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The Political Determinants Of Food Security: Democracy, Decentralization, And Federalism

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**THE POLITICAL DETERMINANTS OF FOOD SECURITY:
DEMOCRACY, DECENTRALIZATION, AND FEDERALISM**

by

CATHERINE E. SCHMITT-SANDS

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

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Approved By:

Advisor

Date

DEDICATION

I dedicate this dissertation to my husband Jason and my mother Elizabeth.

Without them, none of this would have been possible.

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LIST OF ABBREVIATIONS

ECLAC/CEPAL	Economic Commission for Latin America and the Caribbean/Comisión Económica para América Latina y el Caribe
FAO	United Nations Food and Agriculture Organization
FH	Freedom House
FIES	Food Insecurity Experience Scale
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
FSI	Food Security Index
GDP	Gross Domestic Product
GFS	Government Finance Statistics
GHI	Global Hunger Index
GWP	Gallup World Poll
HFIAS	Household Food Insecurity Access Scale
HFSSM	Household Food Security Survey Module
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
MCAR	Missing Completely at Random
MI	Multiple Imputation
MSA	Multiple Streams Approach
OLS	Ordinary Least Squares
PCSE	Panel Corrected Standard Errors

PPP	Purchasing Power Parity
PRI	Institutional Revolutionary Party
PoU	Prevalence of Undernourishment
RMSE	Root Mean Square Error
SUN	Scaling Up Nutrition
TSCS	Time-Series Cross-Sectional
UN	United Nations
UNICEF	United Nations Children’s Emergency Fund
USDA	United States Department of Agriculture
VoH	Voices of the Hungry
WB	World Bank
WFP	World Food Program
WHO	World Health Organization

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CHAPTER 1 THE POLITICS OF FOOD SECURITY

Introduction

This dissertation examines the empirical relationship between democracy, decentralization, federalism, and food security across countries and over time. This dissertation employs the Multiple Streams Approach (MSA) (M. D. Jones et al. 2016; Kingdon 1984; Zahariadis 2007) from the field of public policy as a basis to hypothesize about how democracy, decentralization, and federalism affect the specific policy outcome of food security, and then tests these hypotheses using a newly compiled dataset of all countries from 1990 to 2011. What makes governments pay attention to food insecurity? To what extent does democracy affect food security? Do formal federations have more food security than unitary systems? To what extent does decentralization affect food security? Do different types of decentralization (fiscal, administrative, or political) affect food security? The answers to these questions will contribute to the literature on democracy, decentralization, federalism, and social welfare.

The relationship between democracy and social welfare is the subject of an active debate that measures and operationalizes these concepts in several different ways. Scholars have sought to measure and test democracy's effect on social spending (Avelino, Brown, and Hunter 2005; Brown and Hunter 1999, 2004; Kaufman and Segura-Ubiergo 2001; Stasavage 2005), and on social welfare outcomes (Lake and Baum 2001) including poverty rates (Pribble, Huber, and Stephens 2009), school fees and attendance (Harding and Stasavage 2014), and infant mortality (Ross 2006). Most of this literature has a regional focus; some scholars study exclusively Latin America (Avelino, Brown, and Hunter 2005; Brown and Hunter 1999, 2004; Kaufman and Segura-Ubiergo 2001; Pribble, Huber, and Stephens 2009) or Africa (Harding and Stasavage 2014;

Stasavage 2005). The most consistent finding from these regional studies is that democracies spend more on social programs than authoritarian systems. Studies with a global scope are less common (Blaydes and Kayser 2011; Lake and Baum 2001; Ross 2006). Only one study has examined democracy's effect on a direct indicator of food security: per capita calorie availability (Blaydes and Kayser 2011). Whether the increased social spending in democracies translates to better social outcomes among those who need it most is, therefore, not a settled question.

Food security is a basic human need; it exists when all people have enough nutritious food for an active and healthy life. Despite being fundamental to all human life, and therefore to any definition of social welfare, food security remains understudied in the political science literature on politics and social welfare. This project uses food security as a measure of social welfare, and studies it quantitatively on a newly assembled dataset of secondary data with a global scope.

To date, no studies have specifically addressed federalism's or, more generally, decentralization's effect on food security. Not only does this dissertation address this gap in the literature, but also it contributes to a methodologically diverse literature that examines federalism and social policy (Pierson 1995; Rodden 2010). It builds on prior work that has operationalized and constructed measurements of three dimensions of decentralization – fiscal, administrative, and political (Schneider 2003a) – by employing these measures as independent variables. The dataset also incorporates recent data from the International Monetary Fund Government Finance Statistics Database to directly measure the dimensions of decentralization, providing several different ways to test the relationship between food security and decentralization.

Scholars have examined the relationship between decentralization and pro-poor policy outcomes broadly defined (Jütting et al. 2005; Schneider 2003b; Von Braun and Grote 2000), poverty reduction (Ali Khan 2013; Crawford 2008; Crook 2003; Crook and Sverrisson 2001; Vedeld 2003), education outcomes (Faguet and Sánchez 2008), health outcomes (Uchimara and Jütting 2009), and responsiveness to local needs (Faguet 2004). While this literature uses a common theoretical frame – that decentralization is expected to be more efficient and more effective than centralization (Jütting et al. 2005) – single or small-N comparative case studies are most often employed. This dissertation will examine decentralization using a large-N comparative dataset, and it will apply existing theory on decentralization to a new policy problem: food security.

How and whether political institutions and arrangements affect social welfare is a perennial question in political science. As more and more countries transition to democracy, the relationship between democracy and social welfare has been a focus of attention. Decentralization too has been an active topic in recent years, especially as it has evolved in developing countries. While the case for decentralization may be strong theoretically, there is some question about how well it works in practice. Finally, food security itself is a fundamental human need and it underpins health, productivity and welfare. This dissertation bridges several literatures and brings the focus squarely onto the question of whether these political determinants – democracy, federalism, and decentralization – affect food security.

The Multiple Streams Approach

This project uses the Multiple Streams Approach (MSA) (M. D. Jones et al. 2016; Kingdon 1984; Zahariadis 2007) from the field of public policy as a way to organize arguments and talk about politics and policy problems. First proposed by Kingdon (1984), the MSA has been widely

used and applied in many settings across the world (M. D. Jones et al. 2016). The MSA models policymaking at the system level, and conceives of political systems as composed of three streams: *problems*, *policies*, and *politics*. The problem, policy, and politics streams flow through the political system independently of one another. At critical moments, policy windows open and provide the opportunity for changes in policy. When a policy window opens, a policy entrepreneur (essentially, a power broker) can couple the three streams together – a specific policy, addressing a particular problem, at a fortuitous moment in politics – and policy change can occur – a new policy is placed on the decisional agenda, or a new policy is adopted. The MSA is a useful tool to talk about how politics affects problem definition and policy choice at the system level.

Problems are social conditions that exist in a society, but not all social conditions are problems. They become problems when some person or interest group that cares about them becomes powerful enough to define them as something that ought to be addressed by government action. The problem stream is commonly operationalized by indicators, which are statistics or other measurements that describe the seriousness, scope, or magnitude of a given problem. These indicators form a steady flow of information, and sometimes changes or trends in certain indicators, or simply the introduction of new indicators measuring an existing problem, can precipitate policy change (Baumgartner and Jones 2009). *Policies* are solutions. They may arise in the policy stream in response to specific problems, but they are not always generated secondary to problems. Policies often exist independently of problems that they could address, and their champions will actively seek new problem areas that can justify the adoption of their preferred policies (Cohen, March, and Olsen 1972). Policies sink or swim based on several criteria,

including value acceptability (whether the policy conforms to prevailing values within the political system), technical feasibility, and adequacy of resources (M. D. Jones et al. 2016, 16). *Politics* comprises the ideological composition of a given government, the national mood, and the relative power of interests and the pressure they can bring to bear. The politics stream provides the theoretical framework for the empirical tests presented in this project. Bringing new players into the system, as democracy does by empowering previously disempowered groups, changes the power balance and therefore opens the possibility of defining social conditions like food security as political problems, and adopting new policies to address those problems.

Democracy and Food Security

Democracy is, at its most essential, a political system in which power is transferred through regular elections. Democracy also encompasses concepts such as political rights, civil liberties, and the rule of law. This project takes a broad view of democracy that includes these features of a democratic polity. Democracies and non-democracies differ from one another in politics, problems, and policies. In each difference, democracies are more likely than non-democracies to pay attention to food security, to treat it as a political problem, and to take action to address food insecurity (Dreze and Sen 1991; Sen 1982, 1983, 1996).

Politics in democracies and non-democracies differ along the dimensions of representation, accountability, responsiveness, participation, and mobilization. Democracies differ from non-democracies in their degree of representation. Public officials in democracies are accountable to their constituents through regular elections. Because politicians are accountable to their constituents, they should be more responsive to the needs of their constituents in democracies than in non-democracies. Broader segments of society participate in political

decisions in democracies versus non-democracies. People participate in political decisions in democracies through either voting or through mobilization that puts pressure on public officials. Why does this matter for food security? In non-democracies, politicians need only respect the preferences of the societal coalition that keeps them in power, and that coalition may be exceedingly small and is often solely comprised of elites (Bueno de Mesquita et al. 2002). Food insecurity is largely a problem of those living on the lower economic rungs of any societal ladder. In non-democratic countries, it is precisely these people who usually lack a political voice.

In developing countries, large proportions of the population are food insecure (FAO, IFAD, and WFP 2015). Under democracy, numbers translate to political power. Food insecure people are afforded the means to make the government address food security, and are able to punish those public officials who ignore the issue. Since, in developing countries, the number of people suffering from food insecurity is substantial, food insecurity is precisely the type of problem that would enter the decisional agenda in a democracy and be ignored in a non-democracy.

The differences between democracies and non-democracies in the politics stream in turn affect the problems stream. Because there is representation of broader segments of society in democracies than in non-democracies, more conditions in society can come to be viewed as political problems that ought to be addressed by public action. Food insecurity is just such a condition. Historically, food insecurity was considered to be an unavoidable fact that accompanied population growth (Malthus 1872) – as populations grew, food production would not be able to keep up, inevitably leaving many unable to meet their basic nutritional needs. This is the core of the argument that food availability is the causal factor in food insecurity. In the 20th century, thinkers (de Castro 1952, 1972; Dreze and Sen 1991; Sen 1983) began to redefine food

insecurity, showing that it is a product of the political choices that structure food distribution, more related to the question of who has power and resources within a society than to the amount of available food. This is core of the argument that food accessibility is the most important causal consideration in food security. Of course, writings among scholars and thinkers can provide a conceptual framework, and can cause people in society to view problems differently, but they do not necessarily make it onto the political agenda. That step usually occurs due to political pressure, which is more often possible in democracies than in non-democracies.

Democracies have more space for group formation in civil society than non-democracies, often ensured through protections surrounding freedom of association. Pressure groups can mobilize around issues that would be considered background conditions in the absence of such mobilization. Given teeth through the mechanisms of accountability through representation, such mobilization can define food insecurity as a political problem, bring it onto the public agenda, and incentivize politicians to take political action to solve it. In non-democracies, food insecurity can be ignored or remain defined as a condition rather than a problem unless the underlying regime ideology tends to turn attention towards it, or unless some elite group becomes a champion for the issue, thus causing politicians to pay attention (Varshney 2000). While these mechanisms may intermittently cause non-democracies to provide food security, the mechanisms in democracy make it more likely that politicians as a matter of basic political survival will address food security as a political problem.

The policy stream on the issue of food insecurity is strongly influenced by the problem definition adopted within a given country. For example, food insecurity has profound effects in the first 1000 days of life, with early nutritional deficits manifesting themselves over an

individual's lifetime (The Lancet 2013). Many countries have defined the problem of food insecurity in this manner, and have chosen to focus their efforts on maternal and child food insecurity as a result (SUN 2015). Other countries have defined food insecurity as a problem that results from lack of economic access to sufficient food because of poverty, pointing to economic growth-centered solutions (Varshney 2000).

As I explore more fully in Chapter 2, food insecurity is a complex issue with many manifestations and myriad causes. It is particularly prone to redefinition, which can point to widely varying policy solutions. This may be more of an issue under democracy than non-democracy. In democracies, a competing array of interests struggle to capture politicians' attention. Since food insecurity is multi-causal, it may be an issue that many groups can latch onto in order to push particularistic agendas. Most food insecurity policies have long time horizons for the positive effects to be felt – that is, they require a certain amount of political commitment over the long term. Politicians in democracies have famously short time horizons – usually reaching to the next election – and so long-term policies that could be more effective may be forsworn in favor of short-term projects that can be directly attributed to current politicians (Harding and Stasavage 2014).

Hypotheses: Democracy and Food Security. The foregoing discussion illustrates that it is not simply elections that make democracy qualitatively different – freedom of expression and assembly, mobilization, participation, and representation all must play a role if democracy is to change social welfare. This dissertation employs a concept of democracy that is readily measured quantitatively using the Freedom House indexes of Civil Liberties and Political Rights, while retaining as much as possible the meaningful depth that inheres in the concept.

Democracy exists along two dimensions. *Political rights* comprise the first dimension. Are there elections? Are they free and fair? Do parties compete freely? Is suffrage universal and participation of all social groups allowed? *Civil liberties* comprise the second dimension. Are basic rights protected? Is there freedom of expression, association, and assembly? Is the rule of law respected? These two aspects of democracy both provide different avenues for democracy to affect food security. Political rights provide the means to hold politicians accountable; open participation assures that disadvantaged groups can freely choose those that represent their interests (and punish those who do not). However, without the full complement of civil liberties, those groups may not be able to articulate their interests in the first place, mobilize fully to achieve their goals, or keep up political pressure between elections to ensure that representatives remain attentive. Responsiveness – a major factor in the argument that democracy will produce higher food security – is promoted by both increased political rights and increased civil liberties. Therefore, I propose a pair of hypotheses to test the relationship between democracy and food security:

H1: Countries with more political rights will have more food security.

H2: Countries with more civil liberties will have more food security.

By dividing the hypotheses along the two dimensions, I will be able to test the relative importance of both civil liberties and political rights, rather than conflating the two (or dropping a dimension) in a simplified concept of democracy.

Federalism and Decentralization: What is the Difference?

Governmental Structure. Governments project power over a given geographical space, and in so doing, they must incorporate a (more or less) diverse population with a variety of needs and

preferences. To this end, there are three main types of governmental structure: *federal*, *unitary*, and *confederal*. *Federal systems* of government comprise at least two levels of government – national and subnational – that have constitutionally defined authority to govern their respective territories (Burgess 2006; King 1982). Federal constitutions provide for the “distribution of legislative and executive authority and allocation of revenue sources...ensuring some areas of genuine autonomy” (Watts 2016, 12). Federations have formal procedures to incorporate the constituent subnational governments into decision-making at the national level, and the constituent governments retain autonomy, to varying degrees, within their own jurisdictions (Burgess 2006). The constitutional basis of federations is an important defining characteristic, because it draws a bright line between federations and *unitary systems* – those in which only the central government has the ultimate authority to govern. Both federations and unitary systems may function in a decentralized manner (discussed below), but in federations, changes to the structure of authority require subnational agreement and supermajority action, whereas in unitary systems changes can be made through normal majoritarian processes and are entirely at the discretion of the central government. Finally, *confederal systems* are like federal ones in that they have at least two levels of empowered government, but the authority in confederations ultimately resides in the subnational governments, which delegate powers to the national government for specific purposes.

There are currently twenty-seven federal countries in the world.¹ They are diverse aside from their federal structure and the particular politics that entails. Some are continental in scope,

¹ Argentina, Australia, Austria, Belgium, Bosnia and Herzegovina, Brazil, Canada, Comoros, Ethiopia, Germany, India, Iraq, Malaysia, Mexico, Micronesia, Nepal, Nigeria, Pakistan, Russia, Saint Kitts and Nevis, Somalia, South Sudan, Sudan, Switzerland, the United Arab Emirates, the United States, and Venezuela.

like Australia, while others are tiny island nations, like Comoros. Some have many subnational governments, like Russia, while others have only a few, like Belgium. Some are based in civil law systems, like Austria, while others are based in common law systems, like the United States. Some of them formed from unions of independent states, like Switzerland; others through devolution from unitary regimes, like Nigeria; and still others from a combination of the two, like Canada. All of them began in an effort to accommodate regional diversity, but that diversity may have been historical or territorial, like it was in Mexico, or cultural, linguistic, ethnic, religious, or a combination of these, like in India.

All federal countries have subnational governments, but those governments differ substantially in the scope of their jurisdiction – that is, in what policies they may enact and what powers they hold (Watts 2016, 15–17). The legislative power may reside at the national level while the administrative powers are decentralized, as it is in Austria, or the subnational governments may have both legislative and executive powers, as in the United States. If legislative powers exist at the subnational level, policymaking authority may be exclusive to different levels, concurrent between levels, shared among levels, or residual (that is, one level may have all policymaking authority not explicitly assigned elsewhere). A few federations – Brazil, India (as of 1992), South Africa, and Venezuela – have constitutionally defined jurisdictions for local level governments as well (Watts 2016, 16).

Federal systems, however, have commonalities, and they stem from the constitutional nature of the political structure. While the scope of jurisdiction of the constituent governments varies widely, subnational governments have substantial autonomy *within* their jurisdictions (Watts 2016, 17). This autonomy is protected in federations in a way that it is not in unitary

systems. It cannot be altered easily – often requiring a constitutional amendment. This entrenchment of the structure of power within federal systems stimulates, enables, and empowers certain political groups within those systems to enshrine their preferences in government policy. Often, redistribution is constrained in federal systems, both institutionally, and by the particular politics that federalism engenders (discussed below).

Federalism, when viewed from the standpoint of structure, represents an institutionalized form of decentralization. However, as with formal and informal institutions, decentralization may exist *de jure* or *de facto*: a system that is greatly decentralized in its structure – like a federal system – may be quite centralized in its function, and likewise a structurally centralized government – like a unitary system – may be decentralized in function. In order to discuss this phenomenon more meaningfully, I first turn to a discussion of decentralization in political systems in general, and then relate decentralization to federalism more specifically.

Decentralization. Whether a country is federal or unitary in a formal sense, political power in practice exists along a spectrum of decentralization. Decentralization is the extent to which the functions of power are distributed away from the national government to different levels of government. If all power is held at the national level, a country is said to be centralized; a country with all power held at the subnational levels would be decentralized.

Decentralization has three commonly cited dimensions: *fiscal*, *administrative*, and *political* (Schneider 2003a; Von Braun and Grote 2000). These dimensions address three questions about how power is distributed. Firstly, what level of government controls the monetary resources within the system? How is fiscal impact distributed between levels? The

answers to these questions place a country on a spectrum of *fiscal decentralization*. For example, if funding flows at the national level's discretion from the national to the subnational levels and those levels lack the power to raise their own funds, the country would be fiscally centralized. If the subnational levels are fiscally independent of the national level – for example, if they collect their own taxes, or if the transfers from the central government are constitutionally mandated and/or unconditional – the country would be fiscally decentralized. If the national government does the bulk of expenditures, then the country would be fiscally centralized. If the subnational governments are making more expenditures relative to the national government, that would be more fiscally decentralized.

Secondly, what level of government decides what policies to pursue? Who implements these policies? The answers to these questions place a country on a spectrum of *administrative decentralization*. For example, if subnational levels of government can adopt and implement policy independent of national government influence or control, the country would be administratively decentralized. If bureaucrats at the subnational levels are employed by the national government and implementing national level policies, then the country would be administratively centralized. The more autonomy the subnational governments have from national control, the more administratively decentralized a country would be.

Thirdly, at what level of government does representation occur? Where does political authority lie? The answers to these questions place a country on a spectrum of *political decentralization*. As a structural matter, if a country had elections at the national, state or provincial, and municipal levels, it would be politically decentralized; a politically centralized country would only have elections at the national level. However, political decentralization is a

functional matter as well. If subnational elected representatives are largely ceremonial, having little power within their jurisdictions, or if subnational elected officials are simply stand-ins for national authorities, then even a country with subnational elections at multiple levels may be politically centralized.

These three dimensions range from total decentralization to total centralization. Countries often function at a point somewhere midway between the two extremes, however. For example, a country may have subnational governments that are responsible for implementing some policies with the national government responsible for others. That country would fall part way along the spectrum towards administratively decentralized. In another country, subnational governments may be able to collect certain taxes or fees and control those resources while the national government collects its own taxes and does not share that revenue. That would be a case of partial fiscal decentralization.

Decentralization in Federal and Unitary Systems. When decentralization is treated as a description of how a governmental system functions, it becomes clear that both federal and unitary countries (and confederations for that matter) may display different degrees of decentralization. Federal systems have institutionalized decentralization of authority, often explicitly defined in their constitutions, but many of them function in a more centralized manner than would be expected from the underlying structure. Likewise, many unitary systems function in a decentralized manner defined by their policy choices.

Fiscal decentralization varies from country to country based on the extent to which subnational governments have access to and control over their own revenues, whether or not they have taxing powers, the scope and magnitude of expenditures that they make relative to

the national government, the extent of dependency on transfers from the national government, and whether those transfers are conditional or not (Watts 2016, 17). Federal countries differ greatly from one another on the degree of fiscal decentralization that they empirically display; likewise, unitary countries vary along this dimension as well. To use one measurement of fiscal decentralization (Dziobek, Gutierrez Mangas, and Kufa 2011) as an example, the revenue raised by subnational governments as a percentage of total revenue ranges widely among federations and unitary systems, as shown in Table 1.1. I have chosen to present data from 1996 given that one of my decentralization models uses data from that year, but any year that was chosen would display a broad range similarly to this one.

Table 1.1. Subnational Revenue (% of Total Revenue) in 1996 for Selected Countries

Federal Countries		Unitary Countries	
Country	Subnational Revenue (%)	Country	Subnational Revenue (%)
Malaysia	16.70	Chile	7.49
Mexico	30.86	Thailand	8.96
Austria	36.30	France	19.50
Belgium	40.34	Peru	23.61
Switzerland	63.15	Bolivia	38.65
Canada	71.06	Denmark	57.13

Source: calculated by the author using data compiled from *IMF Government Finance Statistics Yearbook* (International Monetary Fund 2014)

Subnational expenditure as a percent of total government expenditure is another measure of fiscal decentralization, and this too varies among federal and unitary countries, as shown in Table 1.2.

