Senior Project

Department of Economics

"Economic Growth and the Arab Spring"

Andrew Kuntz

May, 2014

Advisors: *Dr. Francesco Renna*

Abstract

In this study I examine the economic links of civil conflict in 21 Arab World countries over a five year period. The results show that there is evidence to show that GDP growth negatively affects civil conflict. However when primary commodities as a percent greater than 25 is examined, growth is insignificant and commodity dependence is positively related in an LPM. Probit analysis shows that the risk for the mean country in the dataset is about 0.01%

Acknowledgments

I would like to than Dr. Francesco Renna and Dr. Elizabeth Erickson for their help and support with this project. Dr. Renna's fields of research are Applied Econometrics and Labor Economics. Dr. Erickson fields of research is Agricultural Economics, Development, and Environment. Dr. Renna helped me by keeping me focused on my schedule and offering constructive criticism that helped shaped my study, without his strict deadlines and criticism, this paper would not have been completed. Dr. Elizabeth Erickson who initially sparked my interest in the economics of developing nations. Dr. Erickson also functioned as a second reader for this project. She was instrumental to asking the right questions about this project and her knowledge of knowledge of developmental economics was crucial to this project.

Table of Contents

Introduction

Economic growth and civil war are linked but given the recent events that have shaped the Arab World, I wonder if there is a link with economic growth and the Arab Spring. Previous studies have shown growth is a significant factor in civil conflict. In 1991, Sierra Leone had a per capita GNI of $180 when civil war broke out (Susan E. Rice 2006). Ivory Coast had a large decline from $1,120 in 1980 to $650 in 2000 when they experienced civil war civil war. In Indonesia, per capita GNI dropped from $1,120 in 1997 to $670 in 1998 when there was a clash between government armies and independent fighters causing about 3,000 deaths over three years.

On December 10, 2010 a street vender named Tarek al-Tayeb Mohamed Bouzizi protested his mistreatment by his local government through the act of self-immolation. Protests began in Sidi Bouzid, the city where he was born and lived in, within the hour of his act. He died from his injuries on January 4, 2010 and the president of Tunisia was ousted and in exile by the 14th of January 2010, ending his 23 year rule. By December of 2013, the ruling powers of Tunisia, Egypt, Libya, and Yemen have been forced to step down, twice in the case of Egypt. Major protests have taken place in Algeria, Iraq, Jordan, Kuwait, Morocco, and Sudan while minor protest have taken place in Mauritania, Oman, Saudi Arabia, Djibouti, Western Sahara, and Palestine. Map 1 displays the Arab World Countries and marks those affected by the Arab Spring. These series of events are collectively known as the "Arab Spring". Their goals have so far been to implement democracy, free elections, human rights, employment, and regime change. The Arab Spring is still currently ongoing. The Arab Spring has thus far affected 18 countries that have experienced minor civil disobedience to general uprising against their government. The

current ongoing conflicts in the Arab World have drawn parallels with the Revolutions of 1989, also known as the Autumn of Nations. This was a revolutionary wave of events that overthrew the communist governments in several Central and Eastern European countries.

The question that should be asked is what role economic factors contribute to civil war in the Arab World. There are a variety of possible factors that can contribute to a civil war onset. From a gathering of previous literature that has researched the link between income and civil conflict, there are many possible variables or theories about factors that contribute to the onset of civil war. Certain economic factors that were found to be significant in previous literature are slow income growth, low per capita income, and natural resource endowment. However it is important to note that there is possibly an endogenous relationship with civil conflict and low income and slow income growth. Noneconomic factor that have also found to be important are factors favor insurgency conditions have been previously found to be significant such as mountainous territory and poor road conditions. Demographic characteristics that are found important are ethnic fractionalization, democracy level, and population. The type of government is also important due to the interaction between the populace of a nation and their government.

Literature Review

Collier and Hoeffler (2002) studied the incidence of civil war in sub-Saharan Africa from 1965 to 1999. They apply the Collier-Hoeffler model and use a logit and probit regression to analyze the conflict to determine if the risk of civil war in Africa is different from other regions. Their model analyzes four main factors: finance, civilian grievances, military advantage, and history. GDP per capita, lagged GDP growth, and Primary commodity exports dependence were found to be significant. There are several possible interpretations of their results. GDP per capita

can proxy for the cost of recruiting rebel labor. It also can proxy for the military strength of the government. Growth of income can be a proxy for job opportunities for young males who are the primary recruits for rebel forces. It is also a possible proxy for lower grievances. Commodities as a percent of GDP can represent financing for rebels or it can represent a measure of government corruption since high primary commodity export dependence is associated with corruption. The variables the authors used to represent grievances play a less important part. Inequality and political repression was not found to be significant. Geographic dispersion is found to significant. In a relatively large population to land area, there is a lower risk. This is because it would be easier for governmental forces to defend their nation. The high incidence of civil war in Africa is due to its poor economic performance.

