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**THREE ESSAYS ON INSTITUTIONS, RELIGION, AND
ECONOMIC DEVELOPMENT**

Hossein Radmard

Dissertation submitted to the
College of Business and Economics
at West Virginia University
in partial fulfillment of the requirements
for the degree of

Doctor of Philosophy
in
Economics

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Analysis, State Religiosity, Conflict

Abstract

Three Essays on Institutions, Religion and Economic Development

Hossein Radmard

This dissertation consists of three essays that provide empirical evidence on the importance of institutions, informal institutions and particularly religion in economic development. In the first chapter, the relationship between religious adherence rate in the U.S. counties and entrepreneurship is examined. After controlling for spatial dependencies, results indicate that more religious counties, meaning counties with higher rate of religious membership, have lower entrepreneurial potentials. Chapter 2 investigates the relevance of institutional quality in efficiency of public spending. This study is delivered in the state level. By using a non-parametric method, efficiency of public spending is calculated and then its relationship with some indicators of institutional quality is tested. It is shown that states with better judicial system and less restrictive labor market present more effective public spending. In the last chapter the role of state religiosity in the political and societal conflict is studied. The hypothesis states that if a country has a religious government, the chance and magnitude of having a domestic conflict due to religious heterogeneity would increase. After controlling for several covariates, there is not enough evidence found to reject the null hypothesis. Therefore religious heterogeneity in countries with religious state seems to be associated with larger magnitude of conflict.

Dedication

*I dedicate this dissertation to my wonderful family and the memory of my beloved brother,
Dr. Shapour Radmard.*

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Table of Contents

Chapter 1. Introduction	1
1.1 Religion and Entrepreneurship: A County-level Analysis.....	2
1.2 Institutional Quality and Efficiency of Public Spending: Evidence from the U.S. State Governments	3
1.3 Religious Heterogeneity, State Religiosity and Conflict	5
Chapter 2. Religion and Entrepreneurship: A County-level Analysis	7
2.1 Introduction	7
2.2 Literature Review	10
2.3 Theoretical Argument	14
2.4 Variables and Data	16
2.4.1 Entrepreneurship (Ent_i): self-employment & small firms growth rate	17
2.4.2 Religious Factors (REL_i): Religiosity & Religious Diversity	19
2.4.3 Covariates	20
2.5 Methodology	23
2.6 Spatial Dependence	24
2.7 Results and Discussion.....	27
2.7.1 Direct Effects	28
2.7.2 Indirect Effects.....	29
2.7.3 Entrepreneurship spillover effect.....	30
2.7.4 Control variables.....	31
2.7.5 Denominational variables results.....	32
2.8 Conclusion and Discussion	32
Appendix A	34
Chapter 3. Institutional Quality and Efficiency of Public Spending: Evidence from the U.S. States Governments	47
3.1 Introduction	47
3.2 Literature Review	49
3.2.1 Public Spending and its Efficiency	50

3.2.2	Institutions.....	51
3.3	Empirical Design, Variables, and Data	53
3.3.1	Data Envelopment Analysis (DEA).....	53
3.3.2	Testing the relationship between efficiency and Institutions.....	57
3.4	Explanatory Variables: Institutions.....	58
3.5	Empirical Analysis	62
3.6	Conclusion.....	63
	Appendix B	65
Chapter 4.	Religious Heterogeneity, State Religiosity and Conflict.....	70
4.1	Introduction	70
4.2	Literature Review and Theoretical Argument.....	72
4.2.1	Confrontation of Identities and Conflict	74
4.2.2	Minorities' Frustration	76
4.3	Variables and Data	78
4.3.1	Dependent Variable: Conflict	78
4.3.2	Religious Heterogeneity.....	79
4.3.3	State Religiosity	81
4.3.4	Control Variables	84
4.4	Methodology	88
4.5	Empirical Results and Analysis.....	89
4.6	Conclusion.....	92
	Appendix C	93
Bibliography		99

List of Tables

Table A2.1: LM Test---Dependent Variable: Self-employment rate (SELFEMP).....	35
Table A2.2: LM Test---Dependent Variable: Annual average growth of small firms (AVEGROW).....	35
Table A2.3:SAR Results	37
Table A2.4 :SEM Results	38
Table A2.5:SLX Results	39
Table A2.6 :SDM Results	40
Table 2.1: Descriptive Statistics and Sources.....	40
Table 2.2 :OLS Results	42
Table 2.3:SDM Results	43
Table A3.1: List of States with Right-to-Work.....	65
Table A3.2: Component Areas of Economic Freedom of North America Index	65
Table 3.1: Descriptive Statistics and Sources.....	65
Table 3.2: DEA efficiency Score Results	67
Table 3.3: OLS Regression Result; Dependent Variable: Efficiency Score: pooled 1998-2005.....	68
Table A4.1:The Areas and Components of the EFW Index	94
Table 4.1: Descriptive Statistics and Sources	95
Table 4.2 :Tobit Regression Results: pooled observations 1990-2004.....	96
Table 4.3: Tobit Regression Results with official religion variable (OFF)	97
Table 4.4: Tobit Regression Results with state religiosity variable (STATREL).....	98

List of Figures

Figure 2.1: Religious Adherence in the U.S.....	43
Figure 2.2: Self-employment in the U.S.....	43
Figure 2.3: Counties comparison over states border: OH-WV.....	44
Figure 2.4: Counties comparison within state: NY.....	44
Figure 2.5: Counties comparison over states border: WV-VA	45
Figure 2.6: Counties comparison within state: CA	45
Figure 3.1: DEA frontier for US states.....	68

Chapter 1

Introduction

In studies on economic development, a large literature has been accumulated on the topic of institutions in recent decades. Douglass North gives a general definition for institutions as “rules of the game” that shape human interactions. They are humanly devised constraints that affect interactions between people. Changing these constraints affects people’s incentives and, therefore, affects economic, political, and social outcomes. Studying institutional arrangements helps to shed some light on why there is a high variation of the level of economic development across economies. There is a growing number of studies focusing on this particular aspect of institutions. Some of them conclude that institutions are among the most important factors explaining the differences in economic performance, e.g. Acemoglu, Johnson and Robinson (2001). But some claim that institutions are more of the outcome of policies, and some other factors such as human capital have more priority in the analysis, e.g. Glaeser, La Porta and Shleifer (2004). Overall based on this literature, we can confidently state that institutions matter in many different aspects of development.

The ultimate purpose of this dissertation is to contribute to the empirical evidence on the importance of institutions in development and to shed light on particular channels through which this connection improves. To this end, in two chapters I specifically concentrate on one informal institution, religion, and in the other essay I examine the relationship between institutional quality and government performance in local level.

Studying informal institutions, such as culture, social norms and religion have been attracting attention in sociology, political science and recently in economics. Religion, taken as one important variable in socio-economic performance, is related to economic development

through very diverse channels. In the two chapters of this dissertation, I try to contribute to areas of entrepreneurship and political stability and their connection to religion. Another area of studies in this dissertation is the relationship between quality of institutions and efficiency of governments. In what follows, I introduce the three essays and briefly present their main findings and contributions.

1.1 Religion and Entrepreneurship: A County-level Analysis

There is a growing consensus that religion plays an important role in various social and economic outcomes, yet little is known about specific mechanisms and channels through which religion affects economic development. Theoretical studies on this topic can be dated back to Max Weber's seminal work, *The Protestant Ethic and the Spirit of Capitalism*. More recent studies, particularly empirical ones, focus on growth and social outcomes (e.g. Barro and McCleary, 2003). One key component of development, left out from the literature of economics of religion, is entrepreneurship. It is believed by many scholars that entrepreneurship and what entrepreneurs do is essential for dynamic and sustainable economic growth and development.

This essay examines whether level of entrepreneurship across the U.S. counties can be explained by religiosity and religious diversity. The underlying goal is to investigate if faith and religious practice of individuals impact their entrepreneurial behavior. Very few studies look into this particular channel through which religion and economic performance can be connected. Dodd and Gotsis (2007) examine a similar question using some micro-level survey-based dataset. But in this paper, I try to consider the aggregated county-level data and focus more on the collective entrepreneurial potential of people in communities rather than individual level.

Entrepreneurship can be viewed from completely different perspectives. In this chapter, two different variables are constructed to proxy what can partially capture entrepreneurial

potential in county level. It is stated “partially”, because coming up with one single measure showing the entrepreneurship of a society or a locality is quite an impossible task to accomplish. That is why the two measures are considered to tackle different aspects of the dependent variable. They are the share of self-employment in the total employment, and the annual growth rate of small firms in each county.

Religious adherence rates for each county are used as a measure of religiosity level, and religious diversity is calculated considering five main religious denominations: Catholics, Evangelical Protestant, Mainline Protestant, Orthodox and the others. These variables are taken and constructed from Religious Congregations and Membership Studies.¹

After considering spatial dependencies among counties, by employing spatial econometric methods, results indicate that religious factors are not beneficial for entrepreneurship within the borders of a county. But they positively affect neighboring localities’ entrepreneurial potential. Also there is a small variation of effects among different denominations. This paper contributes to the literature of economics of religion in two ways. First, relationship between religion and entrepreneurship has not been investigated for this level of study in previous research. Second, including spatial modeling in this literature can help understand the mechanism by which religion can impact behavior and eventually economic output. This aspect has been neglected from previous studies as well.

1.2 Institutional Quality and Efficiency of Public Spending: Evidence from the U.S. State Governments

It is often perceived by many government officials that higher GDP per capita and more income equality are favorable for the economy. Scholars from different school of thoughts also assume balanced policies toward growth and equality would result in more stable development process.

¹ It is organized and conducted by Association of Religion Data Archives (ARDA).

To reach these two goals, different policies can be implemented. Fiscal tools, such as public spending may have a significant effect on economic growth and income distribution. There is important evidence in the real world, and that is the remarkable variation across economies in the effectiveness of their public expenditure. The second chapter of the dissertation focuses on this aspect of public spending and its relationship with institutions. Particularly the impact of some institutional quality measures on effectiveness of public spending for governments of the 50 states in the U.S is examined.

Basically the question is if better institutions would promote higher efficiency of public spending. The efficiency particularly is measured regarding how much growth and equality simultaneously can be achieved given a certain level of public spending. For this purpose a nonparametric method, Data Envelopment Analysis (DEA), is employed to calculate the efficiency.

There are three major venues for comparing institutional quality which are considered: judicial system, labor market and political affiliation. In these areas, there is not a large variation among states in the U.S (as compared to cross country comparisons). Nonetheless we still can observe the differences in performance of judiciaries and also structure of labor markets. Moreover political preferences are varied among states. On the other side we see variation among states' public spending efficiencies. Arizona and Idaho seem to have the most efficient public spending while Alaska and Wyoming are among the least efficient ones. The ultimate goal here would be to investigate if these variations in effectiveness can be explained by level institutional qualities. The overall findings confirm that better judicial system and less regulation in the labor market enhance effectiveness of state governments.

1.3 Religious Heterogeneity, State Religiosity and Conflict

Secularization theory prior to the 1980's was the dominant paradigm among social scientists (Nordas, 2004). This theory claims as societies become industrialized and generally modernized, political power of religion would fade away. However there are multiple real world examples that challenge and negate this theory as there have been states with religion at the core of their constitution and political existence. Gill and Keshavarzian (1999) show that old line secularization theory is not supported by empirical evidence. Religious organizations and leaders have become more politically active and in some cases they have been able to have direct impact on the policy decision making levels in the government. Therefore religion is one important topic when we study the social and political status of countries.

Besides this issue, observation from around the world reveals that in most of the countries, population demographics have become more diverse. This can be due to several reasons including immigration. Along with this increasing social heterogeneity, religious fractionalization would increase as well. Social heterogeneity for so many years has been one issue studied by social scientists as one factor relevant to challenges of societal and political stability. Basically there are studies that claim as societies become more diverse, e.g. higher religious diversity; the probability of political instability due to confrontation of different groups would increase. One typical representation of social/political instability is violent conflict, e.g. civil war.

In this chapter, I want to connect these two topics and examine two hypotheses regarding the relationship between religion and conflict. The first hypothesis presents the question of whether countries with higher religious heterogeneity face higher risk and magnitude of conflict. The idea of social heterogeneity, i.e. ethno-lingual or cultural diversity, has been studied

extensively in the conflict literature. However there are a limited number of studies focusing on religious heterogeneity.

The second hypothesis, which is the main contribution to the literature, includes the role of the state. It investigates whether having a religious government affects the relationship between heterogeneity of society and its propensity to have political violent conflict. Measuring the religiosity of the state is a challenge. I rely on the constitutional framework of countries and also the regulations toward religious groups and activities. Data from the Religion and State project (RAS) is extensively used here.

After offering two different ways of measuring religious heterogeneity and state religiosity, by controlling for some key covariates, results confirm that the religiosity of state in heterogeneous societies can be a catalyst for conflict. It means that in countries with religious states, higher religious heterogeneity is associated with higher magnitude of conflict.

Chapter 2

Religion and Entrepreneurship: A County-level Analysis

2.1 Introduction

The teachings of most of religions have general or detailed rules and frameworks for different aspects of the adherents' lives, including the economic aspect. In the religious texts of different faiths there are several sets of rules that regulate “right” and “wrong” behavior. Besides teachings and rules, religion as an informal institution in any society, directly or indirectly affect economic output through various social channels. For example creation of networks around religious groups impacts members' behavior. If an individual is a member of a religious group and therefore a part of a network, information and resources availability for them would be different. So in the aggregate level this one particular dimension of religion will affect behaviors and in general changes the rule of game.

This paper investigates the relationship between religious factors and one dimension of economic behavior of individuals. Particularly entrepreneurial behavior is the matter of concern here. Putting in short form, I want to test if religiosity and religious diversity have any effect on the level of entrepreneurship. The analysis is for the counties in the U.S.

There is only a small number of studies that investigates a similar question. But they are all in a different scale or implementing different variables. Anderson et al. (2000) explores the role of religion in the formation of enterprise culture in Britain during the 1980s. Their finding shows that despite the confrontation of the Church and economic conventional view back in 1980s, religion supported the entrepreneurial culture. Dodd and Gotsis (2007) look into the same relationship using survey data in the U.S. Audretsch et al. (2007) examines the influence of different religions on propensity to become an entrepreneur in India. Using individual level

survey data, they find Christians and Muslims tend to present higher propensity to become entrepreneur, as opposed to Buddhists and Hindus. Carswell and Rolland (2007) approach a similar question as the current paper and use survey data in New Zealand. They show that the increase in the religiosity and religious diversity of New Zealand society has not affected entrepreneurship negatively.

The study of religion in the realm of social sciences, particularly modern economics, is relatively a new phenomenon. However some claim Weber's *The Protestant Ethic and the Spirit of Capitalism*, written in 1905, was the first to identify economic role of faith. Iannaccone (1998) even argues that Adam Smith was the one who started the modern study of economics of religion. Anderson (1988) investigates the aspects of *Wealth of Nations* in which the economics of religion is highlighted. In any case, the importance of religion as an informal institution in different parts of social lives of individuals has been attracting attention of economists for a while. This increase in research examining the economic functions of religion was accompanied by a new trend in quantitative studies. These studies started to grow rapidly after a paper titled "Religion and Economic Growth" by Barro and McCleary in 2003. The authors analyze the influence of religious participation and beliefs on a country's rate of economic growth. They find that some aspects of beliefs, i.e. belief in heaven and hell, are positively associated with economic growth while religious service attendance negatively impacts the growth.

The current paper is trying to seek out a slightly different part of religiosity's importance. Entrepreneurship is increasingly being recognized as a primary engine of economic growth and development. What entrepreneurs do is crucial to the dynamics of any society by which they combine the existing resources and innovative ideas to create new economic goods and services and ultimately new jobs. In short, entrepreneurs are the link between the new ideas and economic growth and development. Do the faith and religious practice of people affect their entrepreneurial

behavior? Is there any connection between the level of religiosity and the entrepreneurial activities? Logically at the beginning we need to define these two concepts, entrepreneurship and religiosity. Secondly, this question can be answered or analyzed at different layers. For example at one level, the story can be the relationship between religious values of an individual and his creative and innovative character. So it would be an absolute micro level analysis that can be very well categorized in other field of social or human sciences. On another level, we can look at these questions, in an aggregated level of a group of individuals. Here, rather than micro analysis, I am interested in examining the topic at the social level. In other words, I want to examine if the importance of religion in a society has any effect on entrepreneurial behavior of members of that society and ultimately the level of entrepreneurship.

Besides the ultimate objective of this paper which is to investigate the relationship between religious factors and entrepreneurship, the spatial behaviors of these variables are examined as well. By that, I am referring to the impact of entrepreneurship and religious factors in one county on entrepreneurship level of the neighboring counties. For measuring religiosity, like some previous studies, data from the Association of Religion Data Archives (ARDA) is utilized. This is from Religious Congregations and Membership Study in year 2000.²

The contributions of this paper can be summarized in different parts. First, the research question of this paper for the scale of counties in the U.S has not been investigated before. So it is a new dimension to be added to the literature of economics of religion in the scale of regional studies. Second, the argument of spatial dependence and spatial behavior, to the knowledge of author is a new approach in the literature of both entrepreneurship and economics of religion.

The remainder of the paper is organized as follows. Section 2 will be a literature review. Section 3 consists of a theoretical argument and states the hypotheses of the paper. Section 4

² The data is collected by Association of Statisticians of American Religious Bodies and is available on the Association of Religion Data Archives website: www.TheARDA.com.

describes the data and the variables. Model and specification are presented in section 5 followed by empirical results and finally the conclusion.

2.2 Literature Review

The consensus of the studies in the literature of economics of religion is; it is likely that religion affects economic performance and this impact happens through different yet highly related channels. One channel is the essence of religious teaching and principles.

Anderson (1988) refers to Adam Smith's *Theory of Moral Sentiments* and points out that religious belief provides strong incentives to follow moral restraints such as trust, honesty, benevolence, and restraint from violence that have an effect on civil society. Iannaccone (1995) points out that all religions work to instill certain values, morals, and behavioral frameworks in their followers and these values, beliefs, and morals are recognized in most aspects of human behavior. Another similar argument is that the belief or the fear of God leads adherents to abide by "a kind of internal moral enforcement mechanism" (Anderson, 1988, p. 1069). This is what sometime is referred to as "supernatural monitoring" or "God is watching you", which leads adherents to be trustworthy, truthful, honest, and ethical (Innacconne, 1995; Anderson and Tollison, 1992). Berggren (1997) claims religious people are discouraged from engaging in activities such as divorce, abortion, non-payment of debt, and illegitimate births, treating these activities as sinful. All of these indirectly point to the effects that belief in the religions' principles would have on the behavior and ultimately on the economic activity and performance. A similar literature has documented the importance of religion on economic and social outcomes in the US. Lipford et al. (1993) study the impact of church membership (using US state level data) on abortion, divorce, murder, illegitimate births and crime and find that church attendance has a negative effect on most of these variables.