Table 1.2. Subnational Expenditure (% of Total Expenditure) in 1996 for Selected Countries

Federal Countries		Unitary Countries	
Country	Subnational Expenditure (%)	Country	Subnational Expenditure (%)
Malaysia	16.52	Thailand	9.61
Austria	33.52	France	18.22
Belgium	38.15	Peru	27.53
USA	47.56	Sweden	38.73
Canada	67.76	Denmark	55.81

Source: calculated by the author using data compiled from *IMF Government Finance Statistics Yearbook* (International Monetary Fund 2014)

Subnational revenue and subnational expenditure as percentages of their respective totals vary *between* unitary and federal countries, as well. A two-sample t-test for the difference in mean subnational revenue percentages in 1996 (null hypothesis: no difference between the means) showed a significant difference (two-tailed $p = .002127 < .05$; 95% confidence interval for the difference: [15.07%, 24.31%]) with federal countries having a higher mean subnational revenue percentage. A two-sample t-test for the difference in mean subnational expenditure percentage (null hypothesis: no difference between the means) shows a significant difference (two-tailed $p = .009396 < .05$; 95% confidence interval for the difference: [14.54%, 23.17%]) between federal and unitary countries in 1996, with federal countries having a higher mean subnational expenditure percentage on average. While federal countries are higher on both these measures than unitary countries on average, there is still a substantial range – more than 50 percentage points in all cases – within each category, showing that there is a difference both *between* and *among* federal and unitary systems on the dimension of fiscal decentralization.

Administrative decentralization is commonly conceptualized as comprising three steps that proceed from least to most decentralized: deconcentration, delegation, and devolution (Schneider 2003a). *Deconcentration* occurs when a national government establishes

geographically dispersed field offices that are responsible for implementing particular policies. *Delegation* occurs when a national government assigns implementation responsibility either to subnational governments or to outside agencies, who remain accountable to the national government for the results. *Devolution* occurs when national governments confer total responsibility and power over a policy to subnational governments. This dissertation views these three steps as a continuum from most centralized to most decentralized on the administrative dimension. All three steps may be taken regardless of whether a country is federal or unitary. Federal countries are more likely to have many of these choice made *a priori* in their constitutions, whereas unitary countries are more flexible in the choice to deconcentrate, delegate, or devolve power to subnational governments.

Federal countries are distinct from unitary countries in the degree of autonomy that subnational governments enjoy within their policy jurisdictions. In other words, while unitary countries may be substantially decentralized on the administrative dimension, and some federal countries may have a smaller scope of subnational policy responsibilities than their unitary counterparts, federations in particular “leave their constituent units with greater autonomy in the exercise of their responsibilities” (Watts 2016, 17). Watts assesses the autonomy of subnational governments within federations when it comes to expenditures (i.e. who decides how the money is spent at the subnational level) (Watts 2008). Figure 1.1 summarizes his assessment.

Figure 1.1. Autonomy Exercised by Subnational Governments Regarding Expenditures in Selected Federations

Least Subnational Autonomy Most Centralized		Most Subnational Autonomy Most Decentralized	
Argentina, Comoros, Ethiopia, Malaysia, Micronesia, Mexico, Nigeria, Pakistan, Russia, St. Kitts and Nevis	Australia, Austria, Brazil	India, United States, Germany	Belgium, Canada, Switzerland
Source: (Watts 2008, 2016)			

Schneider (2003b, 2003a) employs percentage of subnational revenue that comes from own-source taxes as a measure of administrative decentralization. This indicator captures the extent to which subnational governments control resources that they can direct towards their own policy priorities. While the indicator also captures something about fiscal decentralization, it gives a measure of the autonomy of the subnational governments in terms of who decides how resources are to be spent: the more revenue a subnational government collects from its own-source taxes, the more policy autonomy it has. The percentage of subnational revenue that comes from own-source taxes varies among federations and unitary countries, as shown in Figure 1.3.

Table 1.3. Percentage of Subnational Revenue Derived from Own-Source Taxes in 1996* for Selected Countries

Federal Countries		Unitary Countries	
Country	Subnational Expenditure (%)	Country	Subnational Expenditure (%)
Austria	11.14	South Africa	5.56
Belgium	16.10	Indonesia	20.11
Malaysia (2000*)	28.71	Bolivia	36.58
India	48.97	Mongolia	47.87
Canada	54.63	Thailand	55.03
Mexico	55.45	Chile	79.21

Source: calculated by the author using data compiled from *IMF Government Finance Statistics Yearbook* (International Monetary Fund 2014)

Subnational revenues derived from own-source taxes may vary between federal and unitary systems, but there is no evidence that this was the case in 1996. A two-sample t-test for the difference in mean percentage of subnational revenues derived from own-sources taxes (null hypothesis: no difference between the means) showed no significant difference (two-tailed $p = .7797 > .05$) between federal and unitary systems. However, this variable does show substantial variation *within* system type, with a range of 44.32 percentage points in federal countries and a range of 77.56 percentage points in unitary ones.

Politically decentralized countries have subnational representation. Functionally, however, subnational governments exist on a spectrum of effective jurisdiction and power. Along the political dimension, federal systems are clearly decentralized in structure – all federal systems that are democratic have elected officials at the subnational level. However, many unitary systems have local or subnational elections for specific offices as well. For example, France, which has a unitary constitution, has elected regional assemblies as well as local elections for city councils at the municipal level. Countries vary along the spectrum of political decentralization if the elected officials at different levels are not empowered to make autonomous decisions within their respective jurisdictions. In federal countries that have a single dominant political party, such as Mexico during the rule of the Institutional Revolutionary Party (PRI), political power can remain extremely centralized with all decisions flowing from the national government, even when subnational officials are elected and ostensibly representing their local and regional constituencies. Likewise, if party discipline is high, even without a single dominant party, officials at the national government level may dominate decision-making at the lower levels of

government. In this way, political decentralization as an empirical reality may contrast from political decentralization as a structural feature of a governmental system.

Conclusion. The foregoing discussion supports my decision to treat decentralization and federalism as two separate but related concepts in this dissertation. Decentralization will be measured as a functional matter using factor scores that separate the concept along its three dimensions. Federalism is treated as a dummy variable that scores a one for countries with federal constitutions, and zero otherwise. By including these variables in my analyses, I can measure and control for the effects of both federalism and decentralization, and by including interactions where relevant, I can measure the effects of federalism and decentralization combined.

Decentralization and Food Security

Decentralization is a policy choice, and an increasingly prevalent one in developing countries (Jütting et al. 2005). This choice is made on the basis of strong theoretical arguments, but solid empirical evidence of positive social outcomes is often inconsistent or lacking (Ali Khan 2013; Conyers 2007; Crawford 2008; Faguet 2004; Uchimara and Jütting 2009; Vedeld 2003; Von Braun and Grote 2000). In theory, decentralization improves efficiency, in the sense of satisfying the specific needs and preferences of the populace. Decentralization allows policies to be tailored to both local problems, and to local policy preferences. If all policy is set at the national level, this can lead to one-size-fits-all policies that may not effectively address problems as they manifest in different parts of a country. Decentralization also theoretically improves governance. Bringing the rulers closer to the ruled should increase accountability and stimulate participation when

people feel a greater degree of external political efficacy – that is, when they feel their actions have a real effect on political decision-making.

Decentralization should affect food security differentially along its three dimensions, and the MSA framework helps to separate out the expected effects. Political and administrative decentralization can be expected to have a positive effect on food security because of improved problem definition (the problem stream), improved targeting of policies (the policy stream), and greater opportunities for political pressure by affected groups (the politics stream). Political and administrative decentralization allow for more finely-grained and nuanced problem definition. Information about specific manifestations of food insecurity at the local level can be gathered, assessed, and contextualized more easily by bureaucrats and politicians with specific local² level knowledge – and this type of knowledge is most likely to reside with local level officials. However, information-gathering is often resource intensive, and can only happen if sufficient fiscal resources are available and in the control of local officials. With good information can come better targeting of policies to local needs. Under political and administrative decentralization, policy choice and implementation are both local, and therefore policies can be tailored to the specific circumstances faced by food insecure people. In one state, the problem causing food insecurity may be drought, so irrigation policies may be the solution; whereas in another, the problem may be unemployment, so works programs would be a better fit. Under decentralization, this choice is possible.

Finally, there are several ways in which politics are likely to be affected by decentralization. When local officials are empowered, they can become both a stimulus of and a

² Local here can be taken to mean state/provincial or municipal – so, local as in not national.

target for mobilization and political pressure among local groups. Likewise, people who may feel that the national government would not heed their problems could be empowered to lobby local officials to make their concerns felt. Given the lack of resources among most people suffering from food insecurity, the lowered costs of participation and lobbying at the local level could make it easier to find ways to bring political pressure to bear. With all of this, however, the underlying assumption is that local governments have the resources they need to address the problems of their constituents, so fiscal decentralization is always a factor in how much decentralized governments can actually accomplish.

Hypotheses: Fiscal, Administrative, and Political Decentralization. The foregoing discussion suggests three hypotheses, one for each dimension of decentralization:

H1: Countries that are fiscally decentralized will have more food security.

H2: Countries that are administratively decentralized will have more food security.

H3: Countries that are politically decentralized will have more food security.

Separating decentralization into these three dimensions and testing each one will allow a more nuanced understanding of how decentralization affects food security.

Federalism and Food Security

Federalism is a formal government structure in which political power is shared between a government at the national level and sub-national units of governments at one or more levels. Formal federations are constitutionally defined. Federalism is often an impediment with respect to social welfare policy (Pierson 1995; Rodden 2010), partly because policymaking is a great deal more complicated under federalism, and partly because federalism can, and in many cases does, empower those who seek to constrain redistribution. In addition to answering the basic policy

question of what should be done, federal systems must answer a second question: who (i.e. what level of government) should do it? Empowered actors at all levels have an institutionalized say in what policies are adopted, and how they are implemented. Federalism complicates policy making, especially when it comes to redistributive policies like most of those that address food security, because it empowers subnational actors to an extent that wealthier regions of a country can block or avoid redistribution of their wealth to poorer regions. The proliferation of policy-making venues under federalism provide more opportunities for opponents to stymie policies with which they disagree by venue shopping, and policy implementation is more complicated under federalism (Pressman and Wildavsky 1984; Schattschneider 1975).

Hypothesis: Food Security and Federalism. The foregoing discussion suggests that formal federalism may impede efforts to address food insecurity. Therefore, I propose the following hypothesis:

H4: Federations will have less food security.

I now turn to a discussion of the data on which these hypotheses will be tested.

Data Sources and Methods

This dissertation uses quantitative methods to investigate the empirical relationships between the variables of interest: federalism; fiscal, administrative, and political decentralization; democracy; and, food insecurity. For this purpose, I have assembled a time-series, cross-sectional dataset of all countries from 1990 to 2011. Each model presented in this dissertation draws on different subset of this dataset – none of them use the entire dataset, principally because the dependent variable is measured less frequently than many of the other variables it contains. All data are secondary – that is, I did not collect any primary data for this

dataset. Instead, I combined information that had already been gathered and published. The data are drawn from the United Nations Food and Agriculture Organization (FAO), United Nations Children's Emergency Fund (UNICEF), the World Health Organization (WHO), the World Bank, the International Monetary Fund (IMF) Government Finance Statistics (GFS), Freedom House, the International Food Policy Research Institute (IFPRI), and research published by Schneider (Schneider 2003a) and Cafiero et al (Cafiero et al. 2016).

Democracy, federalism, and decentralization are the key independent variables. Democracy is measured along two dimensions using the Freedom House scales of political rights and civil liberties. Federalism is measured as a dummy variable that categorizes each country as federal or not, in each year. Decentralization is measured along its three dimensions – fiscal, administrative, and political – using factor scores developed by Schneider (2003a).

My dependent variable in all analyses is food security. Food security is measured using a recoding of the Global Hunger Index (GHI), developed by Wiesmann (2002) and extended by IFPRI. The GHI combines three dimensions of food insecurity – undernourishment in the general population, child underweight, and child mortality – into one number, capturing some of the complexity that characterizes the problem. The GHI is calculated so that it increases as the indicators of hunger increase. However, this dissertation employs the concept of food security, which is inversely related to hunger. Therefore, to eliminate confusion and facilitate discussion, I recode the GHI into what will be called the Food Security Index (FSI). The FSI is the GHI subtracted from 100, thus reversing the scale and creating an index that increases as food security increases.

The problem of missing data, which is considerable in these measures, is addressed using multiple imputation (MI). Models are estimated using ordinary least squares (OLS) regression, and regression with panel corrected standard errors (PCSE).

Chapter Organization

Chapter 1 introduces the dissertation, establishes its contribution to the field, presents the theory and hypotheses to be tested, and provides an overview of the data sources and methods. Chapter 2 defines the central social welfare problem in this project: food insecurity. It provides a current picture of the state of food security in the world, and discusses the characteristics and consequences of food insecurity. Chapter 3 reviews the literature on the theoretical and empirical relationship between social welfare and democracy, decentralization, and federalism, each in turn. Chapter 4 contains the empirical data analysis, presenting my models and findings. Chapter 5 discusses my findings and how they reflect on the research questions central to the dissertation. It also summarizes and contextualizes the foregoing chapters, and suggests further research to be done.

Conclusion

Democracy, decentralization, and federalism all structure the balance of interests in political systems. Both decentralization and democracy are often argued to enhance accountability, and therefore responsiveness of government. But is this the case in practice? What about federations? Are they better equipped to provide food security? This dissertation will examine how democracy, decentralization, and federalism affect one specific social welfare problem: food insecurity.

CHAPTER 2 FOOD INSECURITY: A GLOBAL PROBLEM

Introduction

Food insecurity is a daily reality for millions of people. For centuries, food insecurity and hunger were not understood to be political problems; they were considered to be inherent in the human condition. Malthus (1872) famously theorized in the 19th century that any species, humans no exception, will increase its population until it outstrips the sources of nourishment, triggering misery, famine, and death. This was presented as inevitable and inexorable. The Malthusian definition indicated two possible strategies: population control, and increased food production. However, in his formulation, the problem had no real solution; more food meant more population, and a growing population would inevitably outgrow its source of food. In the 20th century, other theorists began to chip away at the subject of food insecurity.

De Castro (1972) wrote *The Geopolitics of Hunger* in 1952. He pointed out that hunger was an ignored problem, discussion of which was almost taboo, and that its causes lay in the failure of society to recognize and attack food insecurity as something other than an economic and personal failure. Speaking in the context of the Brazilian experience, de Castro pointed out that colonialism and the imposed system of agricultural production, land distribution, and land use were major causes of food insecurity. Sen (1983) examined famines that occurred in India in years when there was a surplus of food production, and found that hunger was caused by a failure of accessibility: distribution of food, not its availability, was the central issue. Thinkers like these began to sketch a different picture of food insecurity: not as an inevitability or a condition of life, but a choice made by societies – a choice that could be unmade. The problem began to be

recognized as a political problem, and food insecurity came to be defined as a failure of public policy.

The market comprises the primary food distribution system of the world today, and many analysts still view the market as the main solution to food insecurity (Leathers and Foster 2004). However, for people facing chronic food insecurity, the market has failed. Poor consumers do not have enough money to register demand for food – if they did, they would buy the food they need – and so the market will not serve them. They rely mostly on their governments to fill the gap. What causes some governments to adopt policies that fight food insecurity? What conditions make governments pay attention to this problem? Under what circumstances are food security policies more effective? What determines the success of public policies to alleviate food insecurity? This dissertation examines food insecurity defined as a political problem with solutions rooted in public policy. In order to do that, food security must be clearly defined and measured. That is the goal of this chapter.

The Dimensions of Food Security

Food security is the state of all people, at all times, having access to enough safe and nutritious food to lead a healthy and productive life (FAO 2009). Food security is a complex concept. It consists of at minimum three dimensions: *availability*, *access*, and *utilization*. These dimensions are ordered. Food cannot be accessible unless it is available. Likewise, food must be both available and accessible before it can be utilized. However, none of the three is sufficient for food security. Food security exists where the three dimensions converge: when enough food is available, accessible, and utilized. Food insecurity is defined in the negative: it is the lack of food security. Food insecurity exists when there is a failure along any of the three dimensions.

Food security and insecurity occur at many different levels of analysis. For example, an individual or a city can be food secure; likewise, a country or a region can be food insecure.

Food security begins with *availability*. Enough food is available when the food supply is large enough and diverse enough to satisfy the energy and nutritional needs of every person in a population. Is there enough food available? Is sufficient food being grown or imported? Is food available in all geographic areas? Food insecurity is unavoidable when the available food is insufficient to meet the needs of a person or a population of people.

Yet overall population-level food availability is not sufficient to resolve food insecurity. Until Sen's (1983) seminal work on famines, availability was thought to be the central problem and food security was assumed to exist if the food supply was large enough to satisfy the caloric needs of a population. Sen examined famines that occurred during times of plenty and concluded that there was another crucial piece of the puzzle. He found that people starved when there was food available because they could not gain access to the food. In so doing, Sen identified the second dimension of food security: accessibility.

Accessibility is the degree to which people can gain control over the available food. Access is itself a multidimensional concept. Access to food may be *economic*, *physical*, or *social*. *Economic access* consists of the ability to exchange economic resources for food. Food may be bought on the open market given sufficient funds; work may be exchanged directly for food; or economic resources such as land and labor can be utilized to grow food. When the resources a person or a population commands are insufficient to acquire enough food in enough quantity and variety to maintain health, food insecurity is the result. *Physical access* is determined by where food is located relative to people. The available food must be reasonably proximate, or

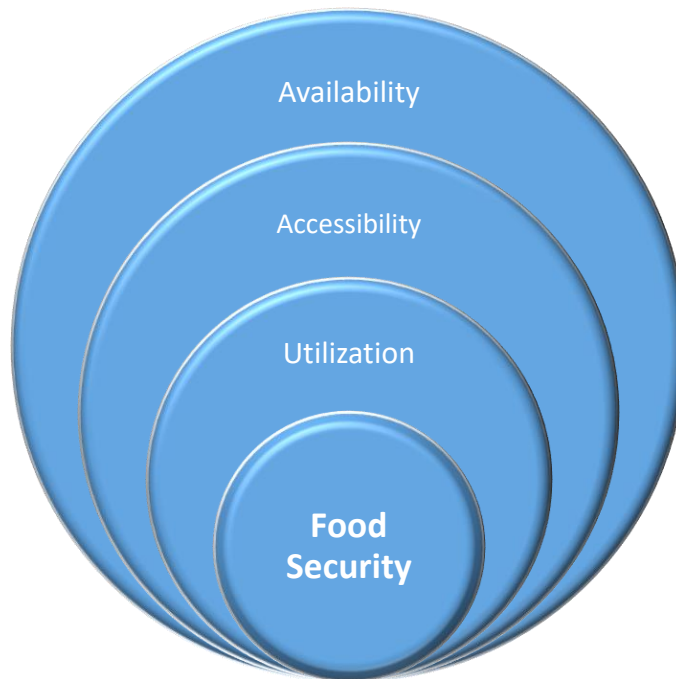
transportation systems must be well-developed and distributed enough to move food expeditiously to the people who need it. Food insecurity results when food is an unreasonable (defined contextually) distance from the people who need it. Finally, access to food has a *social dimension*. In order for food security to exist, people must be able to access it in socially acceptable ways. Resorting to strategies like stealing or scavenging indicates food insecurity. The social dimension of access also includes the idea of a socially acceptable diet; that is, a diet that is appropriate in the cultural context. Resorting to foods that are not culturally acceptable is an indication of food insecurity.

Is the food that is available accessible to everyone? If people are dependent on the wages they earn, do they have enough income to buy sufficient food? If not, are there alternative resources they can use to acquire food such as government programs for vouchers or direct food distribution? If they are farmers, do they have the resources to grow enough food? Can people get enough of a variety of foods or must they limit themselves to only a few, low-quality foods? Can people get food in socially acceptable ways or do they have to resort to strategies that are outside the norm? Is the food they can access part of a culturally acceptable diet? If the answer to any of these questions is negative, then food accessibility is lacking. A failure of accessibility is a dimension of food insecurity.

The third dimension of food security is *utilization*. Is the food that is available and accessible being utilized properly? Utilization failures can fall into two categories: *external* and *internal*. *External utilization* refers to the things external to the physical body that are necessary to properly use food. Two major external factors important for utilization are clean water and sanitation. If no clean water is available or if sanitation is lacking, it becomes difficult to handle

food in a safe and sanitary manner. Another external failure of utilization is food spoilage and waste. This can be a result of improper handling, or it can be due to lack of storage capability. *Internal utilization* factors refer to how a person's body processes food. A normally developed, healthy body will process everything it needs from food, given an adequate diet. An unhealthy or underdeveloped body, however, will often not be able to obtain the maximal benefit from food. Disease can cause malabsorption of nutrients. This facet of food insecurity is examined in more detail below. Figure 2.1 summarizes the foregoing discussion.

Figure 2.1. Food Security in Three Dimensions



Food Insecurity: What Does It Mean for the Individual?

Technical definitions of food insecurity sometimes mask the fact that food insecurity is a lived experience for millions of people every day. A great deal of work has been done to discover the commonalities in experience of food insecurity; it is remarkably similar across cultural

contexts (Ballard, Kepple, and Cafiero 2013). Food insecurity starts with concern and worry about getting food or about running out of food, about not having enough resources to obtain sufficient food. It intensifies as people begin to substitute lower quality foods and reduce the variety of foods they eat because they lack the means to do otherwise. They may shift either to foods or to ways of acquiring food that are less culturally acceptable, and these actions cause them to feel shame. Next, people start to skip meals and limit portions to stretch their supply of food. Finally, they go hungry, not eating for a day or more. While this dissertation relies on other more traditional ways of measuring food security, increasing attention is turning to food insecurity understood in this manner (cf. Ballard, Kepple, and Cafiero 2013; Cafiero et al. 2016; Coates et al. 2006), measured by using surveys to gather information about the experiences and coping strategies of people living under these circumstances.

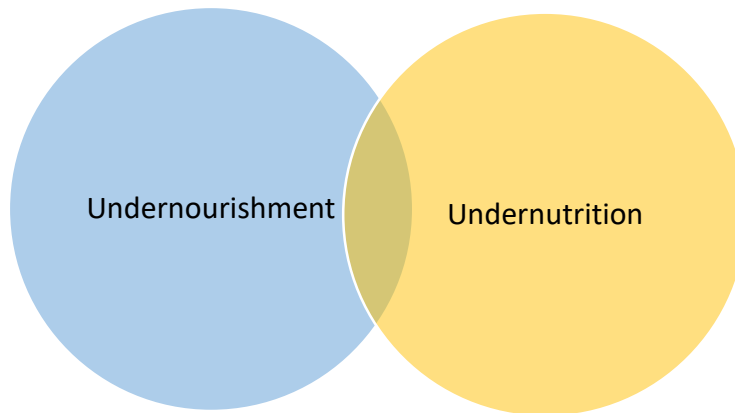
Food Insecurity: The Physical Consequences

Food provides two main categories of resources to the body, both of which are essential for health and life. The first resource provided by food is *calories*. Calories are a measure of energy, and this energy is necessary to run all the processes of the body. Muscle contractions such as heart beats, the physical process of digestion, nerve impulses, respiration, and physical movement all require calories of energy to happen. The second category of resources provided by food is *nutrients*. Nutrients are chemicals that make up the physical aspect of the body, or that take part in bodily processes. Nutrients like protein provide the amino acids needed to construct enzymes that enable body functions, as well as physical structures like cells, muscles and other tissues of the body. Vitamins and minerals are chemical compounds that are necessary in sufficient amounts for healthy body structures and proper bodily function. For example, the

mineral iron is necessary for hemoglobin, a molecule in the blood that carries oxygen throughout the body. Vitamin A is a vital component of the retina in the eye, enabling eyesight. All of the necessary nutrients are available in food, and people can get everything they need from food when they are food secure.

