{\partial J} \leq 0
\]

This function is the result of the fact that citizens may be less able to monitor corruption effectively in a more decentralized economy, because instead of checking on corruption

\(^9\) However, due to data availability issues discussed later, hypotheses surrounding $J$ can not be tested as easily, thus the rest of the model will focus of $D$.

\(^10\) The justification for why accountability may be weaker in subnational governments is discussed in more detail in the hypothesis section.
for just one level of government, citizens have to monitor the corruption of additional levels of government with many more jurisdictions.\textsuperscript{11} This implies that there could be asymmetric information in decentralization, with the governments knowing more about the level of corruption than their residents. Equation (11) is reflective of this phenomenon. For example, consider an increase in D and J where \( D_0 < D_1 \) and \( J_0 < J_1 \). \( D_1 \) and \( J_1 \) represent the characteristics of an economy after it has been more decentralized. From equation (12), we have \( P_{0i} = p(D_0, J_0) \) and \( P_{1i} = p(D_1, J_1) \). Because of asymmetric information, the true decrease in \( P_i \) is not perceived. Thus, from the perspective of the residents, \( P_{0i} = P_{1i} \) even though in reality \( P_{1i} < P_{0i} \). This allows for the governments to decrease \( P_i \) without causing its residents to move away.

Finally, this setup allows for a theoretical derivation of how decentralization affects corruption. Assuming the functions \( f(E_i) \) and \( U_i \) take specific forms, an analytical expression for \( \sum C_i + C_c \) can be formulated. From this expression, the partial derivatives of D can show how fiscal decentralization effects corruption, given certain parameter values.

\textbf{2.2 Analysis with Specific Functions and Values}

Because of these conflicting factors of interjurisdictional competition and weakened accountability, the sign of \( \partial (\sum C_i + C_c)/\partial D \) remains unclear and needs to be explored further. To derive an equation for \( \partial (\sum C_i + C_c)/\partial D \), consider the case where \( P_i = p_i - \beta D - \gamma J \), and \( U_i = (Z_i + Z_c)^\alpha((1-T)I)^{1-\alpha} \), in which \( U_i \) is the typical Cobb-Douglas production function, \( 0 \leq \beta \leq 1 \), and \( 0 \leq \gamma \leq 1 \). Let \( i=1 \) if the jurisdiction is rural and \( i=2 \) if the jurisdiction is urban. Also assume that \( Z_i = \sqrt{E_i + n_1 L_1}/n_1 \) and

\textsuperscript{11} Further explanation and justification of this assumption is described in the next section
\[ Z_2 = \sqrt{E_2 + n_2\Omega + n_2L_2}/n_2, \] where \( \Omega > 0 \). \( n_2\Omega \) represent \( h(\lambda) \), the additional utility received from living in an urban locality, integrated into \( Z_2 \). \( n_2\Omega \) exhibits a networking effect in which additional residents create additional economic opportunities in the locality.\(^{12}\)

In addition, \( n_1L_1 \) and \( n_2L_2 \) represent the function \( L(\varphi) \) for restrictions on labor mobility due to costs incurred from moving to different jurisdictions. Since there are only two types of jurisdictions, only the residents from one type of locality will be moving, depending on which jurisdiction originally provides the greater level of utility for its residents. Therefore, based on the nature of \( L(\varphi) \) as discussed earlier, \( L_1=0 \) and \( L_2<0 \) if \( U_1 \) is originally greater than \( U_2 \), and if \( U_1 \) is originally less than \( U_2 \), \( L_1<0 \) and \( L_2=0 \). The cost of labor mobility is proportional to the number of residents to represent how the cost of moving would be greater if the resident was giving up a larger social network from his or her current jurisdiction. For simplicity, let \( J \) be even and there be an equal number of rural jurisdictions as there are urban, yielding

\[ (13) \quad N = (n_1 + n_2)(J/2) \leftrightarrow n_2 = (2N-Jn_1)/J \]

where \( n_2 \) is expressed in terms of \( n_1 \) in order to determine the number of residents in each locality at equilibrium. Next, for output from each jurisdiction, the equation is as follows:

\[ (14) \quad Z_1 = \sqrt{p_1 - \beta D - \gamma J \cdot DTI/n_1 + L_1} \]

\[ (15) \quad Z_2 = \sqrt{p_2 - \beta D - \gamma J \cdot DTII/(2N-Jn_1)+\Omega+L_2} \]

And since \( U_1=U_2 \) in equilibrium:

\[ (16) \quad (Z_1 + Z_2)^\alpha((1-T)I)^{\alpha-1} = (Z_2 + Z_2)^\alpha((1-T)I)^{\alpha-1} \leftrightarrow Z_1 = Z_2 \]

\(^{12}\) \( Z_i \) is also in this form to facilitate algebraic tractability later in the model.
The equations above show that the differences in utility across jurisdictions are determined solely by the differences in \( Z_1 \) and \( Z_2 \). Setting \( Z_1 = Z_2 \) and using (14) and (15) yield:

\[
(17) \quad \sqrt{(p_1 - \beta D - \gamma J) \frac{DTI}{n_1 + L_1}} = \sqrt{(p_2 - \beta D - \gamma J) \frac{DTIJ}{2N - Jn_1 + \Omega + L_2}}
\]

Since the number of residents in each jurisdiction at equilibrium is the current variable of interest, solving the above equation, (17), for \( n_1 \) yields:

\[
(18) \quad n_1 = \frac{2(p_1 - \beta D - \gamma J) \frac{DTIN}{DTIJ(p_1 + p_2 - 2\beta D - 2\gamma J) + \Omega + L_2 - L_1}}
\]

Now that \( n_1 \) is solved for, the next step is to determine the level of corruption at equilibrium. The total amount of corruption income in a country, \( \sum C_i + C_c \), is just the sum of corruption income from all the subnational governments plus the national government. The level of corruption in the rural jurisdictions is

\[
(20) \quad C_1 = (1 - p_1 + \beta D + \gamma J) \frac{DTI(J(p_1 - \beta D - \gamma J) \frac{DTIN}{DTIJ(p_1 + p_2 - 2\beta D - 2\gamma J) + \Omega + L_2 - L_1}}
\]

and corruption in the urban jurisdictions is

\[
(21) \quad C_2 = (1 - p_2 + \beta D + \gamma J) \frac{DTI(N - (J(p_1 - \beta D - \gamma J) \frac{DTIN}{DTIJ(p_1 + p_2 - 2\beta D - 2\gamma J) + \Omega + L_2 - L_1}}
\]

and the corruption revenue from the central government is

\[
(22) \quad C_c = (1 - p_c + \beta D + \gamma J)(1 - D) \frac{DTIN}{DTIJ(p_1 + p_2 - 2\beta D - 2\gamma J) + \Omega + L_2 - L_1})
\]