Another part of the literature emphasizes the idea of social interaction and social networks. Membership in a religious group would lead to the formation of a network. This

network can be the source of accumulation of what is called “social capital”. There are studies that show higher religious adherence also leads to higher social capital in a community or locality. Putnam (1993) argues that trust, and therefore social capital, is higher in societies that have dense networks of civic engagement. These networks include neighborhood associations, sports clubs, choral societies, and political parties. Religious institutions and religious service attendance are often cited as sources of social capital as well (Putnam, 2000; Smidt, 1999; Greeley, 1997; Wuthnow, 1997; Tolbert et al., 1998). This form of capital has been viewed as a vehicle for improving individuals’ well-being and for discouraging free riding and shirking. Several papers examine the effect of religion on human capital and income (Fan, 2008; Sander, 2002; Steen, 1996; Tomes, 1984). [See Appendix for the summary of their results]

An alternative analysis to the above is that religious adherence or participation requires additional resources (e.g. time) (Barro and McCleary, 2003) and this leads to a negative relationship between religious activities and economic growth. Some other studies put this in the form of opportunity cost of time in the individual level decision making indicating that higher rate of attendance increases the opportunity cost (Azzi and Ehrenberg, 1975; Lipford and Tollison, 2003).

Heath et al. (1995) study the effects of religion on the level of income using the U.S. state level data. More importantly, they analyze the effects of various denominations categorized as Jewish, Catholic, liberal and fundamentalist Protestant and find that Jewish membership is positively associated with state per capita income, liberal Protestantism is not associated with state per capita income and Catholicism and fundamentalist Protestantism are inversely associated with state per capita income. Crain and Lee (1999) examine the relation between church membership and per capita income growth in state-level in the U.S. and find no evidence of significant effect.

Religious diversity or polarization has also received attention in this literature (Montalvo and Reynal-Querol, 2005; Barro and McCleary, 2003; Lipford and Tollison, 2003). The original argument dating back to Adam Smith is that established (one state-funded and protected monopoly) churches tend not to be successful in enforcing the moral virtues of followers (Hull and Bold, 1998). In other words, greater diversity of religion in a country or region promotes higher competition resulting in higher quality religion (Barro and McCleary, 2003). Iannaccone (1998) cites empirical evidence to support Smith's claim that concentrated religious markets result in lower levels of religious participation. An underlying point related to present research is that a monopolized religious market may contribute to negative economic growth. Hull and Bold (1998) argue that empirical findings to support Smith's claim may not be applicable to the US since competition between established and non-established churches is not comparable to competition among non-established churches, even if concentration is high in a market of non-established churches. A related argument is that religious fractionalization, similar to ethnic fractionalization, has a negative effect on economic development. From a social capital perspective, religiously fragmented societies have less social capital, leading to less-trusting societies. An alternative point of view is that greater diversity in the form of a "melting pot" (Florida, 2002) can enhance economic well-being in a society.

The other part of the related literature to the current research includes various studies examining entrepreneurship. Since entrepreneurship is a multidimensional concept and there is no general agreement on an economic theory of entrepreneurship, previous studies have defined and used the term in different ways. Beginning with Schumpeter (1934) an "entrepreneur" is an individual with innovative ideas, utilizing new combinations of means of production. Kirzner (1979) emphasized the entrepreneur as an enthusiast in discovering opportunities to make profit. Knight (1921) and Schultz (1980) described an entrepreneur as an individual who is willing to

take risks in performing economic functions, while others (Hagen, 1960; McClelland, 1965; Kihlstrom and Laffont, 1979) argued that an entrepreneur is a person with certain unique psychological characteristics. Although these concepts have contributed greatly to the understanding of entrepreneurship, a universally accepted explanation or measure of the concept has not yet been found. Hence, previous studies have used different concepts according to the purpose of the study, the theory applied, and the availability of information needed for empirical research.

Acs et al. (2005) used start-ups of new firms as a measure of entrepreneurship that facilitates spillover of knowledge. This is based on the theory of endogenous growth where knowledge was added as a factor explaining economic growth aside from the traditional factors of production, capital, and labor. Audretsch and Keilbach (2005) introduced the concept of entrepreneurship capital, referring to the society's capacity to create entrepreneurial activity specifically to generate new firms. They hypothesized that a region with more entrepreneurship capital shows a better economic performance. This is based on the theory of entrepreneurship serving as a mechanism to transform knowledge spillovers to economic growth.

A section in this literature that is highly related to the rationale of this paper is the role and function of social networks in promoting entrepreneurship. Aldrich and Zimmer (1986) introduced a model that identifies entrepreneurship as embodied in a network of continuing social relations. This network facilitates or constrains the linkage between aspiring entrepreneurs, resources and opportunities. This framework is different from the traditional model which assumed entrepreneurship as a highly personality-based concept. Dubini and Aldrich (1991) expand the arguments to different subsections of the network: organizational and informal. They argue that there is a coexistence and coordination between the two networks in order to promote and facilitate the entrepreneur's activities. Greve and Salaff (2003) study the

network activities of entrepreneurs and claim that in different stages of starting a business, entrepreneurs establish different networks. Overall the literature on entrepreneurship and network effects has been expanding and the general conclusion supports the significant positive effect of networking on expansion of entrepreneurial activities.

2.3 Theoretical Argument

The association between religion and the level of entrepreneurial activity can be looked into from different angles. In this paper both religious factors and entrepreneurship are aggregated for the county level analysis. Therefore although the theoretical reasoning behind the empirical study is based on individual behavior analysis, the result should be discussed and adjusted in the aggregate level.

As mentioned in previous sections, religions provide moral and ethical foundation for their adherents encouraging them to behave in a specific way. Thereby economic behavior might be directly influenced by the impact on traits and attitudes, and indirectly by promoting factors which themselves influence economic outcomes (Barro, 2003). Also, religion may influence economic results through its institutional sources. Public commitment to a religious organization, like attending religious services, signals the acceptance of a certain code of conduct. This creates incentives among possible transaction partners to use religion as a signal for specific characteristics of a person (Tomes, 1984). Furthermore being a part of a network would impact the intensity and level of economic behavior. In particular, when we are looking at the entrepreneurial activity, the concept of social interaction and network effect would be more important. Basically the hypothetical claim is that, people would be affected by being a religious adherent or a member of a religious denomination, through two channels: first, based on the teaching of the religion and second under the influence of the socio-religious network that they are a part of. Although both of the two venues of impact seem strong and relevant, yet

expecting a particular sign or significance for the relationship between religiosity and entrepreneurship is difficult.

The other religious factor that is included in the analysis is the religious fractionalization. As discussed in the literature review section, social, cultural and religious diversity have impacts on different economic parameters. Entrepreneurship level, if we can define it in the general form as the density of innovative activities in one locality, can effect and be affected by religious plurality. The idea is that as the society gets more diverse, it becomes a better platform for different enterprise plans to grow. At the same time possibly we can claim that entrepreneurs would be attracted to more diverse societies so they can start up their business with a hope of having more chance to expand due to the diverse market they have. On the other hand, along with the literature of fractionalization, religious diversity can negatively affect the economic performance. The rationale behind this claim mainly originated from the idea of increasing probability of conflict or instability due to ethno-lingual or religious fractionalization (Easterly and Levine, 1997; Alesina et al., 1999; Alesina and La Ferrara, 2006). This line of reasoning is more valid when we are focusing on national level rather than the small community analysis. Therefore, overall for the current paper it is expected to have a positive correlation between religious diversity and entrepreneurship.

For the dependent variable, entrepreneurship, there are three main categories of theories: personality theories, economic rationality theories and sociocultural theories. In personality theory, the psychological and special personal traits are the main force that makes individuals prone to behaving as entrepreneurs (Brockhaus, 1982). Economic rational theory considers entrepreneurs as rational agents who scan the market and choose the niche that will help them to maximize their return. Finally the sociocultural theories posit the propensity to entrepreneurship based on nationality, race, culture and religion (Aldrich and Zimmer, 1986). In reality

entrepreneurship is a mixed result of all these ideas which are highly related to each other. In this paper the two economic and sociocultural theories are more emphasized.

The general hypothesis is that, there is a significant relationship between religious factors and entrepreneurship in counties of the U.S. In other words, religiosity and religious diversity are significant explanatory variables for entrepreneurial potential. By the theoretical basis presented here, I expect to see a positive effect of religious diversity on entrepreneurship; however sign of religiosity coefficient seems unclear. Besides this part of hypothesis, the paper investigates the spatial behavior of the main variables as well. Basically I propose two questions: does entrepreneurship in one county have any impact on entrepreneurship in the neighboring counties? Also, do religious factors in one county affect the entrepreneurship in neighbors?

Why should there be such spatial relation to begin with? The broad answer to this question is, in analyzing social or economic variables in small scale, e.g. counties; spatial dependence is an inevitable fact. Only in the labor section we can discuss that there are different types of mobilities that make the analysis more complicated. There are residences of one county who may go to a church which is located in the neighboring county or they may work in another county. All these mobilities cause a realistic suspicion toward spatial dependence.

2.4 Variables and Data

Measuring entrepreneurship and religiosity is a critical task to accomplish as in the literature there is no consensus on the approaches. This problem comes down to the single issue of how to define each of the two concepts. In this section the definition and the variables employed in the paper are described.

As explained in the theoretical section, entrepreneurship can be viewed from completely different perspectives. Here in this paper, two different variables are constructed to proxy what

can partially capture entrepreneurial potential at the county level. It is stated “partially”, because coming up with one single measure showing the entrepreneurship of a society or a locality is quite an impossible task to accomplish. That is why the two measures are considered to tackle different aspects of the dependent concept (entrepreneurship).

Religiosity also, as the main religious factor included in the paper, is difficult to quantify. There are different measures used in the literature as proxy for this variable. Usually the level of attendance (to religious services) and general (religious) adherence rate are taken into consideration.³ Attendance rates are constructed by the surveys that are delivered at the individual level. In the following paragraphs, I explain the variables and the data sources used in the paper.

2.4.1 Entrepreneurship (Ent_i): self-employment & small firms growth rate

The idea of using self-employment as a proxy for entrepreneurship has been challenged and criticized in the literature but overall it can be claimed as one of the typical determinants (Parker, 2004). Low et al. (2005) define two measures of entrepreneurial potential. One is an indicator of the “breadth” of entrepreneurship and the other is a measure of its “depth”. Share of self-employment (non-farm proprietors) from total non-farm employment is the variable for capturing the breadth of entrepreneurial potential and the average income of non-farm proprietors in the accounted county is the indicator of depth of entrepreneurship. The first measure refers to the concentration of entrepreneurs and basically shows how rich a county is as far as entrepreneurial activities. On the other hand, depth variable would account for the amount of wealth that entrepreneurs generate and therefore could lead to continuous growth in the number of entrepreneurs. In this paper, the first measure in Low et al. (2005), share of self-

³ “Belief in god”, “importance of religion in daily life” and similar variables are common as well in the literature.

employment, is used as a proxy for entrepreneurship. The data of proprietors are from Bureau of Economic Analysis (BEA) over the time range of years 2000 to 2010.

In the literature small businesses are perceived as a vehicle for both Schumpeterian entrepreneurs, those who introduce innovative production process, and also for those who are simply self-employed (Wennekers and Thurik, 1999). This means small establishments and firms provide an opportunity for innovative ideas to develop and grow. Also because of low cost they are more suitable for starting self-employment businesses. In general due to the small scale of cost and management, small businesses are better platform for growing entrepreneurial start-ups. Small businesses not only contribute to the employment level but also to innovative and competitive power. The importance of small firms and their relationship to entrepreneurship is not a new observation. Henderson (2006) implements ratio of small firms to the total number of establishment as a proxy for entrepreneurial potential.

The second measure of entrepreneurship considered in the chapter is the average annual growth rate of firms with less than 500 employees. There are different definitions for small businesses depending on the structure of the firm, the support it receives from the public agencies or the size of its employment. For the size of employment also there are different categorizations. Here I considered less than 500 employees as small firm and using the data from Statistics of U.S. Businesses (SUSB) for year 2000 to 2009. I constructed the annual growth rate of the number of these small firms in each county. This variable basically measures the change in the number of active small firms. Counties present different trend in the combination of small and large establishment and firms. In some localities the number of active small firms shows high volatility as we observe different rate of birth and death of small businesses.

The limitation of empirical studies on capturing entrepreneurship activities always exists. I believe these two variables, as several studies in the literature (mentioned in the literature review section) also use them, are good proxies for showing a large portion of entrepreneurial potential of the counties. One point however worth mentioning is the difference in the statistical nature of them. The first variable, percentage of self-employment, is a level variable but the other variable is a growth rate. So in interpretation of the coefficients and marginal effects this difference should be considered.

2.4.2 Religious Factors (REL_i): Religiosity & Religious Diversity

In the quantitative research related to the topic of religion, measuring the religiosity level has always been an issue. Different studies have been employing different proxies and using various data sets available. Almost all of the cross country studies use the data from the World Value Survey (WVS) and utilize some questions regarding the belief in life after the death or religious denominations to measure the religiosity. Studies concentrated on the U.S. however mostly employ the data available through the Association of Religion Data Archives (ARDA) or General Social Survey (GSS). Here in this paper church membership and religious adherence percentage from Religious Congregations and Membership Studies provided by ARDA are the main explanatory variables for religiosity. [See Appendix for more detail on the description of the related survey of the data].

The main variable is the percentage of population who are members of religious congregations. This is from year 2000 survey dataset. The individual adherence rate of main groups; Mainline, Evangelical, and Catholic denominations are just added to investigate any

possible individual impact of them⁴. They are not in the core attention of the hypothesis but as a side issue are addressed in the Appendix.

Choosing religious adherence percentage as the main proxy for level of religiosity was based on two reasons. First past literature (Azzi and Erenberg, 1975; Lipford and Tomlinson, 2003; Barro 2004; Gruber, 2005) implemented this measure in different levels (national or cross countries) of studies. Second availability of data with specified location has been a limitation.⁵

For the other religious variable, religious diversity, a relatively common measure of fractionalization is used. Gini-Simpson index as shown below represents the plurality or diversity. It simply determines the probability that two random entities selected from a population would represent the same type.

$$d_c = 1 - \sum_{i=1}^{i=M} \left(\frac{L_{ci}}{L_c} \right)^2$$

where, L_{ci} is the number of individuals in county C that belongs to religion (denomination) i. L_c is the total population of county C. So as d_c is higher and closer to 1, county C shows higher level of denominational plurality. This measure here mostly captures the diversity among Christianity's different main denominations. Mainline, Evangelical, Catholic, Orthodox and others are the main groups used to calculate the fractionalization index.

2.4.3 Covariates

Several control variables based on previous literature of entrepreneurship [e.g. Mojica et al. (2009) and Henderson (2006)] are included in the empirical models.

⁴ Note that the selection of individual denominations is solely based on the rank of the denomination membership share in the total adherence population. Also Latter-day Saints denominations are excluded in this study.

⁵ GSS data set does not include geo information. This is the reason despite its advantages it is not used here.

Demographic Characteristics (Ω_i):

A higher skilled labor force is expected to be more productive and probably has potential to manage an entrepreneurial activity (Goetz and Freshwater, 2001; Evans and Leighton, 1989; Bates, 1993; Audretsch and Fritsch, 1994; Malecki, 1994; Bregger, 1996; Robson, 1998). That is why education attainment measured by percentage of population with a bachelor or higher degree, is included in the model and expected to have a positive relationship with dependent variable. However the type of education is a key in its relationship with entrepreneurship. One can imagine high tech education or more technical engineering degrees help individuals to start up their business in the related fields. But degrees in sciences might not necessarily be like that and may help the graduate to find a job in a public school or institute.⁶

Locations with higher average income per capita can be attractive for entrepreneurs to start their business or expand their networks. So it is expected that counties with higher average income would be a safer or more suitable platform for growing entrepreneurship. Therefore per capita income is another control variable. Also higher unemployment rates raise the odds of layoffs and the relative returns to self-employment and, therefore, increase the share of proprietorships in all jobs.

Population density is a typical criterion to be considered of some significance in explaining the level of self-employment or other aspects of entrepreneurial potentials especially when the rural economic variables are matter of concern. Median age of residents of counties also is another demographic characteristic included.

⁶ This is a concern that should be addressed in future research.

Regional Characteristics (π_i):

Owner-occupied homes and median housing values in counties are considered as control variables. Homeownership and higher housing values significantly enhance proprietors' ability to secure finance they need (Robson, 1998). Therefore it is expected that higher percentage of homeownership and higher housing value would be associated with higher entrepreneurial potential.

It is expected that counties with higher level of connectivity to the transportation network show a higher level of entrepreneurship. So a dummy variable accounting for access to interstate highways serves as another measure for infrastructure.

Another variable included is the level of natural amenity rank for counties, as measured by climate and a number of related variables (McGranahan, 1999), and it is expected, *ceteris paribus*, higher level of amenities to be associated with higher potential for entrepreneurship. This index takes values between 1 to 7 and the higher the better natural amenities representing county has. Finally, rural-urban continuum code is used in the regressions as another control variable. Ranging from 1 to 9, this code shows the continuum of metro to rural counties. The higher the code is, the more rural feature (less population and less adjacency to metro area) it has.

Policy Characteristics (Δ_i):

Government can directly impact entrepreneurship at any level. Particularly, taxes, government spending and regulations are important in this analysis. Per capita federal government expenditure as a potential positively related variable and also property tax revenue set of the local governments, are included. These account for the potentials of infrastructure provision.

Counties with higher infrastructure can be attractive for new businesses and therefore be effective in the entrepreneurial potential of accounted locality.

Finally, I use Small Business Survival Index (SBSI) to capture the effect of various government policies on self-employment and small firms' growth. This annually reported index put together 32 to 38 different government-imposed or government related costs which directly or indirectly impact entrepreneurial activities in state level. The major areas of concern are taxes (income, capital gain, corporate, etc.) and regulations (health care, minimum wage, workers' compensation, etc.). The lower the value of index, the lower government imposing cost would be, or the state is more entrepreneurship friendly.

This leads to the following general model of entrepreneurship level in county i :

$$Ent_i = f(\Omega_i, \Delta_i, \pi_i, REL_i)$$

One important point should be noted here. The analysis is a cross-section. But most of the variables are averaged out throughout a period of a decade. Religious variables are all from year 2000; entrepreneurship variables however are simply the average for years between 2000 to 2009 or 2010. Control variables are mixed of averaged and level. Table 2.1 presents the summary of statistics and their sources.