Food insecurity is the state of not having enough food, and further, not having enough nutritious food. It may be due to failures of availability, access, utilization, or combinations thereof. Chronic food insecurity manifests in the human body as two physical conditions: *undernourishment* and *undernutrition*. *Undernourishment* is the lack of sufficient calories; that is, a person suffering from undernourishment cannot access enough food to meet his or her daily energy requirement. *Undernutrition* is the lack of sufficient nutrients; that is, a person suffering from undernutrition is lacking a sufficient amount of one or more key nutrients, such as protein, vitamin A, zinc, or other vitamins and minerals. Another way to say the same thing is that undernourishment results from an insufficient quantity of food, whereas undernutrition results from an insufficient quality of food (Waterlow 1997). The two conditions are distinct because neither is necessary nor sufficient for the other. A person can have enough calories, but if the diet is insufficiently varied then they may lack of one or more key nutrients to the point of lasting harm. Likewise, a person may have a nutritious enough diet in that there is no specific nutrient so lacking as to cause permanent harm, but may not be able to regularly consume enough calories to maintain a healthy and productive life. Finally, the two can be concurrent in the same individual. Figure 2.2 summarizes this discussion.

Figure 2.2. Food Insecurity: Primary Physical Conditions



Undernourishment and undernutrition, separately or together, cause a host of measurable effects. In children, undernourishment and undernutrition can cause *stunting* (low height for age). Stunting in particular indicates chronically insufficient food for normal growth (Waterlow 1972). In both children and adults, undernourishment leads to *underweight* (low weight for age) and *wasting* (low weight for height). Wasting in particular indicates acute food insecurity that has caused weight loss in the shorter term. A person can be underweight as a result of either wasting or stunting, so this indicator captures food insecurity both in the short- and long-term (Black et al. 2008).

Undernutrition leads to a host of different diseases directly caused by vitamin and mineral deficiencies. Undernutrition and undernourishment also increase susceptibility to infectious and chronic illnesses and diseases. In turn, disease has a reciprocal effect on both undernutrition and undernourishment. For example, diseases that cause acute diarrhea render individuals unable to

properly absorb nutrients, exacerbating undernutrition. In adults, illness may lead to low productivity or even a total inability to work. Even absent illness, chronic undernourishment leads to low productivity due to weakness and lack of endurance. In both of these ways, food insecurity compromises adults' ability to work and thereby produce food or earn wages to buy food, which in turn exacerbates food insecurity. Undernutrition and undernourishment in children leads to *cognitive effects* that may last a lifetime. Finally, undernourishment and undernutrition can lead to increased *mortality*, especially in children but, in acute cases, in adults as well. Figure 2.3 summarizes this discussion.

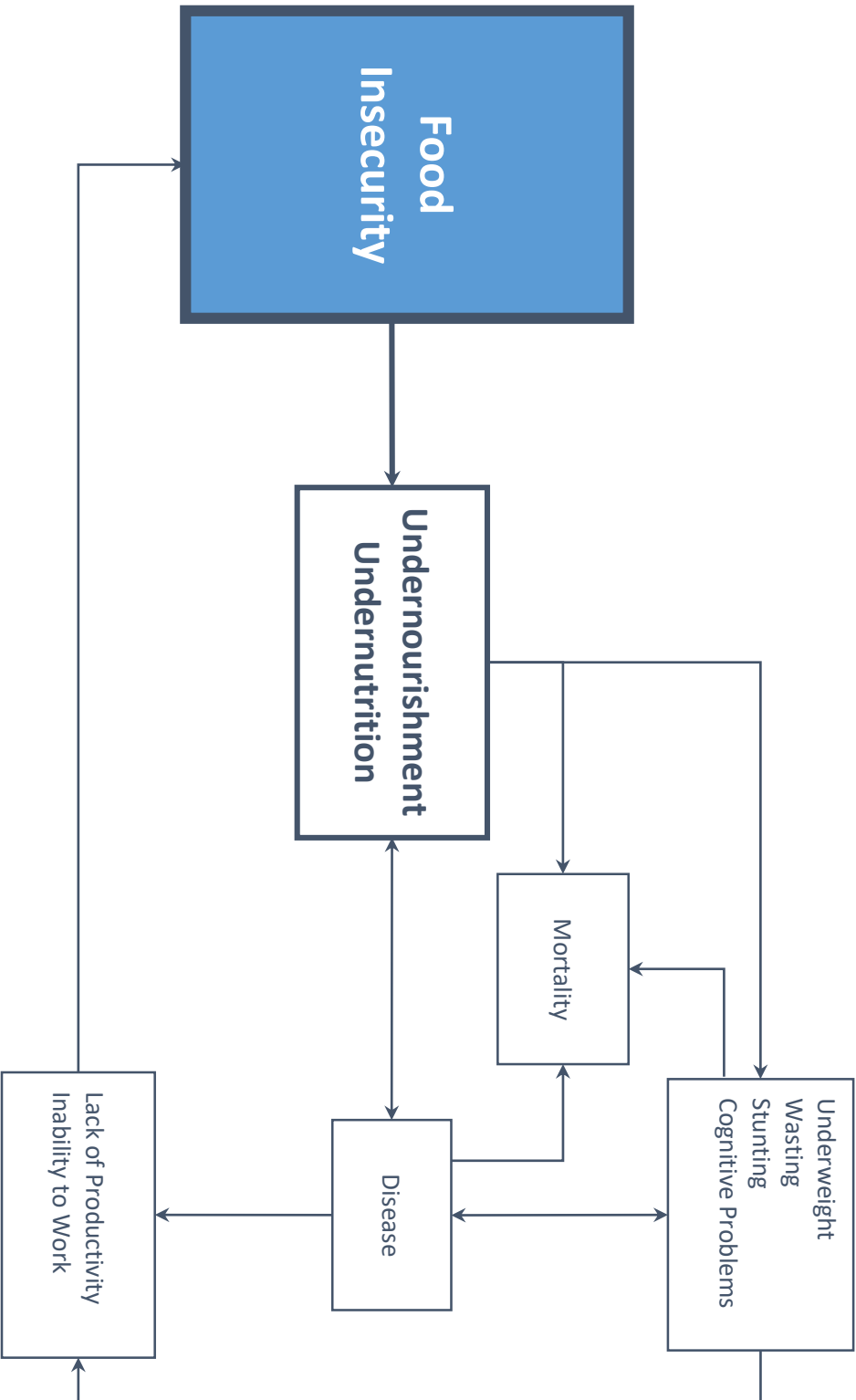


Figure 2.3. Food Insecurity: Primary and Secondary Effects

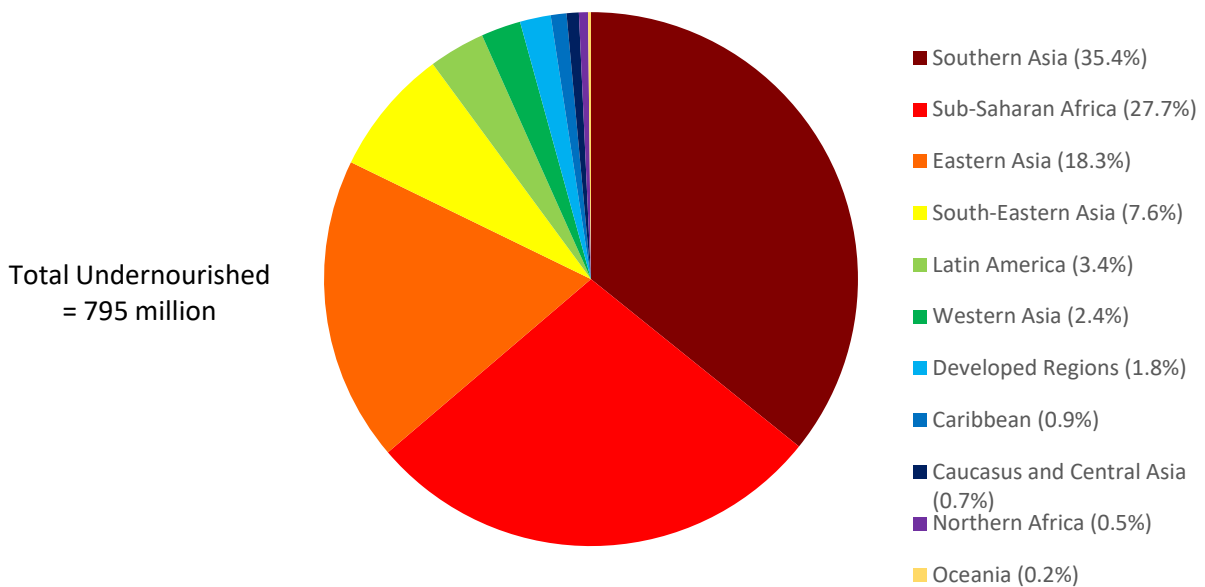
The literature about food security and food insecurity is rife with different descriptive words and varieties of measurement (FIVIMS 2002; A. D. Jones et al. 2013). A number of concepts occur regularly that appear to be synonyms for food insecurity, but important and sometimes subtle nuances exist. Mixing concepts and using distinct words interchangeably can easily lead to conceptual confusion. The word *hunger* appears frequently in discussions of food insecurity. *Hunger* can mean (at minimum) two different things. One is a physical feeling that individuals get when they have not eaten for a period of time. Hunger in this sense functions as the body's signal that it has a need for food. A second use of hunger is to refer to the situation I have defined as food insecurity. This use of hunger can apply at the individual, national, regional, or global level. Hunger is an evocative term, and one with an emotional impact, because it allows the reader to directly relate to the topic at hand – readers of this research have certainly experienced hunger in the first sense. Ironically, people who are chronically undernourished (i.e. hungry in the second sense) often cease to feel the physical sensation of hunger, and those who suffer from undernutrition will often experience no hunger (in the first sense) related to that condition. *Malnutrition* is another word used frequently to refer to undernourishment and undernutrition, but it has also come to encompass overnourishment, overweight, and obesity in the literature. *Primary malnutrition* refers to undernourishment and undernutrition due to a lack of food; *secondary malnutrition* refers to the malabsorption of nutrients that occurs due to disease. In general, these terms will only be used in this project when referring to other works.

The Magnitude and Scope of the Problem

How many people are food insecure? The answer depends on what measurement is used. Different measures capture different dimensions of food insecurity.

One of the most commonly cited measurements of food insecurity is the FAO's prevalence of undernourishment (PoU). This measure combines data on food supply and household consumption to estimate the probability that a randomly drawn individual in a country will be undernourished – i.e. unable to get enough food to meet their daily caloric requirement. This probability can then be converted into a percentage or into a raw number of people. Thus, the PoU attempts to capture both availability and access. The PoU estimates that in 2015, 795 million people were undernourished (FAO, IFAD, and WFP 2015). This amounts to just over one in nine people worldwide. The geographical distribution of food insecurity as measured by the PoU is shown in Figure 2.4. It is worth noting that the PoU uses a threshold of the minimum calories to maintain a sedentary life – the minimum calorie requirements for an active life would be higher, and using that threshold would define even more people as food insecure.

Figure 2.4. Distribution of Undernourished People by Region (%), 2015



Source: FAO 2015

Note: These numbers are three-year average estimates of the prevalence of undernutrition (PoU) from 2014 to 2016. The sum is 99% due to rounding errors.

Another way to directly measure food security – specifically the access dimension – is to use survey questions. In the 1990s, the United States Department of Agriculture (USDA) developed an eighteen question survey module called the Household Food Security Survey Module (HFSSM) that sought to measure both the presence and the severity of the experience of food insecurity at the household level (Kennedy 2002). The survey questions inquire whether households, given their level of money or resources, could acquire enough food, or if they had to adopt strategies such as limiting types of food, eating less food, or going without food. The answers to the questions allowed a household to be rated on a scale of four categories: food

secure; mild food insecurity; moderate food insecurity; and severe food insecurity.³ International attention has turned to this scale, and it has been adapted to and validated in many developing country contexts (cf. Coates, Swindale, and Bilinsky 2007; Magaña-Lemus et al. 2016; Melgar-Quinonez et al. 2006; Villagómez-Ornelas et al. 2014). Most recently, the FAO has instituted the Voices of the Hungry (VoH) project that deployed a version of the scale called the Food Insecurity Experience Scale⁴ (FIES) in the annual Gallup World Poll (GWP) starting in 2014 (Cafiero et al. 2016). The first deployment of the FIES covered 146 countries, and found that 1.01 billion people over 15 years of age in those countries experienced moderate or severe food insecurity in the previous 12 months. Of these, 375 million people experienced severe food insecurity.

By far the most plentiful measures of food insecurity are measures of utilization – how well the food that is available and accessible is used by the bodies of the people eating it. Utilization failures show up as both undernutrition and undernourishment. Undernutrition causes deficiencies of important nutrients. As of 2013, more than 2 billion people suffered from deficiencies in crucial micronutrients such as iodine, iron, vitamin A, and zinc, -- i.e. they lived

³ A food secure household does not report experiencing any food insecurity: it has access to sufficient food of the quality and type that the inhabitants prefer. All of the food insecure categories are cumulative – e.g people who are in households with severe food insecurity are also experiencing mild and moderate food insecurity. Inhabitants of a household experiencing mild food insecurity (sometimes called food insecure without hunger) worry about running out of food, sometimes do run out of food, and adopt strategies to stretch their food supply such as eating a lower quality diet or a smaller variety of foods than they would if they were food secure. Adults living in households with moderate food insecurity (sometimes called food insecure with moderate hunger) begin skipping meals and reducing portions, and they may lose weight from undereating; children in these households are fed a less balanced diet, and may not eat enough overall. Severe food insecurity (sometimes called food insecure with severe hunger) brings smaller portions, chronically skipped meals, and entire days without food for both adults and children. [(Kennedy 2002)]

⁴ The FIES module comprises eight questions that asked about food insecurity experiences over the past twelve months (Cafiero et al. 2016, Table 2-1, 7). During the validation process, these questions were found to conform to theoretical assumptions that they consistently measure escalating severity of food insecurity. Seven of the questions asked about individual experiences, and the remaining one asked about the individual's household. Affirmative answers on four to seven questions scored as moderate food insecurity; affirmative answers on all eight qualified as severe food insecurity.

with undernutrition -- due to a poor quality or insufficient diet (IFPRI 2014). Between 1995 and 2005, an average of 33 percent of children under five and 15 percent of pregnant women were deficient in vitamin A as measured by blood tests (Black et al. 2013). Another way that vitamin A deficiency is determined is by incidence of night blindness; 1 percent of children under five and 8 percent of pregnant women had night blindness on average in that time period. In 2011, 18 percent of children under five and 19 percent of pregnant women had iron deficiency anemia – i.e. the type of anemia that can be corrected with adequate dietary iron or supplementation (Black et al. 2013). In 2005, 17 percent of people globally were deficient in zinc, and iodine deficiency stood at 29 percent of the global population in 2013 (Black et al. 2013). These statistics reveal a widespread problem with food insecurity.

The World Health Organization (WHO), UNICEF, and the World Bank (2015) release estimates each year of the number of children under the age of five suffering from the effects of food insecurity, which are stunting, wasting, underweight, and mortality, each of which will be defined below. These estimates are based on household surveys carried out in 150 countries and territories and they allow inferences to be made about the entire population of 667 million children under five in the world in 2014.

Stunting is defined as low height for age, and a child is considered stunted when he or she is more than two standard deviations below the mean for the population to which the child belongs. Stunting is the result of chronic food insecurity, and is often not remediable once it sets in – at a certain age, height becomes permanent so limited early growth cannot be made up indefinitely. In 2014, 159 million, or 23.8 percent, of children under five worldwide were stunted.

Wasting is defined as low weight for height. Wasting occurs when a child faces acute food insecurity – that is, an often short-term, drastic reduction in the amount of food. This happens during famine, and also during other times of food shortfall that do not qualify as famine. A child is classified as wasted if he or she is more than two standard deviations below the mean for the reference population to which the child belongs, and severely wasted at more than three standard deviations below the mean. Wasting is caused by acute and severe undernourishment, but it is almost always remediable with feeding. In 2014, 50 million, or 7.5 percent, of children under five were wasted, and of those, one-third were severely wasted, which amounts to 2.4 percent, or 16 million, of all children under five.

Underweight is defined as low weight for age. A child is classified as underweight if he or she is more than two standard deviations below the mean for age and sex in the reference population to which the child belongs. In 2011, the global proportion of children under five who were underweight was 16 percent, or 101 million (Black et al. 2013). Underweight as a category can encompass both children who are stunted and children who are wasted.

Mortality is the most extreme result of chronic food insecurity. Mortality is caused by food insecurity directly and indirectly. The following mortality figures are for children under five years of age in 2011 (Black et al. 2013). The number of children in that age group who died in 2011 was 6,934,000. Estimates of child mortality attributable to stunting range, depending on the method of estimation, from 14.7 percent to 17 percent of total deaths in that age group, which amounts to 1.02 million to 1.2 million children (Black et al. 2013). 14.4 percent to 17 percent (1 million to 1.2 million) of child deaths in 2011 were attributable to underweight. Wasting (including severe wasting) caused 11.5 to 12.6 percent (800,000 to 875,000) of the

mortality in children under five; 7.4 to 7.8 percent (516,000 to 540,000) was attributable to severe wasting. Zinc deficiency accounted for 1.7 percent of mortality or 116,000 children, and vitamin A deficiency led to 2.3 percent or 157,000 deaths of children under five in 2011. These percentages cannot be added to get the total percentage of mortality attributable to nutrition deficiencies because many conditions overlap in the same individuals. Still, it is estimated that jointly, 44.7 to 45.4 percent of mortality of children under five in 2011 was attributable to nutritional deficiencies (Black et al. 2013). Food insecurity causes mortality most often because of increased susceptibility to and severity of disease. A study of 53 developing countries found that 56 percent of deaths of children under five “were attributable to malnutrition’s⁵ [disease] potentiating effects, and 83% of these were attributable to mild-to-moderate as opposed to severe malnutrition” (Pelletier et al. 1995, 443). Depending on the country, the effect of malnutrition ranged from 13 to 66 of child mortality, with a minimum of three-quarters of mortality due to malnutrition ascribed to mild-to-moderate malnutrition, as opposed to severe.

Utilization measures capture the dire effects of food insecurity, but they are problematic in that they also capture conditions that are caused by things other than food insecurity. However, given the ease with which anthropometric measurements, especially on children, can be gathered, these are sometimes the only measures available to assess food security. Over time they reveal patterns, even though each individual measurement may reflect other factors as well.

Conclusion

This chapter defines food security conceptually along three dimensions: availability, accessibility, and utilization. Food insecurity manifests in the individual as undernourishment

⁵ Pelletier et al. (1995) use underweight to measure malnutrition.

(lack of calories) and undernutrition (lack of nutrients). Food insecurity affects the survival and health of millions of people around the world. This chapter has sought to provide a conceptual basis and a statistical picture of the scope of the problem.

CHAPTER 3 POLITICS AND SOCIAL WELFARE: WHAT DO WE KNOW?

Introduction

Food security is of fundamental importance to social welfare. This dissertation examines how democracy, federalism, and centralization are related to food security – specifically whether they enhance food security at the national level in developing countries. The relationship between both democracy, federalism, and decentralization to social welfare is an active area of scholarship, although food security as a specific outcome has not been studied to any great extent. This chapter presents a review of the literature. Firstly, this literature review examines the relationship between democracy and social welfare as it has been framed, operationalized, measured, and tested in the existing literature. Secondly, it turns to federalism and decentralization and how they relate to social welfare outcomes.

Democracy and Social Welfare

A number of scholars have investigated the relationship between democracy and social welfare. Social welfare comprises an extremely broad subject area; therefore, it has been defined, measured, and operationalized in several different ways. In the study of democracy and social welfare, a common approach has been to use social spending as a proxy for social welfare (Avelino, Brown, and Hunter 2005; Brown and Hunter 1999; Kaufman and Segura-Ubierno 2001; Stasavage 2005). Most studies that use this approach assume that increases in social spending entail a positive effect on social welfare outcomes; papers that take this approach will be discussed briefly. A few scholars have increased the scope of measurement to include social service provision (Harding and Stasavage 2014; Lake and Baum 2001) or social welfare outcomes directly measured (Lake and Baum 2001; Ross 2006); a subset of these have used outcome

measures that relate to food insecurity (Blaydes and Kayser 2011; Pribble, Huber, and Stephens 2009; Ross 2006).

Democracy itself has been operationalized in a variety of ways in the study of the relationship between democracy and social welfare. The approaches include operationalizing democracy as: a dummy variable for democracy and authoritarianism (Avelino, Brown, and Hunter 2005; Brown and Hunter 1999); a dummy variable based on multiparty competition for the executive (Stasavage 2005); a three-category range from authoritarian to democracy (Pribble, Huber, and Stephens 2009); and a variety of recodes of the Polity III and Polity IV autocracy-democracy scale (Blaydes and Kayser 2011; Kaufman and Segura-Ubiergo 2001; Lake and Baum 2001; Ross 2006) often paired with robustness checks using the Freedom House democracy measures (Lake and Baum 2001; Pribble, Huber, and Stephens 2009). Summarizing this literature and bringing it to bear on the current topic – democracy and food security – is a challenge.

Democracy and Social Spending. In the literature on democracy and social welfare, social welfare is often operationalized in terms of social spending. Some studies look at aggregate social spending while others separate it into different types, such as social security, health, or education spending. Most employ the implicit assumption that such spending leads to better social outcomes, especially for the poor. Many of these studies are limited to a single region.

Latin America has been a frequent source of data to test the relationship between democracy and social welfare. Brown and Hunter (1999) examined aggregate social spending on health, education, and social security in 17 Latin American countries from 1980 to 1992 and found that authoritarian countries were more responsive to economic factors and democracies were

more responsive to political pressure and demographic changes; low-income democracies were especially likely to spend more than their authoritarian counterparts. Authoritarian systems were quicker to cut social spending in the face of economic downturns than democracies were. Avelino, Brown, and Hunter (2005) studied 19 Latin American countries from 1980 to 1999 and found that democracy was associated with increased social spending, particularly on human capital formation in the face of globalization. Democracies were found to protect social programs more than authoritarian countries, especially programs with large constituencies, but also those with small but politically powerful constituencies. In contrast, Kaufman and Segura-Ubierno (2001) examined 14 Latin American countries from 1973 to 1997 and found democracies no different than authoritarian regimes in terms of aggregate social spending or responsiveness to economic downturns. When social spending was disaggregated into social security spending and spending on human capital (i.e. health and education), democracies were found to spend more on human capital than both authoritarian and popularly based (those dependent on organized labor or oriented towards the popular sector) regimes.

