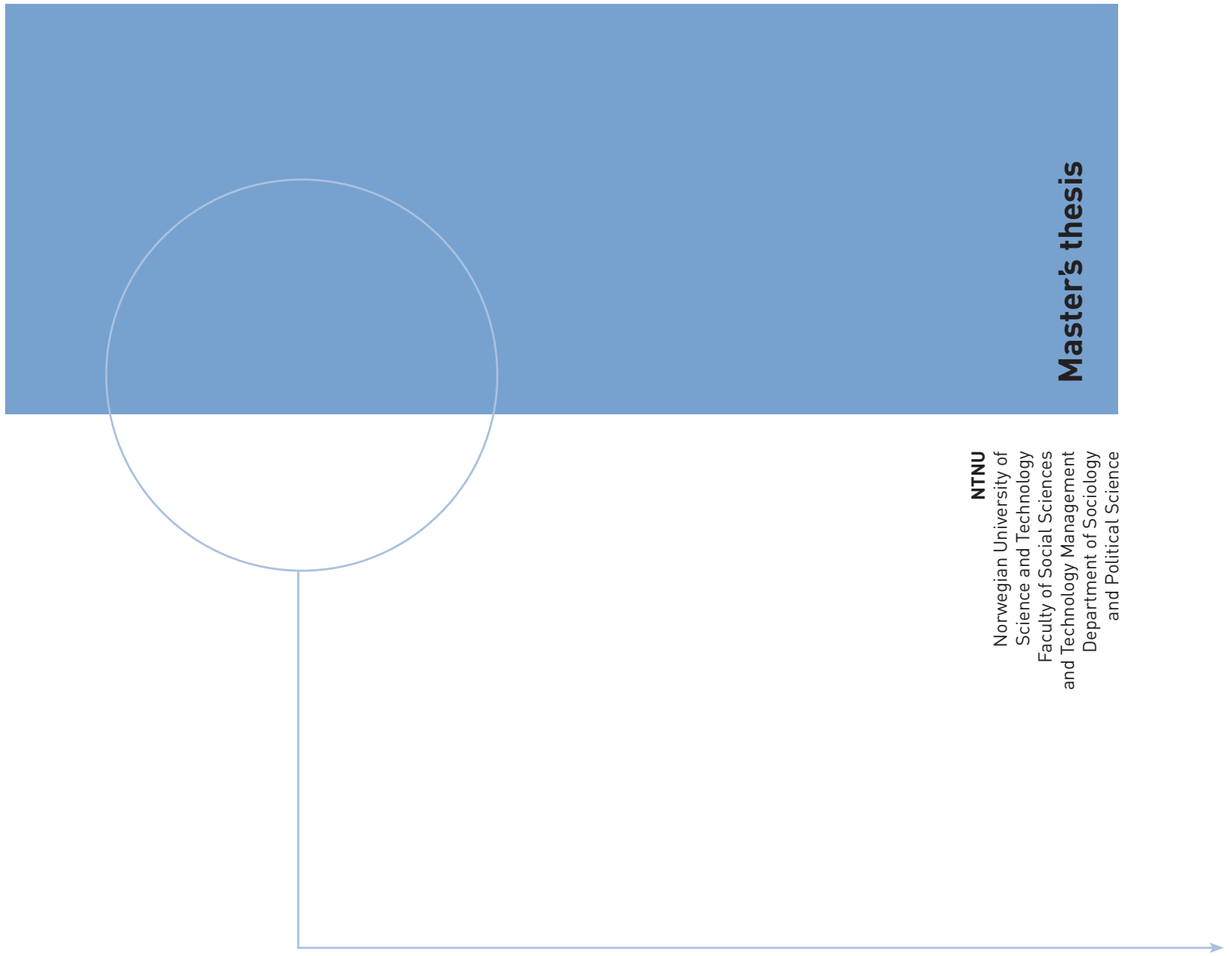


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# Oil Price Cycles and Political Instability

## An Analysis of the Effect of Oil Price Fluctuations on Anti-Government Demonstrations

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# FORORD

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# 1 INTRODUCTION

"Oil in modern society is like blood in the human body" (Hannesson 1998: 1).