2.5 Methodology

Following the theoretical argument and explanations of the variables and data, in this section the empirical method to test the hypothesis is presented.

I first check the possible relationship between religious factors and entrepreneurship measures with an Ordinary Least Square (OLS) baseline regression.

$$Ent_i = X_i\beta + \varepsilon_i \quad \varepsilon \sim N(0, \sigma^2 In) \quad (1)$$

where Y denotes the dependent variable, entrepreneurship level and X represents the matrix of independent variables including religiosity, religious diversity and all the control variables.

Simple OLS result has some useful insight for motivating the hypothesis of the paper but definitely it is not enough. Results are shown in Table 2.2.

Results present different signs for coefficients of religious factors in the two regressions. This can simply tell that in the two regressions, dependent variables are capturing different parts of entrepreneurship. In other words, the relationship that we observe among religious factors and entrepreneurship is different for the two dependent variables. One may argue that the mechanism through which religion impacts self-employment is different from that of small firms' growth. But both of the variables are representing entrepreneurial potentials. Table 2.2 shows that an increase of one percent rate of adherence will decrease the rate of self-employment by 0.14 percent but it increases the growth of small firms. Moreover counties with diverse range of congregational members experience lower self-employment rate but higher small firms growth.

These inferences cannot be very reliable due to the arguments that follow. As one of the main contributions of the paper, I want to discover the possible spatial behavior of the two main variables, religious factors and entrepreneurship. If it is confirmed that indeed there is a spatial dependency, then OLS result cannot be reliable.

2.6 Spatial Dependence

Although counties (the unit of analysis here) are well differentiated units, the underlying spatial correlation among them can sometimes be difficult to distinguish using these boundaries, particularly with respect to religious adherence and the nature of labor market. These overlapping spatial relationships could cause problems with the framework used to collect information from these localities. For example, religiosity variables may not line up with the

borders of the county. It is likely that some of the adherents in a particular church live in a different county. The data on membership and adherent figures were collected by the localities in which the congregation itself is located, rather than by the state in which individuals actually reside. So this shows an implicit spatial effect. Also the measures of entrepreneurial potentials (the dependent variables) can have the same behavior. One county's entrepreneurship level can be dependent on the economic factors including self-employment of the neighboring counties. Therefore, any empirical analysis of issues in regions or localities should take these overlapping relationships into consideration. Figure 2.1 and 2.2 present the maps for religious adherence rate and self-employment in the US counties respectively. By a general view of these maps, we can observe some source of spatial dependency trace for these two variables.

In the presence of spatial effects, the estimated parameters without spatial correction can be inefficient and/or biased. Previous studies on related topics including income growth using US county- and state-level data have confirmed that these regional cross-sectional data display spatial dependence (Rey and Montouri, 1999; Rupasingha et al., 2002). This can be a guideline to extend the argument for entrepreneurship variables as well. One can claim that the self-employment rate in West Virginia and Kentucky might share more similarity than that of West Virginia and California. The same thing can be expected for religious parameters.

Spatial dependence in a model can be due to different reasons. On one hand the dependent variable in one locality can be influenced by the same variable in neighboring locations. If this is the case, the Spatial Autoregressive Model (SAR) should be used. On the other hand, spatial dependence could be presented in the residuals when there are omitted unobservable variables that can be spatially correlated. In this case, the Spatial Error Model (SEM) is estimated to correct the spatial bias.

But besides these, if the relationship between independent variables of concern (religiosity and religious diversity here) and the dependent variable (entrepreneurship) have spatial components, then we should think of some other types of models. This means that for example religious adherence rate of one county affects the self-employment rate in the neighboring county. In that case, Spatially Lagged Explanatory Variables Model (SLX) should be estimates. But if not only we see the spatial dependence between religious factors and entrepreneurship but also an auto-spatial dependence in entrepreneurship variable, then Spatial Durbin Model (SDM) is the specifications to use. So in general possible specifications are as follow:

$$\text{SAR:} \quad Y = \rho WY + X\beta + u \quad (2)$$

$$\text{SEM:} \quad Y = X\beta + u \quad , u = \lambda Wu + \varepsilon \quad (3)$$

$$\text{SLX:} \quad Y = X\beta + \theta WX + u \quad (4)$$

$$\text{SDM:} \quad Y = \rho WY + X\beta + \theta WX + u \quad (5)$$

where; Y denotes an $n \times 1$ vector of the dependent variable, X represents an $n \times k$ matrix containing the independent variables, and W is a spatial weight matrix.⁷ Scalar ρ denotes a spatial lag parameter, λ denotes scalar spatial error parameter, β denotes the k parameters to be estimated for the explanatory variables, and θ is the scalar representing the weighted independent variables.

Now which of these model specifications would explain the spatial behavior of the variable better? A careful model selection procedure is conducted to answer this question. Besides Lagrange Multiplier (LM) test, an algorithm suggested by Elhorst (2010) has been followed to conclude the most desired model. The Elhorst's suggested procedure is as follows: first by using LM test it is checked if the OLS model can be rejected in favor of either SAR or

⁷ The weight matrix is 5-nearest neighbor weight matrix. However LeSage and Pace (2010) describes that if the model specification is well selected, estimate results are not sensitive to weight matrix structure.

SEM or both. Whichever model is picked it will be used in a likelihood ratio (LR) test against SDM model. Finally if any of the SAR or SEM would pass the test, they will be the “best” model, otherwise SDM will be picked.

After doing so, it turned out that Spatial Durbin Model (SDM) has the most favorable data generating process for the current data set. LM test⁸ results and the detail of Elhorst procedure and its results are presented in the Appendix A.

Having SDM as the “best” model suggests that there is a possibility for a spatial behavior not only in the entrepreneurship variables, but also in the relationship between independent variables and dependent one. It means self-employment and other entrepreneurial measures in one county affect the same parameters in neighboring counties. Moreover religious factors (and control variables) of neighboring counties would impact county’s entrepreneurship.

2.7 Results and Discussion

The regression results of all alternative specifications, SAR, SEM and SLX are presented in the Appendix, (Table A2.3 through A2.5). Here I focus on the results from the main model, SDM, presented in Table 2.3.

It seems that religiosity and religious diversity both show positive and significant total impact on entrepreneurship. So for example if adherence rate goes up with one percentage points, rate of self-employment grows by 0.07 percentage points, and growth rate of small firms will increase by 0.03 percentage points. Also a unit change in religious diversity would change self-employment by 7.7 percentage points and small firms’ growth by almost 4 percentage points in the same direction. For a more detail analysis, we need to look into the direct and indirect effects. Direct effect refers to the impact of religious factors on entrepreneurship in the same

⁸ A MATLAB code written by Donald Lacombe is used. Available on:
<http://community.wvu.edu/~djl041/matlab.html>

locality, and indirect effect points to the relationship between the two variables over the borders of the counties.

2.7.1 Direct Effects

Share of self-employment and growth rate of small firms present negative relationship with religiosity of the same county. Higher number of people as members of religious congregations is associated with less entrepreneurial activities. So this result simply state that more religious counties would have lower potential for entrepreneurship. Such relationship can be explained as follows.

First, as mentioned before, teachings of religion and the set of rules and frameworks it provides affect the economic behavior of individuals. One channel through which it can affect entrepreneurial activity is risk-taking behavior. The idea of risk taking is in the heart of entrepreneurship. Entrepreneurs in general are risk takers. This particular behavioral characteristic however is not quite promoted by religious teachings. In contrast, most of the religions one way or the other promote the spirit of conservatism which values the hard and “good” work within the established frame and not a revolutionary or radical change. The relevance of the relationship of risk behavior and religious belief set has been looked at from different angles in the literature. Most of the empirical studies have tested this relationship in the individual micro level (Rupasingha and Chilton, 2009). For example Leon and Sepulveda (2012) examine the relationship between level of religiosity of individuals and their saving/investment preferences. They find religious people are significantly more cautious and risk-averse than non-religious ones. Along the same line, here I expand the reasoning to aggregated level of adherents in one locality, and expect more religious society to be more conservative and less risk-loving.

Secondly, membership and contributing to the religious service have opportunity cost. One can claim instead of going to church or spending resources on religious related activities,

individuals can participate in “productive” economic tasks. This is somewhat a classic argument in the literature which looks at religion as a consumption good with a large set of substitutes (Barro and McCleary, 2003).

So these two reasons would mainly explain why we see negative impacts of religiosity on entrepreneurship. Also there can be some other minor reasoning too, for example certain types of businesses and economic activities are not very welcome to grow and expand in religious localities. Although it may sum up to a small portion of self-employment and firms, but it still can be a source for such relationship between religious factors and dependent variables.⁹

The direct effect of religious diversity shows opposite sign for the two different dependent variables. More religiously diverse county would have significantly lower rate of self-employment but higher growth rate for its small firms. Small businesses, due to higher opportunity and bigger market that they would have, grow more in diverse societies. However in the same time a fractionalized society consisting of different religious group, with a potential of competition and not getting along well, may result in lower level of productive activities. So the different sign for the direct effect of religious diversity can partially be explained within these two strands of logic.

2.7.2 Indirect Effects

In contrast to the direct effect, for both dependent variables we see positive indirect effect of religious factors. Higher religiosity and religious diversity promote entrepreneurship in neighboring counties. Part of such relationship can be explained due to the mobility of the entrepreneurs. This means that one county is not attractive for entrepreneurial activities because of higher religiosity of it, and this make the entrepreneur to move to neighboring counties. Considering the direct effect of religiosity on entrepreneurship, religious communities are not

⁹ One area that is needed to be studied in further research is to break up the self-employment and small firms by industry and occupation. That will give a more detailed and clear idea of the causal mechanism.

attractive to entrepreneurs. They may move to neighboring localities which are not necessarily as religious as the original county.

Here I bring up four individual examples of neighboring counties and the way entrepreneurship and religiosity have been associated to each other. In figures 2.3 through 2.6, four cases of neighboring counties within one state and cross different states are shown with the related data points of adherence rate, self-employment and small firms' growth. For example in figure 2.3, Belmont county in Ohio shows a steadily higher adherence rate of around 60 percent in comparison to its neighbors in West Virginia (Wetzel and Tyler counties). Also it presents significantly lower self-employment rate and small firms' growth. These counties are much related in the sense of mobility of labor and the connectivity between them. Figure 2.4 looks at the same issue in the state of New York. County Otsego in the neighboring location of counties Montgomery, Herkimer and Oneida presents lower religiosity and higher entrepreneurial potential. Same argument for the other two figures presented can be brought up.¹⁰

Overall, we can see that high religiosity in one county result in more entrepreneurs deciding to live in surrounding localities. Such positive indirect impact is due to the significant tie between the direct and indirect effect.

2.7.3 Entrepreneurship spillover effect

The rho coefficient, that shows the spillover effect of dependent variable, is significant for both small firms' growth and self-employment ratio. This suggests that after controlling for spatial variation of independent variables, entrepreneurship show spatial distribution. This dependence seems to be more significant for small firms' growth. The reason can be that the relationship among firms is not limited to the borders of counties and this can be claimed for small businesses

¹⁰ It is important to note that these individual examples are not the base of reasoning. But since they satisfy the logic presented in here, they are listed as examples. Certainly there are other examples that not necessarily support the argument and can even be used as counter-argument.

as well. This argument cannot be stated with the same level of confidence for the number of self-employees.

2.7.4 Control variables

The results for control variables to a large extent satisfy the expectations. The significance and the magnitude are quite stable for the models of the two dependent variables. For example the per capita income level has a positive direct but negative indirect effect on self-employment and small firms' growth rate. So higher level of income in one county promotes more entrepreneurial activities, but more income level in neighboring counties would draw the entrepreneurs away from the accounted county. Therefore it seems income level is an attractive variable for entrepreneurs. Education level however, has different direction of impacts for the two models. Higher education directly leads to lower self-employment but higher growth of small firms. But indirectly it benefits both of the entrepreneurship variables. One way to explain this is that people with higher degree of education, would be qualified to work for a bigger organization or company, which provide a higher level of salary in comparison to self-employment. So indirectly income is an incentive that channels the education's impact on entrepreneurship.

Government per capita expenditure and population density both show very small negligible impact on entrepreneurship. Natural amenity index, as expected, affects the level of self-employment and small firms' growth positively. The METRO variable represents the metro-rural continuum index. As the index increases the accounted location is more rural and less connected to metro areas. Results show that as counties which are more rural have higher self-employment but lower growth of small firms. The coefficient for the highway access variable shows that more connected counties experience lower self-employment. Finally, as it was expected, more restriction of government on the market by taxation and regulations causes a

decrease in the level of entrepreneurship. The coefficient for Small Business Survival Index is negative directly and indirectly for both models.

2.7.5 Denominational variables results

In section 5 of the Appendix (Table A2.6), I included the short version (covariates are not presented in the table) of SDM results for denominational adherence rate variables. “MAINRT”, “EVANRT” and “CATHRT” represent the percentage of population who are members of Mainline, Evangelical and Catholic congregations respectively.

Including these variables overall does not change the significance and the signs of control variables. The rate of adherence to Mainline congregation, positively affects self-employment but negatively impacts small firms’ growth in counties. Almost the same pattern can be seen for the other two congregational adherence rates. Significance and magnitude vary but the direction of impacts is quite the same among them.

2.8 Conclusion and Discussion

The purpose of this paper was to examine whether religious adherence rate and religious diversity can partially explain the entrepreneurship level in the U.S. counties. Also the spillover effect and the spatial behavior of these variables were in the core of the research question. Two main variables for measuring entrepreneurship are self-employment rate and growth of small firms.

After testing five different specifications of models and reporting the results, it turned out that the Spatial Durbin Model (SDM) was the most appropriate. In this model, not only the spatial behavior of entrepreneurship is considered, but also the effects over the borders for religious factors would be accounted.

The results indicate that religiosity is not beneficial for self-employment rate and growth of small firms in the same locality. But it has positive effects on neighboring counties' entrepreneurial potential. The effect over the borders of counties (indirect effect) exceeds the direct effect; therefore the total impact of religious factors are positive.

Appendix A

A2.0 Related Literature

Tome (1984) investigates the role of religious and denominational backgrounds on earnings and the returns to human capital, but he finds no evidence to support the connection between the two. Steen (1996) tests the correlation among earnings differentials and rates of return to human capital for different religious backgrounds using data from the National Longitudinal Survey. His findings indicate that men raised as Catholics have a significantly higher income than men raised as Protestants. Also Jewish men have significantly higher earnings than men raised in all other religious traditions. Sander (2002), using General Social Survey (GSS) data, investigates the endogeneity between human capital and religious activities. He finds that education is not an exogenous determinant of attendance at weekly religious services and religious contributions, and there is no causal effect of education on religious activity when education is treated as endogenous. Fan (2008) formulates a theoretical model of linking religion and education. His model attempts to combine sociological and economics literature and shows that people's religious participation is determined by the concern for their children's human capital accumulation as well as their religious beliefs.

A2.1 Short explanation on the religious adherence data

Data on religion factors are from a study designed and completed by the Association of Statisticians of American Religious Bodies (ASARB), which represents statistics for 149 religious bodies on the number of congregations within each county of the United States. Where available, also included are actual membership (as defined by the religious body) and total adherents figures. Participants included 149 Christian denominations, associations, or communions (including Latter-day Saints and Unitarian/Universalist groups); two specially defined groups of independent Christian churches; Jewish and Islamic totals; and counts of temples for six Eastern religions. Totally 741 variables and 3142 cases are reported. The study and data collection were completed in between 1999 to 2001. The 149 groups reported 268,254 congregations with 141,371,963 adherents, which is 50.2% of the population of 281,421,839. There are 14 non-participating religious bodies that reported more than 100,000 members to the Yearbook of American and Canadian Churches, 2000, including all historically African American denominations. These groups reported a combined membership of 31,040,360 in the Yearbook, which is not reflected in the congregations and membership data. The lack of historically African American denominations should be noted when referencing the number of total adherents or denominations in an area.

A2.2 LM-Tests Results

The following two tables show the LM test results for the two dependent variables. It can be concluded that between SAR and SEM models, SEM is a better specification for both.

Table A2.1: LM Test---Dependent Variable SELFEMP

TEST	LM-test Statistics Value	P-Value
LM-Lag	44.2765068949088	0.00
LM-Lag Robust	52.7679596459724	0.00
LM-Error	94.1171226289587	0.00
LM-Error Robust	102.627032589765	0.00

Table A2.2: LM Test---Dependent Variable AVEGROW

TEST	LM-test Statistics Value	P-Value
LM-Lag	534.439133135445	0.00
LM-Lag Robust	3.19754333675235	0.073748973195264
LM-Error	572.222956579739	0.00
LM-Error Robust	41.2023000073454	0.00

A1.3 Elhorst (2010) model selection procedure

For the dependent variables, the following procedure is presented and the results are reported here.

1. LM test points to the “better” model among OLS, SAR and SEM.
2. The “better” model (either SEM or SAR) would be tested using the likelihood ration (LR) with the following two hypotheses:

$$H_0 : \theta = 0$$

$$H_0 : \theta + \rho\beta = 0$$

If the first hypothesis cannot be rejected, SAR is the model and we cannot use SDM. And if the second hypothesis cannot be rejected, SEM would be the best model and we should discard SDM. If opposite of any of above happens, SDM should be selected. As it is shown below, it happens to be the case and Spatial Durbin Model selected as the primary specification.

➤ Dependent Variable: SELFEMP

- LM-test result confirms that SEM is a better DGP than SAR and OLS.
- LR-test

Test	LR-test Statistics Value	p-Value	Result
SAR vs. SDM	260.3446	0	SDM

Test	LR-test Statistics Value	p-Value	Result
SEM vs. SDM	211.4362	0	SDM

Given both LM and LR test, SDM would be the best model for SELFEMP variable.

➤ **Dependent Variable : AVEGROW**

- LM-test result confirms that SEM is a better DGP than OLS and SAR.
- LR-test

Test	LR-test Statistics Value	p-Value	Result
SAR vs. SDM	102.3254	0	SDM

Test	LR-test Statistics Value	p-Value	Result
SEM vs. SDM	72.811	0	SDM

Given both LM and LR test, SDM would be the best model for AVEGROW variable.

Note: One other step is to compare the OLS and SLX. This would follow the same procedure, but since SDM results (rho coefficients) are significant overall we can claim that SDM procedure is the better model.