Thus, the total corruption for the economy is

\[
(23) \quad \sum C_i + C_c = (1 - p_1 + \beta D + \gamma J) \frac{DTI(J(p_1 - \beta D - \gamma J) \frac{DTIN}{DTIJ(p_1 + p_2 - 2\beta D - 2\gamma J) + \Omega + L_2 - L_1}} + (1 - p_2 + \beta D + \gamma J) \frac{DTI(N - (J(p_1 - \beta D - \gamma J) \frac{DTIN}{DTIJ(p_1 + p_2 - 2\beta D - 2\gamma J) + \Omega + L_2 - L_1}} + (1 - p_c + \beta D + \gamma J)(1 - D) \frac{DTIN}{}}
\]
Finally, the above equation can be used to calculate partial derivatives and see how certain variables effect corruption. Unfortunately, the variable of interest, D, has a very complicated partial derivative. Assigning the following numerical values to some of the variables simplifies the model:

\[ N = 30,000,000 \text{ (average population per country)} \]
\[ J = 3,000 \text{ (number of counties in the United States)} \]
\[ I = 10,000 \text{ (World GDP/Capita)} \]
\[ \gamma = 0 \text{ (for simplification)} \]
\[ T = .25 \text{ (a typical tax rate)} \]
\[ P_c = .3 \text{ (for simplification)} \]

The use of these numbers yields the following partial derivative:

\[
\frac{\partial}{\partial D} \left( \sum C_1 + C_2 + C_c \right) = \frac{(5.625 \times 10^{17} D^2((\Omega + L_2 - L_1) + L_2 - L_1)(p_2 - 2p_1 + \beta D) - (1.5 \times 10^7 \beta D^2(\beta D - 2p_1) + 7.5 \times 10^6(p_1 + p_2 - 2\beta D))^2}{((\Omega + L_2 - L_1) + 7.5 \times 10^6(p_1 + p_2)(p_1 - p_2))(\Omega + L_2 - L_1) + 7.5 \times 10^6(p_1 + p_2)(p_1 - p_2))}
\]

The sign of which is solely determined by the numerator. If \( \Omega + L_2 - L_1 \) is relatively small, then \( \frac{\partial}{\partial D} \left( \sum C_1 + C_2 + C_c \right) > 0 \) when \((1.5 \times 10^7 \beta D^2(\beta D - 2p_1) + 7.5 \times 10^6(p_1 + p_2)(p_1 - p_2)) < 0 \). The sign of the latter expression remains unclear. If \( \beta D / 2 < p_1 < p_2 \) then \( \frac{\partial}{\partial D} \left( \sum C_1 + C_2 + C_c \right) > 0 \), but if \( \beta D / 2 > p_1 > p_2 \) then \( \frac{\partial}{\partial D} \left( \sum C_1 + C_2 + C_c \right) < 0 \). \( \beta D / 2 < p_1 < p_2 \) would occur if urban jurisdictions had a lower initial propensity for corruption than rural jurisdictions and the effects of weakened accountability were relatively small. On the other hand, \( \beta D / 2 > p_1 > p_2 \) would occur if rural jurisdictions had a lower initial propensity for

---

13 These are approximate values, rounded to ease computation
corruption than urban jurisdictions and the effects of weakened accountability were relatively large.

In summary, the effects of fiscal decentralization on corruption remain unclear from a theoretical perspective. In certain cases, increasing fiscal decentralization can be shown to lower corruption for an economy via interjurisdictional competition, but in others cases, the effects of fiscal decentralization remain ambiguous at best. This model suggests that the net impact of fiscal decentralization on corruption is ultimately an empirical question.

2.3. Hypotheses

To put the model described above in a more qualitative perspective, interjurisdictional competition, which is increased by decentralization, works by ultimately awarding less corrupt localities with more residents and revenue. At first, when the subnational share of government expenditures increases because of decentralization, this indicates that local governments are providing more of the proportion of government services to their residents. Because of this, a citizen that moves between localities will see a bigger difference in the government services they receive than they would have under a more centralized system. This is important because corrupt governments tend to provide services less efficiently, such as with bribes being needed for government services. Thus, if one locality is more corrupt than the other jurisdictions, residents will tend to move away from this corrupt locality to another one where their utility will be greater. Since local governments would want more residents for a larger tax base, decentralization can create competition to lower corruption.
It is important to note that since cities and provinces are geographically closer and are more culturally homogenous than countries, residents cannot move between countries as easily. Therefore, if a country is corrupt, many citizens cannot emigrate because of labor mobility restrictions due to these factors. At the subnational level, on the other hand, residents can be much more mobile. Because of this, the theory of interjurisdictional competition is more accurately applied to heterogeneous localities in a decentralized country rather than to many countries at the international level.

The theory of interjurisdictional competition originated with Tiebout (1956), whose model showed that decentralization leads to greater variety in the provision of public goods, allowing citizens to find the jurisdiction that offers the best bundle of government services for themselves and causing the overall level of utility in a country to increase. Since Tiebout’s paper was published, the idea of interjurisdictional competition has been applied to the corruption literature, where citizens are assumed to prefer less corrupt jurisdictions. However, Bardhan (2002) questions how well this model can be applied to corruption. Bardhan criticizes Tiebout’s model for its reliance on some particularly strong assumptions such as perfect mobility and information of residents, conditions that often do not hold, particularly for less developed countries. In my model, I relax the perfect information and mobility conditions, but I still rely on other assumptions such as income equality. As a result, it is left to empirical models to test whether or not the assumptions in Tiebout’s model, along with similar models, detract from their real-world predictive power (Treisman 2000; Fisman and Gatti 2002a).

On the other hand, fiscal decentralization could also increase corruption by weakening accountability, as pointed out by Fisman and Gatti (2002a). For example, it
may be much easier for citizens and the media to monitor one central government than many additional levels of government with multiple jurisdictions. Not only does decentralization increase the number of entities to monitor, it could be unclear which level of government is corrupt if there is a diffusion of responsibilities and blame. Therefore, increasing decentralization may result in residents losing information on how corrupt the governments are, thus allowing for more corruption. Similarly, Persson and Tabellini (2000) point out that national offices are often more prestigious and powerful, from which they hypothesize that monitoring of corruption is greater at the national level since the media and public may deem this level of government more worthy of attention (cited in Fisman and Gatti 2002a).

The effect of weakened accountability in decentralization would most naturally be assessed by the number of tiers or jurisdictions of government, a measurement of administrative decentralization. However, this theory can also be applied to fiscal decentralization. Even if there are multiple tiers of governments, if most of the government services are provided by the central government, then citizens know that the central government is still the one to be monitored most carefully. However, as more and more of government expenditures are handled by the local governments, then which tier to hold accountable for inefficient delivery of public services may become less clear. Therefore, indicators of fiscal decentralization can also be used to test the hypothesis of weakened accountability.

In addition to my two main theories of interjurisdictional competition and weakened accountability described previously, there are other ways decentralization can affect corruption. Fiscal decentralization could lower corruption through checks and
balances, as proposed by Treisman (2002). As he describes, when there are additional levels of government with significant responsibilities, one level may be able to monitor and prosecute another for corruption, particularly if doing so could be self-advantageous. On the other hand, fiscal decentralization could increase corruption because local officials may be easier to influence since they often have lower salaries and their services are more specialized, thus they might be easier to target. Wolfinger (1974) emphasizes this point, saying that “decentralized political systems are more corruptible, because the potential corrupter needs to influence only a segment of the government, and because in a fragmented system there are fewer centralized forces and agencies to enforce honesty” (quoted in Treisman 2002, p.11). Similarly, Arikan (2004) argues that the stronger personal links allowed by a decentralized system between government official and special interests may reverse any positive effects of the process.