Collier and Hoeffler (2004) wrote a paper to address how greed and grievances affect civil war in an extension of previous paper they wrote (Collier and Hoeffler 1998). They analyzed 79 civil conflicts between 1960 and 1999. Their measure of civil conflict are conflicts with at least 1,000 combat related deaths per year and rebel forces must make up 5 percent of these deaths. The first question they address financing rebellion. They address three sources of finance which are natural resources, donations from diaspora, and hostile governments who would subvert the local government. To measure these factors they analyzed primary commodity exports per GDP, diaspora, and whether or not these conflicts happened during the Cold War. Income also plays a role since a rebel has to make more as a rebel than the next best alternative. However other characteristics are possibly correlated with income. Male secondary school enrollment is an important measure because rebels target young males for recruitment. They also measured growth rate of the economy to measure new income opportunities. These three previous measures interpreted when they are low as possible measures of forgone income or as a

possible measure of grievances. Opportunity of rebellion can also be due to weak government military capability. This could be due to large amount of forestry or mountainous regions. A final source of rebel opportunity is social fractionalization. They interpret high fractionalization as affecting the amount of possible recruits for rebellion. They found that finance as measure by primary commodity exports is an important variable. This is because of two possible interpretations. One is that it gives the rebel forces the ability to extortion. The other possible explanation is that dependence on natural resources leads to weak governance and possible corruption. A second significant factor is economic opportunity. Male secondary education enrollment, per capita income, and the growth rate are all significant. The authors believes that these proxies as forgone earnings of rebellion. One economic factor that was not important was inequality. From their logit regressions, they found that the models that focus on rebellion opportunities are better than when objective indicators are added.

Fearon (2005) wrote his paper as a response to the findings in Collier and Hoeffler's "Greed and Grievance in Civil War". In particular, he studies the relationship between primary commodity exports and its effects on civil war. Fearon does not suggest that funding opportunities are not an important factor in explaining civil conflict, but that primary commodity exports as a percentage of GDP is not a good measure of it. The author argues that oil exporters aren't affected by rebel extortion. He hypothesizes that governments that depend on oil exports have weaker state institutions than those of other comparable countries of the same per capita income. However he believes that rebel forces do not have the capacity to exploit oil revenues nor would they be better at exploiting these resources than government forces. To test this he ran an OLS regression with government observance of contracts as the dependent variable and primary exports, income, and fuel exports as the regressors. He ran two models, one with fuel

exports and one without. When fuel exports are added, primary exports as a percent of GDP becomes statistically insignificant. He wanted to test if primary commodity dependence would still be significant after fuel exports is added, although there is a strong correlation between the two variables. This means that oil exports have weaker states according to this measure. The overall implication of his study that state capacity to deal with the needs of its people is possibly more important than the just dependence on primary commodities. The significance of primary commodities instead has a spurious relationship with civil conflict.

In another study, the authors explore the connections between civil war and ethnic and religious antagonism. (Fearon and Laitin 2003) They find that that civil war is mostly due to conflicts that happened during the 1950's and 60's. The authors also find that that when they controlled for per capita income, there is not a link between civil conflict and ethnic diversity or religious diversity. This is in contrast to the notion of "ethnic wars" and is important to the understanding of civil war. The authors argue that risk of civil war can be explained rather by conditions that would be conducive to insurgency. The factors they believed that were relevant are poverty, political instability, rough terrain, and large populations. This paper believes that economic growth has a correlation to less civil wars but it may be a by-product of a stable government that can address its citizens.

Alexander and Harding (2006) challenge the belief that civil conflict is more likely in low income countries. They believe that previous results are biased due to unobserved country heterogeneity from county-level differences that exist across the variety of countries in the world. The two main paper they address is Collier and Hoeffler's "Greed and Grievance" and Fearon and Laitin's "Ethnicity, Insurgency, and Civil War". To challenge these papers, Alexander and Harding uses nonlinear fixed effects model. After they used fixed effects analysis

with time effects, the only variable that remains significant from the analysis from Fearon and Laitin (2003) is a dichotomous variable on whether or not a country is a new state. The important implications from this is that per capita income is insignificant. To analyze Collier and Hoeffler (2004), they used a conditional fixed effects logit. Their results show that GDP per capita is not significant and when male secondary education is used instead to estimate the forgone income from rebellion it is also insignificant. Another important finding is that the marginal effect of primary commodity exports on civil war increases. The results of this paper leads the authors to believe that the opportunity model proposed by Collier and Hoeffler (2006) is not robust enough to withstand criticism. Instead, the theory proposed by Fearon and Laitin (2003) that focuses on state capacity is instead more important.

Acemoglu and Robinson (2010) explore the relationship between institutions with growth and development. They argue that differences in economic prosperity across countries are due to differences in institutions. One of the key features of institutions is that they form the incentives for human behavior. However economic institutions are shaped by the political process of the country. The authors realize that while they only present a preliminary understanding of the factors that shape the political equilibrium that then shapes economic institutions. Once there have been reforms to their institutions, political and economic, such as in China after 1978, there can be a change from stagnant growth to rapid growth. This fits in the research on civil conflict because of Fearon (2005) and Alexander and Harding (2006) theorize that state capacity has an important impact on the population.

In Miguel, et al. (2004) they used rainfall variations as an instrumental variable for economic growth in 41 African countries in a period of 1981-1999. Their belief is that income and income growth has a significant impact on the decision to rebel or not. However they do not

fully explore the theory that they used. The authors believe that rainfall variations are important because of the lack of irrigation that is prevalent to Africa. It is a plausible instrumental variable because civil conflict does not affect rainfall in any practical sense. For sub-Saharan African countries, a large portion of the population relies on agriculture for food and work. They find that growth shocks have a strong causal impact on the likelihood of civil war and it does not significantly differ with regard to rich nations, democratic nations, ethnically diverse, or mountainous African countries. They also believe that economic conditions are critical to setting off a civil conflict in Africa. The authors believe that a possible avenue for policy makers to explore is to implement public works projects during times of recessions to increase the opportunity cost of rebellion to the individuals who are susceptible to becoming rebels.