A2.4 Alternative Models Results

Table A2.3:SAR Results

Dependent Variable	Self-employment rate (SELFEMP)			Annual Average Growth rate of small firms (AVEGROW)		
	Total	Direct	Indirect	Total	Direct	Indirect
Constant	27.763 (9.074)			-1.48 (-2.9)		
Percent rate of all denominations adherence (TOTRT)	-0.18*** (-8.40)	-0.16*** (-8.40)	-0.02*** (-8.39)	0.003 (0.65)	0.002 (0.65)	0.001 (0.64)
Religious Diversity Index (RELDIV)	-21.27*** (-7.44)	-18.15*** (-7.43)	-3.11*** (-7.43)	2.03*** (2.73)	1.20*** (2.74)	0.829*** (2.69)
Per capita Income (INC)	0.336*** (7.635)	0.28*** (7.633)	0.04*** (7.63)	-0.012 (-1.10)	-0.007 (-1.10)	-0.005 (-1.10)
Percent of population with at least bachelor degree (EDU)	-0.18*** (-5.54)	-0.15*** (-5.54)	-0.02*** (-5.54)	0.07*** (9.19)	0.04 (9.31)	0.03*** (8.03)
Median Age (MEDAGE)	-1.22* (-1.78)	-0.86 (-1.28)	-0.36 (-0.94)	0.76** (2.84)	0.55* (1.99)	0.20* (1.75)
Population Density (POPDEN)	-0.031 (-1.38)	-0.020 (-1.389)	-0.009 (-1.389)	-0.012** (-2.51)	-0.002** (-2.52)	-0.09** (-2.47)
Per capita Federal Expenditure (GOVEX)	-0.08*** (-5.44)	0.05*** (-5.44)	0.03*** (-5.44)	0.21*** (-8.48)	0.18*** (-8.93)	0.02*** (-7.22)
Percent of Houses occupied by owners (HOUSOWN)	0.011** (1.98)	0.008** (2.55)	0.004** (2.33)	0.211** (2.12)	0.105* (1.66)	0.094* (1.85)
Median value of Housing (MEDHVAL)	0.052** (2.04)	0.009** (2.41)	0.041** (2.05)	0.094* (1.84)	0.073 (1.59)	0.002* (1.74)
Percentage of population unemployed (UNEMP)	-0.007* (-1.77)	-0.006** (-1.99)	-0.000** (-1.99)	0.000* (1.96)	0.000 (1.23)	0.000 (1.11)
Small Business Survival Index (SBSI)	-1.00*** (-5.47)	-0.84** (-1.98)	-0.15** (-2.50)	-2.05*** (-4.88)	-1.95** (-2.75)	-0.10*** (-3.11)
Property Tax Revenue (PROPTAX)	0.10*** (8.76)	0.08*** (8.766)	0.01*** (8.74)	-0.003 (-1.21)	-0.002 (-1.21)	-0.001 (-1.20)
Natural Amenity Index (NATAMEN)	1.21*** (6.40)	1.03*** (6.404)	0.17*** (6.39)	0.24*** (5.51)	0.147*** (5.41)	0.101*** (5.39)
Rural-Urban Index (METRO)	0.76*** (8.97)	0.65*** (8.97)	0.11*** (8.96)	-0.054** (-2.55)	-0.032** (-2.55)	-0.022** (-2.51)
Interstate Highway access (HWY)	-3.159*** (-7.78)	-2.69*** (-7.71)	-0.46*** (-7.77)	-0.146 (-1.404)	-0.086 (-1.40)	-0.059 (-1.39)
rho		0.15*** (143.85)			0.432*** (21.97)	
R-squared		0.160			0.1617	
Rbar-squared		0.1571			0.1589	
log-likelihood		-9753.2676			-4323.9742	

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Table A2.4 :SEM Results

Dependent Variable	Self-employment rate (SELFEMP)		Annual average growth of small firms (AVEGROW)	
	Coefficient	t-stat	Coefficient	t-stat
Constant	33.63***	(12.37)	-1.21**	(-2.05)
Percent rate of all denominations adherence (TOTRT)	-0.19***	(-16.59)	0.007**	(-2.04)
Religious Diversity Index (RELDIV)	-21.08***	(-18.12)	0.925**	(2.10)
Per capita Income (INC)	0.318***	(8.22)	0.002	(0.32)
Percent of population with at least bachelor degree (EDU)	-0.192***	(-6.61)	0.044***	(9.11)
Median Age (MEDAGE)	1.27**	(2.55)	-0.76*	(-1.98)
Population Density (POPDEN)	-0.021	(-1.57)	-0.009***	(-2.04)
Per capita Federal Expenditure (GOVEX)	-0.03***	(-5.47)	-0.15***	(-9.04)
Percent of Houses occupied by owners (HOUSOWN)	0.001*	(1.66)	0.198**	(2.59)
Median value of Housing (MEDHVAL)	0.007*	(1.78)	0.027*	(1.75)
Percentage of population unemployed (UNEMP)	-0.005*	(-1.91)	0.013	(0.97)
Small Business Survival Index (SBSI)	-1.124**	(-2.81)	-0.015**	(-2.61)
Property Tax Revenue (PROPTAX)	0.1126***	(10.13)	0.000	(0.19)
Natural Amenity Index (NATAMEN)	0.996***	(7.52)	0.167***	(4.52)
Rural-Urban Index (METRO)	0.674***	(9.58)	-0.055***	(-4.14)
Interstate Highway access (HWY)	-2.918***	(-8.26)	-0.082	(-1.36)
lambda	0.254***	(11.42)	0.473***	(40.70)
R-squared	0.2038		0.3174	
Rbar-squared	0.2012		0.3152	
log-likelihood	-9728.8134		-4309.217	

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Table A2.5:SLX Results

Dependent Variable	Self-employment rate (SELFEMP)		Annual average growth of small firms (AVEGROW)	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	3.50	0.781	-5.31***	-6.47
Percent rate of all denominations adherence (TOTRT)	-0.21***	-9.23	0.007**	-1.736
Religious Diversity Index (RELDIV)	-19.03***	-6.82	1.42**	2.78
Per capita Income (INC)	0.315***	7.74	0.002	0.367
Percent of population with at least bachelor degree (EDU)	-0.193***	-6.57	0.046***	8.57
Median Age (MEDAGE)	1.008*	2.05	-1.057*	-1.98
Population Density (POPDEN)	-0.005	-1.63	-0.045**	-1.72
Per capita Federal Expenditure (GOVEX)	-0.24***	-5.30	-0.50***	-8.64
Percent of Houses occupied by owners (HOUSOWN)	0.001***	5.23	0.003***	6.27
Median value of Housing (MEDHVAL)	0.003**	2.44	0.007**	2.41
Percentage of population unemployed (UNEMP)	-0.003*	-1.80	-0.002**	-2.46
Small Business Survival Index (SBSI)	-1.551**	-2.23	-1.348***	-4.68
Property Tax Revenue (PROPTAX)	0.171***	11.32	0.002	0.72
Natural Amenity Index (NATAMEN)	-0.106	-0.35	0.042	0.773
Rural-Urban Index (METRO)	0.650***	7.11	-0.059***	-3.56
Interstate Highway access (HWY)	-2.903***	-7.913	-0.070	-1.04
Weighted Percent rate of all denominations adherence (WTOTRT)	0.27***	8.23	0.037***	6.192
Weighted Religious Diversity Index (WRELDIV)	25.49***	5.998	2.26***	2.907
Weighted Per capita Income (WINC)	-0.370***	-5.42	-0.043***	-3.461
Weighted Percent of population with at least bachelor degree (WEDU)	0.376***	7.34	0.028***	3.026
Weighted Median Age (WMEDAGE)	0.248*	2.15	-1.551**	-2.88
Weighted Population Density (WOPDEN)	0.085	0.41	-0.171	-0.342
Weighted Per capita Federal Expenditure (WGOVEX)	0.02	1.254	0.08	0.708
Weighted Percent of Houses occupied by owners (WHOUSOWN)	-0.081**	-2.55	-0.203*	-1.79
Weighted Median value of Housing (WMEDHVAL)	-7.522*	-1.60	-0.002	-0.94
Weighted Percentage of population unemployed (WUNEMP)	0.198*	1.61	0.024*	1.98
Weighted Small Business Survival Index (WSBSI)	0.004*	1.88	0.543	1.58
Weighted Property Tax Revenue (WPROPTAX)	-0.167***	-8.99	-0.007**	-2.092
Weighted Natural Amenity Index (WNATAMEN)	1.63***	4.72	0.334***	5.29

Table A2.5 cont'd :SLX Results

Weighted Rural-Urban Index (WMETRO)	0.416***	3.028	0.007	0.306
Weighted Interstate Highway access (WHWY)	1.76*	2.484	0.10	0.825
R-squared	0.233		0.203	
Rbar-squared	0.228		0.197	

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

A2.5 Denominational Results

Table A2.6 :SDM Results

Dependent Variable	Self-employment rate (SELFEMP)			Annual average growth of small firms (AVEGROW)		
	Total	Direct	Indirect	Total	Direct	Indirect
Percent rate of Mainline denomination adherence (MAINRT)	0.0074** (2.01)	0.00 (-0.002)	0.007 (1.29)	-0.003*** (-3.44)	-0.002*** (-3.33)	-0.0004 (-0.36)
Percent rate of Evangelical denomination adherence (EVANRT)	0.007*** (2.82)	-0.003 (-0.698)	0.0108** (2.078)	-0.003*** (-5.57)	-0.0000 (-0.097)	-0.03*** (-3.68)
Percent rate of Catholic denomination adherence (CATHRT)	0.0009 (0.335)	-0.008** (-1.82)	0.009* (1.868)	-0.004*** (-6.22)	-0.001 (-1.408)	-0.003** (-3.28)
Religious Diversity Index (RELDIV)	6.093 (1.220)	-18.98*** (-7.02)	25.08*** (4.83)	6.002*** (5.09)	1.5820** (3.428)	4.420*** (3.8871)
rho		0.146*** (141.84)			0.413*** (20.92)	
R-squared		0.244			0.2391	
Rbar-squared		0.237			0.2325	
log-likelihood		-9607.6264			-4237.6	

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Table 2.1 : Descriptive Statistics and Sources						
Variables	Description	Mean	Std.Dev.	Min	Max	Source*
Entrepreneurship						
SELFEMP	(Non-farm Proprietor Employment/Total Non-farm Employment)*100: Averaged 2000-2010	23.98	9.23	3.045243	68.53041	BEA-REIS
AVEGROW	Average Annual Growth of small (less than 500 employees)firms Averaged 2000-2009	-0.0718	1.65	-13.27569	17.22222	USCB
Religion						
TOTRT	All Denominations—Percent Rate of adherence in Year 2000	53.2298	18.26162	1.816347	98.379	ARDA
MAINRT	Mainline Denominations—Percent Rate of adherence in Year 2000	14.1949	11.38461	0	88.40	ARDA
EVANRT	Evangelical Denominations-- Percent Rate of adherence in Year 2000	22.8218	16.9146	0	99.37	ARDA
CATHRT	Catholic Church-- Percent Rate of adherence in Year 2000	13.807	14.85797	0	94.68	ARDA
ORTHRT	Orthodox Denominations-- Percent Rate of adherence in Year 2000	0.0637	0.25	0	3.78	ARDA
OTHERRT	Other Denominations-- Percent Rate of adherence in Year 2000	2.34	8.56	0	74.21	ARDA
RELDIV	Religious Diversity Index-Year 2000	0.532	0.23	0.004	0.99	Constructed-ARDA
Other Variables						
INC	Per capita Income(in thousands of dollars): Averaged 2000-2010	28.77	6.75	13.63	98.37	BEA
EDU	% of Population (25 years and older) with bachelor or higher degree Averaged 2000-2010	15.62	5.93	3.78	70.15	USCB
MEDAGE	Median age of population: Year 2000	35.21	3.55	21.91	54.73	USCB
HOUSOWN	Percent of homes occupied by owners: Averaged 2000-2010	73.41	7.38	17.65	88.24	USCB
MEDHVAL	Median value of housing(in ten thousands of dollars): Averaged 2000-2010	6.453	3.284	1.498	48.831	USCB
UNEMP	Percent of Population who are unemployed : Averaged 2000-2010	7.18	2.48	0.53	38.2	USCB
GOVEX	Per capita Federal Government Expenditure (in thousands dollars): Averaged 2000-2004	6.914	4.012	1.206	15.868	USCB
PROPTAX	Property Tax Revenue (% of total Revenue): Year 2002	62.6175	18.15813	2	93	USCB
SBSI	Small Business Survival Index: Averaged 2000-2010	60.91	12.75	27.55	88.82	SBEC
NATAMEN	Natural Amenities Index (1-7)	3.492	1.04	1	7	ERS-USDA
METRO	Rural-Urban Continuum Code (1-9)	5.14	2.67	1	9	ERS-USDA
POPDEN	Population Density (Hundreds of population per square mile) in Year 2000	2.35	13.655	0.00044	669.401	BEA-REIS
HWY	Dummy for Interstate highway access (0-1)	0.4364	0.4960	0	1	Constructed-USCB
*BEA-REIS: Bureau of Bureau of Economic Analysis, Regional Economic Information System; ARDA: Association of Religion Data Archives; USCB: U.S. Census Bureau, SBEC: small Business & Entrepreneurship Council						

Table 2.2 :OLS Results

Table 2.2 :OLS Results

Dependent Variable	Self-employment rate (SELFEMP)		Annual average growth of small firms (AVEGROW)	
	Coefficient	t-stat	Coefficient	t-stat
Constant	28.84***	(9.34)	-2.67***	(-4.84)
Percent rate of all denominations adherence (TOTRT)	-0.14***	(-7.87)	0.005*	(1.76)
Religious Diversity Index (RELDIV)	-17.06***	(-6.96)	1.65***	(3.76)
Per capita Income (INC)	0.27***	(7.23)	0.002	(-1.10)
Percent of population with at least bachelor degree (EDU)	-0.13***	(-4.85)	0.05***	(10.15)
Median Age (MEDAGE)	1.56**	(2.66)	-0.59*	(-1.66)
Population Density (POPDEN)	-0.081	(-1.49)	-0.005**	(-2.36)
Per capita Federal Expenditure (GOVEX)	-0.24***	(-5.20)	-0.11***	(-8.98)
Percent of Houses occupied by owners (HOUSOWN)	0.003***	(5.38)	0.007***	(4.21)
Median value of Housing (MEDHVAL)	0.05**	(2.84)	0.08**	(2.88)
Percentage of population unemployed (UNEMP)	-0.0004*	(-1.99)	-0.008	(-1.18)
Small Business Survival Index (SBSI)	-0.98***	(-4.33)	-2.14***	(-6.44)
Property Tax Revenue (PROPTAX)	0.087***	(8.97)	0.003	(-0.79)
Natural Amenity Index (NATAMEN)	1.22***	(7.85)	0.28***	(10.09)
Rural-Urban Index (METRO)	0.73***	(10.20)	-0.05***	(-4.04)
Interstate Highway access (HWY)	-2.72***	(-7.83)	-0.057	(-0.92)
R-squared	0.1698		0.1752	
Rbar-squared	0.1671		0.1725	
***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.				

Table 2.3:SDM Results

Dependent Variable	Self-employment rate (SELFEMP)			Annual average growth of small firms (AVEGROW)		
	Total	Direct	Indirect	Total	Direct	Indirect
Percent rate of all denominations adherence (TOTRT)	0.068** (2.17)	-0.212*** (-10.15)	0.28*** (7.703)	0.033*** (3.847)	-0.008** (-2.22)	0.041*** (4.97)
Religious Diversity Index (RELDIV)	7.72* (1.66)	-19.08*** (-7.30)	26.81*** (5.66)	3.97*** (3.51)	1.24** (2.76)	2.73** (2.535)
Per capita Income (INC)	-0.07 (-1.03)	0.31*** (8.42)	-0.39*** (-5.09)	-0.043** (-2.32)	0.001 (0.16)	-0.04** (-2.50)
Percent of population with at least bachelor degree (EDU)	0.20*** (3.46)	-0.19*** (-6.93)	0.40*** (6.91)	0.079*** (5.37)	0.04*** (9.63)	0.033* (2.43)
Median Age (MEDAGE)	1.54** (2.03)	1.20* (1.84)	0.32 (0.84)	-2.08* (1.74)	-1.83* (1.81)	-0.96 (1.42)
Population Density (POPDEN)	-0.003 (-1.10)	-0.012* (-1.73)	0.041 (0.35)	-0.088 (-1.58)	-0.034** (-2.21)	-0.053 (-0.40)
Per capita Federal Expenditure (GOVEX)	-0.42 (-1.42)	-0.54*** (-5.39)	0.11 (1.10)	-0.61** (-2.57)	-0.63*** (-9.54)	0.01 (0.733)
Percent of Houses occupied by owners (HOUSOWN)	0.002** (2.15)	0.000* (1.74)	0.000 (1.11)	0.015*** (4.59)	0.007* (2.03)	0.007 (1.59)
Median value of Housing (MEDHVAL)	0.008* (1.88)	0.006 (0.94)	0.001 (0.91)	2.104 (1.22)	0.942 (1.05)	1.162 (0.94)
Percentage of population unemployed (UNEMP)	-0.128* (-1.73)	-0.142 (-1.26)	0.014 (1.12)	-1.005** (-2.48)	-0.912* (-1.67)	-0.089 (-0.79)
Small Business Survival Index (SBSI)	-2.004** (-2.54)	-1.86*** (-2.84)	-0.144** (-2.49)	-1.885*** (-3.09)	-0.945*** (-3.57)	-0.938*** (-3.42)
Property Tax Revenue (PROPTAX)	0.00 (0.02)	0.17*** (12.28)	-0.17*** (-8.97)	-0.006* (-1.79)	0.001 (0.65)	-0.008* (-2.00)
Natural Amenity Index (NATAMEN)	1.51*** (6.90)	-0.14 (-0.54)	1.66*** (5.05)	0.38*** (6.89)	0.035 (0.72)	0.34*** (4.92)
Rural-Urban Index (METRO)	1.05*** (7.76)	0.66*** (7.44)	0.39** (2.58)	-0.06* (-1.82)	-0.05*** (-3.72)	0.00 (-0.15)
Interstate Highway access (HWY)	-1.01 (-1.26)	-2.92*** (-8.27)	1.90** (2.36)	0.43 (0.22)	-0.076 (-1.25)	0.120 (0.66)
rho		0.187*** (21.531)			0.443*** (4.200)	
R-squared		0.234			0.2065	
Rbar-squared		0.229			0.2013	
log-likelihood		-9623.0953			-4272.8115	

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Figure 2.1: Religious Adherence in the U.S.

Data: Religious Adherents as Percentage of Population, Year 2000
Source: Religious Congregations and Membership Study: 2000, ASARB

Figure 2.2: Self-employment in the U.S.