In addition to fiscal decentralization, administrative decentralization also affects corruption but in a way that is very similar to its fiscal counterpart. Both of these forms of decentralization reflect division of the government into multiple parts, thus these forms should have more or less the same effect on corruption. Therefore, the same hypotheses used for fiscal decentralization can also be applied to administrative decentralization, although certain hypotheses may be more reflective of one form than the other. The number of tiers of government may be a more direct way of testing the hypothesis of checks and balances, for example, but fiscal decentralization may show how much power the lower levels have to check the national government. Similar logic can be applied to the other hypotheses to show how both fiscal and administrative decentralization affect corruption in comparable ways.
Political decentralization, on the other hand, is qualitatively different from the other two forms since it includes additional powers for ordinary citizens rather than a division of government. Therefore, it needs different hypotheses to describe how it affects corruption. Political corruption could lower corruption through increased electoral accountability, as proposed by Treisman (2002). In this process, if citizens suddenly have the power to elect non-corrupt representatives, local officials would then face the incentive to avoid corruption in order to preserve their jobs. On the other hand, electoral decentralization could increase corruption through capture, the process of bureaucrats and politicians being influenced by interest groups, as first stated in The Federalist Papers 10 (cited in Bardhan and Mookherjee 2002). Special interests may have greater personal connections and yield more power at the local level, thus they may be better able to manipulate a local official for their own needs. This could cause the poor and minorities to be less well-protected. In a more ethnically divided society, for example, the ethnic majority could use their recently gained political influence at the local level to take control of the subnational government and use their power to oppress the minority. Bardhan and Mookherjee (2000) develop a model in which decentralization increases capture by elites under certain conditions. Thus it appears from a theoretical perspective that political decentralization may have an ambiguous effect on corruption as well.

It is important to note that these theories describe how decentralization lowers all forms of public corruption rather than just one. Interjurisdictional competition, for example, can impact many forms of corruption at the same time. If citizens can leave a locality due to excessive bribery, they can also leave the locality if they are dissatisfied
with rampant patronage, embezzlement, extortion from the police, or kickbacks. The only difference between these forms of corruption could be the strength of their linkage with decentralization. For instance, embezzlements, extortion, and bribery may be more visible to residents, allowing decentralization to better lower these forms of corruption. However, large gift-giving and patronage may be less noticeable forms of corruption, so decentralization may not work as well with these facets of corruption. Despite these differences, all three forms of decentralization should affect every type of political corruption, and since the forms of corruption are probably highly correlated, lowering a more visible form of corruption may also lower less noticeable forms of corruption.

From these arguments, I formulate the following table of hypotheses concerning the possible theoretical connections between the various forms of decentralization and corruption:
## Table 1: Linkages between Forms of Decentralization and Forms of Corruption

<table>
<thead>
<tr>
<th>Form of Decentralization</th>
<th>Fiscal &amp; Administrative</th>
<th>Fiscal &amp; Administrative</th>
<th>Fiscal &amp; Administrative</th>
<th>Fiscal &amp; Administrative</th>
<th>Electoral</th>
<th>Electoral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form of Corruption</td>
<td>interjurisdictional competition</td>
<td>checks and balances</td>
<td>weakened accountability</td>
<td>influential local officials</td>
<td>accountability</td>
<td>capture</td>
</tr>
<tr>
<td>Bribery and Kickbacks</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Graft and Gifts</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Extortion and Robbery</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Patronage, Nepotism, And Cronyism</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Embezzlement</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Direction of Relationship</td>
<td>Positive</td>
<td>Positive</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Note: A 2 indicates a strong linkage between that type of corruption and decentralization, while a 1 indicates not as strong of a linkage.
From this table, the two hypotheses that will be incorporated into my working hypothesis will be the hypotheses of interjurisdictional competition and weakened accountability. These two are selected because of data usability issues, described later, and the structure of the theoretical model, which focuses on these two hypotheses. Because the hypothesis of interjurisdictional competition states that fiscal decentralization will decrease corruption while the hypothesis of weakened accountability states that decentralization will increase corruption, I put forward that decentralization will have no overall significant effect on levels of corruption. From these arguments, my main hypothesis is as follows:

**Hypothesis:** Fiscal decentralization has no significant effect on corruption because the corruption-reducing effect of interjurisdictional competition is nullified by the corruption-inducing effect of weakened accountability.

**2.4. Corruption Data Used for Testing Hypothesis**

To empirically test the hypothesis listed above, cross-national data will be used. Although some detail is lost by having such a broad perspective, cross-national analysis still captures the average effect decentralization has had on corruption across the world. Transparency International’s Corruption Perception Index (TT’s CPI) will be the indicator used for measuring corruption, which is a subjective indicator composed of surveys, from multiple institutions, of business people and country analysts. Michael Johnston (in Jain
describes the CPI as the “poll of polls.” Subjective data do have problems, such as possible cultural bias, not detecting changes in corruption, and measuring perceptions of corruption rather than corruption itself. Illustrating the flaws of using perceptions of corruption, Michael Johnston (in Jain 2001) cites the hypothetical example that outside observers might interpret a scandal stirred up by feuding fractions as corruption when really it is just ethnic conflict. Objective data, which is an alternative to subjective data, also has flaws in that the definition of corruption varies from country to country. Any cross-national data would have to be based on these figures, thus even supposedly objective data would be subjective. Because of this flaw, the data could not be compared across countries. Availability, however, is the main reason for choosing to use subjective data because the main corruption data in the literature appears to be subjective. Therefore, subjective data will be used for this study (Lambsdorff 2006).

Despite its potential drawbacks, there are many benefits of using TI’s data. A minimum of three sources are required for a country to be included in the index, which tends to minimize possible outliers from the sample of respondents. TI also uses inputs from both natives of a particular country who would tend to understate corruption as well as foreigners who would tend to overstate corruption. Because of this, the corruption scores tend not to be biased in either direction (Lambsdorff 2006). Johnston (2001) also praises the reliability of the data since it reflects various perceptions of corruption from thousands of individuals. However, others have cited some problems with TI’s data. Lambsdorff (2006) criticizes the data source for having insufficient country coverage as well as not picking up on changes in corruption across time. Johnston (in Jain 2001) questions whether the scale used for the CPI is consistent for all values in the interval as
well as whether the index is biased toward measuring bribes rather than all forms of corruption.\(^{14}\)

There are a few additional publicly available measures of corruption which I have chosen not to use because I believe they suffer from even more problems than TI’s CPI. The PRS Group has created the *International Country Risk Guide*. This dataset includes measurements of corruption going back to 1980, but it measures only the political risk involved with corruption rather than corruption itself. The index represents corruption’s effect on political stability in a country, so a country with high levels of corruption could have a low score if corruption is generally tolerated in the country. As a result, this data could be inappropriate for testing the hypothesis that decentralization impacts corruption (Lambsdorff 2006). The World Bank’s *World Governance Indicators* (WGI) also has a corruption indicator, but the complex and somewhat vague composition of these variables makes it unclear if these variables actually measure the concepts the World Bank claims they measure.\(^{15}\) Overall, even though TI’s CPI does have some structural problems, it appears to be the best source for measuring the effects of decentralization on corruption.