Overall these papers help illustrate the problem when trying to establish a clear connection between conflict and economic growth. They focus on different factors such as religion, ethnic fractionalization, democracy, inequality and often result in differing conclusions. This study is important because I am hoping that I can contribute to current knowledge about the causes of civil conflict in the Arab Spring. The question that I am focusing on is what role economic factors played in the Arab Spring.

Theory

The general economic theory of civil conflict is one of opportunity costs. GDP per capita and GDP growth are important to the study of civil conflict because they represent a proxy for the opportunity costs of rebellion. GDP per capita represents the income that is forgone when a person chooses to rebel. Education is an important variable because it can also be used as a measure of opportunity costs. For example an individual who has a lower amount of schooling

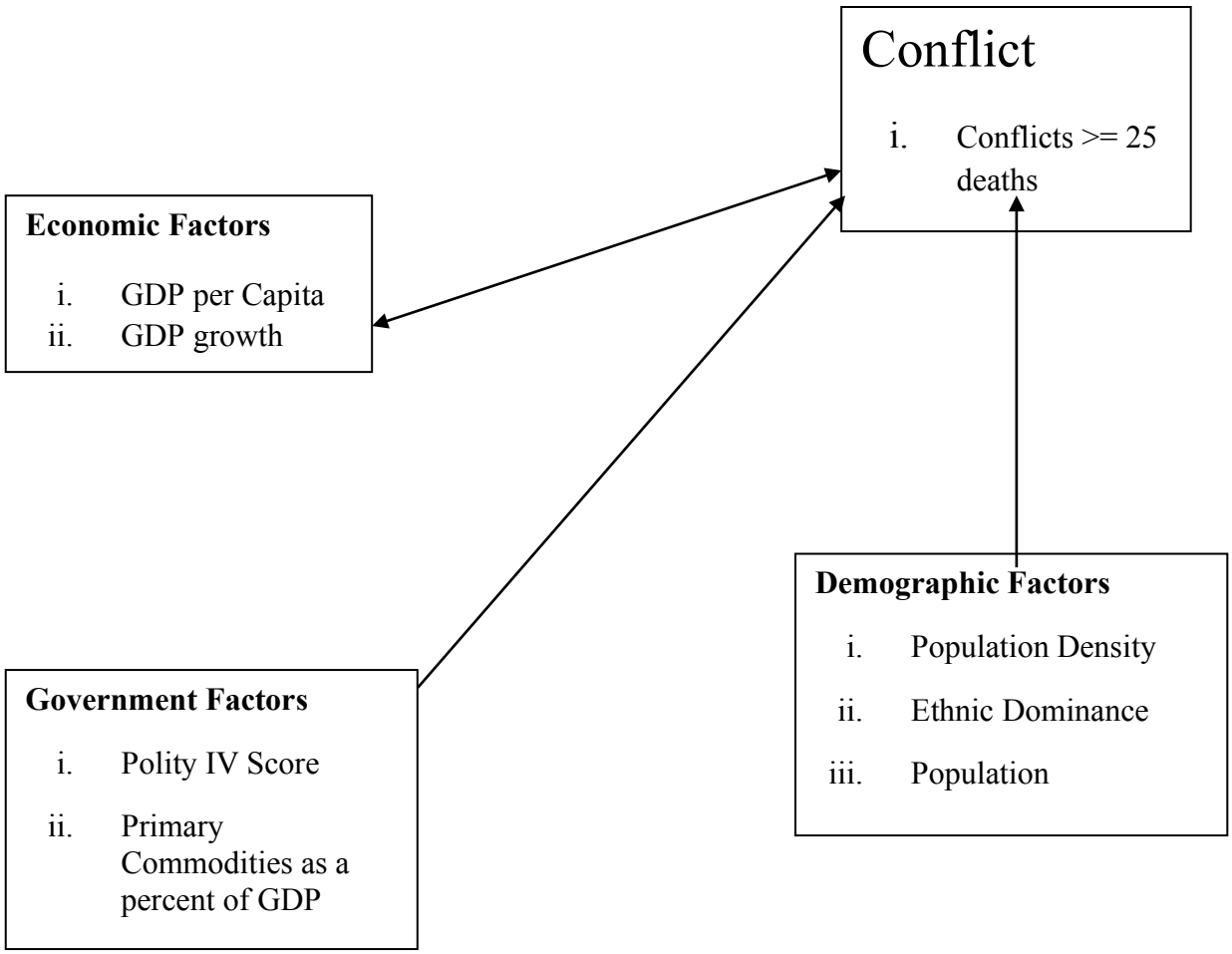
risks less from loses in income from rebellion. Another element crucial to rebellion is the ability for a rebel army to grow in terms of personnel. If the unemployment rate is low, it is harder to recruit individuals for a rebellion since the labor market and rebel forces compete for labor. One major issue that is faced when analyzing economic growth and conflict is that conflict can have an impact on GDP growth and GDP per capita.

I use the UPPSALA/OSLO Conflict database of conflicts of greater than or equal to 25 deaths as a measure of civil conflicts. I believe that this best captures civil conflicts that are larger than small protests and still smaller than full civil war. Other studies have used a threshold of at least 1,000 deaths but they do not properly capture small conflicts.