Data: Share of Self-Employment to Total Employment, Year 2000
Source: Bureau of Economic Analysis-Regional Economic Information System

Figure 2.3: Counties comparison over states border: OH-WV

Figure 2.4: Counties comparison within state: NY

Figure 2.5: Counties comparison over states border: WV-VA

Figure 2.6: Counties comparison within state: CA

Chapter 3

Institutional Quality and Efficiency of Public Spending: Evidence from the U.S. States Governments

3.1 Introduction

One of the governments' biggest challenges is to develop policies that raise the standard of living without creating large income gaps between the rich and the poor. Depending on the time span and more importantly political and social ideology of governments, pro-growth or pro-equity policies are implemented, however pursuing both seems to be the "better" strategy in the long-run. There is a significant debate over the relationship between these two types of policies in the literature. *Equality and Efficiency, the Big Tradeoff* by Okun published 1975 is one classic example that thoroughly explains how and why there is a trade-off.

Besides these arguments, several studies have shown different relationships between economic growth and income equality. Although some believe they are negatively correlated, there are studies claiming that growth promotes equality or vice-versa (Angeles-Castro, 2006). There is a set of tools in hands of the state by which they can *decide* how to impact the size of pie and how to distribute it. Scholars argue that redistribution of wealth is the major function of government, and also it is the main source of growth in the size of fiscal state (Peltzman, 1980; Tullock, 1983). Basically if we want to examine the governments' action toward either or both direction of growth and equality, we need to analyze the tools it has, e.g. fiscal policies, and see how it uses them.

Behind the debate on trade-off between growth and equality, there is an important question that opens a door to another literature which is closer to the main argument of this paper. Regardless of the direction that the government picks and follows, given the fact that both

higher growth and more equally distributed income are favorable goals, the efficiency of the public sector is very important. How effective are governments' policies in changing economic performance and equality simultaneously? More specifically we are interested to know why some governments are more effective in pursuing equality and efficiency than the others. Which factors drive the differences between them? Our concentration here is particularly on efficiency of public expenditure in achieving higher growth and income equality.

We think besides all systematic and structural factors, *institutions* and their quality are very important in changing the effectiveness of governments' action. Hence we focus on some areas of institutional arrangements to address the research question. In summary the core research question of the current paper is: Does institutional quality impact the efficiency of government spending?

In the empirical investigation we use state-level observations from 50 state governments in the U.S. The proposed hypothesis is as follows: *"States with higher institutional quality have more efficient public spending to reach higher growth and equality."*

The main findings confirm that there is enough evidence to support the above hypothesis. However it should be clearly defined and differentiated what specific institution we are referring to. In particular we find that states with a better judicial system and less restrictive labor market tend to have more efficient public spending. Furthermore political affiliation of legislature and executives are included in the analysis and there are some mixed results for them.

Our contribution to the existing literature of efficiency of public spending and also institutional analysis can be categorized into three parts. First the methodology that we use to measure the efficiency, although used in other literatures, to our knowledge has not been employed to address the same question with these variables. Second, the scale of study which is

state level, considering the factors we include in the analysis, is new. Finally connecting the two parts on measuring efficiency and institutional consideration is our other contribution.

This chapter is organized as follows. In the next section an overview of the related studies on public spending efficiency and institutions is presented. After that we explain the research design, variables and data. Section 5 will present the major results and findings and finally section 6 states the concluding remarks.

3.2 Literature Review

Much of the variation in growth rates and income inequality across economies and over time is still not completely understood. Although cross-country studies, based on dynamic panel data techniques, have been able to correct some of the methodological problems in the earlier literature (such as measurement and specification errors, simultaneity bias, and the potential causality), conclusive empirical results have yet to be obtained. The same issue exists when we compare the local economies (Hughes and Edwards, 2000).

One variable that has been studied extensively is the role of fiscal policies, such as public spending, on growth and equality. Since the seminal contribution by Barro (1990), there have been a number of analytical studies highlighting the various channels through which public expenditure may affect growth. But, at the empirical level, robust relationships have been difficult to capture. In general the studies on the effects of government expenditure on growth appear to have various conclusions. Almost the same argument can be brought up about income distribution and the impact of government expenditure on it. There are studies in favor of a positive relationship between government expenditure and lower inequality, e.g. Afonso et al. (2008). But there are some which confirm the negative correlation (De Mello and Tiongson,

2006). Overall there is no clear consensus on the direction of the possible effects of public spending on either growth or equality.

For the purpose of this paper, we focused on two segments of the literature. One is on the issue of effectiveness of government spending and the other consists of studies concerned about institutions.

3.2.1 Public Spending and its Efficiency

Public fiscal spending can be instrumented to stimulate any economy's performance both in the short run and in the long run. There is a lengthy literature consisting of theoretical and empirical studies that focuses on the extent to which public expenditure, income transfers and taxation impact the growth and overall economic performance (Tolmie, 2007). Fox (1999) points out the importance of assessing public sector performance in maintaining a prosperous economy and promoting growth. Barro (1990) discusses the potential for long-run growth that is derived from infrastructure investments. In addition, there is a sizeable literature focusing on fiscal expenditure and its aggregate economic effects (Blanchard and Perotti, 2002).

In the past twenty years, attention of scholars, especially in macroeconomic analysis, has shifted toward the idea of efficiency of public spending. In a general sense, this efficiency simply refers to how successful policies are to fulfill the goals. Tanzi and Davoodi (1997) and Gupta et al. (2011) are among several studies that focus on different ways of assessing public spending effectiveness. Pritchett (2000) and Keefer and Knack (2007) besides spending, investigate the efficiency of public investment as well. A few recent studies (e.g., Afonso et al., 2005; Afonso and Aubyn, 2005) have performed efficiency analyses using OECD data, but they do not explain the sources of variations in efficiency across countries.

Previous studies on the efficiency of the public sector in economic performance found a significant divergence of efficiency across countries and subsectors of governments. Education and health are the two sections that have been more analyzed. Fakin and Crombrugghe (1997) examine the efficiency of government subsidies in central European countries. Gupta and Verhoeven (2001) look into the education and health spending in African countries while Clements (2002) and Aubyn (2003) test education in Europe.

In general there are two major branches of the empirical literature on efficiency of government spending. One is the macro/country-level and the other one is on local governments. Afonso, Schuknecht, and Tanzi (2005, 2006) examine public expenditure efficiency in economic performance in the OECD countries and in emerging markets. De Borger and Kerstens (1996), and Afonso and Fernandes (2006) find evidence of spending inefficiencies for the local public sectors. Afonso, Schuknecht, and Tanzi (2008) investigate the efficiency of taxation and some other fiscal policies in order to decrease income inequality in OECD countries.

Most of these studies for calculating the efficiency of public sector apply the Data Envelopment Analysis (DEA) method. This is the same model we will be using here, however in the context of a state-level analysis for public spending efficiency in growth and income equality. To the authors' knowledge no work has been conducted using such a non-parametric method.

3.2.2 Institutions

Among the fundamental sources of long-run economic development, institutions have received considerable attention in recent years. North (1990) defined institutions as the “rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction”. The most obvious formal institutions are the formal rules (constitutions, laws, and property rights) and informal institutions (conventions and codes of behavior such as norms, customs,

taboos, and traditions). North further stated that institutional change shapes the way societies evolve through time and, hence, the direction of economic performance.

Numerous empirical studies have provided convincing evidence to support the view that differences in institutions can have a large effect on output per capita, including Knack and Keefer (1995), Hall and Jones (1999), Acemoglu et al. (2002), Rodrik (2002), Rodrik et al. (2004), Eicher and Leukert (2009). These empirical studies rely on a limited range of datasets to measure institutions or “institutional quality” and moreover they all study national economies and compare countries. In the studies using institutions and their quality, always measurement is an important issue. There are several projects in which scholars offer some proxies for quantifying the quality of institutions.

One relatively recent developed measure is Economic Freedom Index (EFW) introduced in Gwartney, Lawson and Block (1996). The index number is ranging from zero to ten for each country. As the number gets higher the economic environment is closer to free market and as it gets close to zero, the country has less economic freedom and lower institutional quality. A relatively large portion of research in this literature uses this index as a proxy for institutional quality (e.g. Haan, 2003; Berggren, 2003; Gwartney, Holcombe and Lawson, 2004; Ayal and Karras, 1998; De Haan and Siermann, 1998; Carlsson and Lundstrom, 2002). These studies use EFW to check the relationship of institutions with growth, income level, income distribution and several other socio-economic parameters. Some few papers examine effect of economic freedom on both growth and equality together. Scully (2002) shows economic freedom is significantly affective on both.

One other quantitative index for institutional quality is conducted by Kaufmann et al. (2008), World Governance Indicator (WGI). This index has six subcomponents¹¹ by which some aspects of institutions are measured.

In this paper, since we are interested in institutional arrangement in the local level and not national level, the approach as well as variables used will be slightly different from those employed in country-level studies. We need to come up with some sort of representative of state's institutional quality that has two properties. First it is not an outcome of a process (i.e. it is exogenous). Second it can be well represented by a quantifiable variable.

3.3 Empirical Design, Variables, and Data

For testing the hypothesis, we essentially take two steps. First we need to find a way to define and calculate the “efficiency” of public spending. For this purpose a non-parametric method, Data Envelopment Analysis (DEA), is employed. It is, to our knowledge, the first time in the related literature that this method is used to answer this research question. Second, we check if the efficiency has any correlation with institutional quality.

3.3.1 Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA), a non-parametric method, was originated from Farrell (1957) frontier analysis and popularized by Charnes, Cooper and Rhodes (1978). The DEA procedure allows for an estimation of the level of technical effectiveness in a production process. There is a long literature with application of DEA in different areas related to efficiency or productivity of production units. Emrouznejad (2001) lists almost 500 studies that use DEA as an evaluation tool. In the urban and regional studies DEA method has a broad use. Usually topics of

¹¹ Voice and accountability, Political stability and absence of violence, Government effectiveness, Regulatory quality, Rule of law and Control of corruption.

these studies are related to the efficiencies of industries or local governments (Tong, 1996; Hajalmarsson, 1992; De Borger, 1996).

DEA employs linear programming to compare decision making units (DMUs) which produce multiple outputs using multiple inputs. A production frontier is estimated without any form of production technology being specified. This frontier indicates the maximum possible output given a certain level of input. The term “envelopment” comes from the fact that the frontier envelops the set of observations. This frontier will then serve as a base for calculating the relative effectiveness (efficiency) of the DMUs. Units are either on or below the frontier.

Each DMU’s efficiency is defined relative to that of all others. So at a specific level of input the DMU with highest output would be the most efficient and then other DMUs will be ranked with respect to that one particular DMU. The efficient unit cannot increase the amount of one of its output without decreasing other output or increasing the inputs. So clearly DMUs are facing an optimization problem. The base of optimization process is as follows.

For each DMU, the model finds the optimal linear combination of units in the sample which produces higher output level with fewer inputs. This linear combination represents a hypothetical composite unit that should satisfy two constraints:

1. All output levels are greater or equal to the output level of the DMU under analysis.
2. All input levels of the composite unit are less than or equal to the input levels of the analyzed DMU.

The model searches for comparison that identifies output slack or excess input usage of the unit under analysis, as defined by the above inequality conditions. Suppose we have n DMUs and each unit has k inputs and produces m outputs. The DEA model can be sketched with the following mathematical programming for a given DMU_i :

$$\text{Objective Function} \quad \text{Min}_{\lambda_i} \delta = u_i s_i + v_i e_i \quad (1)$$

Subject to:

$$\text{Output Slack} \quad Y\lambda_i - y_i = s_i \quad (2)$$

$$\text{Excess Input} \quad x_i - X\lambda_i = e_i \quad (3)$$

$$\text{With} \quad \sum_{j=1}^n \lambda_{ij} = 1, \quad \lambda_i \geq 0, e_i \geq 0, s_i \geq 0$$

Where;

$y_i : (m \times 1)$ vector of the outputs for DMU_i

$x_i : (k \times 1)$ vector of the inputs for DMU_i

$Y : (m \times n)$ output matrix

$X : (k \times n)$ input matrix

$\lambda_i : (n \times 1)$ vector of weights assigned to linear combination of comparison set

$s_i : (m \times 1)$ vector of output slack

$e_i : (k \times 1)$ vector of input excess

$u_i, v_i : (1 \times m)$ and $(1 \times k)$ vectors of weights used in the evaluation process of the objective function.

The objective function in output-oriented model is to maximize the proportional increase in outputs produced with a given level of inputs, equation (2). For the input-oriented model the objective is to maximize the proportional decrease in the input necessary to produce a given level of output, equation (3). DEA models can be either variable return to scale (VRS) or constant return to scale (CRS). Choosing the return to scale, CRS versus VRS, In case the weights determining hypothetical composite comparison, λ_{ij} , sum to one, model is VRS, otherwise it is CRS.

The model used in this paper is an input-oriented DEA with variable return to scale. Choosing the orientation of DEA is arbitrary, as there is a duality between the two methods (input versus output orientation). But return to scale depends on the computational characteristics of the model. The frontier set for CRS models are larger than that for VRS counterparts.

Therefore our focus here is on the objective function subject to restriction in equation (3). The units of analysis, as discussed before, are state governments in the U.S.

Basically we are assuming an implicit production function for each state. For these production functions there is one input and two outputs. By comparing states to each other we can define a relative efficiency for them.

Input & Outputs, Efficiency Scores

The input we use in the DEA in this paper is general public expenditure at state level. In the literature there are diverse subsets of public spending included in the model for calculating the efficiency. Here however, we only implement the main general expenditure per capita. By general expenditure, we consider intergovernmental as well as direct expenditure. However it does not include federal transfers. So this is specifically expenditure spent and financed by state governments and not federal government. Data for general state government expenditure is from the Census Bureau on state government finance.

For the outputs, there are two factors we included; per capita GDP growth and inverse of gini coefficient. These two represent the two areas we assume as the result of the public sector policies, one representing economic performance and the other distribution of income. Per capita GDP growth is from Bureau of Economic Analysis (BEA) based on real GDP per capita in 1997 dollar. Data for measure of inequality, gini index, is from a project by Mark Frank that provides a detailed dataset on several measures of income inequality in the state level from 1945 to very recent. This gini is a net measure and not transfer. Since here the actual output we are looking for is equality, simply by subtracting gini from one ($1 - \text{gini}$) we can have a proxy for income equality.

Table 3.2 presents efficiency score for 50 states using DEA. These scores are based on averaged input and outputs for the time range between 1998 and 2005. It seems Arizona and Idaho have the most efficient public spending and Alaska and Wyoming with 0.28 and 0.49 are among the least efficient states. These numbers basically refers to the distance of each DMUs (state) from the frontier (or from the most efficient ones). As the numbers get smaller they show a further distance from the frontier. For example Alaska which has the score almost equal to 30% which means that this state does not use 70 percent of its input to produce the two outputs and therefore it acts inefficiently. Figure 3.1 also shows the calculated efficiency score on graph. As it is shown, states with higher score are closer to the frontier and less efficient ones, e.g. Alaska are far from it.¹²

3.3.2 Testing the relationship between efficiency and Institutions

In the second part of empirical analysis, we use the efficiency scores calculated by DEA method in regression set-up to test the hypothesis. Simply we want to see if institutions have any significance to explain the variation of efficiency among states. The general specification of the model would be:

$$EFF_i = \beta_0 + \beta_1 INS_i + \varepsilon_i \quad (4)$$

Where EFF_i represents the efficiency score of state i , and INS_i is a matrix of different measures of institutional quality for state i .

¹² As a simple representation of how the efficiency score is calculated, for example on the graph in figure 3.1, to calculate efficiency score of Oregon, we need to divide its distance from the origin by the distance of the frontier to origin: OA/OB

3.4 Explanatory Variables: Institutions

The area of our interest in this essay for explaining the difference in states' public spending efficiency is institutional quality. Obviously there can be a long list of different institutions, formal or informal. But we focus on some formal institutions that have the characteristics of structuring the economy rather than being output of policies.¹³

Judicial System Quality

The quality of judicial system is one essential factor in development. A powerful judicial system which enforces and protects property rights is an important basis for economic growth and development. Moreover this judicial system (for example of a state) can directly impact the cost of participating in businesses. Also judicial decisions affect the cost of mandates and in general businesses regulations (Hall and Sobel, 2007). So overall we can say that judicial systems in states are important and their quality can change the rules of game. Therefore we include a measure of quality of judicial system in the model.

This measure is an index based on a survey of lawyers conducted by the U.S. Chamber of Commerce that started in 2002 and basically ranks states' legal liability system. The index gets values between 0 to 100, as the higher value refers to a "better" judicial system. It covers some areas such as juridical impartiality, judicial competence, and general treatment of tort and contract litigation. These areas are reflected in the survey questions that have been conducted among approximately 1000 randomly selected lawyers across the country.

When judicial system has a reliable performance in protecting and enforcing the rights, the institutional baseline would be provided for economic activities, including governments'

¹³ For example some informal institutions such as culture, norms, or religion certainly in the big picture would be relevant. But for two reasons we are not concerned about them. First our study is state-level, therefore variation in such institutions among states is minimal if none. Secondly, informal institutions cannot be the variables that are affected (or justified) by governments.

policies. This is why our expectation is to see a significant and positive correlation between judicial system quality and efficiency of public spending.

Labor Market

Labor market is one important sector and its institutional changes make the economic outputs vary. The structure and composition of labor forces and most importantly the regulations on the labor market are the major factors to consider for an institutional comparison between economies. In this paper we control three aspects of the labor market by including three variables.

- *Right-to-work*

In the United States, under the 1947 federal Taft-Hartley Act, some states have passed a law that bans union security agreements. This law is called right-to-work. It simply means in the states with this law, unions and employers are forbidden from entering into agreements that require employees to join a union and pay dues and fees to it in order to get or keep a job. Currently twenty four states have the right-to-work law. Most of them are southern and western states. Michigan and Indiana just very recently in 2012 passed the state law for right-to-work. See the Appendix for the list of states. Data for this variable is from Department of Labor.

The variable we include is a dummy for right-to-work. We think that this direct regulation of the state governments can affect the institutional arrangement of a state and ultimately the effectiveness of its fiscal tools such as public spending.

- *Union Density*

Along with the idea for including the right-to-work parameter, union density variable is another explanatory factor. Union density is measured as the percentage of nonagricultural employees'

population who are members of unions. Hirsch, Macpherson and Vernon (2003) put together a dataset on union membership and coverage in states from the year 1973 up to recent years.

We understand the clear correlation between this variable and right-to-work and that is why we use them in different specifications. Union membership (density) can basically be assumed as a variable which is the result of particular regulation, e.g. right-to-work. Therefore, it may not be necessarily a variable representing the institutional arrangement of a state, but only a direct output of some institutional set-ups.