Because of the structure and reputation of TI’s CPI, the index should be appropriate for testing the hypotheses linking corruption and fiscal decentralization. As stated earlier, decentralization should affect all forms of corruption. Similarly, for weakened accountability, enlarging the bureaucracy allows some officials to extract bribes and kickbacks without being noticed, so participating in other forms of corruption may be unnoticed as well. The surveys and responses used to compose the CPI reflect all these forms of corruption in a country. Respondents are asked about their perceptions of

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\(^{14}\) As in whether a score of 9 versus 8 represents the same difference in the level of corruption as a score of 2 versus 3

\(^{15}\) Thomas (2007) says that the WGI does not give bad data so much as incorrect data (p.31).
bribery, embezzlement, kickbacks, and patronage for a respective country along with many other questions, and these responses are then aggregated to form the Corruption Perception Index. Thus, the CPI is appropriate for testing the hypotheses of interjurisdictional competition and weakened accountability since the index measures all forms of corruption with a fair degree of reliability.

2.5. Decentralization Data Used for Testing Hypothesis

As for measurements of decentralization, the best indicator of fiscal decentralization is subnational expenditure, expressed as a percentage of total government expenditure, acquired from the IMF’s Government Finance Statistics (GFS). Expenditure is better to use than subnational revenue because it more accurately reflects the proportion of government services that are being provided at the subnational level. Residents should be more concerned about how efficiently public services are being provided than to which level of government they pay taxes, thus the subnational expenditure statistics should be more appropriate for testing my hypothesis.

Some authors, such as Ebel and Yilmaz (2002), criticize the GFS for not going into enough detail about subnational expenditure. These authors cite that the IMF gives overall subnational expenditure as a percentage of total government revenue, pointing out that the decision of how this money is spent could be coming from the central government. For example, even if public services such as education and police protection are technically provided by the local governments, the national government may regulate how these services are provided and control the funding for them. Therefore, the IMF’s revenue figures probably overstate fiscal autonomy and give an incomplete picture.
Fisman and Gatti (2002b) argue that expenditure decentralization without revenue collection responsibility can allow local officials to avoid the consequences of inefficiency since their revenue would be mostly unaffected by their actions. Thus, the potential positive effects from decentralization may be undermined.

The main alternative cross-country source for fiscal decentralization comes from the OECD. Ebel and Yilmaz (2002) recommend this source because it goes into more detail on subnational revenue. Unfortunately, these data from the OECD only contain information for the 30 countries within the organization, thus the sample is not nearly as inclusive. In addition, subnational revenue and expenditure have over a 97% correlation, so it appears that these two variables are basically the same and that expenditure decentralization is rarely implemented without revenue decentralization. Thus, it appears that the lack of detail from the GFS may not be as detrimental in practice as others have suggested.

The IMF’s data also appear to be appropriate for testing my hypothesis stating that the corruption-reducing effects of interjurisdictional competition will be canceled out by the corruption-increasing effects of weakened accountability. The IMF’s GFS show what proportion of the government services are provided at a local level, so if one locality provides these services less efficiently because of corruption, the process of interjurisdictional competition should still be in effect to help lower corruption. Similarly, if local governments spend more of the overall government revenue, then which level of government to hold accountable for corruption may be less clear, making the subnational expenditure data useful for testing the part of my hypothesis related to weakened accountability as well. The potential problem of the IMF’s data not reflecting
fiscal autonomy may not be problematic as long as the jurisdictions differ in their services and level of corruption. For example, the central government may stipulate how local governments spend their money on public works projects, but even with this mandate, in one jurisdiction this money could be embezzled by the politicians but in another it could be used for its correct purpose, thus the data should still be usable for testing my working hypothesis.

Other indicators of decentralization exist, but cannot be used in my study for several reasons. Electoral decentralization is one such indicator, which is typically measured by the presence of subnational elections. There does not appear to be any other competing indicators for measuring electoral decentralization. Administrative decentralization, on the other hand, can be measured in multiple ways. Usually, it is measured by the number of tiers or jurisdictions of government. Other indicators of administrative decentralization are whether there are contiguous autonomous regions within a country as well as whether states or provinces have authority in taxing, spending, or legislating. The variables listed above can be accessed through the database of political institutions. Unfortunately, these variables cannot be used. As I will explain later, the use of such variables would cause sample selection bias, but a Heckman model can not be used to predict missing values because of their discrete nature. As a result, the variables for administrative and electoral decentralization cannot be included in my statistical model. This is unfortunate because decentralization is a multidimensional concept where all aspects interact with one another and could have

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16 Because these variables lack observations for many developing countries.
17 Since the typical Heckman models is set up with the dependent variable being continuous.
different impacts on corruption. Despite this issue, I feel it is still best to exclude these variables in order to mitigate sample selection bias.

3. Econometric Model and Results

3.1. Econometric Issues in the Literature

The proper econometric estimation for testing my hypothesis that fiscal decentralization will have no significant effect on corruption is somewhat difficult because of the statistical problems surrounding the datasets for decentralization and corruption. One is the infeasibility of panel estimation. Previous cross-country studies appear to be solely cross-sectional. There have been panel studies of decentralization at the subnational level such as in Fisman and Gatti (2002b), Foster and Rosenzweig (2001), as well as panel studies of decentralization’s effect on economic growth across counties as presented in Yilmaz (1999), Davoodi and Zou (1998), and Ehdaie (1994). No studies, however, have used panel data, a cross-country focus, and a measurement of corruption as the dependent variable. Unfortunately, it is unclear if panel estimation is even feasible with the current cross-country datasets on corruption. For TI’s CPI, the most widely used source in the literature, a country’s score changes very little from year to year. Thus, there appears to be not enough variation over time for panel analysis, particularly for a fixed effects model which is essentially a time-series model. It is also unclear what the year-to-year changes represent in the data. TI says the variations could either represent changes in the country’s level of corruption or modifications in methodology. Therefore, a fixed effects model does not appear to be feasible, which is

\[\text{From here on, since my study will focus of fiscal decentralization, the use of the word “decentralization” by itself will be a reference to fiscal decentralization.}\]
unfortunate since this type of model can correct for unobserved heterogeneity, a type of omitted variable bias cross-section regressions cannot account for.

Another problem with the data used in previous studies has been sample selection bias. The dataset most commonly used for measuring fiscal decentralization, the IMF’s GFS, contains data for roughly 40 countries, most of which are developed countries. The following table summarizes the number of observations for each country in the IMF’s data from 1995-2006:
Table 2: Description of IMF’s Subnational Expenditure Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>3</td>
<td>Finland</td>
<td>9</td>
<td>Morocco</td>
<td>3</td>
</tr>
<tr>
<td>Australia</td>
<td>8</td>
<td>France</td>
<td>11</td>
<td>Netherlands</td>
<td>12</td>
</tr>
<tr>
<td>Austria</td>
<td>12</td>
<td>Germany</td>
<td>12</td>
<td>New Zealand</td>
<td>4</td>
</tr>
<tr>
<td>Belgium</td>
<td>12</td>
<td>Greece</td>
<td>11</td>
<td>Norway</td>
<td>7</td>
</tr>
<tr>
<td>Bolivia</td>
<td>5</td>
<td>Hungary</td>
<td>11</td>
<td>Poland</td>
<td>6</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>1</td>
<td>Iceland</td>
<td>9</td>
<td>Portugal</td>
<td>10</td>
</tr>
<tr>
<td>Chile</td>
<td>7</td>
<td>Ireland</td>
<td>12</td>
<td>Russia</td>
<td>2</td>
</tr>
<tr>
<td>Colombia</td>
<td>1</td>
<td>Israel</td>
<td>7</td>
<td>Slovak Republic</td>
<td>4</td>
</tr>
<tr>
<td>Congo</td>
<td>1</td>
<td>Italy</td>
<td>12</td>
<td>South Africa</td>
<td>7</td>
</tr>
<tr>
<td>Cyprus</td>
<td>9</td>
<td>Lithuania</td>
<td>7</td>
<td>Spain</td>
<td>12</td>
</tr>
<tr>
<td>Denmark</td>
<td>9</td>
<td>Luxembourg</td>
<td>8</td>
<td>Sweden</td>
<td>9</td>
</tr>
<tr>
<td>El Salvador</td>
<td>5</td>
<td>Malta</td>
<td>4</td>
<td>Thailand</td>
<td>4</td>
</tr>
<tr>
<td>Estonia</td>
<td>7</td>
<td>Mongolia</td>
<td>1</td>
<td>United Kingdom</td>
<td>9</td>
</tr>
</tbody>
</table>
For the few developing countries in the dataset, such as the Republic of Congo, data is sometimes available for only one year. This structure seems to suggest that previous studies reflect how decentralization affects corruption in developed countries rather than in the entire world, which could be problematic. Previous studies may have found that decentralization reduces corruption because local governments may be more competent and better monitored in developed countries. In developing countries, on the other hand, officials in local governments may be more corruptible because bottom-up accountability may be lacking due to a weaker civil society and political system. Because of this, decentralization may not be able to reduce corruption in these cases.