Stasavage (2005) examined democracy and education spending in 44 African countries between 1980 and 1996. He theorized that with the onset of democracy, rural groups in these countries would have more political power than they did under authoritarian regimes. Urban groups would be similarly empowered no matter the regime type, since urban unrest is a perennial peril to governments whether democratic or authoritarian. Rural groups prioritize primary education over university level education, and urban groups favor university funding. Therefore, Stasavage hypothesized that if it is true that democracies are more responsive to newly empowered constituencies, then, as they become democratic, regimes should increase

service provision (operationalized here as education spending) and distribute those service increases accordingly. Stasavage found that countries with multiparty competition for the executive (the operationalization of democracy employed in this study) had higher education spending overall, and this was driven by increased spending on primary education while university funding stayed constant, supporting the contention that democratic politicians will tailor their actions to newly empowered groups.

These studies examined social spending as a proxy for social welfare. On balance, democracy was found to have a positive effect on social spending in most cases. These studies were limited to certain regions, and they do not provide evidence that increases in social spending have had positive impacts on social welfare outcomes.

Democracy and Social Service Provision. The literature has several different foci when it comes to democracy and social welfare. Some studies examined the relationship between democracy and social service provision, which is a more proximate measure for social welfare than social spending. Other studies look at social welfare outcomes directly. When outcomes are tested, democracy's effect becomes more complex.

An influential and oft-cited study by Lake and Baum (2001) examined nine social service provision measures⁶ and eight social welfare outcomes and found that democracy has a generally positive effect in comparison to authoritarian systems. This study employed 17 cross-sectional

⁶ Lake and Baum (2001) test 17 total measures. While their study employs all of them as measures of provision of public services (Lake and Baum 2001, 600–602, Table 1), this dissertation makes a conceptual distinction between social service provision and social welfare outcomes. Therefore, the literature review will consider the two categories of measures separately. Social service provision is measured as: primary school pupil-teacher ratio; health care access; clean water access: total, rural, and urban; population per physician; attended births; DPT and measles immunizations. Social welfare outcomes are measured by: adult illiteracy; persistence in school to fourth grade; primary, secondary, and tertiary school gross enrollment ratios; crude death rate; infant mortality rate; and life expectancy at birth.

analyses and five time-series cross-sectional (TSCS) analyses using data from between 37 and 110 countries, depending on the measure in question, from the years 1970 to 1992. Among the studies discussed in this literature review, this study is one of the few that includes both developing and developed countries, although the authors indicate that the inclusion of high-income countries did not bias the results (Lake and Baum 2001, 603). While the magnitude varied across indicators, in all but six of the 38 cross-sections, democracy had a strong and positive effect (appropriately scaled by indicator – positive here represents an improvement) compared to authoritarian systems. The five TSCS analyses examined democracy's association with secondary school enrollment ratio (yearly from 1975-1993), safe water access (every three years from 1985-1994), measles and DPT immunizations (every 3 years from 1986-1995 for both), and infant mortality (every five years from 1967-1992), all measured in first differences – the change in level from the prior time period to the current time period. In all cases democracy was strongly associated with positive changes as compared with authoritarian regimes. The authors conclude that democracy is associated with higher levels of public services worldwide.

Harding and Stasavage (2014) examine the question of democracy and social service provision in 29 African countries between 1980 and 2007. They ask several related questions. Does democracy lead to greater social service provision? If so, what types of social services can democracy be expected to increase or improve? Finally, does democracy lead to better social outcomes through higher service provision? Their argument rests on the time horizons and goals of politicians within new democracies with weak state capacity. Under democracy, politicians will seek to provide social services in order to fulfill campaign promises and to build electoral support. However, in a context of weak state capacity, it is difficult for voters to attribute blame or credit

for many types of policy actions, and so politicians will tend to implement changes and services for which the credit is easily attributable. When it comes to education provision, such a politician, faced with the choice to improve school inputs (by providing more teachers) or abolishing school fees, will choose the directly attributable action of abolishing school fees. Abolishing school fees is an example of social service provision that should result in higher attendance, but this raises questions about the quality of the services provided. Indeed, Harding and Stasavage find that under democracy, school attendance is higher and that this effect is due to the abolishing of primary school fees. However, teacher-pupil ratios also are higher under democracy because these less attributable inputs do not keep pace with the higher enrollments – so, while democracy does provide more services, service quality is not necessarily enhanced. Finally, Harding and Stasavage present survey evidence from Kenya that voters indeed make decisions to support politicians based on campaign promises to abolish school fees.

Democracy and Social Welfare: A Complicated Picture. The Harding and Stasavage study brings nuance to the debate about democracy and social welfare. Whereas previous studies expected and tested the positive effect of democracy, this study points out that democracy may have a positive effect on some outcome indicators, but that this may come at the expense of other indicators. Rather than considering democracy as a monotonically positive influence on social welfare, perhaps it is important to consider exactly how democracy works in practice, and how the pragmatic politics that attend elections and re-elections might influence the choice of social welfare options that democratic politicians are likely to support.

Harding and Stasavage were not the first to question whether democratic politics may hinder the effectiveness of social welfare efforts. Varshney (2000) addressed this question by

asking why long-standing democracies (defined as countries that had maintained democracy for more than half the time since the late 1940s or since a particular country's independence) have not eliminated poverty. Poverty is conceptualized in terms of malnourishment, and defined as the percent of the population living on less than \$1 (PPP) per day – the amount needed to maintain a minimum caloric intake for body functions (Varshney 2000, 724). Using a small-N comparative design, Varshney compared 8 democracies to 15 authoritarian countries and found that democracies have a moderate record on poverty alleviation (and no democratic country has ignored the problem) while authoritarian countries run the range from best to worst. He argued that in authoritarian countries, governments must satisfy the elite (who are not food-insecure) but that these countries may attack poverty if there is an ideological reason to do so or if an elite coalition forms behind poverty alleviation. In democracies, the government must serve the needs of the electorate, which in developing countries will be disproportionately poor. This would lead one to believe that democratic governments would vigorously attack poverty, but the fact that poverty alleviation has been only moderate under long-term democracy shows that this is not the case.

Varshney argues that the pattern of moderate poverty alleviation (but not elimination) by democracies may be due to two different characteristics of democratic politics. First, he differentiates between indirect and direct methods of poverty alleviation: indirect methods are growth-mediated and include market-oriented reforms, currency devaluation, and liberalizing trade; whereas direct methods include distribution of food, income, or assets to the poor (Varshney 2000, 722–23). Democratic politicians with short time horizons extending little past the next election, faced with an impoverished electorate, will opt for the direct methods rather

than seek to build support for indirect policies that may pay off in the long run but will also cause short term disruption. In fact, the reason Varshney posits for authoritarian poverty alleviation success stories is precisely that in those countries, politicians had the ability to adopt and impose unpopular policies because they were not accountable to any but the elite – who usually benefited from such policies. The direct methods will alleviate the most severe forms of poverty, but may not solve the larger structural issues that, if addressed, can lead to long-term and more successful poverty alleviation. Second, Varshney points out that while people may be divided into the poor and the well-off, the poor are not a monolithic group that will vote on economic self-interest alone. The poor as a group are divided along ethnic, religious, and geographical lines to name just a few, and they may vote along those lines instead of supporting anti-poverty politicians as a voting bloc. Thus, the effect of the large numbers of impoverished voters may be attenuated at the ballot box.

Both Varshney (2000) and Harding and Stasavage (2014) shed light on the complexity of the links between democracy and social welfare. While the poor make up a large portion of the electorate in most developing countries, it does not automatically follow that the interests of the poor as an economic bloc will be addressed by democratic governments. In order for that to happen, those interests must first be coherently expressed at the ballot box. Even in that case, democratic politics may sometimes work against effective policy action. The politician who wants to be re-elected may not be able to effectively advocate for optimal policies, and may instead opt for more easily explained solutions or quick fixes that do not address the underlying issue in the long run. For both these reasons, we may not always observe positive social welfare changes in democracies when compared with authoritarian systems, or the picture may be mixed, albeit

in predictable ways. As this discussion related to food insecurity, however, the short time horizons of democratic politicians may work in favor of ameliorating food insecurity. Short-term food and voucher provision programs can be very successful in providing food security, even if they are not long-term fixes.

Democracy and Food Security. No project on food security and democracy can be complete without making mention of Amartya Sen's seminal and extensive work on democracy and famine (Dreze and Sen 1991; Sen 1982, 1983, 1996). Sen found that historically, famines have often occurred in years when food production was more than sufficient to cover nutritional needs. This fact led him to the insight that food supply is only part of the equation in food security; an equally important aspect is food distribution – what is now called food accessibility. Sen first defined entitlements – the bundle of resources (both monetary and nonmonetary) that people can exchange for food – and traced the cause of famine to entitlement failure. Different groups within society have different levels of entitlements, which are the result of both market activity and, to a large extent – especially for the most vulnerable – government policy. During normal times, they can exchange these entitlements for enough food to live and thrive. Certain groups in society are more vulnerable than others to entitlement failure, which may be caused by environmental or economic disaster. Widespread entitlement failure causes famine.

Sen used comparative case studies to draw the conclusion that democracy protects against famine (Sen 1983). Specifically, the existence of opposition parties and a free press under democracy constitute a systematic source of political pressure on the regime in power, which forces it to address famine conditions. Sen assumes that democracies will have freedom of the press (showing how important it is to consider broader concerns than just elections when

examining democracy and social outcomes) and that the press would bring information about ongoing famine to public attention. Opposition parties likewise have an incentive to publicize famine as a way to criticize the party or parties in power. Sen points out that the rulers never starve in a famine, and argues that “(d)emocracy...would spread the penalty of famine to the ruling groups and the political leadership” (Sen 1996, 24). This is a statement about the power of focusing events, like severe famine, to shift attention within a political system. But what about the case of chronic food insecurity?

Chronic food insecurity is not the same as famine. Chronic food insecurity has a more complex set of causes, and therefore, problem definition is much less clear. Likewise, the solutions to it are numerous. Whereas democracy may be protective against famine, it may not be so automatically advantageous for other types of social problems: “Democracies have been particularly successful in preventing disasters that are easy to understand, in which sympathy can take an especially immediate form....While the plight of famine victims is easy to politicize, these other deprivations call for a deeper analysis” (Sen 1996, 26). He argues this weakness of democracy is particularly problematic when a problem disproportionately affects minority groups within the society: the extent to which such a problem will be politicized will depend on how sympathetic the minority group is in the eyes of the majority. Finally, Sen emphasizes that political rights are central to the formulation of needs in the first place. If there are no political rights, then some conditions will simply remain in the background, not defined as political problems, but rather as personal failings or just natural inevitabilities.

If democracies are more responsive to food insecurity than non-democracies, this must be in part because politicians in democracies feel electoral pressure to adopt policies to increase

food security. It follows that the motivation to address food insecurity will be a function of election cycles – when elections are imminent, politicians should be especially attuned to food insecurity among potential voters. The Hunger and Nutrition Commitment Index, a project that investigates political commitment to hunger reduction and nutrition enhancement, provides evidence that this may be true (te Lintelo et al. 2014; te Lintelo and Lakshman 2015). Expert interviews were used to assess political commitment to food and nutrition security in six countries: Bangladesh, India, Malawi, Nepal, Tanzania, and Zambia. Experts were asked the question: “How sensitive are government budget expenditures on hunger and malnutrition to electoral cycles?” (te Lintelo et al. 2014, 105). In three of the six countries this electoral sensitivity was characterized as strong or very strong, in one it was fairly strong, and in two it was moderate.⁷ Strikingly, in five out of six countries, the expert panels judged government expenditures on hunger to be more sensitive to electoral cycles than to emergencies and disasters – in some cases dramatically so. This finding supports the proposition that elections cause politicians to pay attention to food insecurity, while leaving open the question of whether the attention is sustained or intermittent.

Turning back to the quantitative empirical literature, two recent studies have used food security measures as the dependent variable in empirical tests of the relationship between democracy and social welfare (Blaydes and Kayser 2011; Pribble, Huber, and Stephens 2009). Pribble et al (2009) examine poverty in 18 Latin American countries from 1968 to 2001; their

⁷ The authors differentiate between hunger and undernutrition (te Lintelo et al. 2014, 9) and report expert responses for both. Part of their project is an effort to determine whether political commitment is different along these dimensions. I report their findings for what they term ‘hunger’ because it most closely aligns with the definition of food insecurity used in this dissertation.

poverty measure is based on the percentage of households that have enough resources (monetary and nonmonetary) to satisfy their basic nutrition requirement (CEPAL/ECLAC 2002, 39, Box 1.1). Blaydes and Kayser (2011) study available calories per capita (which they term calorie consumption). Both papers found that democracy had a positive effect on their respective dependent variables, as compared with authoritarian systems.

Democracy and Social Welfare: The Missing Data Problem. An important paper by Ross (2006) addressed two separate issues: first, it examined prior work on democracy and social welfare and identified an important source of bias present in most studies; and second, it presented a new analysis of democracy and its relationship to infant and child mortality. Infant mortality is strongly related to food security – so much so that it is included in the Food Security Index that I will use as my dependent variable in the next chapter. Democracies spend more on social welfare than authoritarian systems, but it does not follow that social outcomes will be pro-poor. The distribution of such spending is an important consideration, because if it accrues to those with middle and upper incomes – in which case government spending would simply displace the spending such groups would have the means to do anyway – then increased social spending will not translate to better outcomes for all social strata. This is why it is important to broaden the study of democracy and social welfare to include outcomes, rather than using proxy measures that may not tell the whole story.

The second concern Ross raises is methodological – and devastating for prior studies that purport to show empirical links between democracy and good social welfare outcomes. Most of these studies use listwise deletion to deal with missing data.⁸ This practice is not a problem if the

⁸ For exceptions see Stasavage (2005) and Harding and Stasavage (2014).

data are missing completely at random (MCAR) – in MCAR cases, the data that are missing have no relationship with any variables in the dataset as a whole, and therefore no relationship with the other variables in the model. The randomness of the MCAR missing data protects against sample bias in the results. However, Ross analyzes datasets from prior studies and finds that the data are not missing completely at random. In fact, there is a pattern to the missingness. Democracies that are low-income tend to be the recipients of foreign aid and loans from institutions like the International Monetary Fund and the World Bank. Aid from such institutions comes with stipulations for data generation (to check on effectiveness of programs funded by the aid) and with capacity building funds for data collection. Authoritarian countries are less likely to get such aid and therefore less likely to produce data on social welfare outcomes. This adds up to a devastating pattern of missingness in the resulting datasets – low-income democracies have complete data and are therefore included in analyses, while high-performing authoritarian countries are dropped because their data is incomplete (Ross 2006, 863). Regime type is the explanatory variable in studies of democracy and social welfare, and the missingness in the data is directly related to it. Ross presents empirical support for many of the steps in this argument.

Ross argues that the pattern of missingness leads to sample bias and skewed results. Specifically, it makes the relationship between democracy and social welfare outcomes appear much stronger and more positive than it actually is. Ross tests the effect of regime type on infant and child mortality on a dataset of all 168 states with more than 200,000 population that were sovereign from 1970 to 2000 (Ross 2006, 865). When testing for the effect on a dataset that used listwise deletion to address missing data, democracy is a significant predictor of infant and child

mortality. However, when Ross re-estimated the model after using multiple imputation to mitigate the effect of the missingness, democracy was no longer significant.

Lessons from the Literature. Three lessons stand out from this review:

- 1) It is crucial to use measures for social welfare that capture the phenomenon in question instead of proxies like social spending, even if the proxies are more easily measurable and the data is more available. This project operationalizes social welfare as food security, arguably the foundation on which all other types of social welfare are built. Instead of measuring food security in terms of spending, calorie availability (Blaydes and Kayser 2011), or in terms of household or individual resources (Pribble, Huber, and Stephens 2009), food security will be measured using an index that captures more information about the manifestation of food insecurity in each country by including a measure that captures food supply (availability) to calculate percent undernourished as well as two measurable outcomes that depend heavily on food security: child mortality under five years of age and child underweight under five years of age (Wiesmann 2002). This index incorporates measures of all dimensions of food insecurity, enhancing its content validity.
- 2) Many of the cited studies have a limited geographical scope. This limits the generalizability of their findings. If democracy truly enhances food security, this should be evident across both time and geographical space. Rather than test this relationship in a particular region, my analysis includes all countries over 200,000 in population from 1990 to 2011.
- 3) It is vital to address the missing data problem before performing data analysis of international datasets dealing with regime type in order to prevent sample bias.

Therefore, I will use multiple imputation to impute the missing values and present results on two datasets: one using listwise deletion and the other using multiple imputation.

In conclusion, this literature review shows that the question of democracy's effect on social welfare is still open. While it has been tested in a variety of contexts, methodological problems raise questions as to the legitimacy of positive findings. My analysis will attempt to learn from the experience of these other scholars and apply the lessons learned in a new context.

Decentralization and Social Welfare

Decentralization is an increasingly common policy prescription, especially in developing countries (Ali Khan 2013; Von Braun and Grote 2000). The relationship between decentralization and various social outcomes has been studied extensively using case studies (Crawford 2008; Crook 2003; Jütting et al. 2005; Steiner 2007; Uchimara and Jütting 2009), and occasionally in more quantitative designs within a case study context (Faguet 2004; Faguet and Sánchez 2008). One challenge when surveying this literature is the sheer number of different ways decentralization is defined and operationalized.

Almost all studies of decentralization share a common basis in dividing the concept along three dimensions. Firstly, who controls public monetary resources? The answer to this question places a country on a spectrum of *fiscal decentralization*. For example, if funding flows from the national level to the subnational governmental units and the subunits lack the power to raise their own funds, the country would be fiscally centralized; if the subunits are fiscally independent of the national level, the country would be fiscally decentralized. Secondly, who decides what policies to pursue and who implements these policies? The answer to this question places a country on a spectrum of *administrative decentralization*. For example, if subunits can adopt and

implement policy independent of national government influence or control, the country would be administratively decentralized. Thirdly, who controls representation, and thereby, participation? The answer to this question places a country on a spectrum of *political decentralization*. Often the differences between studies lie in how these different dimensions are measured, but the underlying distinctions remain in place.

A common theme in the literature is that poorly designed or incompletely implemented decentralization, on any dimension, is unlikely to produce positive effects on social welfare. Crook (2003) reviewed political and administrative decentralization in sub-Saharan Africa and found that weak accountability mechanisms combined with local politics that favored elite interests impeded pro-poor policy outcomes. Crawford (2008) examined political decentralization in Ghana, which took place when the central government instituted district assemblies, and found no effect on poverty reduction. This was ascribed to constraints left in place by the central government that limited local autonomy, calling into question whether political decentralization can be effectively implemented from the top down.

Decentralization success stories include countries where implementation was more complete or well-designed. A quantitative study in Bolivia, where extensive fiscal, administrative, and political decentralization occurred in 1994, found that it had a substantive and positive effect on the pattern and quality of human capital formation and social service provision, and that these changes reflected the preferences of the poorest municipalities (Faguet 2004). A further study compared Colombia to Bolivia and tested the effect of decentralization on public education outcomes. In Colombia, the decentralization was fiscal, and enrollment rates increased. In Bolivia, the decentralization was more comprehensive, and again had the effect of directing

spending to address social needs, driven by the preferences of the newly empowered rural and poorest communities (Faguet and Sánchez 2008).

Quantitative Measures of Decentralization. Schneider (2003a, 2003b) developed quantitative measures of decentralization using factor analysis. His analysis differentiates between types of decentralization along the usual three dimensions, and measures these dimensions with multiple indicators, most from the IMF Government Finance Statistics (GFS) along with other sources (Schneider 2003a, 41). Fiscal decentralization is measured by subnational expenditures and revenues as percentages of their respective totals. Administrative decentralization is measured by taxation and transfers as a percentage of subnational grants and revenues. Political decentralization is measured as the presence of municipal and/or subunit (state) elections. These indicators were used in a factor analysis that scored each country where data was available from zero (pure centralization) to one (pure decentralization) on three dimensions.

Using these factor scores, Schneider (2003b) examined the effect of different types of centralization on tax capacity and pro-poor expenditures. Fiscal decentralization had no effect on either. Political centralization had a positive effect on both tax capacity and pro-poor expenditure. Administrative decentralization had a positive effect on pro-poor expenditures but no effect on tax capacity. Von Braun and Grote (2000) use the same categories and definitions, but their indicators vary from Schneider's. Political decentralization is the same – the presence of elections at different levels of government. Fiscal decentralization is similar; Von Braun and Grote use the share of subunit expenditure in total country-wide expenditures. Administrative decentralization is measured completely differently; they use the amount of subdivision within the country (when available) and the population size (in multivariate analysis) to signify this type

of decentralization (Von Braun and Grote 2000, 4). They found in a cross-sectional analysis limited by data availability that 1) fiscal decentralization reduced poverty (measured with the Human Development Index) with declining marginal effect; 2) small-population countries (which are deemed to be more administratively centralized) have lower poverty than large ones; and, 3) elections at the national level only do not make a difference in poverty over having no elections at all, but state-level and, even more so, municipal-level elections had a positive effect on poverty reduction – i.e. political decentralization has a positive effect on reducing poverty (Von Braun and Grote 2000, 25).

Conclusion. The literature on decentralization and social welfare is methodologically diverse. The findings in the literature are mixed, but it is difficult to draw solid conclusions given the variety of definitions and measurements employed in these studies. Qualitative studies have often found that the promises and actual outcomes of decentralization do not match up. This is frequently due to incomplete implementation or poor design when countries decentralize. This supports the choice in this dissertation to focus on measures that capture decentralization quantitatively. These measures can capture whether decentralization has actually occurred in practice. The potential exception is political decentralization, since the mere presence of elections at subnational levels may not necessarily mean that those elections are competitive or effective in implementing truly representative or responsive government at the subnational level.

Federalism and Social Welfare

The effect of federalism on public policy is a subject of ongoing debate. Pierson (1995) posits three categories of institutional effects that follow from federal arrangements. Firstly, federalism changes the strategies, preferences, and influence of existing political actors and

groups. Secondly, federalism empowers new political actors, namely the subnational governmental units. Thirdly, typical problems and strategies arise when public policy-making authority and responsibility are shared among actors, as they are under federalism. Each of these characteristics of federal systems have implications for social policy-making and, ultimately, social policy outcomes. Whereas all political systems ask and answer the question of what policies should be adopted and implemented, federal systems add the questions of who should decide policies and who should implement them to the mix.