Ethnic dominance and religious dominance can be important because of the benefit of the majority taking resources from the minority groups. Collier (2000) believed that ethnic dominance by 45 to 90 percent of the population, had the largest possible benefits from transferring resources from the remaining minority groups. Any larger or smaller a minority group, then the costs of taking resources would outweigh the benefit. Ethnic dominance can also lead greed in civil conflict, such as in 1993 when the Hutu government committed genocide against the Tutsi minority. In this case some individuals participated in the massacre for personal gain rather than any other personal grievances.

Population and population density captures the effects of the ability of the military to affect the population. A dense population would make it harder for rebel forces to hide from government forces. Whereas a population that is sparsely spread out enables rebel forces to strike targets and effectively hide because the population isn't as concentrated to a small area. Population is also used because a large population requires a larger military force to control.

The government of a nation is also important, because its relationship with its people affects the decision to rebel. When there are fewer government institutions that exist to meet the needs of the people, there is a greater the risk of rebellion. This kind of relationship is especially strong in resource dependent countries that don't depend on taxation as a source of government financing. This is because extractive economies tend to establish extractive institutions. Strong dependence on natural resources also provides a motivation for rebel groups to try to dominate the areas of natural resources for themselves and fund their revolution or secession from their government. Democracy is always significant and always positively related to conflict. I believe that this is because a strictly authoritarian government rules typically through military power meaning that they likely have the ability to deter civil conflict. Now when applying this to the civil conflicts during the Arab Spring, we should look at two of the most authoritarian governments, Libya and Syria. In Libya, rebel forces were able to successfully take over control of the state in little over 8 months where Syria still has an ongoing conflict after three years. I believe that this is due to outside support for rebels in the case of Libya. The rebel forces were supported by defecting military units and a collective known as the 'Friends of Libya'. This collective consisted of many other Arab Nations and Western Nations in a joint effort to oust the reigning government of Libya. Syria, however, was able to gain support from other nations such as Iran and Russia and from militant groups such as Hezbollah that was able to counter support for rebel forces.


Conflict
i. Conflicts >= 25 deaths
Economic Factors
i. GDP per Capita
ii. GDP growth
Demographic Factors
i. Population Density
ii. Ethnic Dominance
iii. Population
Government Factors
i. Polity IV Score
ii. Primary Commodities as a percent of GDP

Econometric Model

For my project I am looking at Arab World Countries from the year 2008 to 2012. The change of the countries is due to the recent series of conflicts collectively known as the Arab Spring. My hypothesis is that economic growth is a significant factor to civil conflict and that it has a negative relationship with civil conflict. However there is a multi-collinearity issue that prevents some variables from being used therefore there will be four equations estimated.

$$Conflict_{i.t} = \beta_0 + \beta_1 GDPGrowthPct_{i,t} + \beta_2 GDPpcpt_{i,t} + \beta_3 DEMOCRACY_{i,t} + \beta_4 ETHNICD_{i,t} + \beta_4 LOG(POP)_{i,t} + \beta_4 LOG(AREA)_{i,t} + u_{i,t}$$

$$Conflict_{i.t} = \beta_0 + \beta_1 GDPGrowthPct_{i,t} + \beta_2 GDPpcpt_{i,t} + \beta_2 DEMOCRACY_{i,t} + \beta_3 ETHNICD + B_4 POPDENS_{i,t} + u_{i,t}$$

$$Conflict_{i.t} = \beta_0 + \beta_1 GDPGrowthPct_{i,t} + \beta_2 DEMOCRACY_{i,t} + \beta_3 ETHNICD_{i,t} + \beta_4 LOG(POP)_{i,t} + B_5 LOG(AREA)_{i,t} + \beta_6 CCD_{i,t} + u_{i,t}$$

$$Conflict_{i.t} = \beta_0 + \beta_1 GDPGrowthPct_{i,t} + \beta_2 DEMOCRACY_{i,t} + \beta_3 ETHNICD_{i,t} + \beta_4 POPDENS_{i,t} + \beta_5 CCD_{i,t} + u_{i,t}$$

H_0: GDPGrowth has a parameter estimate different from 0.
H_1: GDPGrowth has a parameter estimate of 0.

Where,

CONFLICT stands for a dummy variable for conflict, 0 = no 1=yes. Conflict is measure in conflicts of greater than or equal to 25 combat deaths.

GDPGrowthPct stands for percentage growth in GDP. It is expected that it will have a negative sign relationship with Conflict.

GDPpcpt stands GDP per capita per 1000. GDP is measure in constant 2005 dollars. It is expected that it will have a negative sign relationship with Conflict.

DEMOCRACY stands for the country's POLITY IV score. It is expected to have a positive relationship with conflict.

ETHNICD stands for the ethnic fractionalization of a country. It is a dummy variable for ethnic dominance. Where it is 1 when ethnic dominance is greater than 0.45 and less than 0.90 and 0 when it is less than or equal to 0.45 or greater than or equal to 0.90. The closer the fractionalization is to 0, the more homogenous a country is. The closer to 1 the fractionalization is, the more heterogeneous a country is. It is expected to have a positive relationship with conflict.

LOG(POP) stands for the natural log of a nation's population. It is expected to have a positive relationship with conflict.

POPDENS stands for population density. It is expected to have a positive relationship with conflict.

CCD is a dummy variable for when primary commodities exports makes up more than 25 percent of a countries GDP in nominal US dollars. UN Comtrade Database SITC Rev. 4 commodity codes 0, 1, 2, 3, 4,and 68. It is expected to have a positive sign.