To overcome the lack of data in developing countries, I will first estimate a Heckman Selection Model with fiscal decentralization as the dependent variable. A Heckman model should be used instead of OLS because countries in the IMF dataset may be more or less decentralized than countries not in the sample. For example, countries that are more decentralized may feel the need to have better data collection and reporting procedures to keep track of the level of decentralization in their country. Because of this, such countries may be more likely to be included in the GFS data since the IMF has to rely on figures these countries provide. Based on this model, I will then predict the missing values of decentralization and use these predicted values along with the actual values for the observed countries to estimate a model of decentralization’s effect on corruption. While the use of the unaltered IMF’s data would give an accurate description of decentralization for the countries in the sample, this may be insufficient if the goal is to look at the overall effect decentralization has had across the world. The rest of this paper will focus on this potential contribution to the field.

19 i.e. the use of OLS here may cause sample selection bias
3.2. Specification and Estimation Issues

As previously stated, I will first estimate a Heckman regression with decentralization as the dependent variable to predict missing values:

\( D_{i,t} = \alpha_1 + \sum \beta_k x_{k,i,t} + \rho \sigma_u \lambda (\sum \gamma_k z_{k,i,t}) \)

where \( \sum \beta_k x_{k,i,t} \) represents the main equation measuring decentralization and \( \sum \gamma_k z_{k,i,t} \) represents the selection equation for the model. The meaning of the variables are as follows: \( D_{i,t} \) represents decentralization, \( x_k \) is a particular variable in the decentralization equation, \( z_k \) is a variable in the selection equation, \( \rho \) is the correlation between the error term of the decentralization equation and the selection equation, \( \sigma_u \) is the standard deviation of the error in the selection equation, and finally \( \lambda \) is the inverse Mills ratio evaluated at country \( i \) and year \( t \). The data is pooled from the years 1995-2006 to create a natural weighting procedure for the selection mechanism. This is important because developed countries have data available for most years while developing countries have much less coverage. A typical cross section Heckman model would give Sweden the same weight as the Republic of Congo, thus giving an inaccurate description of the selection process.

From the Heckman equation, I will predict the subnational expenditure values for the unobserved countries, and then use these values along with the observed statistics in an OLS model to test my hypothesis connecting decentralization and corruption. The equation to estimate is as follows:

\( C_i = \alpha_2 + \delta D_i + \sum \theta_k v_{k,i} + \varepsilon_i \)
where $C_i$ represents corruption, $v_k$ is a control variable, and $D_i$ is either the actual observed value of decentralization for country $i$ or the predicted value of decentralization derived from (1) for an unobserved country $i$. I will also run an OLS with only the observed data to compare the results. Endogeneity bias could also be an issue, as Fisman and Gatti (2002a) suggest that corrupt officials in the central government may be against fiscal decentralization since it could restrict their ability to extract bribes. Therefore, I will also estimate a 2SLS regression to help correct for possible endogeneity bias. A 2SLS regression should also correct for potential measurement error caused by using the predicted values of the decentralization variable instead of actual values. In addition to 2SLS, I will perform a bootstrapping procedure since estimates of the variance may be inaccurate in the OLS regression because predicted values are used rather than a random variable. As for the dimensions of analysis, (2) will be measured with cross-sectional data rather than panel data, since TI’s CPI does not appear to have meaningful variation over time, as discussed earlier.

The most recent 2008 CPI, which includes data for 180 countries, will be used for equation (2). Lambsdorff (2006) criticize older CPIs for not having data for many developing countries, but TI appears to have improved their data collection to cover most of the world, therefore this complaint seems to be no longer valid. The explanatory variables will use the average values from 2002 to 2006 for each country. Averaging across 5 years should mitigate year-to-year fluctuations, such as a one year drop in GDP from a recession which may give an inaccurate picture of the degree of economic development for a country. The explanatory variables are also lagged behind the CPI several years to help mitigate any potential simultaneity problems. A 2SLS regression
will be used to correct further for endogeneity bias in the target variable, but unfortunately, 2SLS cannot also correct for endogeneity problems in the control variables at the same time. Using lagged values should help mitigate this problem. In addition to correcting for endogeneity, lagged values are also appropriate for the general structure of the data, since the CPI is based on perceptions of corruption which may take several years to change if there is an actual change in corruption levels for a country. Because of this, it is also natural to expect that the explanatory variables may take several years to affect the CPI.

3.3. Explanatory Variables and Controls

In order to help reduce omitted variable bias when measuring the coefficient for \( D_i \), several controls are needed. The tables below list definitions along with summary statistics for these variables used throughout the study:
Table 3: Variable Descriptions

<table>
<thead>
<tr>
<th>Name</th>
<th>Source</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption Index</td>
<td>Transparency International</td>
<td>Corruption perception index (1: most corrupt)</td>
</tr>
<tr>
<td>Subnational Expenditure</td>
<td>IMF's Government Finance Statistics</td>
<td>Subnational expenditure (% of total Government Expenditure)</td>
</tr>
<tr>
<td>Civil Liberties</td>
<td>Freedomhouse</td>
<td>Index of civil liberties (1: most civil liberties)</td>
</tr>
<tr>
<td>GDP/Capita</td>
<td>World Bank WDI*</td>
<td>GDP per capita, PPP (constant 2005 international $)</td>
</tr>
<tr>
<td>Government Expenditure</td>
<td>World Bank WDI</td>
<td>General government final consumption expenditure (% of GDP)</td>
</tr>
<tr>
<td>Capital</td>
<td>World Bank WDI</td>
<td>Gross capital formation (% of GDP)</td>
</tr>
<tr>
<td>Imports</td>
<td>World Bank WDI</td>
<td>Imports of goods and services (% of GDP)</td>
</tr>
<tr>
<td>Population</td>
<td>World Bank WDI</td>
<td>Total population</td>
</tr>
<tr>
<td>Area</td>
<td>World Bank WDI</td>
<td>Land area (sq. km)</td>
</tr>
<tr>
<td>Urban</td>
<td>World Bank WDI</td>
<td>Urban population (% of total)</td>
</tr>
<tr>
<td>English</td>
<td>La Porta et al. (1999)</td>
<td>1: English common law legal origin</td>
</tr>
<tr>
<td>French</td>
<td>La Porta et al. (1999)</td>
<td>1: French commercial code legal origin</td>
</tr>
<tr>
<td>Federal</td>
<td>Forum of Federations</td>
<td>1: Federal system of government</td>
</tr>
</tbody>
</table>