Federalism changes the incentive structure for existing political actors, which affects the strategies they adopt and the influence they can exert. Most of the differences under federalism can be expected to have negative consequences for social policies that require redistribution. Federalism divides a country into a patchwork of political jurisdictions, and the economic markets that underlie these jurisdictions are rarely contiguous with them. This arrangement can produce a situation called *competitive deregulation*. Since capital is mobile, its power is enhanced under federalism because it can choose to exit a political jurisdiction at any time. Any jurisdiction that wants to implement generous social policies risks the possibility that businesses who are opposed to such redistribution will move to another location, which causes inter-jurisdictional competition to minimize both regulation and social spending (hence the argument that only the national level of government should attempt redistribution, leaving the sole objective of jurisdictions like cities to be economic development (Peterson 1981)). Therefore, social programs can be expected to be less generous and less widespread in federal systems.

Another difference under federalism is that representation is organized along geographic lines. This provides the opportunity for geographical alliances to emerge among interests that

under other circumstances might not cooperate, such as capital and labor in high wage versus low wage regions, often precluding class-based national policy (Pierson 1995, 454). Finally, federalism complicates the picture of both policy adoption and policy implementation, since there are many more venues in which these fights can take place, and many more actors interested in the outcomes (Pressman and Wildavsky 1984). Political actors and groups face a greater array of options when trying to achieve their policy goals. They are likely to target specific venues or levels of government depending on what they want to achieve (Schattschneider 1975). Interest groups and other nongovernmental actors care about which venue adopts and administers which policy because different combinations of these can help them achieve specific policy content goals. It may be difficult to predict what the effects will be, but it is sure that they are different than what would happen in a unitary system. The federal institutional system influences both the options and the strategies available to achieve policy goals.

In addition to the typical actors and groups that vie for power in most political systems, federalism creates an institutionally powerful new set of actors – the geographic subunits themselves. Depending on the circumstances, these subunits may compete with, preempt, or petition the national government. Pierson discusses several ways the introduction of these subunits can influence social policy. First, governments have historically derived legitimacy from providing social benefits to their constituents, and this leads to a phenomenon called competitive state-building (Pierson 1995, 455). In federal systems, both the national level and the subunit level would like to take this legitimacy for themselves. Therefore, any decision as to what social programs to provide becomes only part of a more contentious debate over who should provide them – that is, over jurisdiction. The governments themselves care about policy control

regardless of content, since that control will allow them to claim credit or assign blame for social outcomes.

A second and related phenomenon under federalism is policy preemption. Policies are often pursued at the subunit level and they preempt possibly more sweeping policy changes at the national level. In other cases, subunits resist policy change at the national level if they have more comprehensive policies in place already. Either way, the fact that either level may make policy can limit the policy options that are enacted. Thirdly, policy diffusion may occur, wherein policies enacted in one subunit are adopted by other subunits or expanded to national policies. Fourthly, self-sorting by people looking to satisfy their preferences for tax and service packages (Tiebout 1956) may limit the social programs adopted. Especially in contexts of extreme fragmentation at levels of government below state or province, the fact that those with resources can choose to live separately from those without can limit the policies enacted.

These last three possible effects could conceivably result in better or more social policies enacted, but given the fact that businesses and wealthy people can move out of generous jurisdictions to ones that have less-generous policies, and therefore perhaps a lower tax burden, means that in practice federalism is a hindrance to redistribution. A race to the bottom is a more likely result.

Finally, according to Pierson, federalism introduces a number of problems inherent in shared policymaking. Firstly, since policy adoption in federalism often involves forming broad but shallow coalitions, and so many players hold a veto, the resulting policy will usually play to the lowest common denominator. Secondly, the complexities involved in implementing policy across levels of government will often result in jurisdictional guarantees and protections being a primary

goal in policy design, to the detriment of rational or efficient policy. Thirdly, policy options that limit the need for joint decision making often seem the best under federalism, because the goal becomes avoiding the vicissitudes of the process rather than enacting the best policy option from a rationality or efficiency point of view.

Rodden (2010) argues that in democracies with right-skewed income distributions, the natural tendency is towards redistribution from the rich to the poor. In theory, federalism prevents redistribution, while in practice some federations have progressive intergovernmental and interpersonal transfers while others do not. This supports Pierson's contention that federalism may not by itself be a causal factor.

Conclusion. Federalism does not ease the path to redistribution, and at best complicates the situation. This may have an effect on redistributive policies like those that alleviate food security. The fact that federalism restricts redistributive policy choices, even in situations of political decentralization, may lead to lower food security than would occur under a unitary system.

CHAPTER 4 DEMOCRACY, DECENTRALIZATION, AND FEDERALISM: DO THEY DETERMINE FOOD SECURITY?

Introduction

This chapter presents the data analysis in three sections. The first section presents the analysis of democracy and food security. The following two sections cover different measures of decentralization. All models contain a measure of federalism. In all cases where variables were significant, the effects were in the expected direction. The findings are mixed: some variables that were expected to be significant predictors of food security were not significant. Civil liberties protections and rule of law are consistently strong positive predictors of food security. Political rights were positively associated with food security in one model. When measured by factor scores, administrative and fiscal decentralization were found to have the strongest positive effect on food security, whereas political decentralization was not statistically significant. However, when measured directly using IMF government finance statistics, neither administrative nor fiscal decentralization had a statistically significant effect on food security. This may be due to imprecision in how well the underlying concepts are captured by the measure in question. Federalism had a consistently strong and negative effect when significant, but it is not significant in all models.

The Dataset

For this dissertation, I constructed a dataset using secondary data from multiple sources in order to test hypotheses about the relationship between food security, democracy, federalism, and decentralization. The data dictionary containing all of the variables employed in this dissertation is presented in Appendix A. See Table 4.1 for the sources of data.

Table 4.1. Sources of Data
Data Sources
(Cafiero et al. 2016)
(Schneider 2003a)
Freedom House Civil Liberties Rankings
Freedom House Political Rights Rankings
International Food Policy Research Institute
International Monetary Fund Government Finance Statistics
Polity IV (Marshall, Gurr, and Jaggers 2012)
UN Food and Agriculture Organization Food Security Indicators
UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN Department of Economic Affairs Population Division)
World Bank Database of Political Institutions

The dataset contains observations for 229 sovereign countries from 1990 to 2011. The total number of observations is 5308. The complete dataset contains more than one hundred variables comprising measures of food security, economy, regime type, and other political variables. Given the sources and subject matter, there is a substantial amount of missing data, and as such, the complete dataset is not used for any of the models presented. Rather, the relevant subset of data is analyzed for each model. The variable definitions, sources, and years of coverage for each model are presented in the sections below.

The Dependent Variable: The Food Security Index

To recap the lengthy discussion in Chapter 2, food security is a complex concept with three main dimensions: availability, accessibility, and utilization. Firstly, in order for food security to exist, there must be an adequate food supply to meet the energy and nutrient needs of the entire population – this is the availability dimension. Food availability is necessary but not sufficient for food security, however. Secondly, the food that is available must be accessible to the population – if any subset of the population cannot access enough food, then food security

will decrease even if there is an adequate food supply. Finally, the utilization dimension captures how well the population makes use of the food that they can access. Are they eating enough calories and getting enough nutrients to prevent undernourishment (lack of dietary energy) and undernutrition (lack of dietary nutrients)? If not, then there will be food insecurity on the utilization dimension even if there is enough food available and accessible.

Food security, comprising these interrelated dimensions, is particularly well-suited to measurement by an index, which is a composite measure that combines information from multiple indicators into one, easily interpretable number. The Food Security Index (FSI) – which is the Global Hunger Index (IFPRI 2012; Wiesmann 2002) with the scale reversed – will be the dependent variable in each model presented in this chapter. The FSI is an additive index that contains three equally weighted dimensions, presented in Table 4.2.

Indicator	Weight	Dimension
Prevalence of Undernourishment (%)	1/3	Availability, Accessibility
% of children under 5 who are underweight	1/3	Utilization (Undernourishment)
% mortality in children under 5	1/3	Utilization (Undernourishment, Undernutrition)
Source: (IFPRI 2012; Wiesmann 2002)		

Prevalence of undernourishment is the probability (expressed as a percentage) that a randomly selected person from the population will lack sufficient calories to lead a sedentary life. It is calculated using measures of food supply, inequality in access to food, and country-specific per capita calorie minimum thresholds. Therefore, it measures aspects of both the availability and accessibility dimensions of food security. Underweight in children under five years of age is a

measure of the percentage of children under five who fall two or more standard deviations below the mean of weight for age. Underweight is considered to be a measure of undernourishment, because underweight is caused by a lack of sufficient calories. It measures the utilization dimension of food security – it captures no direct information about whether food is available or accessible, but rather the percentage of children under five have been unable to utilize sufficient food. Mortality in children under five years of age is the last measure, and it is also a measure of utilization. However, it captures information about both undernourishment and undernutrition, since both a lack of calories and a lack of sufficient macro- and micronutrients contribute to mortality in this age group.

To calculate the Food Security Index, each indicator is weighted by a third and summed together, and then the sum is subtracted from 100:

$$\begin{aligned} \text{Food Security Index} = 100 - & \left[\left(\frac{1}{3} * \text{Prevalence of Undernourishment (\%)} \right) + \right. \\ & \left. \left(\frac{1}{3} * \% \text{ of children under 5 who are underweight} \right) + \right. \\ & \left. \left(\frac{1}{3} * \% \text{ mortality in children under 5} \right) \right] \end{aligned}$$

The resulting FSI is scaled from zero to 100 where zero indicates total food insecurity and 100 indicates total food security, although neither extreme is found in practice. It is measured in 1990, 1995, 2000, 2005, and 2011.

Food Security and Democracy

This section presents models that test the theoretical relationship between food security and democracy. Democracy is not treated as a monolithic concept; rather, I use measures (discussed below) that attempt to capture two separate dimensions of democracy: political rights

and institutions (the degree to which the institutions in a country are democratic); and civil liberties and rule of law (the degree to which fundamental rights are protected and the rule of law holds).

Hypotheses. The hypotheses tested by these models are as follows:

H1: Countries with more political rights will have higher food security.

H2: Countries with more civil liberties will have higher food security.

Democracy Measure. The two dimensions of democracy are measured using the Freedom House scales of political rights and civil liberties (Freedom House 2014a). Freedom House produces annual measures for almost all countries in the world. The Freedom House rankings have two main categories: political rights, and civil liberties (Freedom House 2014b). The political rights rating is based on the freeness and fairness of electoral processes, amount and quality of political pluralism and participation, and quality of government in terms of corruption, transparency, and effectiveness. The civil liberties rating is based on the degree to which freedom of expression and belief are protected, the extent of rights of association and organization, the presence and strength of the rule of law, and the extent of personal autonomy and individual rights in each country during each measurement year. Both of these groupings represent important – and different – dimensions of democracy. The ratings are based on in-house analysis of “a broad range of sources, including news articles, academic analyses, reports from nongovernmental organizations, and individual professional contacts,” along with consulting external experts in academia and the larger human rights community; these analyses are applied to answer questions that score each country on ten indicators of political rights and fifteen indicators of civil liberties, which are then combined into the two scales (Freedom House 2014b).

Each scale, as employed in this dissertation, runs from one to seven where one is the lowest and seven is the highest degree of freedom⁹. Freedom House uses the terminology of freedom instead of democracy, and I will occasionally adopt it here to keep clarity between my measurements and sources. In regression analyses using ordinal variables such as this one, variables with seven steps or more are often employed as if they are continuous. However, in order for that to be a reasonable choice, one would have to argue convincingly that the increase from one to two on one of the scales is equivalent to a movement from two to three, four to five, or any other increase of one. In addition, treating these scales as continuous overlooks the fact that the lines between number ratings are not so bright and obvious as the numbers placed on them would suggest. In order to acknowledge the categorical nature of these measures, I will employ them in my models having collapsed the one-to-seven scales into three categories. For both the political rights and civil liberties scales, I classified countries rated one or two as not free; three to five as partly free; and six or seven as free. I then created dummy variables for each of the six categories, with a one if the country fell in that category for a particular year, and a zero otherwise.

Countries that score a one or two on the Freedom House Civil Liberties scale (those I have categorized as not free) have very few or no civil liberties protections, and do not have due process. Scores of three to five (categorized as partly free) represent countries that have either moderate civil liberties protections, or a mixture of strong and weak civil liberties protections. Scores of six or seven (categorized as free) are given to countries that have a wide range of civil

⁹ Freedom House publications use a scale of 7 = least free to 1 = most free. This dissertation follows the common convention of reversing the scale from 1 = least free to 7 = most free, in order to facilitate interpretation. An increase in the rating then represents more political rights or more civil liberties.

liberties protections, freedom from discrimination (in most cases), due process and the rule of law. Countries that score a one or two (categorized as not free) on the Freedom House Political Rights scale have restricted political rights, limited political parties (sometimes only one), and may be autocratic or under military rule. Scores of three to five (categorized as partly free) are given to countries that have moderate protections for political rights, or a mixture of strong and weak protections. Scores of six or seven (categorized as free) represent countries that have free and fair elections, effective government, competitive parties, and incorporate minority interests (to a different extent across the two scores).

For each rating, I chose to use 'not free' as my base category, and consequently the models include only the part free and free categorical variables. The coefficients on those variables will represent the change expected when moving from not free to either part free or free along the respective dimension.

Independent Variable Lags. As democracy increases, food security is expected to increase. However, the time frame for this increase is not clear. There are three reasons to lag the dependent variable in these models. First, when making a theoretically (if not methodologically) causal claim, the cause must precede the effect. Secondly, while the percent underweight and percent mortality measures in the FSI are measured yearly, the prevalence of undernutrition is a three-year average. To include this measure in models with independent variables within one year of the FSI would essentially mean that the independent variables and some portion of the dependent variable are contemporaneous, thus leaving any causal argument on shaky ground. Third, the complexity of the political systems in question make it unlikely that a movement

towards democracy will immediately effect policy change. In addition, any policy change made at the national level will take time to have an effect on the ground.

We are left with a quandary: while we can say easily that a one-year lag is too short, due to the nature of the FSI components, what is the optimal lag? Even if optimal lags could be presumed for one component of the FSI, there is no guarantee that a change in democracy will affect child underweight, child mortality, and prevalence of undernutrition at the same rate. Choosing a single length for lagging the independent variables may miss important variation. Therefore, the methodological step I have taken is to estimate three sets of models, with three-year, four-year, and five-year lagged independent variables.

Multiple Imputation. Following the advice of Ross (2006), all the models presented in this section are estimated using datasets that have been multiply imputed to correct for bias due to possibly nonrandom patterns of missingness. Ross used infant mortality as a dependent variable, and infant mortality (like child mortality) has almost complete data for almost all country years. Unfortunately, missingness in my data occurred on the dependent variable – some countries had no FSI measurement for any year in the dataset, so those countries could not be included in the imputed dataset. However, the percentages of countries that scored not free on the civil liberties scale in the imputed dataset (19%) and in the complete dataset of all country years (17.62%) were not significantly different ($z = .1878$, two-tailed $p = .8510$). Likewise, the percentages of countries that scored not free on the political rights scale in the imputed dataset (33%) and in the complete dataset of all country years (30.59%) were not significantly different from one another ($z = -.2073$, two-tailed $p = .8358$). This supports an argument that my imputed dataset, even with a number of countries dropped, still has retained a significant percentage of countries

that score low on these scales – supporting an argument that the imputed dataset still contains a good number of authoritarian countries. The Global Hunger Index, on which the Food Security Index is based, is not available for all country years, but rather is published in 5 year increments. These are more reasonable increments to capture the quantities contained in the FSI, since prevalence of undernutrition is published as 3 year averages. The Food Security Index has values for 1995, 2000, 2005, and 2011 in 118 countries.

I used Amelia II (Honaker, King, and Blackwell 2011) to perform all multiple imputation in this project. Amelia II allows the user to specify the time-series cross-sectional structure of the dataset, in this case being made up of 118 separate countries with 4 observations per country. It produces a default of five complete imputed datasets, a number that is considered sufficient in most cases. For the three-year and four-year lagged independent variables, I used the default of five; for the five-year lagged independent variables, there was proportionally more missing data, so I instructed Amelia II to create ten imputed datasets. I used the multiple imputation utilities in Stata 14 to import and manipulate the imputed datasets. Stata 14 allows the user to define estimation procedures in the context of multiple imputation, so that when model parameters are estimated, the degree of uncertainty in the multiply imputed datasets is taken into account when computing standard errors and thus significance levels. Essentially, multiple imputation corrects the variance-covariance matrix to remove the bias that would have been present had it been calculated on data using listwise deletion. While none of the significance levels changed for any of my models when run on the imputed versus nonimputed datasets, some of the coefficients and standard errors did change in magnitude. Given the consistency of the results between the imputed and nonimputed data, I present only the models estimated on the imputed dataset.

Each set of lagged independent variables had a different degree of missingness. For the dataset with three-year lagged independent variables, 2.966% of the observations would have been dropped using listwise deletion to deal with missing values. 2.75% of the observations in the four-year lagged models would have been dropped using listwise deletion. 5.93% of the observations in the five-year lagged models would have been dropped without the use of multiple imputation. Using multiple imputation obviated the need to use listwise deletion to drop any country with a FSI value that also had missing data in other variables.

Variables and Measures. The models presented here include the democracy measures outlined above, the usual categorical variable for federalism, and two controls. The first is the natural log of GDP per Capita, which I employ as a measure of economic development. The second control variable is a dummy variable for sub-Saharan Africa, which is one if a country is in sub-Saharan Africa.

Descriptive statistics for the datasets are presented in Table 4.3. These are calculated on the imputed datasets, so standard errors are provided that take into account the uncertainty across imputations. Table B.1 in Appendix B presents the list of countries that are included in the models reported in this section.

Table 4.3. Descriptive Statistics for Food Security and Democracy Models (Multiple Imputation).

Variable	Mean	Standard Error				
Food Security Index	86.476	.4559				
	3 year lag		4 year lag		5 year lag	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Civil Liberties: Part Free	.6631	.02184	.6754	.02160	.6419	.02244
Civil Liberties: Free	.1483	.01646	.1364	.01604	.1536	.01717
Political Rights: Part Free	.4174	.02278	.4013	.02297	.3877	.02305
Political Rights: Free	.2508	.02002	.2614	.02035	.2551	.02050
GDP per capita (ln)	7.05612	.05504	7.02089	.05369	6.9619	.05340
Federalism	.1081	.01430	.1081	.01430	.1059	.01418
sub-Saharan Africa (1=Yes)	.3559	.02206	.3559	.02206	.3559	.02206

The Models. The initial estimations of all models included all four democracy measures in each model. None of them were statistically significant. The bivariate correlations among the measures suggest that they may be highly collinear – that is, a country that scores as part free on the civil liberties scale is likely to be in the same category on the political rights scale. To separate the effects of the two dimensions of democracy, I estimated models separately, one set with the civil liberties dummies and one set with the political rights dummies. Interestingly, the effect sizes were consistent across the models that included all four dummy variables and those that included only two – only the standard errors changed significantly. This supports the argument that multicollinearity was inducing too much uncertainty for the variables to appear significant, while leaving the coefficients themselves unbiased.

The models are estimated in Stata 14 using linear regression with panel-corrected standard errors. Each model exhibited first order autocorrelation, which was addressed by specifying that the correlation type was AR1. This results in Stata using Prais-Winsten regression for the coefficients. Table 4.4 gives the regression results. The significance level used in these models is alpha = .05.

Table 4.4. Estimates for Models with Freedom House Democracy Measures, DV = FSI in 4 panels (1995, 2000, 2005, 2011)

	3 year lag		4 year lag		5 year lag	
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>
GDP per capita (ln)	4.07760* (.8051)	4.09826* (.8237)	3.9587* (.8385)	4.0040* (.8551)	3.8413* (.8209)	3.8556* (.8519)
Federalism	-1.3139* (.5558)	-1.3903* (.5712)	-1.1716 (.6650)	-1.4304* (.6504)	-1.04959 (.7303)	-1.0891 (.8157)
sub-Saharan Africa	-7.5808* (1.1499)	-7.4126* (1.09215)	-7.7530* (1.1105)	-7.5644* (1.04759)	-7.9325* (1.09355)	-7.8544* (1.08751)
Civil Liberties: Part free	1.3982* (.6090)		1.2354 (.7354)		1.1205* (.5505)	
Civil Liberties: Free	1.6899* (.8030)		1.8537* (.8308)		1.8276* (.7568)	
Political Rights: Part Free		.7787 (.6307)		1.2985 (.7518)		.4424 (.5046)
Political Rights: Free		1.1197 (.6785)		1.4458* (.7015)		1.0002 (.5581)
Constant	59.1128* (5.8384)	59.4897* (5.9422)	60.2274* (6.3502)	60.07626* (6.3769)	61.4634* (6.2910)	61.9209* (6.3383)
Regression Statistics						
n	472	472	472	472	472	472
Number of Countries	118	118	118	118	118	118
F	21.18*	23.04*	22.72*	28.25*	19.76*	21.05*
p-value of F	.000	.000	.000	.000	.000	.000
RMSE	5.6173	5.6201	5.6842	5.6853	5.6601	5.7020
Number of Imputations	5	5	5	5	10	10
*p (two-tailed) < .05						
Each cell contains the unstandardized coefficients and the standard error in parentheses.						

Findings. In all models, the natural log of GDP per capita had a strong positive effect on food security of approximately four points on the Food Security Index. Contrary to expectations, the further the GDP variable is lagged, the lower the effect, although substantively the differences between the coefficients are very small – all of them are within 0.2 of each other. Being located in sub-Saharan Africa is a strong negative predictor across all models with coefficients between -7.5 and -8. These increase as the lag increases within model specification – that is, the coefficients in the civil liberties models increase as the lag increases, and likewise with those in the political rights models.

Federalism is significant in three of the six models. It is significant in both models with three-year lagged independent variables, and also in the political rights model with four-year lagged independent variables. Federalism was not significant in either of the five-year lagged models. I expected federalism to negatively affect food security, and that hypothesis is supported, and certainly not contradicted. The coefficients are consistent and negative across the models where they are significant. They range from -1.4304 to -1.3139, which is in the expected direction.

Across all the models, effect size and direction for federalism is consistent, even when the coefficients are not significant. This suggests a fairly robust result. Slightly lower effect sizes (reflected in the decreasing coefficients) and slightly more uncertainty (reflected in the increasing standard errors) combine to make the coefficients lose significance as the lag increases. This suggests that federalism impacts food security more in the short term (within two to three years), and that impact is attenuated in the longer term (five years or longer).