- *Labor Market Freedom*

This is a broad area under which one component of Economic Freedom Index of North America (EFNA) is calculated (See Appendix for description of the index and its components). Area 3 of EFNA which is on regulation has one component on labor market regulations, 3A. This segment itself consists of three parts. Overall this variable represents how a state or provincial government in the North American countries (US, Canada and Mexico) is free of government regulation. Minimum wage legislation, percentage of government employment and union density are the areas considered. The expectation is to see less regulations and restriction on labor market would lead to more efficient public spending. In an economy where labor forces are free to choose their economic action, we would imagine governments' justification to the economy will work with less friction and ultimately more efficiently.

An important note is that all these three variables have high correlations and including all together would be problematic. The point is to capture the institutional quality (particularly here in the labor market) as much as possible. So we use the three variables in different specifications.

Political Affiliation

Quality of political institutions is certainly one key variable that is repeatedly shown in development literature to play an important role in economic performance. The structure of the political body in any government at any level is one determinant of how states manage their finances. When we are discussing the political arrangement in the governments of states in the U.S. we are particularly interested to analyze the political affiliation of two main players. On one hand we have the legislature section which includes Senate and House of Representatives. On the other hand we have the executive sector with governors. It can be a shortcoming of the breadth in analyzing political institutions, if we just examine the affiliations. However even by simplifying the complicated political system to only what party politicians belong to, we still can to some extent capture the role of politics in our dependent variable of concern (i.e. efficiency of public spending). This criticism can be more significant when we are looking only at the two major political parties in the U.S. It is because there might be cases under which, for example one state's legislature by majority be Democratic but in the voting and decisions they act with the Republican preferences. So being member of a party does not necessarily mean satisfying the party goals in every occasion.

For legislature political affiliation, we look into the majority of states senate and house of representative separately. Then by combining the two, we have one measure, as a dummy that represents the general legislature sector's affiliation. For example if for one state in the senate 60 percent of politicians are republican and in the house only 30 percent are republican, we can say that overall the majority of legislature politicians in that state are Democrats. Therefore the dummy variable would get value of zero. In the case of republican majority, the dummy variable

would get value of 1. This variable is constructed based on the data from National Conference Of States Legislatures (NSCL).

Same argument, but less complicated is applied for the executive sector by taking governors' political affiliation. National Governors Association (NGA) provides a comprehensive datasets on political affiliation of governors along with so many other details for a relatively long period of time.

Summary of variables descriptive statistics is presented in Table 3.1. Note that all variables are from a pooled observation for year 1998 to 2005.

3.5 Empirical Analysis

Table 3.3 presents Ordinary Least Square (OLS) results for nine different specifications. In these regressions observations for the time period between 1998 to 2005 are pooled. In the specifications with more independent variables, size of sample is smaller. This is because of data availability of some variables. For example Judicial System Quality is available only for a limited time range. Models 1 through 6 essentially represent the bivariate regressions between efficiency scores and our six major explanatory variables.

As it was expected, quality of judicial system is positively associated with the efficiency score. All the three measures we included for the labor market quality confirm that less regulations and more freedom in the labor market are favorable for effectiveness of government spending. As the coefficient of union membership variable (MEM) with high significance shows negative effect on efficiency, we can claim that states with more union power tend to be spending less efficiently. The same argument can be stated for positive and significant coefficient of right-to-work variable. For political environment variables, it seems that only

legislature political affiliation matters for efficiency of public spending. The results show that a Republican majority legislature on average is associated with more efficient public spending. Model 7, 8 and 9 include all the variables but in none of them the three labor market variables are present simultaneously. The reason for that, as discussed before, is that labor market variables are highly correlated and having them together in the regression would cause problems. Although choosing one model is not the concern here but comparing the three specifications, 7 through 9, we can see that model 8 has a better goodness of fit.

So given model 8, as the judicial system quality index increases by one unit, efficiency score increases by 0.2 percent. An increase of one unit in Economic Freedom Index will make the score go up by almost 12 percent. Also states with Republican majority in legislature, on average have 5 percent higher efficiency score than state with Democrat majority.

3.6 Conclusion

Empirical studies in different levels confirm that better institutions can provide a basis upon which economic activities and policies can be delivered better. In general institutions matter and they impact the development through different channels.

This paper examines the relationship between institutional set-up and government spending efficiency in the U.S. states. After using a non-parametric method, we calculate the efficiency score for each state. This number simply represents that relative to all other states, how efficiently one state spends its general expenditure. The considered outputs for governments' fiscal policy are higher growth and more equally distributed income.

Our final finding shows that higher quality of judicial system and less regulatory labor market are positively associated with the public spending efficiency. The political affiliations of legislature and executives have mixed results depending on the specification. However there is

empirical evidence that show, states with republican legislature have more efficient government spending in comparison to democrat states.

Appendix B

Table A3.1: List of States with Right-to-Work

State	Year Constitutional Amendment Adopted	Year Status Enacted
Alabama		1953
Arizona	1946	1947
Arkansas	1944	1947
Florida	1968	1943
Georgia		1947
Idaho		1985
Indiana	State law, 2012	
Iowa		1947
Kansas	1958	
Louisiana		1976
Michigan	State law, 2012	
Mississippi	1960	1954
Nebraska	1946	1947
Nevada	1952	1951
North Carolina		1947
North Dakota	1948	1947
Oklahoma	2001	2001
South Carolina		1954
South Dakota	1946	1947
Tennessee		1947
Texas		1993
Utah		1955
Virginia		1947
Wyoming		1963

Table. A3.2: Component Areas of Economic Freedom of North America Index

Area 1: Size of Government

EFAI: Govt. consumption expenditures as a percentage of GSP

EFAII: Transfers and subsidies as a percentage of GSP

EFAIII: Employment insurance, workers compensation, and other pensions as a percentage of GSP

Area 2: Takings and Discriminatory Taxation

EFBI: Total Tax Burden as a Percentage of GSP: Includes income taxes, consumption taxes, property and sales taxes, contributions to Social Security plans, and other taxes

EFBII: Top marginal income tax rate and the income threshold at which it applies

Area 3: Labor Market Freedom

EFCI: Minimum wage legislation: Annual income earned by an minimum-wage worker divided by per- capita GSP

EFCII: Government employment as a percentage of total employment

EFCIII: Union density

Table 3. 1: Descriptive Statistics and Sources

Variables	Description	Mean	Std. Dev.	Min	Max	Source*
Out-puts						
GROWTH	GDP per capita annual growth: 1998-2005	2.01	2.08	-6.1	8.73	BEA
EQUAL	1-GINI : 1998-2005	0.42	0.03	0.32	0.47	Frank (2009)
In-put						
GOVEXP	General Government Expenditure per capita (current US \$) : 1997-2005	4358.25	1394.34	2590.54	14293.02	USCB
Institutional Quality						
<i>Judicial System</i>						
JUDQ	Judicial System Quality: 2000-2005	59.10	8.62360	24.8	78.6	ILR
<i>Labor Market</i>						
MEM	% employees covered by a collective bargaining agreement (Union Density): 1998-2005	17.23	8.64356	2.3	26.9	Hirsch et al.(2003) – CPS
RTW	Dummy for Right-to-Work law: 1997-2005	0.443	0.496	0	1	DOL
EFI3	Economic Freedom Index, Area3A: Labor market freedom: 1995-2005	6.587	0.912	5.7	8.7	Fraser Institute
<i>Political Affiliation</i>						
EXPOL	Dummy for governors' political affiliation (1=Republican, 0=Otherwise): 1997-2005	0.544	0.498	0	1	NGA
LEGPOL	Dummy for legislature political affiliation (1=Republican, 0=Otherwise): 1997-2005	0.451	0.497	0	1	NSCL

Note: LEGPOL is combined of two parts for senate and house of representatives.

Dummy for majority of state senators political affiliation (1= Republics, 0=Otherwise) : Upper House

Dummy for majority of state representative political affiliation (1= Republics, 0=Otherwise): Lower House

LEGPOL sums the two to one single variable.

* USCB: U.S. Census Bureau; ILR: Institute for Legal Reform-U.S. Chamber of Commerce; CPS: Current Population Survey; DOL: Department of Labor; NSCL: National Conference of State Legislatures; NGA: National Governors Association

Table 3.2: DEA efficiency Score Results

State	Rank	Score	State	Rank	Score
Alabama	19	0.858605	Montana	38	0.674764
Alaska	49	0.284865	Nebraska	13	0.917713
Arizona	1	1	Nevada	14	0.900145
Arkansas	23	0.808817	New Hampshire	8	0.939656
California	40	0.644066	New Jersey	39	0.669249
Colorado	11	0.922843	New Mexico	44	0.605133
Connecticut	46	0.550338	New York	47	0.498708
Delaware	43	0.612993	North Carolina	15	0.873438
Florida	10	0.935968	North Dakota	34	0.727558
Georgia	7	0.958467	Ohio	22	0.812861
Hawaii	45	0.598762	Oklahoma	20	0.856174
Idaho	1	1	Oregon	33	0.729146
Illinois	18	0.862171	Pennsylvania	26	0.785606
Indiana	4	0.986195	Rhode Island	37	0.678885
Iowa	16	0.871033	South Carolina	30	0.747209
Kansas	12	0.919886	South Dakota	2	0.999569
Kentucky	24	0.798556	Tennessee	3	0.990624
Louisiana	25	0.798416	Texas	6	0.976008
Maine	32	0.745318	Utah	21	0.825933
Maryland	17	0.869091	Vermont	42	0.6228
Massachusetts	41	0.631095	Virginia	9	0.936366
Michigan	31	0.746541	Washington	35	0.700492
Minnesota	36	0.694067	West Virginia	29	0.750736
Mississippi	28	0.760939	Wisconsin	27	0.776634
Missouri	5	0.978236	Wyoming	48	0.493295

Table 3.3: OLS Regression Result; Dependent Variable: Efficiency Score: pooled 1998-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.612 (8.88)**	0.874 (28.54)**	-0.129 (-1.06)	0.635 (36.17)**	0.698 (32.11)**	0.659 (33.86)**	0.818 (12.29)**	-0.260 (-2.17)*	0.588 (8.34)**
Judicial System Quality (JUD)	0.003 (2.29)*	-----	-----	-----	-----	-----	0.001 (1.26)	0.002 (2.15)*	0.002 (1.56)
Percent employees member of union(MEM)	-----	-0.015 (-6.54)**	-----	-----	-----	-----	-0.013 (-7.49)**	-----	-----
Economic Freedom Index-Area3 (EFI3)	-----	-----	0.119 (6.77)**	-----	-----	-----	-----	0.124 (9.38)**	-----
Right-to-Work (RTW)	-----	-----	-----	0.129 (4.89)**	-----	-----	-----	-----	0.129 (6.04)**
Governors' political affiliation (EXPOL)	-----	-----	-----	-----	-0.009 (-0.31)	-----	-0.018 (0.91)	-0.024 (-1.28)	-0.025 (-1.23)
Legislature political affiliation (LEGPOL)	-----	-----	-----	-----	-----	0.060 (2.23)*	0.049 (2.21)*	0.047 (2.28)*	0.048 (2.06)*
Observations	200	450	450	450	439	441	193	193	193
R-squared	0.03	0.09	0.09	0.05	0.00	0.01	0.29	0.37	0.23
**Significant at 1% level, * Significant at 5% level									

Figure 3.1: DEA frontier for US states

Chapter 4

Religious Heterogeneity, State Religiosity and Conflict

4.1 Introduction

Several pioneer social scientists such as John Stuart Mill, Marx, Durkheim and Max Weber promoted the general idea of the “secularization theory”. The core of this theory is that, in the modern world, importance of religion in the political sphere would decline. In other words it claims religion would be marginalized from public to the private sector (Nordas, 2005).

However in recent decades almost all over the globe we can observe the empowerment of religion, particularly in the political scenes. As Haynes (1997) discusses, almost all countries around the world have been experiencing some sort of political tension with the background of religious dispute. There are a large number of real examples that let us think secularization theory has been strongly challenged¹⁴. For example Gill & Keshavarzian (1999) find that opposite of what “old-line secularization thesis” claims, religious organizations and leaders remain or are becoming increasingly active in political and social life. This transmits into the mobility of the adherents and followers to taking action. Majority of ethno-religious conflicts are originated from this idea. Casanova (1994) refers to the Islamic revolution in Iran in 1979, as a key point that shifted religion back into the public contestation. He argues that besides Iranian revolution, the rise of solidarity movement in Poland, role of Catholicism in Sandinista and Evangelicalism in American politics were all developments that somewhat negate the idea of secularization even further. These changes all continue after the cold war up until very recent “war on terror”.

¹⁴ See Berger (1999); Stark (1999); Stark & Finke (2000).

There is no doubt that religion have distinctive role in some of the most repeated conflict zones of the world. For example the bloody conflicts in Algeria, Chechnya, Kashmir, Nigeria, Northern Ireland, Israel–Palestine, Lebanon, Sudan and Sri Lanka, and the civil war in Afghanistan (Hasenclever & Rittberger, 2000; Fox, 2000; Seul, 1999). Although we cannot state that these incidences were all exclusively religious conflicts, but clearly some religious factors have been in the heart of the confrontations¹⁵.

Considering all of these and so many other events that have happened in the recent decades, religion has become one of the most attractive topics in the academic studies and public debates on conflict. Not religion per se, but more precisely religion and its functions in political and social changes.

The current paper looks into the impact of religion on the domestic societal conflicts in countries. It investigates two questions, one which has been raised in the related studies before and one new question to the literature. In both of the questions, focus is on the religious heterogeneity of countries. In the first hypothesis, the impact of religious diversity on the magnitude of conflict is tested. In the second one, role of government and its religious identity is included in the analysis. Particularly I want to see if the level of religiosity of state impacts the connection between religious diversity of a society and the magnitude of conflict.

The main contribution of this paper is its research question which has not been examined before. Correlation between conflict and different types of heterogeneity, e.g. ethno-lingual and cultural, have been studied, but religious diversity is rarely being paid attention to. Moreover, as the more important part of the contribution, role of state religiosity, up to my knowledge, has not

¹⁵ On a different intensity level but yet similar forcing mechanism, we can refer to a large part of political instability and social movements in the Middle East in past four years, known as Arab Spring, with focusing on religion as one of the key issues.

been included in this analysis before. Also the expansion of data set by number of countries and time span is another contribution.

The paper is organized as follows. Next section presents related studies with the focus on theoretical background. Section 3 is about the variables and data used in the model. A brief explanation of empirical method is presented in section 4, and it is followed by empirical analysis of results. Finally section 6 is the conclusion.

4.2 Literature Review and Theoretical Argument

In the past half-century almost one third of the nations around the world have experienced some level of civil war or political unrest. Blattman and Miguel (2010) show that since 1960 twenty percent of countries have had at least ten years of civil war and that portion has steadily increased peaking in 1990s. Some examples of Afghanistan, Lebanon and Somalia can represent the depth and length of these instabilities.

Due to the significance of this important issue, there has been a well-established literature on the concept of conflict in general and moreover the roles of socio-economic determinants of it. Ethnicity, culture and religion have been magnified within this literature. Political scientists and sociologists primarily, and economists to some extend have studied conflict.

The literature on conflict theorizes three main conditions under which (religious) groups would participate in violent actions. First is the issue of social *frustration*. Gurr (1993) argues that one main reason for societal violence with the religious background is when one or several (religious) minorities face deprivation circumstances for a period of time. This may ultimately erupt in form of social mobilization which has been originated from those frustrations (Dollard et al., 1939; Galtung, 1964).

Second, the essential factor that can increase the risk of conflict is the access of groups to *resources*. Basically if there are potential rebel groups which have reached to a certain level of social frustration, but no access to enough resources to mobilize their members, they cannot initiate any serious violent action. Gradually these rebel groups with no resource would die out (Tilly, 1978). So having enough opportunity and sufficient access to resources are key factors for an actual initiation of violent action.

Finally, a primary step in the formation of groups is conflicting *identity*. When a person's individual identity sets in line with its group identity, an individual as a member can possibly be mobilized to take action for the group. However this depends on a long list of parameters, one of which is the size of the group. Now if the society as a large group fails to keep a stable group identity (e.g. national identity), threat of violence and defensive actions will rise (Stryker and Burke, 2000; Bloom, 1990). The separation of individual and group identities is fairly common, but considering an identity (particularly an identity with religious theme) for members of a big group, such as population of a country, is very complicated and almost impossible (Seul, 1999).

The two conditions of identity differences and frustration are the more important backbones of ethno-religious conflicts throughout the history. I focus on these two segments of theory of conflict as the basis for my theoretical argument in this paper.

4.2.1 Confrontation of Identities and Conflict

Nordås (2004) categorizes the perspectives in understanding of identity (in political analysis) to three main groups: primordialism, instrumentalism and constructivism.

Some social scientists have more primordialistic view to identity and claim that cultural factors such as ethnicity or religion are fixed characteristics of groups. For example Vanhanen (2000) argues that group identities are stable basis when analyzing conflicts. Hasenclever and Ritterger (2000) claim that primordialists refer to difference among religious traditions as the major explanatory variable for violent interaction among nations. The famous theory of “clash of civilization” by Huntington (1993) is one of the most important theoretical studies that embrace primordialistic view. He sees ethno-cultural differences among countries to be rooted in the relatively constant differences among civilizations (that countries originally belonged to). Furthermore he argues that conflicts in the twenty first century are going to be all based on these differences, and segregations or alliances will continue to grow on basis of these differences.

There are some criticisms against this view of identity in the context of conflict. Smith (1996) brings up the lack of parameters of time and location in the primordialistic paradigm. He argues that without theoretical explanation on specific incidences, we cannot generalize the reasons for conflict to the differences in identities. Pfaff (1993) gives multiple examples on historical peaceful relations between nations with not only different, but also confronting identities (e.g. some countries in Balkan and Sub-Saharan states) (Welsh, 1996; Newbury, 1983; Lamarchand, 1972).

Opposite of primordialistic view, there is a paradigm of instrumentalism which looks at identity differences as an instrument in the hands of states (political power) to achieve social or economic goals (Nordas, 2004). In this perspective, religious identities play significant roles

leading conflicts only if religion (as a whole) is manipulated by political power. Carment(1993) assumes conflict (by any background or nature) is a function of political differences rather than ethnic, cultural or religious heterogeneity.

So in summary we can say that, these two views have a fundamental difference. While primordialists think that difference in identities per se, is the source of conflict, instrumentalists believe there are so many other factors (bundled in social/political benefits) that play roles in a conflict situation.