*WDI: World Development Indicators

Table 4: Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption Index</td>
<td>180</td>
<td>4.02</td>
<td>2.11</td>
<td>1</td>
<td>9.3</td>
</tr>
<tr>
<td>Sub. Expenditure</td>
<td>283</td>
<td>0.278</td>
<td>0.151</td>
<td>0.0122</td>
<td>0.641</td>
</tr>
<tr>
<td>Log GDP/Capita</td>
<td>2758</td>
<td>8.47</td>
<td>1.3</td>
<td>4.92</td>
<td>11.2</td>
</tr>
<tr>
<td>Log Area</td>
<td>3248</td>
<td>11.1</td>
<td>2.85</td>
<td>0.668</td>
<td>16.6</td>
</tr>
<tr>
<td>Log Population</td>
<td>3133</td>
<td>15.4</td>
<td>2.12</td>
<td>9.89</td>
<td>21.1</td>
</tr>
<tr>
<td>Gov. Expenditure</td>
<td>2614</td>
<td>16.2</td>
<td>6.6</td>
<td>2.86</td>
<td>69.5</td>
</tr>
<tr>
<td>Civil Liberties</td>
<td>3192</td>
<td>3.54</td>
<td>1.86</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Imports</td>
<td>2745</td>
<td>45.8</td>
<td>22.2</td>
<td>1.05</td>
<td>100</td>
</tr>
<tr>
<td>Urban</td>
<td>3232</td>
<td>54.3</td>
<td>24.4</td>
<td>6.56</td>
<td>100</td>
</tr>
<tr>
<td>Capital</td>
<td>2642</td>
<td>22.9</td>
<td>8.73</td>
<td>-23.8</td>
<td>100</td>
</tr>
<tr>
<td>English</td>
<td>3120</td>
<td>0.333</td>
<td>0.471</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>French</td>
<td>3120</td>
<td>0.436</td>
<td>0.496</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Federal</td>
<td>3248</td>
<td>0.113</td>
<td>0.317</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Rounded to 3 significant figures, except for observations

Years used in the summary statistics are 1992-2007, except for the Corruption Index which is for 2008
Observations above 100 for Imports and Capital were truncated at 100, since values above 100 are impossible and due to measurement error

Log=Natural Log, used to mitigate the effects of influential observations
In regards to financial variables, GDP per capita is an important control because developed economies are better able to monitor corruption. In addition, Treisman (2000) notes that higher levels of economic development are associated with greater levels of democracy, education, literacy, and depersonalized relationships, factors that should also help to mitigate corruption. In addition to economic development, openness with the rest of the world should help lower corruption because countries that compete in the global market are less competitive if foreign investors have to pay bribes to do business, as noted by Ades and Di Tella (1996, 1999 cited in Treisman 2000). A proxy for openness used by Treisman (2000) is imports as a percentage of GDP, so this variable will also be used in my study. The relative public sector size in the economy may also influence corruption because the larger the degree of government involvement and interference in the economy, the greater the extent the government has power to extract bribes (Tanzi 1994, cited in Treisman 2000).

As for demographic and political control variables, Fisman and Gatti (2002a) use an index of civil liberties as a control in their study since this variable captures the extent to which citizens, the press, and other aspects of civil society are strong enough to check against possibly corrupt governments. A control variable for the percentage of the population that is urban should also be included because more metropolitan societies may be better equipped to monitor and resist corruption. The structure of the legal system may also be influential. La Porta et al. (1999) argue that countries with a common law legal system evolved from England, where the legal system developed to protect property owners from the state, while non-common law systems grew as more of an instrument of the state. Because legal systems that protect property owners may also protect ordinary
citizens from corruption, a country’s legal system could be a determinant of corruption, so dummies for these two types of legal systems will be used.

Finally, Treisman (2000) uses a dummy variable for whether a country is federal, since this author considers federalism a form of decentralization and justifies his federalism variable with theories regarding decentralization listed earlier in this paper. I do not include federalism as one of my target variables, although I do include it as a control. Federalism is not a main focus of my study because I consider it as encouraging decentralization rather than as a form of decentralization in itself, since federalism is just the general blueprint for the structure of government stated in a country’s constitution, rather than a true depiction of the structure of a country. Even though a country may be technically federal, it is possible that this government structure is more of a formality, and, in practice, the central government is the body that holds most of the governmental power. Even though I do not consider federalism to be one of my variables of interests, I do include it as a control since other researchers have found that federalism may have some effect on corruption.

In addition to the variables listed above that determine corruption, the determinants of decentralization also need discussion. When specifying which variables belong in equation (1) for the decentralization equation, federal countries should naturally have higher levels of fiscal decentralization since federalism creates a formal system in which lower levels of government can demand money and fiscal autonomy. A larger country, in both land area and population, should have more diverse regions and peoples, so the demand for fiscal decentralization should be greater in such states. GDP per capita could also have a positive effect on decentralization, since greater economic activity is
often associated with more diversity in the private sector. Because of this, decentralization may be needed so that varying businesses and industries can find a subnational government that best tailors to their needs. Trade could also be a factor since international openness encourages central governments to be smaller and more attractive to international investors, but this attitude may not necessarily trickle down to the lower levels of governments. Citizens in a country with more civil liberties may demand more diversified public goods, causing fiscal decentralization to be higher in such countries. Finally, government size may be influential since decentralization could be greater in more evolved public sectors (Garret and Rodden 2001).

For modeling the selection process in equation (1), variables for GDP per capita, civil liberties, and imports should be included because countries that are more developed should be more likely to be present in the model. Countries that are more likely to be decentralized should also be more likely to be in the sample, so the variables for federalism, population size, and land area need to be included. So far, all the variables listed above for the selection equation are also found in the main decentralization equation. This would be insufficient, since at least one identifying variable is needed in the selection equation for Heckman models. An identifying variable I propose is gross capital formation as a percentage of GDP. Middle income countries typically have a higher value for this variable, and since these countries should be underrepresented in the IMF’s dataset, this variable may be negatively correlated with selection. However, underdeveloped countries, which also less frequently appear in the dataset, should have lower expenditure on capital as a percentage of GDP. I put forward that for countries not in the sample, middle income countries should overall outnumber low income countries
and thus there should still be a negative correlation, but whether this is true remains to be empirically tested.

There are other potential explanatory variables that previous researchers have used to model corruption which I have excluded from this study. Freedomhouse also has an index of political freedoms along with their index of civil liberties, but these two variables have over an 80% correlation, so it appears that they are mostly the same indicator and the use of both could result in multicollinearity problems. La Porta et al. (1999) use an ethnic diversity index in their study of corruption, arguing that in ethnically divided countries, the group in power may use its position to oppress the other groups via corruption. However, the number of observations is low and the index is based mostly on studies from the 1960’s, so it is unclear whether this variable would even reflect current ethnic diversity in a country. Measurements of income inequality could also be relevant, but the GINI index from the UN Human Development Report cannot be precisely compared across countries because one uniform survey was not used for all countries.