Models 1, 3, and 5 included dummy variables measuring civil liberties and rule of law: Civil Liberties: Part Free; and Civil Liberties: Free. Five out of the six coefficients were statistically significant. In the four-year lag model, Civil Liberties: Part Free was not significant (two-tailed $p = .093$). In all instances where the coefficients were significant, the relationship was positive and substantive. The root mean square error (RMSE) gives a measure of accuracy for a model: the lower the RMSE, the lower the average prediction error when using that model to predict the observed data. Therefore, the RMSE can be used to compare models that have the same dependent variable measured in the same units. Using the RMSE as my decision criterion, I will discuss the three-year lag model (Model 1) in detail, because that model has the lowest root mean square error (RMSE = 5.6173).

As previously discussed, the seven-point Freedom House Civil Liberties scale was transformed into three dummy variables: Not Free (1-2); Partly Free (3-5); and, Free (6-7). Civil Liberties: Not Free serves as the baseline category; therefore, it was not included in the models. The coefficients represent the effect size and direction of being in each category *in comparison to the baseline*. Turning to Model 1, then: holding all other independent variables constant, being partly free with respect to civil liberties is associated with a 1.3982 increase in the Food Security Index, as compared with being in the not free category. The effect size is larger for the Civil Liberties: Free category. Holding all other independent variables constant, a country that is free on the civil liberties scale is expected to be 1.6899 points higher on the Food Security Index than an equivalent country that is not free on the civil liberties scale.

Taken together, these two results support *H2*. To the extent to which these measures capture the concept as intended, countries with more civil liberties have higher food security.

Civil liberties are a dimension of the expansive definition of democracy employed in this dissertation. This model provides strong support that more democracy, in the form of stronger civil liberties protections and increased rule of law, is indeed associated with higher food security.

The only statistically significant coefficient on a Political Rights categorical variable is in Model 4, where Political Rights: Free is significant and positive. It is worth noting that this same variable is nearly significant in Model 6 – the five-year lag model – with a two-tailed p-value of .075, and has a two-tailed p-value of .101 in the three-year lag model. These nearly significant results provide reason to think that the significant result in Model 4 is not simply a fluke. Holding all other independent variables constant, a country that is free on the political rights scale is expected to have a Food Security Index 1.4458 points higher than a country that is not free on the political rights scale. When it comes to political rights, it seems that a move from not free to partly free does not have a significant effect – only once a country moves to completely free, does food security increase. This result supports *H1*, that more political rights will be associated with higher food security. But not just any increase in political rights will do – elections must be free and fair, parties must be competitive, government must effectively control its purview, and barriers to political participation must be nearly nonexistent before food security will increase.

Discussion. These results provide strong support for Hypotheses 1 and 2: countries with more political rights and more civil liberties, respectively, have more food security. However, the results go further than that: there are significant differences between political rights and civil liberties in the magnitude, time frame, and consistency of their associations with food security.

The magnitude of the increase in food security that follows from an opening in civil liberties is largest when moving between the not free and the partly free categories; the increase

in food security that accompanies a move from partly free to free, while still positive, is much smaller. Taking the three-year lag model as an example, moving from not free to part free on the civil liberties dimension produces an increase in FSI of 1.3982 points. Moving from part free to free, however, increases the FSI by only an additional .2917 points. This means that about 83 percent of the total increase in food security that results from an opening in civil liberties comes when the opening is still only partial (not free to partly free). The full transition to free on the civil liberties dimension increases food security only another 17 percent. In the five-year lagged model, the relative strength remains the same although the magnitude is different: the movement from not free to partly free accounts for 61 percent of the increase in food security, while the further move to fully free adds another 39 percent. This implies that the initial opening from complete repression of civil liberties to even partial protections allows for mobilization within society that will push politicians to pay attention to food insecurity and become more responsive. This may take different forms in different countries. Freedom of speech or protest in one country may bring pressure onto politicians, whereas freedom of the press may be the deciding factor in another (Dreze and Sen 1991). Further research could focus on a typology of civil liberties as the independent variable, which could illuminate which ones are most effective at increasing social welfare.

Political rights, in contrast, are only associated with higher food security if the opening is complete. Partial freedom on the political rights dimension is never associated with higher food security at any lag. This suggests that the mechanism by which political rights increase food security only works if a country's people enjoy the full measure of political rights. Perhaps it is only then that parties and politicians who truly represent the interests of the food insecure can

be elected. This too is a question for further research. Another difference is that political rights do not increase food security as much as civil liberties do. Going from not free to free on the civil liberties dimension increases FSI by between 1.6899 and 1.8537 points, depending on the lag, whereas the same increase on the political rights dimension increases FSI by only 1.4458 points. This could mean that the political power afforded to people by the exercise of civil liberties is more effective than that exercised at the ballot box.

A final intriguing difference between civil liberties and political rights in their effect on food security is that civil liberties have a much more consistent effect. Civil liberties were associated with more food security at three-year, four-year, and five-year lags. This suggests that civil liberties provide a continuous opportunity to mobilize and keep up the pressure on government to respond to food insecurity. Political rights were only associated with more food security at a four-year lag. Recall that prior research found that budget expenditures on hunger were related to electoral cycles in some countries (te Lintelo et al. 2014). Perhaps this could explain the intermittent nature of the association between political rights and food security – if effective political pressure through voting behavior is tied to election cycles then I would expect the effect of political rights on food security would go in cycles as well. It may be fruitful to examine whether there is an “election effect” on food security. Future research could include a variable that signifies the number of years since the most recent election and see if that is negatively related to food security.

The analysis presented in this section, based upon the statistical models presented here, shows that democracy is an important determinant of food security. Both political rights and civil liberties are predictors of food security. However, these two dimensions of democracy support

food security in different ways. This suggests that a simplified definition of democracy that focuses on elections alone would miss many of the nuances in the relationship between democracy and food security. In fact, a procedural measurement of democracy that focuses on political institutions might not capture the relationship at all, given that civil liberties comprise the most consistent predictor of increased food security.

Food Security and Decentralization: Model 1: Factor Scores

The first model examines the relationship between decentralization and food security. It tests four hypotheses. Recall from Chapter 3 that decentralization is typically understood to have three distinct dimensions. *Fiscal decentralization* is the degree to which the subnational governmental units in a country have control over their own expenditure choices and revenues. *Administrative decentralization* is the extent to which subnational units control policy choice and implementation. *Political decentralization* is the extent to which a country has elections at subnational levels of government. Each of the three dimensions can be expected to have an effect on food security, independent of the others. Therefore, I will employ one hypothesis for each dimension:

H1: Countries that are fiscally decentralized will have more food security.

H2: Countries that are administratively decentralized will have more food security.

H3: Countries that are politically decentralized will have more food security.

Formal federalism – that is, federalism that is constitutionally defined – is a different matter than decentralization. Constitutionally mandated federalism introduces a number of complications for policy makers who wish to adopt and implement redistributive policies like those that address

food insecurity. It also provides more points of access for those who wish to block policy. Therefore, I propose one hypothesis to test the effect of formal federalism on food security:

H4: Federations will have less food security.

These hypotheses are tested using a cross-sectional dataset of 42 countries. The dependent variable is measured in the year 2000 and the independent variables are measured in 1996, in order to preserve the direction of causation when interpreting the model.

Variables and Measures. Four explanatory variables are included in this model. The first is *Federalism*, which is a dummy variable that takes a one if a country formally defines itself as a federation. While federalism conceptually implies decentralization, in practice a country defined as federation can be quite centralized, and federalism itself causes a number of issues that can obstruct policy formation, adoption, and implementation, as discussed in the literature review. I expect that formal federalism will have a negative relationship with food security.

Three variables capture aspects of decentralization. *Fiscal, administrative, and political decentralization* are measured as factor scores produced by Schneider (2003a). The three types of decentralization are measured by, respectively, subnational expenditures and revenues as percentages of their respective totals, taxation and transfers as a percentage of subnational grants and revenues, and the presence of municipal and/or subunit (state or provincial) elections (Schneider 2003a, 41). These indicators were subjected to a factor analysis that scored each country where data was available on three dimensions from zero (completely centralized) to one (completely decentralized). Confirmatory factor analysis supported the hypothesis that decentralization has three distinct dimensions.

Subnational expenditures as a percentage of total government expenditures, and subnational revenues as a percentage of total government revenues are the indicators for fiscal decentralization. Expenditures (cash outlays) and revenues (cash inflows) together measure the fiscal impact of subnational governments. Percentage of subnational revenues that come from taxes and percentage of subnational revenues that do not come from transfers measure administrative decentralization. Schneider argues that these two indicators capture the degree to which subnational governments control their own resources, thus are administratively separate from the central government. I am not entirely convinced by this argument, as these indicators do not seem to capture the implementation and policy control aspects of administrative decentralization. Still, the factor analysis Schneider presents clearly shows that these two indicators correlate along a different dimension than the fiscal indicators do. The final dimension, political decentralization, is measured by the existence of municipal and state or provincial elections. These measures straightforwardly capture formal representation at subnational levels of government, but neglect to measure the quality of elections or whether they result in qualitatively representative and responsive governance at the subnational level. I expect each of the three factor scores to be positive predictors of food security.

Two control variables are included in this model. The first control is *GDP per capita* measured in 2014 US Dollars. This variable has been transformed by taking the natural log to linearize the relationship between FSI and GDP per capita. Food security is expected to increase with higher levels of economic development, as captured by GDP per capita. The second control variable is a dummy variable for sub-Saharan African. If a country is in sub-Saharan Africa, this variable takes a value of one. This variable captures variation that is specific to sub-Saharan

Africa, which suffers from a combination of specific factors including poor climate, land degradation, and disease burden that cause it to have a higher food insecurity on average. I would have preferred to include subregional level fixed effects that would capture unmeasured variation across all subregions, but this dataset, in a few pivotal cases (particularly India in South Asia), has only one country per subregion – thus conflating subregion-level fixed effects with country-level fixed effects and wreaking havoc in the residuals. Descriptive statistics are presented in Table 4.5, correlations in Table 4.6, and scatter plots for each combination of variables are presented in Figure 4.1. Table B.2 in Appendix B presents the list of countries included in the model presented in this section.

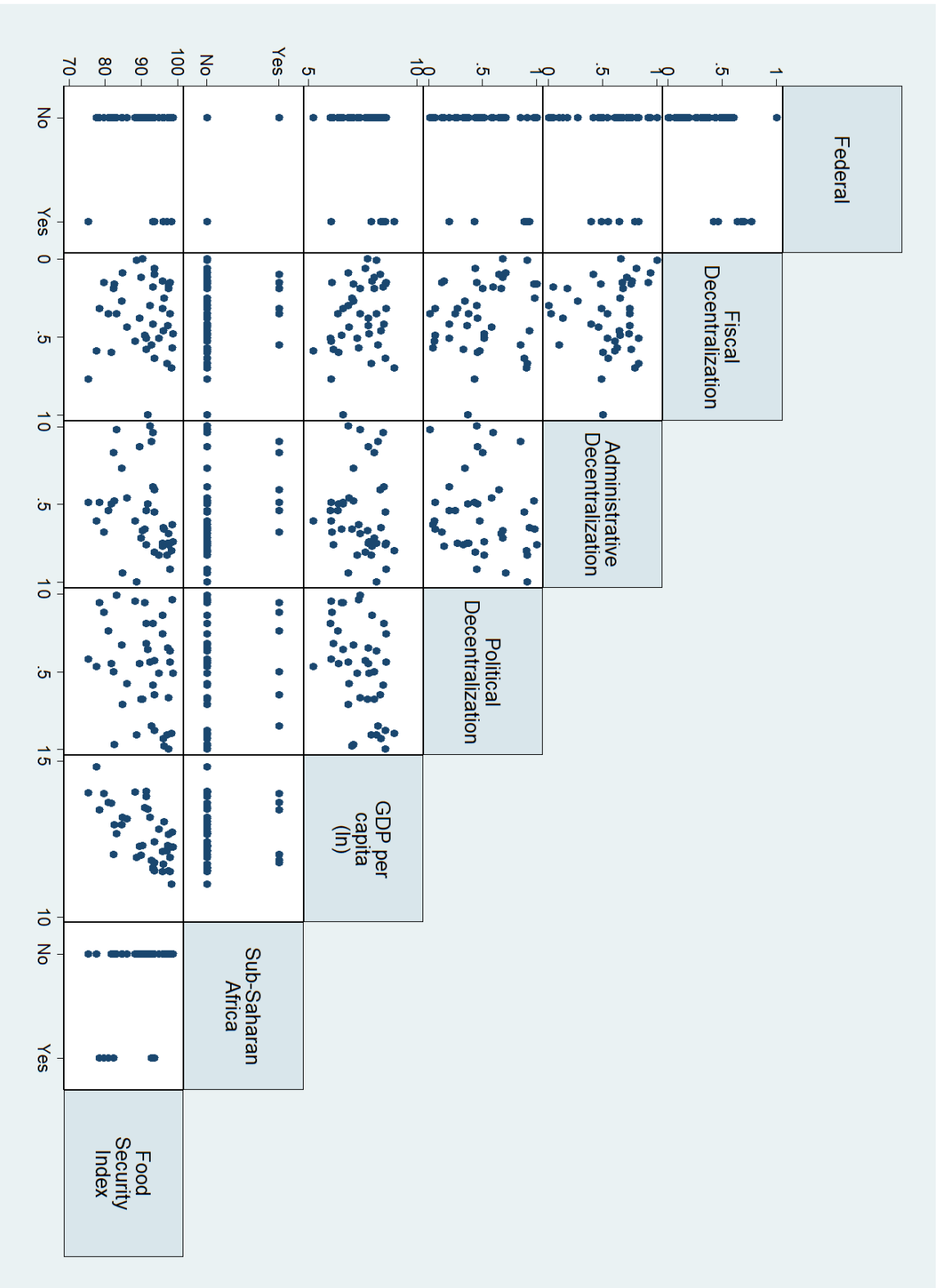
Table 4.5. Descriptive Statistics for Decentralization Model 1 with Factor Scores

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Food Security Index	42	90.3905	6.6528	75.2	98.6
Federalism (1 = Yes)	42	.1429	.3542	0	1
Fiscal Decentralization	42	.3698	.2267	0	1
Administrative Decentralization	42	.5731	.2562	0	1
Political Decentralization	42	.4905	.2962	0	1
GDP per capita (ln)	42	7.3772	.9214	5.1822	8.9512
sub-Saharan Africa (1 = Yes)	42	.1429	.3542	0	1

Table 4.6. Correlation Matrix for Decentralization Model 1

Variable	Food Security Index	Federalism (1 = Yes)	Fiscal Decentralization	Administrative Decentralization	Political Decentralization	GDP per capita (ln)	sub-Saharan Africa
Food Security Index	1.000						
Federalism (1 = Yes)	0.1124	1.000					
Fiscal Decentralization	-0.0037	0.4378	1.000				
Administrative Decentralization	0.3179	0.0729	-0.0931	1.000			
Political Decentralization	0.2579	0.2992	-0.1407	0.1735	1.000		
GDP per capita (ln)	0.6486	0.2929	-0.2872	0.0587	0.4419	1.000	
sub-Saharan Africa (1 = Yes)	-0.3669	-0.1667	-0.1697	-0.2818	-0.1215	-0.0617	1.000

Figure 4.1. Bivariate Scatterplots for Decentralization Model 1



Model Equation and Results. The equation to be estimated is:

$$\begin{aligned} \text{Food Security Index} = & \beta_0 + \beta_1 * \text{Federalism} + \beta_2 * \text{Fiscal Decentralization} \\ & + \beta_3 * \text{Administrative Decentralization} + \beta_4 * \text{Political Decentralization} \\ & + \beta_5 * \ln(\text{per capita GDP}) + \beta_6 * \text{Sub-Saharan Africa} + \epsilon \end{aligned}$$

The regression equation was estimated using Ordinary Least Squares (OLS) regression in Stata 14 and the results are presented in Table 4.7. The significance level for this model (and indeed all of the models presented in this dissertation) is set at $\alpha = .05$.

	Model 1	95% Confidence Interval for β	
Federalism (1 = Yes)	-6.4504* (2.4156)	-11.3543	-1.5466
Fiscal Decentralization	10.7749* (3.7677)	3.1261	18.4237
Administrative Decentralization	6.9156* (2.7002)	1.4339	12.3974
Political Decentralization	-.7602 (2.5487)	-5.9343	4.4139
GDP per capita (ln)	6.0600* (.8801)	4.2732	7.8467
sub-Saharan Africa (1 = Yes)	-4.4918* (1.9643)	-8.4796	-.5040
Constant	39.6740* (7.2338)	24.9886	54.3594
Regression Statistics			
R^2	0.6681		
Adjusted R^2	0.6112		
RMSE	4.1482		
F	11.74*		
n	42		
* p < .05 (two-tailed tests)			
Each cell contains the unstandardized coefficient and the standard error in parentheses.			

The model explains 66.81% of the variation in the Food Security Index. All of the coefficient estimates are significant and in the expected direction except for political decentralization. The

F test statistic was significant, showing that the set of all independent variables is jointly related to the FSI. The Root Mean Square Error is 4.1482, which means that if this model were used to predict the FSI, the average error would be 4.1482. The model is robust to alternative specifications, except that when interactions¹⁰ between the explanatory variables were included, neither the interactions nor the individual variables were significant. This result is likely due to the multicollinearity introduced by interactions in a dataset with such a low number of observations. The model was subjected to a battery of post-estimation tests which found no violations of regression assumptions, multicollinearity, or omitted variable bias.

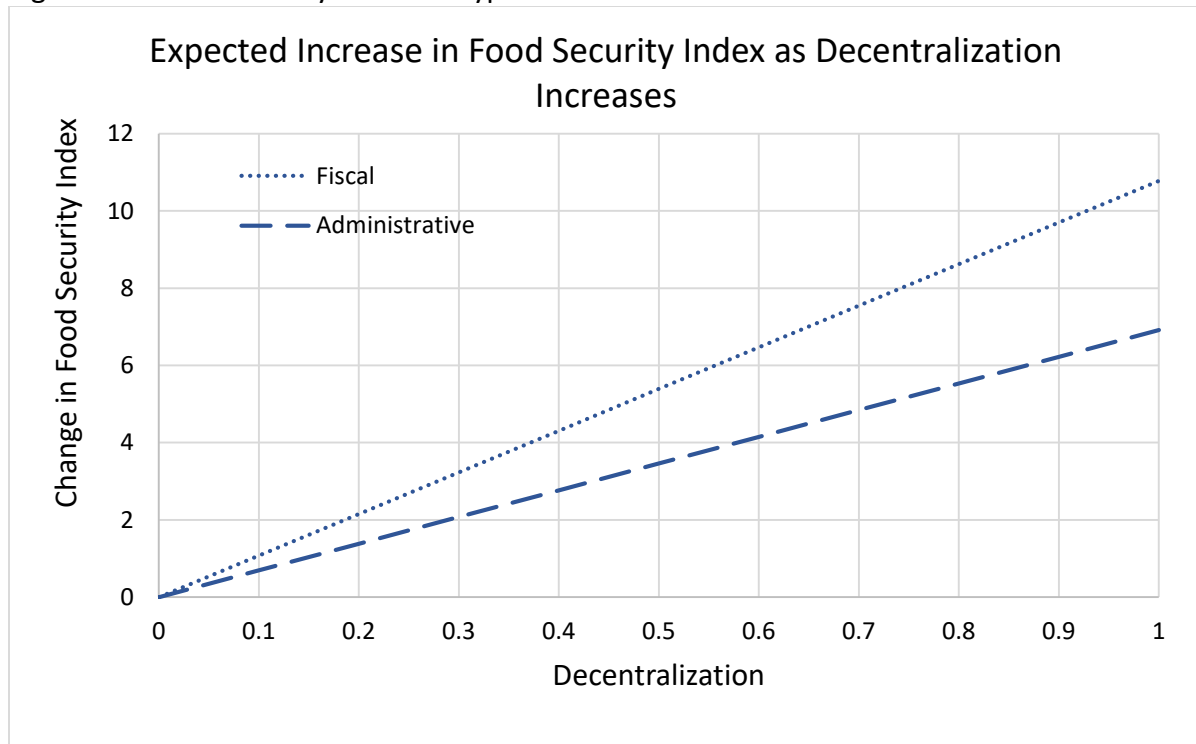
I considered the possibility that Federalism and Political Decentralization were both measuring the same concept and that this was leading to the lack of significance for Political Decentralization when both variables were included. Different combinations of these two variables were tested, including interactions, and the results were robust. Federalism was always statistically significant with a negative coefficient and Political Decentralization was never significant. This may seem surprising, but it is explicable: the factor analytic nature of the Political Decentralization measure means that it does not function as a dummy variable indicator of subnational elections. Rather it captures the placement of a country on a zero to one scale of political decentralization as measured by the combination of the six indicators that were used to calculate the three factor scores (Schneider 2003a). Each of the six indicators partially measure

¹⁰ The following interactions were included in alternative specifications, separately and together, in all possible combinations: Fiscal Decentralization x Federalism; Administrative Decentralization x Federalism; Political Decentralization x Federalism; Fiscal Decentralization x Administrative Decentralization; Fiscal Decentralization x Political Decentralization; Administrative Decentralization x Political Decentralization. Federalism retained significance in almost all the models, and when it was not significant it was near-significant ($p < .10$) and the coefficient was always large and negative. Any single interaction or combination of interactions immediately caused all decentralization variables to lose significance, probably due to multicollinearity between the interactions and the constituent variables combined with the relatively small sample size.

each of the three dimensions, because “the indicators largely measure one of the dimensions and can be clustered according to this principal component, but the effects of other dimensions also spill over into each indicator. This spill-over can be explained as the result of the fact that the dimensions are related to one another and also because the indicators are only imperfect measures of any single dimension” (Schneider 2003a, 47). Fiscal decentralization relates moderately to political decentralization in the factor analysis, so a fiscally centralized country will score lower on political decentralization even if that country has both state/provincial and local elections.

Findings. Of the first three hypotheses, two are supported – both fiscal decentralization and administrative decentralization are statistically significant and positively related to food security. See Figure 4.2 for a graphical representation of the expected change in FSI as fiscal and administrative decentralization increases.

Figure 4.2. Food Security and Two Types of Decentralization



Fiscal decentralization has the strongest positive relationship with the Food Security Index out of any of the independent variables. Figure 4.2 shows the relative strength of this relationship compared with the relationship between FSI and administrative decentralization; the steeper the slope the stronger the predictive relationship. The movement from full fiscal centralization (fiscal decentralization = 0) to full fiscal decentralization (fiscal decentralization = 1) is associated with an increase of 10.7749 in the FSI, holding all other independent variables constant. Smaller increments of fiscal decentralization would also be expected to have a positive effect. For example, an increase in fiscal decentralization of 0.25 would be expected to increase FSI by about 2.7 on average.

Administrative decentralization also has a positive relationship with food security, although it is not as strong as fiscal decentralization. As a country moves from totally centralized administratively (administrative decentralization = 0) to totally centralized (administrative

decentralization = 1), the Food Security Index is expected to increase by 6.9156 on average, holding all the other independent variables constant. This result supports the second hypothesis: administrative decentralization is associated with higher food security.