Connecting these two views is the constructivism perspective. This paradigm offer a middle point position, where identity differences are the key initiator of conflict, but the action of political power is perceived as the catalyst for violent instabilities (Nordas, 2004). Constructivists believe that the combination of both power-seeking of ethnic/religious groups together with bad policies would lead the situation to a violent conflict. This view seems to be growing among academicians and social scientists more than the other two views (Hasenclever and Rittberge, 2000).

Based on these three main categories of theories about identity differences and heterogeneity and its relationship to conflict, I propose the first hypothesis of the paper.

H1: Countries with higher degree of religious heterogeneity face higher chance of conflict.

This statement is directly based on primordialistic view and can be contradicted by other two perspectives. This hypothesis has not been tested extensively in the literature. Most of the research on conflict consider some sort of ethnic fractionalization in their analysis and not specifically religious diversity (Gurr, 2000; Horwitz, 2000; Nordas, 2004). Besides some

technical and empirical set-up, one important issue that changes the result of testing this hypothesis in the literature is how to define the heterogeneity. As Montalvo and Reynal-Querol (2004) show, using index of fractionalization or index for polarization makes a big difference in the result. Fractionalization index is directly a function of how many different groups exist in a society, as opposed to the polarization index that refers to how many large groups of minority are in a country. In other word, polarization in a society is very high when there are few (in extreme case, two) groups of different religious identities with political/social power. Montalvo and Reynal-Querol (2004) develop this comparison for ethnicity variable and not religion.

4.2.2 Minorities' Frustration

The idea that ethnic/religious groups' frustration transits into violent action, was originated by Aristotle (Ellina and Moore, 1990). Simply he argues that groups with limited share of power, start developing frustration through time and this, given sufficient opportunity and resources, would accumulate in a confrontation with the power. So with this view existence of a political power, state, is taken for granted and the state confronts the ideology (here religion) of the minority groups. Dollard et al. (1939) is the premier advocate of this view and followed by them there have been researchers who focus on this aspect of social violence (Davies, 1962; Gurr, 1970; Feierabend, 1966).

There is a plethora of examples in the literature of conflict that show how this frustration which has roots in discrimination or in general contradicting identity with the power, leads to political actions (Gurr, 2000). Wentz (1987) argues when a group's religious view is threatened, the natural reaction would be defensive action which sometimes occurs without considering the cost of it. Geertz (1966) similarly argues that religious belief systems to some extent define individual's

identity, and will provoke a reaction when it is under threats . Religious discrimination, similar to other types of discrimination, leads to frustration and grievances, which can initiate a violent conflict.

The main hypothesis of the paper is based on this section of theory. As it is obvious, the idea of discrimination and the frustration that comes with it can be studied and analyzed when we include a major and important player, government. Governments' view on religion can be set on a spectrum. On one extreme, a fully secular state which embraces all religious views and tolerates practices, and on the other far end we would have governments with an official religion and a distinctive religious view and zero tolerance for alternative ideology/faith and practices. Having this in perspective, I propose the following hypothesis:

H2: In countries with a religious state in power, higher religious heterogeneity is associated with higher risk of conflict.

So H2 is essentially an amendment to H1, by adding governments' religious view. In a society in which one (or some) religion is declared as the religion of the country and there is a limitation for practicing other faiths, minorities start to accumulate frustration due to deprivation they are facing. Ultimately when there are more frustrated religious groups, this possibly would turn to a violent conflict. The difference between this hypothesis and the previous one is that in the first statement, there is no notion of isolation and deprivation of religious groups, therefore no frustration-based mechanism would act to facilitate the confrontation. But in H2 the difference in identities is not the forcing factor, rather it is the dictation of state over religious groups that acts as a catalyst for conflict in diverse societies.

One important issue about this hypothesis is that how we define the religiosity of state. Friedland (2001) claims that constitutional notion of religion is relatively a good measure on how

religious a government is. This claim however can be criticized from some different aspects. I will explain it in the methodology part. But in short probably it is safe to say one parsimonious indicator of religiosity of a state is if the state has an official religion or not.

4.3 Variables and Data

In this section I explain all the variables involved in this project and the data used for them. Table 4.1 presents descriptive statistics and the sources. I use the pooled sample of 128 countries for the time range between 1990 to 2004.

4.3.1 Dependent Variable: Conflict

There is a large literature of quantitative studies with a focus on conflict in the country level. In these studies it is crucial to define conflict clearly, since a small change in the dependent variable's definition, changes the whole argument. Some studies focus on the onset of conflict episodes, such as Collier and Hoeffler (2002) or Fearon and Laitin (2003). Some others study the incidence of conflict (for example as a dummy that represents if any violent act has happened in a certain year or not). Russett and Oneal (2003) based their argument on this aspect. Finally there are studies that are concerned about duration of conflict (e.g. Doyle and Sambanis, 2000).

In this paper however I rely on the magnitude of conflict. The dependent variable is designed to represent the magnitude of societal conflicts. Center for Systematic Peace (CSP) has conducted a project, Major Episodes of Political Violence (MEPV), which has a comprehensive list of all major conflicts from 1946 to 2006. Among all the variables, I use four and construct the dependent variable from them; magnitude of civil violence, civil war, ethnic violence, and ethnic war. The magnitude of these incidences is calculated in the scale of 0 to 10 based on the

level of destruction, number of people dead or injured and population displaced.¹⁶ The dependent variable, conflict, is the total civil and ethnic violence and warfare. It can be simply constructed by summing the four variables (However, it is provided by the MPEV and I used the included variable instead of summing). Therefore it has the value between 0 to 40, as it gets larger it refers to a more destructive and violent incidence.

4.3.2 Religious Heterogeneity

Heterogeneity, as mentioned in the theory part, can be calculated differently. In general in the literature, there are three main dimensions by which heterogeneity of a society can be represented, namely fractionalization, polarization and dominance. In this paper, I only consider fractionalization and polarization¹⁷.

The first one, as extendedly used in different literature, is defined as the probability that two individuals randomly selected from a society, would belong to different (religious) groups. Following gini-simpson index, it is calculated as follows. I call this measure diversity (for the purpose of this paper, religious diversity).

$$Diversity = 1 - \sum_{i=1}^n p_i^2$$

Where, p_i refers to the share of group i from the total population. The value of this index falls between 0 and 1. As it gets larger, it means the society is more diverse.

Polarization however, is different from fractionalization by weighting heterogeneity higher when there are few large groups, and not several small ones.

¹⁶ A complete explanation of dependent variable and how it is constructed can be found in the Appendix section.

¹⁷ Dominance can be measured as the percentage of the population belonging to the largest group.

$$Polarization = 1 - \sum_{i=1}^n \left(\frac{\frac{1}{2} - p_i}{\frac{1}{2}} \right)^2 p_i^2$$

Where p_i is the share of group i . So for example if there are two main religious groups in a country where each of them has half of the population as members, then that society is extremely polarized but it would have diversity equal to 0.5. Therefore fractionalization (as I refer to by diversity) and polarizations refer to somewhat similar issue but they have fundamental difference. One example to show the difference between these two measures would be the cases of United States and Lebanon. The U.S. has a high rate of diversity as it has several somewhat similar size religious groups, but a low rate of polarization. In Lebanon in contrast, there are two major religious group of almost the same size. In this case the society is religiously polarized in two groups.

Besides the measure issue, we should be clear what do we mean by religious group. One might separate religious groups by looking only at the major world religions. Alternatively, we can consider specific religious groups within these world religions. This last way of investigating religious diversity implies, for example, separating between Catholics and Protestant Christians, and between Sunni and Shi'a Muslims. Both of these two categorizations can be valid and important, based on the case of study. There are examples of conflict occurring between religious sub-groups, such as in Northern Ireland, and tension between the Sunni and the Shi'a population in several countries, e.g. Iraq, Afghanistan and what we are observing in Syria now. However, Huntington (1993) argues that the conflict lines after the Cold War would be between different civilizations defined primarily in terms of world religions. The cultural content is also often more similar within world religions than

between them. There are also several examples of conflicts occurring between groups belonging to different world religions, such as the conflicts in Kashmir, Sudan and Israel-Palestine. Although Huntington's idea can be criticized in the real world by the numerous conflicts which have been happening in the past decade, I use the world religion data instead of sub-groups.

Data from World Religion Dataset (WRD) provided by Association of Religion Data Archives (ARDA) is employed. The main part used for the purpose of calculation the heterogeneity factors, are the percentages of population belonged to different religious groups. Christianity, Islam, Judaism, Buddhism are the main world religion considered. Besides these, all other groups are included in one "Other" group. Also there is a non-religious group as well. The adherence rates of these groups in countries for the period of time considered in this paper, do not present significant variations.

4.3.3 State Religiosity

There have been some scattered studies on the notion of religion in the political structure (Friedland, 2001). But it can be claimed that the most robust and complete quantitative study on the topic has been done by Jonathan Fox (Fox, 2000; Fox, 2003; Fox, 2004). These papers are all built upon the extensive research, The Religion and State (RAS) project, which examines constitutional and state arrangements toward religion. This project includes a long list of variables for 169 states between year 1990 and 2008.

In the previous section it was briefly mentioned that role of state in the religious market and also its religious identity, is very significant when we are including such important sector, government, to the analysis. In this paper for constructing one variable that captures different aspects of state in the religion issues, I consider three components. All of them in one way or the

other influence the frustration channel that was presented in the theoretical part. These components are basically three areas in RAS that I believe can help us to understand “how religious” a country’s government is. Existence of a (or some) *official* religion, declaration of the fact that the state is a *religious state*, and finally the level of *religious freedom* in the country, are the three variables by which state religiosity is assessed. All the factors are taken from Religion and State (RAS) project database. Like religious heterogeneity, these variables are quite static and do not present significant variations through time. Here I explain each of them.

Official religion (OFF)

In the RAS database there are multiple variables regarding the status of official religion in the constitution. For example if there are more than one religion recognized as the official, if there is any bias toward either one, if there is a clause indicating any officiality for notion of religion, etc. Here I simply rely on the variable that shows whether there is at least one religion declared to be the official religion. This dummy variable takes value of one in the case of existence of at least one official religion in the state, and it gets zero otherwise. The primary empirical procedure to test the main hypothesis relies on this variable. It means that the basic measure of state religiosity is this variable.

Religious State (RS)

This variable is another dummy that shows if the state is declared as a religious state. The key criterion for this measure is the notion in the constitution of a section that declares for example state X is an Islamic country. Like the previous factor it has binary value of 1 or 0. In case of religious state it would have value of one and zero in case of secular state.

Religious Freedom (FREE)

Besides the overall constitutional representation of state's position with regard to religion, the actual regulations and treatment toward religious groups are important factors that determine states' religiosity. For this purpose, I consider five variables from RAS. They are all dummy variables on the restrictions that constitution and governments' actions set on different religious sectors.

0 = the restriction does not exist

1 = the restriction exists

- 1) Restrictions on conversions away from the dominant religion
- 2) Restrictions on personal status regarding marriage, divorce, burial, and inheritance
- 3) Restrictions on building, repairing and/or maintaining places of worship, including restrictions on holding religious meetings in private homes.
- 4) Restrictions on proselytizing
- 5) Mandatory religious education

The overall freedom variable is the sum of these five dummies. This will result in a variable for religious freedom that gets values between 0 (least restriction, most free) to 5 (most restriction, least free).

Now, first only the official religion variable (OFF) will be considered in the regression analysis and then as a robustness check, I look into a more comprehensive state religiosity variable. That will be the sum of three variables presented: OFF, RS and FREE. Then I add these three criteria together to have a proxy for state religiosity, a variable which takes value between 0 to 7. As the value increase, the state is more religious and restrictive.

4.3.4 Control Variables

Without considering different characteristics of countries, we cannot deliver a sound argument for testing the hypotheses. Therefore a set of covariates are included in the regressions. Based on major research works in the literature of conflict, all these variables seems to have important impact on conflict incidences (Ellingsen, 2000; Collier and Hoeffler, 2002; Fearon and Laitin, 2003).

Economic Characteristics

- GDP per Capita and GDP per Capita Growth

There is a robust consensus in the literature that suggests significant relationship between economic performance and risk of conflict. Researchers analyze this relationship from different aspects. For example Hergre et al. (2001) argues that overall better economic condition makes the establishment of institutions for peace between groups more feasible. De Soysa (2002) claims that when economy is doing better government can collect higher revenue and therefore provide better peaceful environment. Based on the same lines of argument, Fearon and Laitin (2003) and Collier and Hoffler (2002) suggest a negative association between economic development and conflict.

Very similar to the reasoning for inclusion of GDP per capita, growth of this variable can be included in the model with expectation of having a negative correlation to the dependent variable. Gurr (1970) argues that regardless of initial level of wealth, lower level of growth can increase the deprivation of minority groups and ultimately lead to higher chance of conflict.

I use GDP per capita in constant 2000 US dollars. The data is from World Development Indicator (WDI) of World Bank. The variable is log transformed and lagged by one year. Lagged growth rate of GDP per capita from WDI is included in the models as well.

- Gini Index

One key issue in the rising of conflict among groups is the difference in their socio-economic status. As the differences rise, the possibility of confrontation of the groups increases. Hergre et al. (2001) refers to this expectation under the theory of deprivation, which claims minorities accumulate frustration increasingly due to expansion of segregation between classes.

In the context of economic status, gini index, which captures the inequality of income distribution, can represent the gaps between groups. Data for this index gathered from The Standardized World Income Inequality Database (2008) by Frederik Solt.

Political and Institutional Characteristics

- Institutional Quality

In the literature of development economics, it has been repeatedly shown that institutions have significant role in different socioeconomic aspects of any society. One can think of a nation with low quality institutions, particularly an inefficient legal system where property rights are not well protected, and rationalize a high possibility of conflict among groups. When judicial system does not work properly and the specific role of government to enforce the law is not delivered, it is likely that groups with conflicting goals start violent actions.

For this reason an indicator of institutional quality, Economic Freedom of the World Index, by Gwartney, Hall and Lawson (2011), is considered as another control variable. Note that this index consists of 5 main areas on size of government, legal structure, access to sound money, freedom to trade, and regulations in labor market and businesses. Here I only include the second component on legal structure and security of property rights.¹⁸

- Regime Type

The political model of a country can play an important role in preventing a society from conflict (Eckstein and Gurr, 1975). We can consider democratic versus autocratic systems as two extremes and multiple midpoint regimes as the usual alternatives in the real world. The common sense might dictates that democracies would be less prone to conflict and violence. Basically there are various channels through which democracy can be related to lower level of conflict. As Ellingsen (2000) and Rummel (1995) argue, democracy provides the institutions for peaceful relation among groups within a society. But on the other hand there is a valid argument which states, since democracy gives the relative freedom to minorities to promote their ideas and values, naturally confrontation of identities will be more pronounced and that may cause violent conflicts (Auvinen, 1997). Overall regime type is an essential variable to be included in order to explain the conflict. Like multiple studies in the realm of political analysis of conflict, I use PolityIV index. This index consists of three main components (political market competitiveness, openness of executive, and the restriction on the chief executive) and it gets value between -10(least democratic) to 10(most democratic). PolityIV is the product of a project called with same name conducted by Marshall, Jaggers and Gurr. I used the data from the report in 2011.

¹⁸ Table including Economic Freedom components is presented in the Appendix.

Other Characteristics

- Population

Size of population can impact the propensity to violent action based on several hypotheses. A large population size by nature means more diverse set of ideas; it can be belief or faith issue or only personal values. Also countries with larger population usually are more expanded geographically. This makes the control of possible confrontations difficult. Fearon and Laitin (2003) argue that higher population means more layers of social and political classes, and this can increase the propensity to collide as well. For all these reasons, log transform of population of countries is included in the model and it is expected to positively impact the dependent variable.

- New State

States that just newly got their independence usually need some time to structure the institutions and be completely consolidated. Some studies, such as Hegre et al. (2001) or Fearon and Laitin (2001, 2003) show that these states are more prone to conflict. The underlying reasoning for this is the potential of empowering the rebel groups in an unstable environment. Some of these rebel groups can be the groups rooted in the previous regime in power. In any case, the duration of settlement of a stable system in a country seems to be a relevant variable to include in analysis of conflict (Nordas, 2004). Hence, I have included a dummy variable for the first two years of independence. The dummy gets value equal to one if the state has gotten its independence in the past two years and it gets zero otherwise. For this variable, I use the dataset employed in Nordas (2004).

- Oil Exporter

Some studies in the literature (e.g. Fearon and Laitin, 2003 and Nordas, 2004) find that oil exporting countries face higher risk of conflict. The theoretical justification for such behavior is the idea of resource curse and political Dutch disease. As a controlling power has the ultimate ownership of resources, such as oil, motivation of left-out groups to become part of rebel organizations will increase. The variable in the regressions here is from Fearon and Laitin (2003). It is a dummy which gets value equal one when more than one third of state revenue is from oil and otherwise it is equal zero.

4.4 Methodology

The basis of empirical method is regression analysis. To present testing the two hypotheses of the paper, I looked at ten different specifications. The general form of model would be as follows:

$$\text{Magnitude of Conflict} = \alpha + \beta(RH) + \gamma(SR) + \theta(RH * SR) + \mu X + \varepsilon$$

Where, RH is measure of religious heterogeneity, SR is represents state religiosity and X is a matrix of control variables.

An important note that should be pointed out here is about the statistical model I picked to use. As discussed in the variable and data section, the dependent variable, magnitude of conflict, can only take values of between 0 to 40. Also there are around 40 percent of the countries that in different years have the conflict variable equal to zero¹⁹. These limitations make the possibility of bias and inconsistency of ordinary least squares (OLS) coefficients estimate increase. That is why instead of OLS, I rely on Tobit model and estimates of Maximum

¹⁹ For 47 countries the conflict variable is almost constantly equal to zero.

Likelihood. Nordas (2004) which uses the same dependent variable implements Tobit model. The Tobit model is a double-sided model with upper limit of 40 and lower limit of 0.

4.5 Empirical Results and Analysis

H1: Hypothesis 1

In table 4.2, the results for testing the first hypothesis are presented. Model (1) and (3) are simple bivariate relationships between two measures of religious heterogeneity, religious diversity and polarization, and magnitude of conflict in countries. In the bivariate relationships, it seems that only polarization shows significant positive impact on conflict while religious diversity does not have any statistically significant relationship. That can be translated as, if there are few large religious groups; conflict would happen with larger magnitude compared to the situation when there are large numbers of small and diverse religious groups. However, when I include the set of control variables (Model 2 and 4), both of these measures of heterogeneity lose the significance.

Therefore for the first hypothesis, when we are just simply looking at the bivariate relationships, it seems that countries with polarized religious society tend to have more frequent conflict. But it is not necessarily the case for fractionalized countries. This result is along with the literature's finding (Fearon and Laitin, 2003; Nordas, 2004). But it cannot be reliable, since the specification is missing all the important control variables.