Data & Limitations of the Data

The dependent variable is conflicts of greater than 25 deaths per year. I have included this variable because it is a standard measure of my dependent variable and includes small conflicts. This variable is from the PRIO/UPPSALA Conflict Database. They define conflict as "An armed conflict is a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in one calendar year."[1] The other variables are certain country characteristics that I want to take into account that have been previously found to be significant in other studies.

The major limitation in my study is the lack of data. Data tends to not be available in the countries that experience civil conflict. Another limitation is that my model looks at the Arab World countries from 2008 to 2012. There at 21 nations with 97 observations. Out of the 97 pooled years there were 28 intrastate conflicts. Several observations have been eliminated due to a lack of data. For example, several observations of countries lacked a proper Polity IV score due to their government being in transitional state. Also a limitation exists when trying to gather data on the State of Palestine as it is considered a nation in the Arab World but is not recognized by all countries. This problem has created an issue when it comes to data as some sources recognize it and some considered it to be part of Israel.

Also included in this econometric model are several country characteristics. These variables are Polity IV score, ethnic fractionalization, land area, and population. The Polity IV score is included because of the ability of an individual to influence the government. Ethnic

[1] Description from the PRIO/UPPSALA website: http://www.pcr.uu.se/research/ucdp/faq/#What_is_a_conflict__

fractionalization is from James D. Fearon analysis. The more heterogenous a population, the harder it is for a government to influence its population. Land area and population also affects the ability for a nation to repress rebellion.

Main Results from LPM & Probit Regression

Economic Growth and Civil Conflict (Dependent Variable: Conflict25)						
	LPM Models				Probit Models	
	Model 1	Model 2	Model 3	Model 4	Probit 1	Probit 2
Intercept	-2.18*** (0.456)	0.35*** (0.070)	-1.35*** (0.392)	0.31*** (0.888)	-19.04*** (5.97)	3.95*** (1.90)
gdpgrowthpct	-0.01*** (0.001)	-0.005*** (0.002)	-0.01 (0.011)	-0.02** (0.01)	-0.15 (0.1)	-0.316** (0.167)
gdppcpt	0.006** (0.003)	-0.006*** (0.002)	-	-	-0.62 (0.39)	-
Democracy	0.05*** (0.008)	0.016** (0.008)	0.05*** (0.008)	0.03*** (0.01)	0.34** (0.12)	-
ethnicD	0.24*** (0.063)	0.13 (0.084)	0.12 (0.081)	-0.05 (0.084)	1.57* (0.83)	-
logarea	0.08*** (0.0247	-	0.06*** (0.019)	-	0.55*** (0.21)	-
logpop	0.09** (0.040)	-	0.05 (0.030)	-	0.78* (0.40)	-
popdens	-	-0.002*** (0.001)	-	-0.31*** (0.001)	-	-0.66*** (0.30)
CCD	-	-	0.38*** (0.080)	0.31*** (0.110)	-	-8.05** (1.36)
R-Squared	0.4622	0.2076	0.5172	0.38		
Adjusted R-Squared	0.4264	0.1641	0.4604	0.32		
Number of Observations	97	97	58	58	97	58
Note: *,,*** indicates significance at the 90, 95, 99 percent level.**						
Standard Errors and Significance are Heteroscedasiticity Consistent						

In my analysis I used four different models due to issues of multicollinearity. Out of these four, there are two models that best fit the variation in the data. In model 1, the significant variables are GDP growth as an annual percentage, GDP per capita per thousand, Polity IV score, ethnic Dominance, the natural log of the land area in square kilometers, and the natural log of the national population. For every one percent growth in GDP from the previous year, there is a decrease of 1 percentage point. GDP per capita per thousand has a positive correlation, which is unexpected. There are many possible reasons for this positive correlation such as omitted variable bias. Democracy is also surprisingly positively correlated with civil conflict. One would expect that theory would dictate that a more democratic government has better capacity to address the needs and grievances of their people. However it is possible that there is a nonlinear relationship with conflict. The more democratic or authoritarian a country is the more stable and the least stable countries fall between the extremes. It is possible because democratic countries have the state capacity to meet the need of the people, and authoritarian countries have the repressive ability to repress the populace. Each increase in the Polity IV score increases risk by 5 percent. Ethnic dominance increases risk of conflict by 24 percent. This agrees with the theory that ethnic dominance would increase risk due to benefits of transferring goods from minority groups. The natural log of the land area positively affects conflict. This is expected because of the issues of state repression ability to repress a large area or move troops effectively to combat rebels. The natural log of the population is positively correlated with civil conflict, the larger the population, the larger the amount of possible recruits for a rebel army.

The third LPM model takes into account natural resource dependence. In this model Polity IV score, natural log of the area, and dependence on natural resources are significant. Ethnic dominance and GDP growth were not significant. One of the key findings of this model is

that the dummy variable primary commodities dependence is significant and positively affects conflict. GDP per capita was not included due to correlation with primary commodity dependence. Primary commodity dependence increases the risk of civil conflict by 38 percent.