Other control variables that could be included are indices of democracy, years of uninterrupted democracy (Treisman 2000), indicators of education such as literacy rates (La Porta et al. 1999), GDP coming from exports of natural resources (Treisman 2000), average public sector wages (La Porta et al. 1999), and religious demographic information (Treisman 2000). Unfortunately, these variables suffer from sample selection problems as well, with missing data for many developing countries. The use of such variables might nullify the reduction in sample selection bias from the use of the Heckman equation for decentralization. Equations could be specified to predict missing values for these control variables as well, but since this procedure is inferior to actual
data, having multiple variables with Heckman predictions could exacerbate measurement error issues, and an IV regression cannot be run on multiple variables simultaneously to correct for potential measurement error bias. Also, other control variables that I do include could be proxies for these variables. The civil liberties variables, for example, could also measure the strength of democracy and years of uninterrupted democracy. A more economically developed country should have higher literacy rates as well. By the arguments listed above, I exclude these variables with the mindset that even with the risk of potential omitted variable bias, the inclusion of such variables would do more harm than good.
### 3.4. Results

Table 5: Heckman Selection Equation Results (Equation 1)

<table>
<thead>
<tr>
<th></th>
<th>Main Equation</th>
<th>Selection Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Area</td>
<td>0.038***</td>
<td>0.006***</td>
</tr>
<tr>
<td></td>
<td>(6.81)</td>
<td>(3.43)</td>
</tr>
<tr>
<td>Federal</td>
<td>0.172***</td>
<td>-0.016***</td>
</tr>
<tr>
<td></td>
<td>(14.01)</td>
<td>(-3.84)</td>
</tr>
<tr>
<td>Civil Liberties</td>
<td>-0.019***</td>
<td>0.005***</td>
</tr>
<tr>
<td></td>
<td>(-5.38)</td>
<td>(3.52)</td>
</tr>
<tr>
<td>Imports</td>
<td>0.002***</td>
<td>0.001***</td>
</tr>
<tr>
<td></td>
<td>(3.56)</td>
<td>(4.34)</td>
</tr>
<tr>
<td>Gov. Expenditure</td>
<td>0.012***</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>(6.75)</td>
<td>(1.85)</td>
</tr>
<tr>
<td>Log GDP/Capita</td>
<td>0.052***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.63)</td>
<td></td>
</tr>
<tr>
<td>Log Population</td>
<td>0.008***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.54)</td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td>-0.002***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-3.29)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.365***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-3.88)</td>
<td></td>
</tr>
<tr>
<td>Atheta</td>
<td>-0.594***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-4.95)</td>
<td></td>
</tr>
<tr>
<td>Lnsigma</td>
<td>-2.214***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-33.86)</td>
<td></td>
</tr>
<tr>
<td>Number Observations</td>
<td>2499</td>
<td></td>
</tr>
</tbody>
</table>

Marginal effects; t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Full Information Maximum Likelihood and
Robust standard errors used
Coefficient for selection equation listed as marginal effects,
derived from a separate probit estimation
Years used in sample are 1992 through 2007
Table 5 shown above lists the results of the Heckman equation (Equation (1)). In the first iteration not shown above, the variable on capital expenditure as a percentage of GDP was significant and negative in the selection equation, suggesting the overall Heckman model was originally properly identified as well as supporting the original conjecture that more capital intensive countries would be underrepresented in the sample. Also in the first iteration, the GDP/capita and population variables were insignificant as a group in the decentralization equation. Because of this, these variables were dropped from the decentralization equation to improve the identification of the model, leading to the results listed in Table 5. Of the significant variables in the decentralization equation, all had their anticipated signs.\textsuperscript{20} For the selection equation, countries that were federal and had greater civil liberties were surprisingly less likely to be in the sample, suggesting that the IMF’s data under-represents such countries. Interestingly, rho was negative. The standard interpretation of rho implies that countries that are more likely to be in the sample are less decentralized. However, countries present in the sample are typically developed countries which tend to have characteristics that are associated with higher rates of decentralization, such as greater civil liberties and openness with the global economy. Also, several of the variables that increased the probability of selection were also associated with higher rates of decentralization. As a result, the reason for the negative rho remains unclear.\textsuperscript{21}

\textsuperscript{20} To avoid any confusion, for the civil liberties variable, since lower values indicate higher civil liberties, a negative coefficient implies that greater civil liberties increases decentralization.

\textsuperscript{21} This contradiction could suggest that the usual explanation of rho might not be valid, and instead the rho is just the correlation between the unobserved variables in the main equation and the unobserved variables in the selection equation, whatever these variables may be.
Table 6: OLS Results (Equation 2)

<table>
<thead>
<tr>
<th>Regression</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>2SLS, 2SLS, OLS, 1st stage</td>
<td>2SLS, OLS, 2nd stage</td>
<td>Bootstrap</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td>Corruption</td>
<td>Corruption</td>
<td>Corruption</td>
<td>Sub. Exp.</td>
<td>Corruption</td>
<td>Corruption</td>
</tr>
<tr>
<td>Sub. Expenditure (Actual values)</td>
<td>1.850</td>
<td>(0.87)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub. Expenditure (Predicted + Actual)</td>
<td>-2.369</td>
<td>-0.557</td>
<td></td>
<td>-1.583</td>
<td>-0.690</td>
<td></td>
</tr>
<tr>
<td>Log GDP/Capita</td>
<td>1.867***</td>
<td>1.064***</td>
<td>1.147***</td>
<td>0.006</td>
<td>1.145***</td>
<td>1.147***</td>
</tr>
<tr>
<td>Gov. Expenditure</td>
<td>0.057</td>
<td>0.082***</td>
<td>0.062***</td>
<td>0.011***</td>
<td>0.072***</td>
<td>0.062***</td>
</tr>
<tr>
<td>Log Area</td>
<td>0.034***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Population</td>
<td>0.003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Liberties</td>
<td>-0.034</td>
<td>-0.082</td>
<td>(-0.23)</td>
<td>(-1.24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imports</td>
<td>0.005</td>
<td>0.001</td>
<td>(0.46)</td>
<td>(0.24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.016</td>
<td>0.003</td>
<td>(0.88)</td>
<td>(0.30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>0.069</td>
<td>0.315</td>
<td>(0.13)</td>
<td>(1.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>0.033</td>
<td>0.318</td>
<td>(0.06)</td>
<td>(1.21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td>-0.856</td>
<td>0.822</td>
<td>(-1.43)</td>
<td>(1.56)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-14.772***</td>
<td>-5.944***</td>
<td>-6.587***</td>
<td>-0.393***</td>
<td>-6.438***</td>
<td>-6.537***</td>
</tr>
<tr>
<td>N</td>
<td>37</td>
<td>156</td>
<td>161</td>
<td>161</td>
<td>161</td>
<td>161</td>
</tr>
</tbody>
</table>

t statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01
Robust standard errors used for all regression except 5
The average value from 2002 to 2006 for each country is taken of the explanatory variables
For Bootstrap: 1000 replications from both equations, Heckman iterations limited to 100
The table above shows the regression results for the various iterations of equation (2) which test my hypothesis. Column (1) uses only the actual values of decentralization while column (2) includes these numbers along with the predicted values for missing countries. The actual values were moderately similar to the predicted values for the countries present in the IMF data. Using the mean of subnational expenditure from 2002 to 2006 for each country, the average for the absolute value of the difference between the actual and predicted values was approximately 0.11, with a slightly greater discrepancy for less developed countries. Overall, these two regressions are fairly similar. In both iterations, decentralization is insignificant and the log of GDP per capita is the only highly significant variable, suggesting that sample selection bias may not be as much of a problem as originally anticipated. Nevertheless, even if the coefficients do not vary much between samples, the use of predicted values allows for a much larger sample size, thus providing for more accurate estimates of these coefficients. Even with a larger sample size, many of the control variables were insignificant. An F-test showed that the insignificant variables in column (2) were insignificant as a group as well. The exclusion of these variables led to the third regression which has only three variables: subnational expenditure, log of GDP per capita, and government expenditure as a percentage of GDP. Government expenditure had a different sign than originally anticipated, possibly because countries with larger public sectors also have more evolved and sophisticated bureaucracies which have checks in place to stop potential corruption.

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22 I also ran separate regressions for developed and non-developed countries using data from both regression 1 and 2. This did not change the results, suggesting that the effects of decentralization is uniform between both groups of countries.
To correct for possible endogeneity and measurement error biases, a 2SLS regression is needed. In order to ensure the equation is properly specified, at least one identifying variable is required. Two identifying variables I propose are population size and land mass, both taken in natural log form. As discussed earlier, the larger a country is in both land mass and population, the more diverse the country tends to be. Thus, decentralization may be needed to have public goods tailored to various subpopulations. These two variables, however, should have no effect on corruption. The majority of the literature does not include these two variables as explanatory variables for corruption, and Arikan (2004) even uses land mass as his identifying variable for estimating decentralization’s effect on corruption. However, Fisman and Gatti (2002a) do include population size as a control variable, arguing, “if large countries exploit economies of scale in the provision of public services (Ades and Wacziarg, 1997), and therefore have a low ratio of public service outlets per capita, individuals might revert to bribes ‘to get ahead of the queue’” (p. 330). Since this argument could be applied to countries that are larger in respect to land mass as well, it may seem that both population and land mass are determinants of corruption. But Fisman and Gatti’s argument seems questionable. Even if larger countries provide less public goods per capita, this may come about because they are more efficient at providing these public goods, so their citizens should be no worse off. Therefore, I do not include population and land mass as explanatory variables for corruption and instead use them as identifying variables for a 2SLS regression.

Estimation of the 2SLS regression yielded results that were surprisingly similar to the OLS results. A test for over-identifying restrictions showed that the identifying variables were not significant as a group in the main equation and a test for weak

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23 Discussion of these two problems was listed on page 41.
instrumental variables showed the identifying variables as being highly significant in the underlying equation for the determinants of decentralization. These two tests suggest that the 2SLS model is properly specified. A Hausman test did show that the 2SLS and OLS were significantly different, perhaps suggesting that the OLS results are inconsistent. However, the test was barely significant at the 10% level with a p-value of 0.0945. In addition, the test seemed to have been unduly influenced by the difference in the subnational expenditure coefficient, which was insignificant in both regressions. This suggests that simultaneity bias was not a problem in the OLS regressions, even though the Hausman test was significant. In addition to the 2SLS results, a bootstrap estimation did not significantly change the variance and significance of the variables in the model, suggesting that the use of predicted values does not significantly alter the structure of the variance-covariance matrix for equation (1).

Overall, the main determinant of corruption appears to be GDP per capita. Since this variable is in semi-log form, the coefficient of 1.147 implies that a 1% increase in GDP per capita leads to over a 1 point increase in the CPI. Since this index only ranges between 0 and 10, the magnitude of this coefficient is extremely large. Besides general government expenditure, none of the other potential determinants of corruption seemed to have any effect, including the decentralization variable. The results appear to support the original hypothesis that decentralization will have no significant effect on corruption due to the interaction of the corruption-reducing effects from interjurisdictional competition and the corruption-inducing effects of weakened accountability. However, since my theoretical model is more reflective of developed countries, it is unclear if my conclusion can be extended to all countries in the world or just developed countries.
4. Conclusion

This study suggests that decentralization does not significantly affect a country’s overall level of corruption. Decentralization has the potential to reduce corruption by creating competition between governments, but my study implies that these benefits are undercut by decentralization’s tendency to decrease accountability. This outcome is different from some other studies such as Fisman and Gatti (2002a) which showed decentralization lowering corruption. Even though the Heckman model helps to reduce sample selection bias, it does not eliminate it entirely since the predicted values are inferior to actual data. However, the insignificant differences between the OLS and 2SLS estimations suggest that the fiscal decentralization variable does not suffer from bias due to measurement error, so resorting to predicted figures may not be too problematic.

In addition to data availability problems, the exclusion of variables for administrative and political decentralization from my study may also be problematic. Decentralization is a multidimensional concept, so the exclusion of these variables leaves out how the three forms of decentralization interact with one another and affect decentralization in different ways. For example, fiscal decentralization may have no effect on corruption if citizens do not have political rights at the local level. While the exclusion of these variables is problematic, I felt it was best to exclude them in order to use a Heckman model to predict missing values and alleviate sample selection bias, which has not been tried before in the literature. I also attempted to account for political rights at the local level by including other control variables such as the index of civil
liberties from Freedomhouse. Nevertheless, the exclusion of political and administrative decentralization variables gives an incomplete picture of fiscal decentralization’s effect on corruption, an issue that should be explored in future research. Most of the previous studies of decentralization have also not accounted for political decentralization, so even with sample selection issues, the use of a political decentralization variables in future research could provide useful insight. Ideally, more complete data on subnational elections as well as some sort of local democracy score, such as the one created by Freedomhouse for post-Soviets states, could be used, but unfortunately, such data do not exist.

Studying fiscal decentralization from a cross-country perspective also gives an incomplete picture of its effects on corruption. Devolving power and money to subnational governments is often carried out differently from country to country, and some governments may handle decentralization better than others. Accountability in lowers level of government could be much weaker in developing countries, for example, so decentralization may be less effective or even detrimental in such states.

Unfortunately, cross-country datasets cannot capture these idiosyncrasies. As a result, cross-country studies may not be able to provide enough detail to analyze completely the relationship between decentralization and corruption. Despite these problems, empirical cross-country analysis can provide a unique perspective to see if decentralization has had an overall effect in reducing corruption across the world. It is still an open question as to whether this process is a useful tool for reducing corruption. Since there are relatively few studies on decentralization and corruption, more research,

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24 I do acknowledge that even though this variable does account for political rights, it is not a great indicator for the strength of civil society at the local level.
particularly studies on a subnational level for less frequently analyzed countries, should be performed in order to obtain a more accurate perspective of decentralization’s effect on corruption.
5. Appendix

Table 7: Countries Present in the Sample for Equation 2

<table>
<thead>
<tr>
<th>Albania</th>
<th>Dominican Republic</th>
<th>Latvia</th>
<th>Romania</th>
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</thead>
<tbody>
<tr>
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<td>Lebanon</td>
<td>Russian Federation</td>
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25 By “present in the sample for equation 2” I mean the 161 countries present in columns 3 through 6 of Table 6
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