When we consider model (2) and (4), there is not enough evidence to support the hypothesis, neither for fractionalized nations nor for polarized. So in summary, for this sample under study, hypothesis one can statistically be rejected, confirming the disconnection between religious heterogeneity and conflict.

H2: Hypothesis 2

For testing the second hypothesis, first we need to include the state religiosity variable. At this level the simple dummy variable regarding the existence of official religion in the constitution (OFF) is considered for state religiosity. Table 4.3 presents the results regarding the second hypothesis. The first column, model 5, shows the bivariate regression results for state religiosity. The coefficient is statistically insignificant. So based on this simple regression we cannot comment on the relationship that state religiosity might have with the magnitude of conflict. Even after including control variables, in model 6, we still do not observe any significance for the coefficient. But the negative sign is interesting to pay attention to. It simply claims that having official religion is associated with less conflict. This relationship is not particularly in the interest of testing hypothesis 2. Therefore for testing the second hypothesis, four specifications, models 7 to 10, are presented.

More specifically model 8 and 10 are the ones used to test the hypothesis. In both of these specifications, an interaction variable is included. Model 8 is for polarization and model 10 for religious diversity. Coefficient of the interaction term in model 8 is 2.94. This means that if we have two countries one with official religion and one secular, a unit increase in the polarization measure for the two countries make the conflict to have almost 3 units of magnitude higher in the religious state than the secular country. So basically it seems that official religion in countries act as a catalyst that makes impact of polarization on conflict magnified.

Exactly the same interaction variable is used for religious diversity in model 10. However the coefficient here is not statistically significant. From this we can claim that state religious status does not impact the relationship between religious diversity and conflict.

Model 7 and 9 are similar to model six with addition of religious heterogeneity measures. One important issue in these two models is the insignificance of both religious heterogeneity variables. Also it seems that official religion in the constitution negatively impacts the conflict magnitude. As discussed in the previous section, the theoretical explanation for this relationship can be due to lower political and social power of religious minority groups. In the case of existence of a religious state, minorities may have less access to resources and opportunities to mobilize the adherents.

Control variables show different behaviors, some confirming the expectation and some falsifying them. For example among three economic characteristics included, gini shows significant relationship, but opposite of expectation. Negative sign of the coefficient, states that as the income inequality increases, magnitude of conflict decreases. But the negative sign of GDP per capita coefficient shows that as income of individuals increase, we would see less conflict. This is along the expectation. Institutional quality by Economic Freedom Index, presents the expected behavior. The better institutions are, the less conflict we would see. However the regime type in general does not present significant relationship. Population is positively related to conflict. The duration of independence of countries negatively impacts the conflict magnitude.

For robustness check, I run the same sets of specifications, model 5 through 10, for a more comprehensive variable of state religiosity. As explained in the previous sections, the three measures of state religiosity: official religion, declaration of religious state, and religious freedom are combined by summing them up (STATREL). This variable gets values between 0 and 7, and as it increases it refers to higher state religiosity. Since the additional two components, declaration of religiosity and religious freedom are included, it should be noted that

this variable is essentially measuring a different concept. In the real world, there are countries, which have secular state but religious freedom are not in the “best” level. Or there are also countries which have official religion, but the regulations embrace other faiths and provide freedom for their adherents. So STATEREL simply gives a broad picture of importance of religion in the government.

After running the models with the new variable, essentially the same results with minor variations in magnitude and significance can be observed. Results of different specification with this variable are presented in table 4.4.

One point worth mentioning is the change in the log-likelihood magnitude among different specifications.

4.6 Conclusion

This paper examines role of state religiosity in conflict. Previous literature lacks this aspect when analyzing heterogeneity of societies. The main research question here is, whether level of state’s religiosity has any impact on relationship between religious heterogeneity and conflict. Basically I want to investigate whether religious heterogeneity in countries with different state religiosity impacts conflict differently.

After controlling for a set of covariates, Tobit regression results indicate that in countries with religious state, higher religious heterogeneity is associated with larger magnitude of conflict. It means that having a religious state facilitates the initiation of instability and increases the magnitude of conflict as society gets more diverse or polarized.

Appendix C

Conflict Variable (CONF)

The nature and intensity of conflict episodes are completely different across countries or even within one country in different times. For a comprehensive study like Major Episodes of Political Violence (MEPV) a detailed categorizations is needed. As some episodes are quite complex and, in some cases, detailed information on the episode is quite limited; therefore, some cases are difficult to assign to a single category. Particularly problematic are the designations of societal (intrastate) conflicts as either “civil” or “ethnic” as there is often a mixture of political and social identity attributes, especially in regard to episodes of greater magnitude and longer duration. In addition, some may see the distinction made in the compilation of episodes between violence and war as somewhat arbitrary. In making this distinction, information regarding the degree of militant organization, tactical and strategic characteristics, and expressed level of commitment to the use of violence are taken into consideration.

In the description of dataset, it is noted by the authors: “Those who are concerned about the validity of these distinctions should use the aggregated categories”. This is particularly the variable I use in the paper.

The main societal effects considered in MEPV for magnitude assessment of warfare and violence are as follow:

- Human Resources: direct and indirect deaths, direct and indirect injuries, sexual crimes and intimidations
- Population Dislocations: costs, traumas, inefficiencies and indirect impact associated with displacements (personal-safety, logistics, etc.)
- Societal Network: damage and distortions to the fragile fabric of inter-personal associations and the disintegration of relationships and identities based on amity, trust, exchange, mutual-benefit, comity, reciprocity, and deferred gratification, relations necessary for the proper and effective functioning of normative systems (social cooperation, cohesion, coherence, and coordination in politico-legal, economic, professional, and socio-cultural sub-systems).
- Environmental Quality: direct and indirect damage and destruction to general ecosystem; use or release of explosive, corrosive, and devegetative chemical compounds and mechanical devices that limit utilization of agricultural resources, foul surface and subterranean water resources, pollute atmosphere, disseminate toxic substances, and destroy wildlife and habitats.
- Infrastructure Damage: direct and indirect damage, destruction, and over-consumption of material and mechanical infrastructure, resources, and surpluses such as production facilities, storage, transport networks, vehicles, water supplies, croplands, food, medical supplies, etc.

Based on these areas of impacts, warfare magnitudes are categorized in 10 categories as follow (from the smallest magnitude to the highest):

- Sporadic or Expressive Political Violence (01)
- Limited Political Violence(02)
- Serious Political Violence(03)
- Serious Warfare(04)
- Substantial and Prolonged Warfare(05)
- Extensive Warfare(06)
- Pervasive Warfare(07)
- Technological Warfare(08)
- Total Warfare(09)
- Extermination and Annihilation(10)

Table A4.1: The Areas and Components of the EFW Index

<p>Area 1: Size of Government: Expenditures, Taxes, and Enterprises</p> <p>A :General government consumption spending</p> <p>B :Transfers and subsidies as a percentage of GDP</p> <p>C :Government enterprises and investment</p> <p>D :Top marginal tax rate: i: Top marginal income tax rate, ii: Top marginal income and payroll tax rate</p>	
<p>Area 2: Legal Structure and Security of Property Rights</p> <p>A Judicial independence (GCR)</p> <p>B :Impartial courts (GCR)</p> <p>C :Protection of property rights (GCR)</p> <p>D :Military interference in rule of law and the political process (CRG)</p> <p>E :Integrity of the legal system (CRG)</p> <p>F :Legal enforcement of contracts (DB)</p> <p>G :Regulatory restrictions on the sale of real property (DB)</p>	
<p>Area 3: Access to Sound Money</p> <p>A:Money Growth</p> <p>B:Standard deviation of inflation</p> <p>C:Inflation: Most recent year</p> <p>D:Freedom to own foreign currency bank accounts</p>	
<p>Area 4: Freedom to Trade Internationally</p> <p>A:Taxes on international trade</p> <p>i.International trade tax revenues (% of trade sector)</p> <p>ii.Mean tariff rate</p> <p>iii.Standard deviation of tariff rates</p> <p>B:Regulatory Trade Barriers</p> <p>i Non-tariff trade barriers (GCR)</p> <p>ii Compliance cost of importing and exporting (DB)</p> <p>C:Size of the trade sector relative to expected</p> <p>D:Black-market exchange rates</p> <p>E:International capital market controls</p> <p>i. Foreign ownership/investment restrictions (GCR)</p> <p>ii. Capital controls</p>	<p>Area 5: Regulation of Credit, Labor, and Business</p> <p>A: Credit market regulations</p> <p>i.Ownership of banks</p> <p>ii.Foreign bank competition</p> <p>iii.Private sector credit</p> <p>iv.Interest rate controls/Negative real interest rates</p> <p>B: Labor market regulations</p> <p>i.Minimum wage (DB)</p> <p>ii.Hiring and firing regulations (GCR)</p> <p>iii.Centralized collective bargaining (GCR)</p> <p>iv.Mandated cost of hiring (DB)</p> <p>v .Mandated cost of worker dismissal (DB)</p> <p>vi.Conscription</p> <p>C: Business Regulations</p> <p>i.Price controls</p> <p>ii.Administrative requirements (GCR)</p> <p>iii.Bureaucracy costs (GCR)</p> <p>iv .Starting a business (DB)</p> <p>v.Extra payments/Bribes (GCR)</p> <p>vi.Licensing restrictions (DB)</p> <p>vii.Cost of tax compliance (DB)</p>

Table 4.1: Descriptive Statistics and Sources

Variable	Description	Mean	Std. Dev.	Min	Max	Source*
<i>Religion</i>						
STATEREL, State religiosity	Religiosity of State= OFF+ RS+FREE	0.21	1.47	0	7	Constructed
Official Religion(OFF)	=1 state has an official religion, =0 otherwise	0.18	0.38	0	1	RAS
Religious State(RS)	=1 if state declared as religious state, =0 otherwise	0.03	0.187	0	1	RAS
Religious Freedom(FREE)	Between 0 to 5. The higher means less freedom	1.32	1.59	0	5	RAS
RELDIV	Religious Fractionalization Index	0.30	0.22	0.004	0.98	Constructed, ARDA
POLAR	Religious Polarization Index	0.57	0.24	0.001	0.99	Constructed, ARDA
<i>Conflict</i>						
CONF	Magnitude of Conflict	0.72	1.68	0	17	Constructed, MEPV
civviol	Magnitude of civil violence involving state	0.05	0.39	0	4	MEPV
civwar	Magnitude of civil warfare involving state	0.25	1.06	0	7	MEPV
ethviol	Magnitude of ethnic violence involving state	0.102	0.45	0	5	MEPV
ethwar	Magnitude of ethnic warfare involving state	0.304	1.12	0	10	MEPV
<i>Other Variables</i>						
GDP	Log of GDP per capita (constant 2000, US\$)	7.77	1.64	4.05	11.59	World Bank-WDI
GINI	Gini index	38.31	9.68	16.87	69.78	WDI, SWIID
GROWTH	Growth of GDP per capita	2.006	6.35	-50.29	101.1	World Bank-WDI
EFW2	Economic Freedom of the World Index	5.51	1.82	1.15	9.62	Fraser Institute
REGIME	PolityIV	2.89	6.70	-10	10	Polity IV Project
POP	Log of Population	15.48	2.11	9.2	21.01	World Bank-WDI
NEWSTATE	=1 if the country became independent in the past 2 years, =0 otherwise	0.02	0.15	0	1	Fearon&Laitin (2003)
OIL	=1 if the country is Oil Exporter, =0 otherwise	0.15	0.34	0	1	Fearon&Laitin (2003)

*RAS: Religion and State Project; Association of Religion Data Archive; MEPV: Major episodes of political violence; WDI: World Bank-Development Indicators; SWIID: The Standardized World Income Inequality Database

Table 4.2 :Tobit Regression Results; Dependent Variable: Magnitude of Conflict ; pooled observations 1990-2004

	(1)	(2)	(3)	(4)
Consant	0.890 (2.25)*	-0.188 (-1.37)	1.903 (4.52)**	-2.188 (-0.41)
Religious Diversity Index (RELDIV)	-0.327 (-0.90)	0.079 (0.67)	-----	-----
Polarization Index (POLAR)	-----	-----	0.398 (2.97)*	0.258 (1.08)
Log of GDP per Capita (GDP)	-----	-0.004 (-2.04)*	-----	-0.005 (-2.54)*
Gini Index (GINI)	-----	-0.022 (-2.01)*	-----	-0.148 (-3.18)*
GDP per Capita Growth (GROWTH)	-----	0.030 (1.34)	-----	1.841 (0.25)
Economic Freedom of the World Index-Area 2 (EFW2)	-----	-0.517 (-6.33)**	-----	-1.695 (-5.22)
Regime type-PolityIV (REGIME)	-----	0.030 (1.55)	-----	0.094 (1.78)
Log of Population (POP)	-----	0.329 (5.45)**	-----	0.412 (4.21)**
New State (NEWSTATE)	-----	-2.584 (-3.21)**	-----	-3.045 (-2.89)**
Oil Exporter (OIL)	-----	0.395 (0.95)	-----	0.386 (0.78)
Observations	1920	890	1920	890
Log Likelihood	-910.229	-490.329	-907.658	-490.517
Pseudo R-squared	0.049	0.324	0.051	0.648
**Significant at 1% level, * Significant at 5% level				

Table 4.3: Tobit Regression Results; Dependent Variable: Conflict 1990-2004

	(5)	(6)	(7)	(8)	(9)	(10)
Constant	1.721 (1.91)	1.212 (0.92)	1.123 (0.73)	1.018 (0.81)	1.115 (0.09)	1.021 (0.15)
Official Religion (OFF)	-0.421 (-0.95)	-0.312 (-1.53)	-0.225 (-1.91)*	-0.751 (-1.77)	-0.847 (-1.69)	-0.712 (-1.81)
Polarization Index (POLAR)	-----	-----	0.082 (1.02)	0.258 (1.14)	-----	-----
OFF*POLAR	-----	-----	-----	2.942 (2.87)*	-----	-----
Religious Diversity Index (RELDIV)	-----	-----	-----	-----	0.484 (1.11)	0.474 (1.24)
OFF*RELDIV	-----	-----	-----	-----	-----	1.874 (1.46)
Log of GDP per Capita (GDP)	-----	-0.001 (-1.21)	-0.032 (-1.82)	-0.091 (-2.07)*	-0.102 (-1.81)	-0.111 (-2.14)*
Gini Index (GINI)	-----	-0.017 (-2.43)*	-0.019 (-2.54)*	-0.021 (-2.47)*	-1.027 (-1.98)	-1.031 (-2.99)**
GDP per Capita Growth (GROWTH)	-----	0.007 (0.53)	0.023 (0.61)	0.025 (1.07)	0.025 (1.08)	0.028 (1.08)
Economic Freedom of the World Index-Area 2 (EFW2)	-----	-0.220 (-4.97)**	-0.285 (-4.47)**	-0.388 (-4.48)**	-0.545 (-3.99)**	-0.539 (-3.09)**
Regime type-PolityIV (REGIME)	-----	-0.028 (-1.97)*	-0.026 (-1.61)	-0.020 (-1.57)	-0.030 (-1.61)	-0.032 (-1.59)
Log of Population (POP)	-----	0.219 (4.81)**	0.294 (4.91)**	0.294 (5.01)**	0.280 (4.91)**	0.277 (4.89)**
New State (NEWSTATE)	-----	-0.164 (-2.07)*	-1.012 (-2.07)*	-1.181 (-2.07)*	-1.097 (-2.08)*	-1.095 (-2.07)*
Oil Exporter (OIL)	-----	0.071 (0.52)	0.187 (0.81)	0.181 (1.05)	0.209 (1.04)*	0.0211 (1.05)
Observations	1920	896	896	896	896	896
Log Likelihood	-852.125	-502.154	-498.542	-243.582	-448.714	-263.754
Pseudo R-squared	0.057	0.457	0.492	0.664	0.581	0.654

**Significant at 1% level, * Significant at 5% level

Table 4.4: Tobit Regression Results; Dependent Variable: Conflict 1990-2004

	(5)	(6)	(7)	(8)	(9)	(10)
Constant	1.247 (4.51)**	-1.062 (-0.72)	-1.110 (-0.73)	1.022 (2.11)*	1.175 (1.64)	1.112 (2.18)*
State Religiosity (STATEREL)	0.184 (3.15)*	0.462 (1.95)	0.452 (2.81)*	-0.941 (-1.54)	-0.847 (-0.99)	-1.048 (-1.68)
Polarization Index (POLAR)	-----	-----	0.058 (0.12)	-0.328 (-1.15)	-----	-----
STATEREL*POLAR	-----	-----	-----	1.289 (2.21)*	-----	-----
Religious Diversity Index (RELDIV)	-----	-----	-----	-----	0.864 (1.24)	0.045 (1.05)
STATERE*RELDIV	-----	-----	-----	-----	-----	0.998 (2.84)*
Log of GDP per Capita (GDP)	-----	-0.046 (-1.43)	-0.043 (-1.99)*	-0.149 (-2.04)*	-0.112 (-2.11)*	-0.121 (-2.41)*
Gini Index (GINI)	-----	-0.025 (-2.19)*	-0.025 (-2.10)*	-0.023 (-1.97)*	-1.021 (-1.99)*	-1.034 (-2.71)**
GDP per Capita Growth (GROWTH)	-----	0.023 (0.99)	0.023 (0.96)	0.025 (1.05)	0.141 (0.07)	0.174 (0.09)
Economic Freedom of the World Index-Area 2 (EFW2)	-----	-0.396 (-4.85)**	-0.398 (-4.77)**	-0.396 (4.74)**	-1.455 (-2.09)**	-1.614 (-2.99)**
Regime type-PolityIV (REGIME)	-----	0.006 (0.24)	0.006 (0.26)	0.010 (0.42)	0.079 (1.51)	0.147 (1.25)
Log of Population (POP)	-----	0.329 (5.11)**	0.329 (5.10)**	0.333 (5.15)**	0.471 (3.89)**	0.557 (4.19)**
New State (NEWSTATE)	-----	-0.841 (-2.99)*	-1.021 (-2.08)*	-1.181 (-2.47)*	-0.171 (-2.88)*	-0.097 (-2.07)*
Oil Exporter (OIL)	-----	0.147 (0.02)	0.378 (0.15)	0.481 (2.04)*	0.215 (1.98)*	0.011 (1.81)
Observations	1920	896	896	896	896	896
Log Likelihood	-875.214	-488.214	-467.485	-384.452	-467.387	-383.864
Pseudo R-squared	0.067	0.395	0.521	0.610	0.522	0.612

**Significant at 1% level, * Significant at 5% level

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