The explanatory power of the model is fair however there are shortcomings of the Linear Probability Model (LPM). Heteroskedasticity is the first major problem. One of the assumptions of OLS is that $V(\varepsilon i) = \sigma^2_{\varepsilon}$, meaning that the error term has a constant variance. However because this is a dichotomous variable it is likely that this is violated and that there is heteroskedasticity resulting in meaningless standard errors. The second probable violation is that the errors terms are not normally distributed because of the dichotomous nature of the dependent variable. The third likely violation is the linearity of the model. Since this is a dichotomous variable the only values it can take is 0 or 1. However OLS is not restricted to only 0 or 1, meaning that estimates can range between negative infinity and positive infinity. With these violations, it is reasonable to conclude that the LPM is not sufficient to use for this analysis. In order to address these issues, I also ran a probit analysis.

The advantage of the probit analysis is that it produces a z-score which is limited to values between 0 and 1. The results from this analysis have the risk of civil conflict for a country at the mean values in the sample at less than 0.1 percent. This is greatly different from previous analysis of other studies. This leads me to conclude that there needs to be a wider data set used and that my estimates are possibly biased. However these results do tell what variables are important to the study of civil conflict. These variables include democracy level, ethnic dominance, land area, and population were found in the first probit model. The second probit model used GDP growth, population density, and primary commodity exports. Unfortunately the nature of probit analysis isn't as easily analyze as in the LPM. The average risk of a mean

country in both models is less than 0.01%. Using the means of the dataset, primary commodity dependence does not significantly decrease the risk of civil conflict by itself. In the second probit model a country that has a density of 100 persons per sq. km. that depends on primary commodities has a risk of 31.21%, without primary commodity dependence, it has a risk of 96.56%. That means that there was a primary commodity dependence decreased risk by 65.35%. A model a country that has the means of all other variables in this dataset except for population density where it is the minimum of the dataset, has a risk of 81.59%. An increase of one deviation decreases risk to less than 0.01%. This displays the shortcoming of my dataset because previous dataset had a risk of 15% in the mean country and the marginal effects were less drastic.

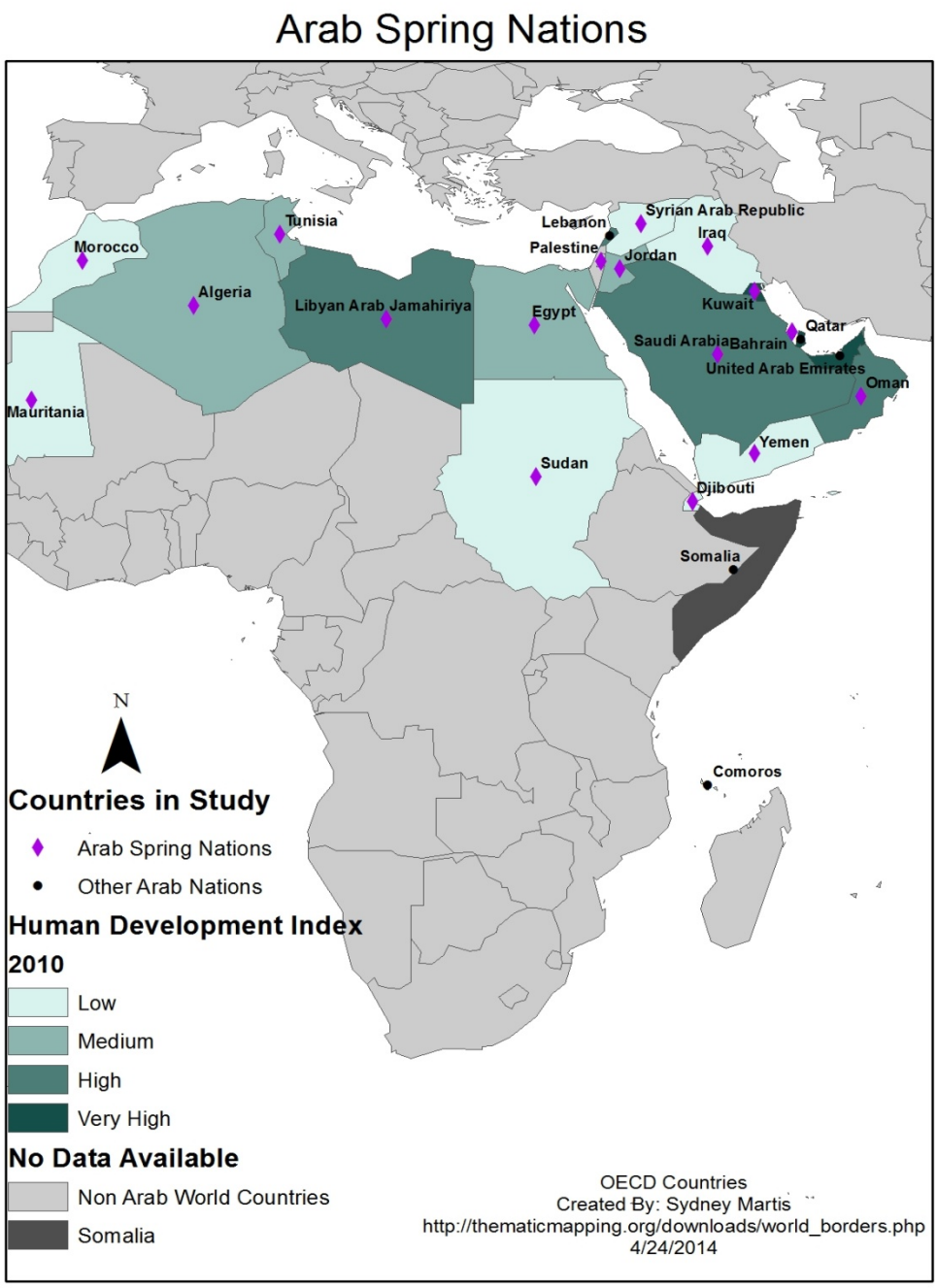
Future Areas of Study & Policy Implications