Political decentralization was not a statistically significant predictor of food security, and this result was consistent across all plausible alternative model specifications. Therefore, the third hypothesis, that political decentralized countries would have higher food security, is not supported. This casts doubt on theories that subnational elections, which allow for voting-enforced accountability, will result in local and state or provincial politicians attending to issues like food insecurity. However, as the qualitative studies in the literature review point out, the mere existence of subnational elections does not insure that political decentralization has truly taken place. It could be that no association is found here because this measurement is unable to differentiate between countries that have decentralized in an effective way and those that have not.

Federalism has a strong, negative relationship with the Food Security Index, a result which supports the fourth hypothesis. Federations are expected to have an FSI 6.4504 lower on average than countries with unitary government systems, holding all other independent variables constant.

The control variables were both significant and their effects were in the expected direction. An increase of one in the natural log of GDP per capita is associated with 6.06 expected increase in the Food Security Index, holding all other independent variables constant. Sub-Saharan African countries are expected to have a Food Security Index on average 4.4918 lower than countries outside of that region, holding all other variables constant.

Discussion. These results support the first two hypotheses: administrative decentralization and fiscal decentralization are associated with better food security. Political decentralization, as measured by the factor score, does not predict food security; therefore, the third hypothesis is not supported by this model. Federalism is a significant negative predictor of food security, which supports the fourth hypothesis. Strikingly, these three significant measures individually each have greater impact on food security than a one-point increase in the natural log of GDP per capita.¹¹

Theory predicted that decentralization ought to produce better social outcomes due to the efficiency gains from the ability to tailor policies to address local problems and satisfy local policy preferences. I argued that decentralization should lead to: better problem definition since definitions can be specific to local circumstances; better targeting of policies since local information will be the most accurate with respect to identifying those in need; and more avenues for political pressure and mobilization, thus increasing responsiveness of government to local needs.

These results show that fiscal decentralization, indeed, is the single most important determinant of food security in any of the models presented in this dissertation. Fiscal decentralization is operationalized in this model as the degree to which revenues are collected and expenditures occur at the subnational level. Administrative decentralization is about two-thirds as strong in its association with increased food security. Administrative decentralization

¹¹ A one-point increase in the natural log of GDP per capita, when expressed in dollars, represents different magnitudes of change at different levels of income. For example, if a country began at \$1000 per capita GDP, a one-point increase in the natural log of GDP per capita would bring that country up to \$2725 per capita GDP. A further one-point increase in the natural log of GDP per capita would bring that same country up to about \$7400 per capita GDP.

here is operationalized as the degree to which subnational governments control their own resources, by measuring the relative percentage of tax as a portion of revenues and the relative percentage of revenues that are not transfers from other levels of governments (which often come with strings attached that limit local autonomy). These results taken together suggest that having sufficient resources under the control of relevant local and subnational decision makers is important to produce food security. These decision makers might be elected politicians or appointed bureaucrats – the measures do not differentiate between types. It is the local control of resources that seems to make the difference.

If democratically elected local leadership matters for food security, then that should show up as a significant coefficient on political decentralization – but political decentralization was not significant. I am hesitant to claim that this proves that local or subnational democracy does not matter, however. Here, political decentralization was captured by the presence of local and subnational elections. Too much of the qualitative literature emphasizes that the presence of elections does not guarantee that local elected officials will be independent of central authority or be able to exercise effective power. Therefore, this result warrants further investigation. A measure that captured more qualitative information about local competitiveness of elections, or autonomy on the part of subnational leaders, might shed more light on the matter.

In the next section, I test similar hypotheses using alternative measurements of decentralization on a time-series cross-sectional dataset.

Food Security and Decentralization: Model 2: IMF measures

The second set of models examining the relationship between food security and decentralization employ a number of indicators gathered by the International Monetary Fund in

the Government Finance Statistics database. These indicators are used to test the following hypotheses:

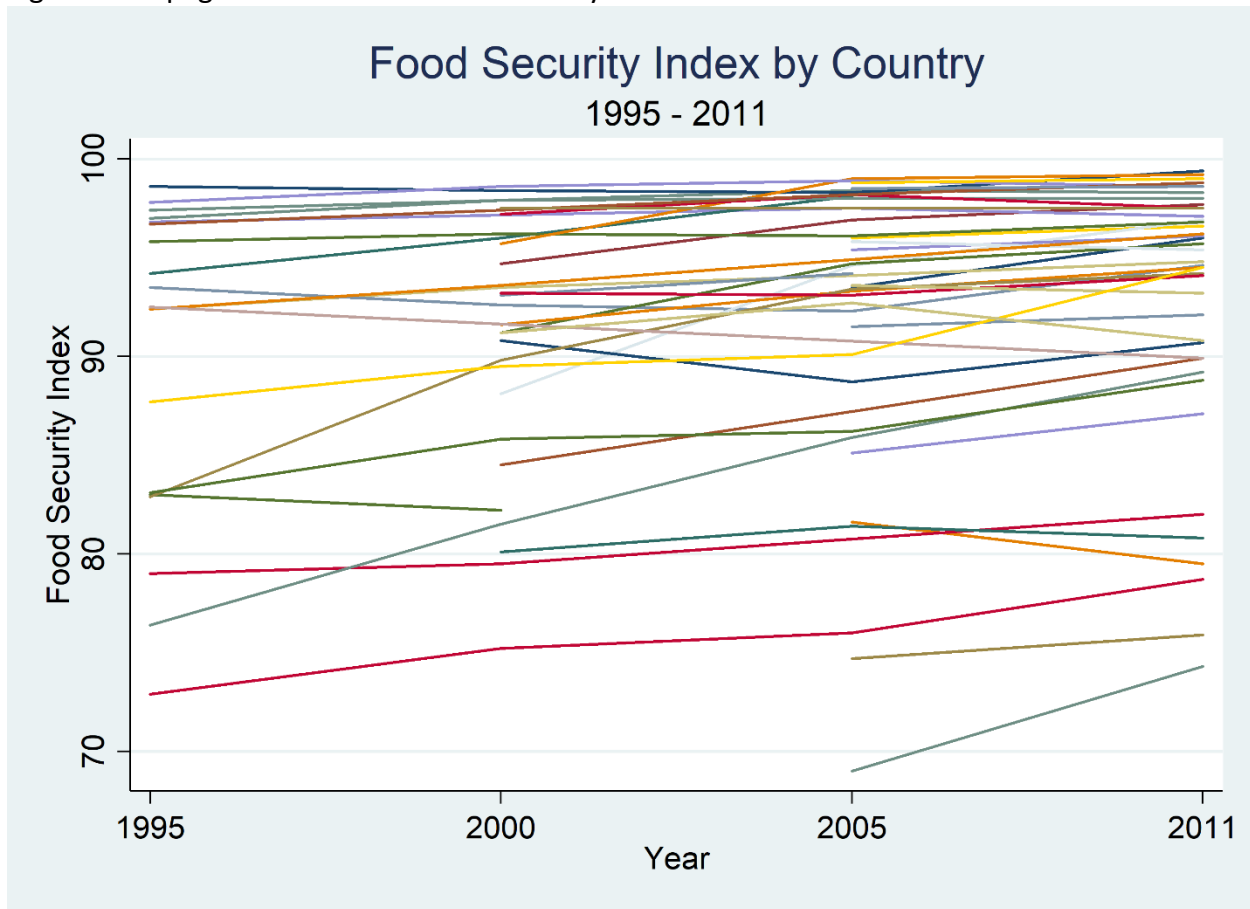
H1: Countries that are fiscally decentralized will have more food security.

H2: Countries that are administratively decentralized will have more food security.

The hypotheses are tested using a time-series cross-sectional (TSCS) dataset of a maximum of 54 countries at four time periods. The models are estimated using linear regression with panel corrected standard errors (PCSEs) (Beck and Katz 1995).

Variables and Measures. The Food Security Index (FSI) is the dependent variable, and it is measured at four points in time: 1995, 2000, 2005, and 2011. The FSI varies both within and between the countries across the time periods. This can be seen in the spaghetti plot shown in Figure 4.3.

Figure 4.3. Spaghetti Plot of the Food Security Index in 54 Countries from 1995 - 2011.



The IMF Government Finance Statistics dataset comprises statistics from IMF member countries, although not all countries report data on all measures (Dziobek, Gutierrez Mangas, and Kufa 2011). The variables incorporated into my full dataset are from 1990 to 2011, although the specific observations used in the models in this section are from 1990 to 2008. The indicators considered in these models are presented in Table 4.8.

Table 4.8. IMF Decentralization Indicators

Indicator (Variable Name)	Variable Name	Dimension of Decentralization
Local Government Expenditures as share of Total Government Expenditures (%)	lclExp	Fiscal
Subnational Government Expenditures as a share of Total Government Expenditures (%)	SNExp	Fiscal
Local Government Revenues as a share of Total Government Revenues (%)	lclRev_TG	Fiscal
Subnational Government Revenues as a share of Total Government Revenues (%)	SNRev_TG	Fiscal
Local Government Tax Revenue as a share of Total Local Government Revenue (%)	lclTax_Rev	Administrative
Subnational Government Tax Revenue as a share of Total Subnational Government Revenue (%)	SNTax_Rev	Administrative
Local Government Compensation of Employees as a share of Total Government Compensation of Employees (%)	lclCmpEmp	Administrative
Subnational Government Compensation of Employees as a share of Total Government Compensation of Employees (%)	SNCmpEmp	Administrative

The IMF employs the subnational versions of these indicators as measures of fiscal decentralization (Dziobek, Gutierrez Mangas, and Kufa 2011). Following Schneider's (2003a) reasoning, subnational and local expenditures and revenues are clearly measures of fiscal decentralization. However, subnational and local tax revenues as shares of their respective revenue streams would seem to answer both the question of who controls the money (fiscal decentralization) and capture the level of autonomy of who implements and controls policy (administrative decentralization). However, collecting more taxes that are kept at and controlled by the local or subnational government level certainly implies more control over how that money

is spent (therefore implying a higher degree of policy control). Following this reasoning, I classify these two indicators as capturing administrative decentralization. The final two indicators are local and subnational shares of compensation of employees. As far as these indicators represent the share of employees at each governmental level, they most closely approximate administrative decentralization.

The year in which each indicator is measured varies, based on the availability of data. The first choice was a four-year lag, to test the same lag that was employed in the factor score model. When this year was not available, I first chose a three-year lag, and if data was not available then either, a five-year lag. This is a more conservative decisional ordering, since presumably whatever effect was seen after four years would be attenuated by using a three-year lag whereas it would be strengthened by using a five-year lag. Missingness in this dataset is not expected to have a systematic relationship with any of the variables, and so the dataset is used as it is.

Formal federalism is included as a dummy variable in this model with one for federal and zero for not federal. Sub-Saharan Africa and GDP per capita (ln) were once again used as control variables. Table 4.9 contains the descriptive statistics for this dataset. Tables B.2, B.3, B.4, and B.5 in Appendix B present the countries included in each model presented in this section.

Table 4.9. Descriptive Statistics for Decentralization Models with IMF Measures

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
FSI	144	91.6854	7.1293	69	99.4
SNExp	75	21.4455	15.8240	.60862	68.2193
SNRev_TG	86	22.2022	16.5928	.6473	71.4723
SNTax_Rev	133	41.7436	23.5918	.9185	100
SNCmpEmp	80	28.8048	23.0517	.2038	76.4562
lclExp	75	16.8475	12.7760	.2750	68.2193
lclRev_TG	88	16.6599	12.8606	.1444	71.4723
lclTax_Rev	139	41.6049	24.2499	.9185	100
lclCmpEmp	82	21.7161	20.5230	.2038	75.5697
GDP per Capita (ln)	144	7.5523	1.0129	4.7792	9.7046
sub-Saharan Africa	144	.1806	.3860	0	1
Federalism	144	.125	.3319	0	1

Correlations are shown in Table 4.10 for the Subnational government variables, and Table 4.11 for the Local government variables.

Table 4.10. Pairwise Correlation Matrix for IMF Subnational Government Decentralization Indicators

Variables	FSI	SNExp	SNRev_TG	SNTax_Rev	SNCmpEmp	GDPperCap (ln)	sub-Saharan	Federalism
FSI	1.0000							
SNExp	-0.0354	1.0000						
SNRev_TG	-0.0883	0.9875	1.0000					
SNTax_Rev	0.0976	-0.0356	-0.1548	1.0000				
SNCmpEmp	-0.0604	0.9085	0.8902	-0.1177	1.0000			
GDPperCap (ln)	0.7271	-0.0495	-0.1063	-0.1011	-0.1119	1.0000		
sub-Saharan	-0.5134	-0.0943	0.0194	-0.3562	-0.0312	-0.2899	1.0000	
Federalism	-0.1568	0.1923	0.1696	0.1170	0.2298	-0.0102	-0.0682	1.0000

Table 4.11. Pairwise Correlation Matrix for IMF Local Government Decentralization Indicators

Variables	FSI	lclExp	lclRev_TG	lclTax_Rev	lclCmpEmp	GDPperCap (ln)	sub-Saharan	Federalism
FSI	1.0000							
lclExp	0.0042	1.0000						
lclRev_TG	0.0083	0.9864	1.0000					
lclTax_Rev	0.0750	0.0232	-0.0701	1.0000				
lclCmpEmp	0.0661	0.8991	0.8726	-0.0144	1.0000			
GDPperCap (ln)	0.7271	-0.1143	-0.1655	-0.1456	-0.1179	1.0000		
sub-Saharan	-0.5134	-0.2359	-0.2234	-0.3086	-0.2606	-0.2899	1.0000	
Federalism	-0.1568	-0.1205	-0.0925	-0.0027	0.0743	-0.0102	-0.0682	1.0000

The correlation matrices show that there is considerable risk of multicollinearity if all four decentralization indicators were to be included in a single model. Subnational revenue as a share of total government revenue (SNRev_TG) and subnational expenditures as a share of total government expenditures (SNExp) are nearly perfectly correlated¹², with a Pearson's r of .9875. Subnational compensation of employees as a share of total government compensation of employees (SNCmpEmp) is strongly correlated with subnational expenditures (SNExp) with a Pearson's r of .9085. Subnational compensation of employees (SNCmpEmp) is also strongly correlated with subnational government revenues as a share of total government revenues (SNRev_TG) with a Pearson's r of 0.8902. Local government decentralization indicators have the same problem. Local expenditures as a share of total government expenditures (lclExp) and local revenues as a share of total government revenues (lclRev_TG) are almost perfectly correlated, with a Pearson's r of .9864. Local expenditures (lclExp) and local compensation of employees as a share of total government compensation of employees (lclCmpEmp) are strongly correlated (Pearson's r = .8991). Finally, local revenues (lclRev_TG) are strongly correlated with local compensation of employees (lclCmpEmp) with a Pearson's r of .8726. The only one of the four indicators that escapes strong correlations with the others is the share of local or subnational revenue that comes from taxes (lclTax_Rev, SNTax_Rev). Due to this complication within the data, I will estimate several models that include the three problematic variables paired with subnational or local revenues from taxes.

¹² Pearson's r varies from -1 (perfect negative correlation) to 1 (perfect positive correlation). A Pearson's r of 0 indicates no correlation between the two variables.

Models and Results. The models presented in this section were estimated in Stata 14. The Wooldridge test for autocorrelation showed that each model exhibited first-order (AR1) autocorrelation (Drukker 2003). AR1 correlation means that the errors at time t are correlated with the errors in the previous time period. If it is not accounted for, such correlation leads to optimistic standard errors and p-values that are too small – causing the conclusion that slope coefficients are significant when they really are not. Given that AR1 correlation is present in these models, I used the procedure `xtpcse` with an AR1 correlation structure specified when estimating the models, which produces linear estimates using a Prais-Winsten regression with panel corrected standard errors (PCSEs). The results are presented in Table 4.12. This significance level for these models is $\alpha = .05$.

Table 4.12. Estimates for IMF Subnational Decentralization Models, DV = FSI in 4 panels

	Model 1	Model 2	Model 3	Model 4
GDP per capita (ln)	2.9603* (.5967)	3.1019* (.6895)	2.6349* (.4971)	3.9581* (.7833)
sub-Saharan Africa	-5.4574* (.5478)	-4.8465* (1.1844)	-5.3672* (1.5859)	-6.8990* (1.4914)
Federalism	.6626 (.9088)	.3465 (.7944)	1.2350 (1.8061)	-3.09682* (.8555)
SNTax_Rev	.01346 (.01612)	.009036 (.01399)	.01698 (.01884)	.01761 (.02093)
SNExp	-.01295 (.03297)			
SNRev_TG		-.004940 (.02427)		
SNCmpEmp			-.008693 (.01754)	
Constant	71.0712* (4.9808)	69.8041* (5.6357)	73.5851* (4.4822)	62.3377* (6.9991)
Regression Statistics				
n	70	81	76	132
Number of Countries	40	42	39	59
R ²	.9678	.9712	.5152	.9591
Wald χ^2	744.57*	355.64*	54.79*	85.85*
*p < .05 Each cell contains the unstandardized coefficients and the standard error in parentheses.				

Findings. These results do not support either hypothesis that fiscal or administrative decentralization is associated with higher food security.

Federalism was only significant in Model 4. Note that Model 4 also has the highest number of observations and countries. Similar to the result found in the model in the previous section, federalism had a negative relationship with the FSI. A federal country is expected to have a Food Security Index on average 3.09682 points lower than a non-federal country, holding all other independent variables constant. This adds to the evidence that when federalism is significant, it is consistently a negative predictor of food security, and substantively quite large.

The natural log of GDP per capita and the sub-Saharan Africa dummy variable showed a consistently strong relationship with food security. In the case of GDP per capita, that relationship is strong and positive across models, whereas a country being located in sub-Saharan Africa is consistently associated with lower food security.

I do not present the results for the local government decentralization measures here, because they are commensurate with the results from the subnational decentralization measures. I also estimated models for each cross-section, again with no substantively or statistically significant results. In short, these models provide no support for the hypotheses that differentiate federalism from different dimensions of decentralization.

Discussion. These models do not support the proposition that administrative or fiscal decentralization is related to food security. In the previous section, the cross-sectional model showed strong support for these propositions. So what are we to take away from this section? There are two ways to view this. First, the results presented in this section may be less reliable because direct measures were used instead of being decomposed into factor scores. Factor scores methodologically differentiate related measures along underlying dimensions, removing the correlations between measures by making them orthogonal to one another. It could be that the measures in their original form (not factored) do not capture the underlying dimensions of decentralization, or that they conflate concepts (in this case administrative and fiscal decentralization), muddying the measures so much as to render them unusable in model estimation. This would imply that the lack of results is due to measurement error, and we should rely on the results from the factor score model. On the other hand, the factor score model was based on a limited sample of countries (determined by data availability), and was cross-sectional.

It could be that the results that were found were an artifact of either the sample or the time period that was used. The only conclusion one can draw with certainty is that this dissertation presents some promising results that warrant further investigation to see whether they can be confirmed.

Conclusion

The statistical analyses presented here provide support for many of the hypotheses proposed in this dissertation. Federalism is associated with lower food security. Administrative and fiscal decentralization are both strongly associated with higher food security in my cross-sectional factor score model. However, in the time-series cross-sectional models that use direct measures of administrative and fiscal decentralization, neither one is a significant predictor of food security. Democracy is positively associated with food security, with the strongest and most consistent results showing that civil liberties may be relatively more important than political rights.

CHAPTER 5 POLITICS AND FOOD SECURITY: WHAT HAVE WE LEARNED?

Introduction

Food security is partly determined by politics. This dissertation examined three political determinants of food security: democracy, decentralization, and federalism. Each one was operationalized and tested against food security using different subsets of a dataset of all countries from 1990 to 2011. Democracy was divided along two dimensions: political rights and civil liberties. Both are significant positive predictors of food security. Increases in civil liberties are more consistently and strongly associated with food security than increases in political rights. Decentralization was assessed along three dimensions: fiscal, administrative, and political. Fiscal and administrative decentralization are both significantly associated with higher food security, although not consistently in all models. The strongest predictor of food security in any model (even compared to economic and geographic factors) was fiscal decentralization measured as a factor score and deployed in a cross-sectional model. However, direct measures of fiscal and administrative decentralization were not significant predictors of food security in time-series, cross-sectional models. Finally, federalism is negatively associated with food security when significant, but it is only significant in five out of the eleven models presented here. This chapter reflects back on the dissertation and discusses how it contributes to the literature about social welfare, democracy, decentralization, and federalism.

Democracy and Social Welfare

This dissertation contributes to the burgeoning literature on democracy and social welfare. In that literature, the most consistent finding has been that democracy increases social spending. This spending was assumed to enhance social welfare. Subsequent studies that

examined social welfare outcomes called that assumption into question and found that democracy's effect on social welfare outcomes is inconsistent, but on balance, positive. However, many studies that found positive effects were undercut by sample bias induced by listwise deletion of high-performing autocratic regimes due to missing data (Ross 2006). Once sample bias from this source was corrected using multiple imputation, democracy was found to have no effect on infant or child mortality. Finally, most of the prior work on democracy and social welfare used an operationalization of democracy that focused on political institutions and procedures. This focus on procedural democracy is particularly troubling, since it seems to exclude much of what is qualitatively democratic about democracy as a political system.

This dissertation adds a new perspective on the relationship between democracy and social welfare in several respects. Firstly, I operationalized social welfare as food security, which is a topic that has not been addressed in much detail in the quantitative political science literature. Secondly, I used a measure of food security, the Food Security Index, that incorporates measures on multiple dimensions of food security, rather than using a simpler proxy variable to stand in for this complex topic. Thirdly, I employed quantitative measures of democracy that capture two important dimensions of that concept: political rights and civil liberties. Political rights comprise free and fair elections, universal suffrage, competitive parties, empowered opposition parties, and freedom of participation. Civil liberties comprise freedom of speech, the press, religion, freedom from discrimination, freedom to organize and assemble, property rights, and rule of law (Freedom House 2014b). Finally, I used multiple imputation to correct for possible sample bias due to patterns of missing data. My results remained significant and positive.

The analysis presented here provides a nuanced view of the characteristics of democracy that produce better social welfare. Political rights and civil liberties both matter for food security, but they matter differently. Civil liberties are more strongly and more consistently associated with increased food security than political rights. Civil liberties have an effect even when they are only partially protected. That effect is enhanced by complete protections, but the largest increase in food security associated with any of the democracy variables comes from a partial opening on the civil liberties dimension. In addition, civil liberties are continuously effective. Every year that civil liberties are protected produces better food security. Partial openings in political rights are not effective – it is all or nothing along the political rights dimension. Political rights are also only intermittently effective. In fact, political rights were only statistically significant with a four-year lag between the political rights measurement and the year when food security was measured (although the coefficient magnitudes were consistent across all lags). This suggests that political rights may be affecting food security through a somewhat different mechanism than civil liberties.