One of the most implications of the results is that primary commodity dependence is an important factor in determining civil conflict in the Arab World. So the obvious question is what nations can do to limit that risk. When primary commodity dependence was added to the analysis GDP growth became insignificant in model and in the other model where it was still significant, it was possibly capturing the effects of omitted variable bias as seen in the loss of explanatory power in the model. In the one probit model that used primary commodity dependence as an explanatory variable, it had a negative effect on civil conflict. I believe that this is due to it acting as a proxy for other variables such as military funding and less as a measure of state capacity. This is because it goes against previous findings from previous studies and it would not make sense given previous theories that it has a negative effect. Primary commodity dependence can be a proxy for extractive economies and extractive institutions. This link is discussed in the book "Why Nation's Fail". The question as to how one can avoid this problem is one that asks how a country can avoid the 'Dutch Disease'. To put it in context of civil conflict, the investment of government interests in exploiting natural resources leads to establishment of extractive institutions and few inclusive institutions. These inclusive institutions are establish to meet the needs of the populace but since extractive economies depend on natural resources rather than taxation, there is little incentive to establish these institutions. It is argued that investment of their extractive economy in inclusive institutions is what Botswana did with their diamond industry and why they have enjoyed sustained growth since their independence while other African nations have experienced severe poverty and repeated civil war.

Another way to improve upon my study is to find a way to account for military spending. I believe that this would change the impact of primary commodity dependence. In my models it is possible that primary commodity dependence is proxies for both state capacity and military spending. Primary commodity dependence allow for larger military spending to protect the natural resources that the government depends on.

My intended goal was to be able to use a 2SLS (two stage least squares) regression where I could have eliminated the problem of reverse causation between civil conflict and economic measures and get truer estimates. The issue that I faced was finding an appropriate instrumental variable that is not affected by civil conflict. I was unable to find an appropriate IV, however I believe that this area of research can benefit from a study that uses a 2SLS. Another possible factor for future study is time. The Arab Spring is still relatively new and there is the possibility that it is not over. A factor that I would've looked at if my time aspect of my data was larger is a measure of peace or previous conflict. However since my dataset covers only five years and they don't very much in regard to years observed and years in conflict, any estimates would likely be off from their true value. Future developments can provide more insight than what is currently available.

Map 1. Arab World Countries[2]



[2] This map was created by Sydney Martis with information gathered from the WDI.

Table 1. Descriptive Statistics

Descriptive Statistics for LPM Model 1 and 2 and Probit Models

Variable	N	Mean	Std Dev	Minimum	Maximum
	Civil Conflict Measure (DV)				
Civil Conflict with >= 25 Deaths: (PRIO/Uppsala) ***(Conflict25)***	97	0.24742	0.43376	0	1
	Economic Characteristic Measures				
Growth in GDP (percentage) ***(gdpgrowthpct)***	97	4.3794083	12.5369454	-61.2682420	104.4832789
GDP per capita per thousand ***(gdppcpt)*** ***(UN National Accounts Database)***	97	9.4808018	13.9716559	0.2712970	60.2589772
	Country Characteristics				
Democracy level (Polity IV score, -10 to 10), ***(Democracy)***	97	-2.9278351	5.428028	-10	9
Ethnic Fractionalization **(Fearon Analysis)** ***(EthnicD)***	97	0.4686052	0.267805	0	0.8117
Land Area ***(Area) (sq. km.)*** ***(WDI)***	97	623940.57	795350.66	760	2381740
Natural Log of National population ***(Population)*** ***(WDI)***	97	15215682.1	17848449.54	649291	79392466
Population Density (POPDENS)	97	164.5154949	346.2569100	3.3209479	1733.98

Descriptive Statistics for LPM Model 3 and 4

Variable	N	Mean	Std Dev	Minimum	Maximum
	Civil Conflict Measure (DV)				
Civil Conflict with >= 25 Deaths: (PRIO/Uppsala) ***(Conflict25)***	58	0.1551724	0.3652312	0	1
	Economic Characteristic Measures				
Growth in GDP (percentage) ***(gdpgrowthpct)***	58	4.59087	4.5753	-12.76575	17.66304
GDP per capita per thousand ***(gdppcpt) (UN National Accounts Database)***	58	11.2936	15.17072	0.60101	60.181
	Country Characteristics				
Democracy level (Polity IV score, -10 to 10), ***(Democracy)***	58	-3.67241	5.25286	-10	9
Ethnic Dominance 0.45>or <0.90 Dummy Variable **(Fearon Analysis)** ***(EthnicD)***	58	0.43103	0.49955	0	1
Land Area ***(Area) (sq. km.) (WDI)***	58	11.7848	2.33621	6.63332	14.68334
Natural Log of National population ***(Population) (WDI)***	58	16.0348	1.34017	13.40919	18.18991
Population Density (POPDENS)	58	20.3482	39.98239	0.83797	170.10053
Primary Commodities greater than 25 percent of GDP Dummy Variable ***(UN Comptrade) (CCD)***	58	0.44828	0.50166	0	1

Table 2. Countries and Amount of Years Included

Country	Total Years	Years of Civil Conflict >=

		25 Deaths
Algeria	5	5
Bahrain	5	0
Comoros	5	0
Djibouti	5	0
Egypt	4	0
Iraq	3	3
Jordan	5	0
Kuwait	5	0
Lebanon	5	0
Libya	5	1
Mauritania	5	2
Morocco	5	0
Oman	5	0
Qatar	5	0
Saudi Arabia	5	5
Somalia	4	4
Sudan	3	3
Syria	5	2
Tunisia	3	0
United Arab Emirates	5	0
Yemen	5	4
Total Years	97	29

***The State of Palestine, while recognized as part of the Arab World, has been excluded due to lack of widespread international recognition as its own separate entity from Israel.**

Bibliography

Alexander, Marcus.; Harding, Matthew C "Is Poverty to Blame for Civil War? New Evidence from Non-Linear Fixed Effect Estimation" Paper presented at the Econometric Society World Congress, 2005

Collier, Paul; Hoeffler, Anke; “Gree and grievance in civil war” Oxford Economic Papers 56 pp 563-595 2004

Miguel, Edward; Satyanath, Shanker; Sergenti, Ernest "Economic Shocks and Civil Conflict: An Instrumental Variables Approach" Journal of Political Economy, 08/2004 Vol. 112, No. 4, pp. 725-753

Fearon, James D. “Primary Commodity Exports and Civil War” The Journal of Conflict Resolution 08/2005 Vol. 49 No 4 pp 483-507

Fearon, James D.; Laitin, David D. “Ethnicity, Insurgency, and Civil War” The American Political Science Review, 02/2003 Vol. 97, No. 1 pp. 75-90

Collier, Paul; Hoeffler, Anke "On the Incidence of Civil War in Africa" The Journal of Conflict Resolution, 02/2002 Vol. 46, No. 1 pp 13-27

Acemoglu, Daron; Robinson, James A. “The Role of Institutions in Growth and Development” Review of Economic Institutions 1.2 10/2010 pp 1-33

Rice, Susan E.; Graff, Corinne; Lewis, Janet. “Poverty and Civil War: What Policymakers Need to Know” The Brookings Institution, 12/2006. Global Economy and Development Working Paper

Acemoglu, Daron; Robinson, James A. “Why Nations Fail” Crown Publishing Group 2012

SAS CODE

```
data one;
set work.arab;

/* variable transformation*/
gdpgrowth = gdp2005/gdp2005t1 - 1;
gdpgrowthpct = gdpgrowth * 100;
gdppc = gdp2005 / population;
gdppcpt = gdppc / 1000;
logarea = log(area);
logpop = log(population);
popdens = population / area / 10;
cc = cc0 + cc1 + cc3 +cc4 + cc68;
ccGDP = cc / GDPCurrent;


if 0.45 < ethnic < 0.9 then ethnicD = 1;
else ethnicD =0;


/*removes observations with missing variables*/
if democracy ="" then delete;
if gdpgrowthpct ="" then delete;
if gdppcpt ="" then delete;
if ethnicd ="" then delete;
if logarea ="" then delete;
if logpop ="" then delete;

/* descriptive statistics*/
proc means;
proc corr;
var conflict25 gdpgrowthpct gdppcpt democracy ethnicd logarea logpop popdens;
/*LPM Model*/

/*PopDens CCD is excluded due to collinearity*/
proc reg;
Model1:model conflict25 = gdpgrowthpct gdppcpt democracy ethnicd logarea logpop /white;


/* GDPGROWTHPCT CCD is excluded due to collinearity*/
proc reg;
Model2:model conflict25 = gdpgrowthpct gdppcpt democracy ethnicd popdens/white;

data two;
set work.one;

if ccGDP > 0.25 then CCD = 1;
else CCD = 0;
if cc ="" then delete;

proc means;
var conflict25 gdpgrowthpct gdppcpt democracy ethnicd logarea logpop popdens ccd;
```

```
proc corr;
var gdpgrowthpct gdppcpt democracy ethnicd logarea logpop popdens ccd;

/* GDPGROWTHPCT EthnicD LogArea is excluded due to collinearity*/
proc reg;
Model3:model conflict25 = gdpgrowthpct democracy ethnicd logarea logpop ccd /white;


/* PopDens EthnicD LogArea is excluded due to collinearity*/
proc reg;
Model4: model conflict25 = gdpgrowthpct democracy ethnicd popdens ccd /white;


data three;
set work.one;

proc sort;
by decending conflict25;

/* PopDens EthnicD LogArea is excluded due to collinearity*/
proc probit order=data;
        model conflict25 = gdpgrowthpct gdppcpt democracy ethnicd logarea logpop ;



/* GDPGROWTHPCT EthnicD LogArea is excluded due to collinearity*/
proc probit order=data;
        model conflict25 = gdpgrowthpct gdppcpt democracy ethnicd popdens;

data four;
set work.two;

proc sort;
by decending conflict25;

/* GDPGROWTHPCT CCD is excluded due to collinearity*/
proc probit order=data;
        model conflict25 = gdpgrowthpct ethnicd logarea logpop ccd;

/*PopDens CCD is excluded due to collinearity*/
proc probit order=data;
        model conflict25 = gdpgrowthpct ethnicd popdens ccd ;

/* GDPGROWTHPCT CCD is excluded due to collinearity*/
proc probit order=data;
        model conflict25 = gdpgrowthpct logarea logpop ccd;

/*PopDens CCD is excluded due to collinearity*/
proc probit order=data;
        model conflict25 = gdpgrowthpct popdens ccd ;

run;
```