Future directions. I found that political rights and civil liberties both produce more food security, but they do so in different ways. Therefore, there are different directions for future research for each dimension. Civil liberties were effective at increasing food security even if the opening was only partial. In fact, the movement from no civil liberties to partial protections was the most effective. The civil liberties measure employed in this dissertation comes from Freedom House, and it includes information about a series of different individual rights and freedoms, and the rule of law. It would be useful to investigate if there is a specific subset of civil liberties that is particularly effective in increasing food security. For example, Amartya Sen (1991; 1983) argues

that freedom of the press is particularly important to ensure a free flow of information about the state of social welfare, which can then serve to mobilize people to hold politicians accountable and make government more responsive. He argued this in relation to famine, however, which is the type of disaster that has the ingredients to hold the attention of the news media. What about the case of chronic hunger of the type addressed in this project? Chronic hunger exists in the background and is not often the focus of splashy media coverage. Employing different measures that separate the concept of civil liberties into its constituent parts may be useful to see what exactly is driving the effect that civil liberties have on food security.

Political rights are a different matter. Two pieces of information suggest that the relationship of political rights to social welfare may be cyclical. Political rights give people the ability to elect officials who will pay attention to food security. This power is centered on elections, however. While elections themselves hold politicians accountable, and officials may feel electoral pressure to address constituents' needs, this effect may not be consistent and continuous, especially if no election is imminent. Scholars who study political commitment to hunger reduction have found that country experts in six countries all reported that expenditures on hunger were sensitive to electoral cycles (te Lintelo et al. 2014). Viewed in that context, my results may fit this cyclical interpretation. That is the subject of my recommendations for future research into the effect of political rights on food security.

If food security is tied to electoral cycles, that effect ought to be measurable. One possibility is to include a measure of whether or not a particular year was an election year in each country. That would determine whether any increases in food security are specifically election-year effects, while also providing a way to assess the magnitude of any effect. A second possibility

is to include, for each year, how many years it has been since the last election. Presumably – if the electoral cycle theory holds – as elections grow more distant, food security ought to decrease.

Finally, the Freedom House measures have been somewhat controversial, given that for many years Freedom House was opaque with its methods for determining the scores. This has largely been rectified – Freedom House now publishes documentation which describes the panels of experts and the questionnaires that are used to score countries. I argue that the Freedom House measures capture more information about the democratic nature of each country than do measures like Polity IV. However, turning to even more nuanced measures of democracy, such as those being developed by the Varieties of Democracy team (Coppedge 1999, 2002), may be useful for future research.

Decentralization and Social Welfare

This dissertation contributes to the literature on decentralization and social welfare by providing a cross-national quantitative study of a subject that has often been viewed through the lens of case studies. My results for decentralization and food security were mixed. In the cross-sectional model using factor scores, both fiscal and administrative decentralization were positively associated with food security. Fiscal decentralization, when measured as a factor score, had a larger coefficient than any other variable in any of the models. In fact, an increase of only about 16 percent in fiscal decentralization would be expected to produce the same magnitude change in food security as moving from not free to completely free in terms of civil liberties. Administrative decentralization, when measured as a factor score, also produces a positive effect – substantively large, but smaller than that of fiscal decentralization. An increase of about 24 percent in administrative decentralization would be expected to produce the same magnitude

change in food security as a complete opening in civil liberties. These results were not replicated, however, in my time-series cross-sectional models that used direct measures of fiscal and administrative decentralization. In those models, none of the measures of decentralization were significantly related to food security. In addition, political decentralization, measured as a factor score, was not associated with food security.

Future directions. This dissertation contributes to the quantitative empirical literature on decentralization. However, the inconsistency of the results across my two types of models indicates that further research is necessary before drawing any conclusions. Methodologically speaking, the model with the significant results is the least robust, for two reasons. First, it is based on a limited sample of 42 countries which are selected into the sample based on data availability. Second, the dataset used for this model is cross-sectional. It is impossible to rule out that there may be period-specific effects between 1996 and 2000 (when the independent variables and the dependent variable were measured, respectively) that account for the significant coefficients. More data collection is the answer here – ideally enough data would become available so that more time slices of decentralization factor scores could be calculated and used in a time-series, cross-sectional analysis. If the relationships shown in my cross-sectional model continued to hold across different time periods, that would bolster the argument that fiscal and administrative decentralization are positively associated with food security.

Finally, the political decentralization measure used herein may be problematic – it is worth noting that these doubts are shared with the original architect of these measures (Schneider 2003). The factor score for political decentralization was based on the presence of local and subnational elections, without assessing the quality of the elections, local participation,

candidates, or anything else. It would be a useful avenue of future research to gather more data on measures that could capture the meaningfulness of local or subnational elections. If the concept could be better measured, rather than lumping effectively and ineffectively decentralized countries together into the same category, then I could be more certain in my conclusions. As it stands, I would argue that the question of whether political decentralization affects food security should remain open pending further investigation.

Federalism and Social Welfare

Federalism has been the subject of a great deal of debate. Many scholars have argued that federalism can constrain spending of all types. Those who focus on redistribution theorize that federalism makes redistribution more difficult. Of the eleven models presented in this dissertation, five showed federalism to have a significant and substantive negative effect on food security. This supports the theoretical contention that federalism makes redistribution (i.e. in this case, spending on and implementation of social welfare programs like the ones that address food insecurity) less likely.

Future directions. Future research in this area should focus on two things. First, other measures of social welfare could be utilized. This project provides preliminary evidence that federalism negatively affects food security. Does it have the same effect on other social welfare problems whose solutions have a redistributive basis? In other words, if redistribution is a problem under federalism, that ought to show up in cross-national studies of all kinds of social welfare measures. Second, with careful selection, measures of social welfare could be used that would maximize the available data. About a third of all federations did not appear in my democracy models, for example, because the FSI was not measured for all of them. Specifically, the wealthy federations

are excluded from my dataset. It would be helpful to choose a dependent variable that captures social welfare, at the same time making sure that it was measured for the vast majority of federations.

Conclusion

In this dissertation, I theorized that political rights and civil liberties – two dimensions of democracy – would produce more food security. The results presented herein suggest that this is true, and offer a more nuanced view. Food insecurity is almost by definition an affliction of the least powerful in any society (Sen 1983). If democracy increases food security, it must do so, in the simplest of terms, by putting the right people in office and subsequently pushing them to adopt the right policies. The former is a function of an open and competitive system of elections in which all candidates compete freely, and all societal groups can exercise their voting rights; only in such a system do candidates who represent those with the least power have a chance of getting into government. The latter is a function of keeping up political pressure to ensure continuous attention to the problem of food insecurity. Political pressure of this type comes from mobilized groups – mobilization which is only possible if civil liberties are effectively protected. If this type of continuous pressure is absent, then attention to food insecurity is likely to vary depending on electoral cycles. In short, political rights ensure responsiveness through electing the right people, and civil liberties ensure responsiveness by providing the avenues to maintain continuous pressure, to motivate politicians to respond even when no election is imminent.

While democracy produces higher food security, the magnitude is small compared with that which may be produced by decentralization. Fiscal decentralization produces a comparatively large increase in food security. Administrative decentralization produces a slightly

lower magnitude of change, while still being substantively large. These results come from a model estimated on limited data in a very specific time frame, however, so further investigation is warranted before drawing firm conclusions. Federalism seems to provide an impediment to increasing food security.

For a long time, scholars who study food security have focused on economic and environmental explanations for the problem of food insecurity (Leathers and Foster 2004). This dissertation shows that without a doubt, politics matter for food security. Absent careful attention to the political determinants of food security, recommended solutions may be at best incomplete and, at worst, ineffective. Political variables should be taken into account and studied in our global effort to solve this important social welfare problem.

APPENDIX A DATA DICTIONARY

Table A.1. Data Dictionary			
Variable	Description	Coding	Source
Food Security			
<i>prevUN</i>	Prevalence of undernourishment (%)	3-year averages, coded into middle year	(IFPRI 2012) UN FAO Food Security Indicators
<i>u5uw</i>	Children under 5 who are underweight (%)		(IFPRI 2012) UN FAO Food Security Indicators
<i>u5mort</i>	Mortality in children under 5		(IFPRI 2012) World Bank
<i>FSI</i>	Food Security Index	$= 1 - \frac{1}{3}(prevUN + u5uw + u5mort)$	
Democracy			
<i>CL_Free</i>	Civil Liberties: Free	if Freedom House Civil Liberties Ranking = [6,7], then 1, else 0	(Freedom House 2014a)
<i>CL_PartF</i>	Civil Liberties: Part Free	if Freedom House Civil Liberties Ranking = [3,4,5], then 1, else 0	(Freedom House 2014a)
<i>PR_Free</i>	Political Rights: Free	if Freedom House Political Rights Ranking = [6,7], then 1, else 0	(Freedom House 2014a)
<i>PR_PartF</i>	Political Rights: Part Free	if Freedom House Political Rights Ranking = [3,4,5], then 1, else 0	(Freedom House 2014a)
Decentralization			
<i>adminDct</i>	Administrative Decentralization	Factor Score from 0 = centralized to 1 = decentralized	(Schneider 2003a)
<i>fiscalDct</i>	Fiscal Decentralization	Factor Score from 0 = centralized to 1 = decentralized	(Schneider 2003a)
<i>polDct</i>	Political Decentralization	Factor Score from 0 = centralized to 1 = decentralized	(Schneider 2003a)
<i>federalism</i>	Does the country have a federal constitution?	1 = Yes 0 = No	CIA World Factbook (Watts 2008)

<i>lclExp</i>	Local Government Expenditures as share of Total Government Expenditures (%)		IMF Government Finance Statistics
<i>lclRev_TG</i>	Local Government Revenues as a share of Total Government Revenues (%)		IMF Government Finance Statistics
<i>lclTax_Rev</i>	Local Government Tax Revenue as a share of Total Local Government Revenue (%)		IMF Government Finance Statistics
<i>lclCmpEmp</i>	Local Government Compensation of Employees as a share of Total Government Compensation of Employees (%)		IMF Government Finance Statistics
<i>SNExp</i>	Subnational Government Expenditures as a share of Total Government Expenditures (%)		IMF Government Finance Statistics
<i>SNRev_TG</i>	Subnational Government Revenues as a share of Total Government Revenues (%)		IMF Government Finance Statistics
<i>SNTax_Rev</i>	Subnational Government Tax Revenue as a share of Total Subnational Government Revenue (%)		IMF Government Finance Statistics
<i>SNCmpEmp</i>	Subnational Government Compensation of Employees as a share of Total Government Compensation of Employees (%)		IMF Government Finance Statistics
<i>Descriptive and Control Variables</i>			
<i>ccode</i>	Country code	Unique identifier	
<i>country</i>	Country name		United Nations
<i>subregion</i>	Geographical Subregion	1 = North Africa 2 = sub-Saharan Africa 3 = Caucasus and Central Asia 4 = East Asia 5 = South Asia 6 = Southeast Asia 7 = West Asia (Middle East)	United Nations

		8 = Caribbean 9 = Latin America 10 = Oceania 11 = Europe 12 = North America	
<i>subSaharan</i>	Is the country in sub-Saharan Africa?	1 = Yes 0 = No	United Nations
<i>GDPperCap</i>	Gross Domestic Product per Capita	natural log	World Bank

APPENDIX B COUNTRIES INCLUDED BY MODEL

Table B.1. Countries Included in Democracy and Food Security Model

** indicates a federal country*

Region	Country
<i>Northern Africa</i>	
	Algeria
	Egypt
	Libya
	Morocco
	Tunisia
<i>Sub-Saharan Africa</i>	
	Angola
	Benin
	Botswana
	Burkina Faso
	Burundi
	Cameroon
	Central African Republic
	Chad
	Comoros
	Congo
	Côte d'Ivoire
	Djibouti
	Eritrea
	Ethiopia*
	Gabon
	Gambia
	Ghana
	Guinea
	Guinea-Bissau
	Kenya
	Lesotho
	Liberia
	Madagascar
	Malawi
	Mali
	Mauritania
Mauritius	
Mozambique	
Namibia	
Niger	

	Nigeria*
	Rwanda
	Senegal
	Sierra Leone
	South Africa
	Sudan* (former)
	Swaziland
	Togo
	Uganda
	United Republic of Tanzania
	Zambia
	Zimbabwe
<i>Caucasus and Central Asia</i>	
	Armenia
	Azerbaijan
	Georgia
	Kazakhstan
	Kyrgyzstan
	Tajikistan
	Turkmenistan
	Uzbekistan
<i>East Asia</i>	
	China
	Democratic People's Republic of Korea
	Mongolia
<i>South Asia</i>	
	Bangladesh
	India*
	Iran (Islamic Republic of)
	Nepal*
	Pakistan*
	Sri Lanka
<i>Southeast Asia</i>	
	Cambodia
	Indonesia
	Lao People's Democratic Republic
	Malaysia*
	Philippines
	Thailand
	Timor Leste
	Viet Nam
<i>West Asia (Middle East)</i>	

	Jordan
	Kuwait
	Lebanon
	Saudi Arabia
	Syrian Arab Republic
	Turkey
	Yemen
<i>Caribbean</i>	
	Cuba
	Dominican Republic
	Haiti
	Jamaica
	Trinidad and Tobago
<i>Latin America</i>	
	Argentina*
	Bolivia (Plurinational State of)
	Brazil*
	Chile
	Colombia
	Costa Rica
	Ecuador
	El Salvador
	Guatemala
	Guyana
	Honduras
	Mexico*
	Nicaragua
	Panama
	Paraguay
	Peru
	Suriname
	Uruguay
	Venezuela* (Bolivarian Republic of)
<i>Oceania</i>	
	Fiji
<i>Europe</i>	
	Albania
	Belarus
	Bosnia and Herzegovina*
	Bulgaria
	Croatia
	Estonia

Latvia
Lithuania
Republic of Moldova
Romania
Russian Federation*
Slovakia
The former Yugoslav Republic of Macedonia
Ukraine

Table B.2. Countries Included in the Decentralization Factor Scores Model
** indicates a federal country*

Region	Country
<i>Sub-Saharan Africa</i>	
	Botswana
	Kenya
	Mauritius
	Senegal
	South Africa
<i>Caucasus and Central Asia</i>	Zimbabwe
	Azerbaijan
	Georgia
	Kazakhstan
	Kyrgyzstan
<i>East Asia</i>	Tajikistan
	China
<i>South Asia</i>	Mongolia
<i>South Asia</i>	
	India*
<i>Southeast Asia</i>	
	Indonesia
	Malaysia*
	Philippines
	Thailand
<i>Caribbean</i>	
	Dominican Republic
	Trinidad and Tobago
<i>Latin America</i>	
	Argentina*
	Bolivia (Plurinational State of)

	Brazil*
	Chile
	Guatemala
	Mexico*
	Nicaragua
	Panama
	Paraguay
	Peru
<i>Oceania</i>	
	Fiji
<i>Europe</i>	
	Albania
	Belarus
	Bulgaria
	Croatia
	Estonia
	Latvia
	Lithuania
	Republic of Moldova
	Romania
	Russian Federation*
	Slovakia

Table B.3. Countries Included in the IMF Subnational Decentralization Model 1
 * indicates a federal country

Region	Country
<i>North Africa</i>	
	Morocco
	Tunisia
<i>Sub-Saharan Africa</i>	
	Congo
	Lesotho
	Mauritius
	South Africa
<i>Caucasus and Central Asia</i>	
	Armenia
	Azerbaijan
	Georgia
	Kazakhstan
<i>East Asia</i>	
	China

	Mongolia
<i>South Asia</i>	
	Iran (Islamic Republic of)
<i>Southeast Asia</i>	
	Indonesia
	Malaysia*
	Thailand
<i>West Asia (Middle East)</i>	
	Jordan
	Turkey
<i>Caribbean</i>	
	Jamaica
<i>Latin America</i>	
	Argentina*
	Bolivia (Plurinational State of)
	Brazil*
	Chile
	Colombia
	Costa Rica
	El Salvador
	Honduras
<i>Europe</i>	
	Belarus
	Bosnia and Herzegovina*
	Bulgaria
	Estonia
	Latvia
	Lithuania
	Republic of Moldova
	Romania
	Russian Federation*
	Serbia
	Slovakia
	The former Yugoslav Republic of Macedonia
	Ukraine

Table B.4. Countries Included in the IMF Subnational Decentralization Model 2
** indicates a federal country*

Region	Country
<i>North Africa</i>	
	Morocco

	Tunisia
<i>Sub-Saharan Africa</i>	
	Congo
	Lesotho
	Mauritius
	South Africa
<i>Caucasus and Central Asia</i>	
	Armenia
	Azerbaijan
	Georgia
	Kazakhstan
<i>East Asia</i>	
	China
	Mongolia
<i>South Asia</i>	
	Iran (Islamic Republic of)
<i>Southeast Asia</i>	
	Indonesia
	Malaysia*
	Thailand
<i>West Asia (Middle East)</i>	
	Jordan
	Turkey
<i>Caribbean</i>	
	Jamaica
<i>Latin America</i>	
	Argentina*
	Bolivia (Plurinational State of)
	Brazil*
	Chile
	Colombia
	Costa Rica
	El Salvador
	Honduras
	Mexico*
<i>Europe</i>	
	Belarus
	Bosnia and Herzegovina*
	Bulgaria
	Croatia
	Estonia
	Latvia

Lithuania
Republic of Moldova
Romania
Russian Federation*
Serbia
Slovakia
The former Yugoslav Republic of Macedonia
Ukraine

Table B.5. Countries Included in the IMF Subnational Decentralization Model 3
** indicates a federal country*

Region	Country
<i>North Africa</i>	
	Morocco
	Tunisia
<i>Sub-Saharan Africa</i>	
	Congo
	Lesotho
	Mauritius
	South Africa
<i>Caucasus and Central Asia</i>	
	Armenia
	Azerbaijan
	Georgia
	Kazakhstan
<i>East Asia</i>	
	Mongolia
<i>South Asia</i>	
	Iran (Islamic Republic of)
<i>Southeast Asia</i>	
	Indonesia
	Thailand
<i>West Asia (Middle East)</i>	
	Jordan
	Turkey
<i>Caribbean</i>	
	Jamaica
<i>Latin America</i>	
	Argentina*
	Bolivia (Plurinational State of)
	Brazil*

	Chile
	Colombia
	Costa Rica
	El Salvador
	Honduras
<i>Europe</i>	
	Belarus
	Bosnia and Herzegovina*
	Bulgaria
	Croatia
	Estonia
	Latvia
	Lithuania
	Republic of Moldova
	Romania
	Russian Federation*
	Serbia
	Slovakia
	The former Yugoslav Republic of Macedonia
	Ukraine

Table B.6. Countries Included in the IMF Subnational Decentralization Model 4
** indicates a federal country*

Region	Country
<i>North Africa</i>	
	Morocco
	Tunisia
<i>Sub-Saharan Africa</i>	
	Botswana
	Congo
	Ethiopia*
	Kenya
	Lesotho
	Mauritius
	Senegal
	South Africa
	Uganda
	Zambia
	Zimbabwe
<i>Caucasus and Central Asia</i>	
	Armenia

	Azerbaijan
	Georgia
	Kazakhstan
	Kyrgyzstan
<i>East Asia</i>	
	China
	Mongolia
<i>South Asia</i>	
	India*
	Iran (Islamic Republic of)
	Sri Lanka
<i>Southeast Asia</i>	
	Indonesia
	Malaysia*
	Philippines
	Thailand
<i>West Asia (Middle East)</i>	
	Jordan
	Turkey
<i>Caribbean</i>	
	Jamaica
	Trinidad and Tobago
<i>Latin America</i>	
	Argentina*
	Bolivia (Plurinational State of)
	Brazil*
	Chile
	Colombia
	Costa Rica
	El Salvador
	Guatemala
	Honduras
	Mexico*
	Nicaragua
	Paraguay
	Peru
<i>Europe</i>	
	Albania
	Belarus
	Bosnia and Herzegovina*
	Bulgaria
	Croatia

Estonia
Latvia
Lithuania
Republic of Moldova
Romania
Russian Federation*
Serbia
Slovakia
The former Yugoslav Republic of Macedonia
Ukraine

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ABSTRACT**THE POLITICAL DETERMINANTS OF FOOD SECURITY:
DEMOCRACY, DECENTRALIZATION, AND FEDERALISM**

by

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Food security is partially determined by politics. This dissertation examines three political determinants of food security: democracy, decentralization, and federalism. Each one is operationalized and tested quantitatively against food security using a dataset of all countries from 1990 to 2011, although each model employs a different subset of the dataset. Democracy is divided along two dimensions: political rights and civil liberties. Both are significant positive predictors of food security. Increases in civil liberties are more consistently and strongly associated with food security than increases in political rights.

Decentralization is assessed along three dimensions: fiscal, administrative, and political. Fiscal and administrative decentralization, when measured as factor scores, were significantly associated with higher food security. In fact, the strongest predictor of food security in any model (even compared to economic and geographic factors) was fiscal decentralization, when measured as a factor score. However, direct measures of fiscal and administrative

decentralization were not significantly associated with food security. Finally, federalism has a consistently strong and negative effect when significant, but it is not significant in all models.

This dissertation contributes to the burgeoning literature on democracy and social welfare, particularly because multiple imputation was used to correct for sample bias and the effects remained significant and positive. In addition, it provides a nuanced view of the characteristics of democracy that produce better social welfare. It contributes to the literature on decentralization and social welfare, a subject often viewed through the lens of qualitative case studies, by providing a cross-national quantitative study of the subject. Finally, it contributes to the literature on federalism by testing theories about the difficulties of redistribution under federalism. Avenues of future research are suggested.

AUTOBIOGRAPHICAL STATEMENT

Catherine E. Schmitt-Sands earned a BA in Political Science and an MA in Political Science with a concentration in Public Policy from Wayne State University. Her strong interest in quantitative methods led her to attend the Inter-university Consortium for Political and Social Research Summer Program for two years. She has presented her work at the annual meetings of the Midwest Political Science Association and the American Political Science Association. She has co-authored an article in the *Journal of Urban Affairs*, and co-authored a chapter in *Implementing Term Limits: The Case of the Michigan Legislature*, published by the University of Michigan Press.

Catherine held a Graduate Teaching Assistantship in the Department of Political Science at Wayne State for three years, during which she taught classes on American government, ethics and public policy, and statistical methods. She subsequently held a Graduate Research Assistantship at the School of Social Work at Wayne State, during which she researched the topic of immigrant-friendly communities. She currently holds the position of Senior Lecturer and Undergraduate Statistics Course Coordinator at the Mike Ilitch School of Business at Wayne State University, where she teaches statistics and research methods.