Oil can be said to be one of the most important natural resources in the world today. As an energy source it is employed to manufacture products, fuel vehicles and produce heat, among other things. Its utility seems almost endless. Like the blood in the human body, oil flows through pipelines carrying the energy that allows society to function as we know it (ibid.: 1). Due to its utility and widespread use the oil market has the contingency to greatly affect the socio-economic and political environment of any state. Important in this regard is the boom and bust cycles in the global oil market, which will affect both importers and exporters of oil. Oil related protests and strikes have been observed in a variety of countries on several occasions. Nevertheless, the topic has gained little attention in academic research. In this paper, I assess the effects of oil price cycles on political instability. Thus, my research question is: *How do boom and bust cycles affect the level of anti-government demonstrations?*

In political science research on oil has largely revolved around the notion of a resource curse, referring to the apparent paradox that resource abundant states seem to experience detrimental effects on economic and political indicators. While economists have focused mainly on the macroeconomic impact of oil and its price fluctuations, political scientists have largely ignored this characteristic of oil and its potential effects. Rather, political scientists have focused on institutional characteristics and political instability in the context of oil abundance. Drawing on various research from both fields, I contend that timing could be an important factor in determining the effect of oil on political instability. The element of timing is incorporated through the price mechanism (the boom and bust cycles), thus extending focus to importers as well as exporters of oil. The timing of political instability is not in itself an innovative topic. Several papers have concerned themselves with the effect of food price fluctuations on political protests in importing and exporting countries (see for example Smith 2013, Hendrix, Haggard and Magaloni 2009, Arezki and Brückner 2011). Research on political instability in an oil related context, on the other hand, has taken neither timing nor importers into perspective. I therefore fill this gap in the literature by examining the effect of oil price cycles on the political instability in oil importing and oil exporting countries.

Using panel data on 122 countries during the 1980-2008 period, I find that oil rents, on average, have a stabilizing effect on the number of anti-government demonstrations. However, my results also indicate that timing may be an aspect to consider when assessing the effect of oil rents on political instability. Evidence in this analysis suggests that countries that are dependent on oil rents experience a higher number of anti-government demonstrations during bust-periods, when the price of oil is low. These results are, however, sensitive to certain changes in the model specifications, and are additionally sensitive to the definition of low oil prices. As such, I can only give partial support to the argument stating that oil dependent countries are prone to higher instability during bust-periods. Interestingly, the empirical results further show that high oil prices have no corresponding effect in oil exporting countries. Contrary to theory, I found no significant effect of high oil prices on the number of anti-government demonstrations in oil importing countries. This can be explained by several possible reasons within two categories. First, it is possible that the population does not demonstrate against the government when their economic conditions change. Second, it may be that high international oil prices do not constitute a change in the population's economic conditions.

The paper is structured as follows: in the next chapter, I present a short overview of relevant literature on the topic in order to ensure the innovativeness of this study. I construct a theoretical framework in chapter 3. I start by noting certain characteristics of oil that can affect a country's political stability. Next, I explore how oil rents may affect the socio-economic and political environment in a resource abundant country and how this relates to the price of oil. I then explain how resource-poor countries can be affected by fluctuations in the price of oil before I make the link between oil price changes and anti-government demonstrations. Lastly in chapter 3, I present the hypotheses generated on basis of the theory. In chapter 4, I present the data and methods. I describe the data set employed, the operationalization of the theoretical concepts and present the estimation specifications. I also consider methodological issues and present the assumptions of my chosen method of analysis. The analysis is presented in chapter 5. I set my hypotheses to an empirical test and discuss their significance in light of the theory presented in chapter 2. I also explore the main results' robustness, inspired by the methodological discussions in chapter 4. Chapter 6 concludes by summarizing the main findings of the paper.

## 2 REVIEW OF EARLIER RESEARCH

This section will review academic literature on the topic of economic shocks and political instability. Earlier research relevant to my research question can be used to draw parallels and gain insight into the relationship between oil price fluctuations and anti-government demonstrations. As such, it provides a natural starting point for my paper. The review will open by presenting research of the broadest possible scope, then narrowing it down throughout the section.

In the broadest sense, the topic of this paper concerns the relationship between economic shocks and political instability. This provides a good starting point for a short literary review. Miguel, Satyanath and Sergenti (2004) have found evidence showing that a negative economic growth shock increased the likelihood of civil conflict in 41 African countries. Similarly, in the article "Economic Shocks and Civil War", Chassang and Padrò I Miquel (2009) show that the propensity for civil war is higher when countries suffer negative income shocks. More precisely, civil war was found to occur in the aftermath of economic shocks that reduce income per capita (ibid.: 3). Correspondingly, Brückner and Ciccone (2010: 519, 524) present a robust correlation between a decline in commodity prices (on impact and with a lag) and the outbreak of civil wars in Sub-Saharan Africa. These studies are more concerned with the effect of economic shocks on civil war. Still, they show that different types of negative economic shocks can and does disrupt political stability. It is an indicator that people react negatively and collectively to a negative shift in economic conditions.

Others have tested whether this notion also holds at an instability level lower than civil war. Within this category, research on commodity prices and political instability seems to have been more common than research on oil prices and political instability. However, there are similarities between the effects of food price spikes and oil price spikes, making these studies relevant to my paper. Oil importing states may be compared to consumers/importers of food. An increase in the price of oil or the price of food commodities, respectively, will increase the cost of living for importers and consumers. Likewise, oil exporting states can be compared to food producers. As the price of oil or food drops, oil exporting states and producers of foods experience a decrease in income while expenditures remain stable. Furthermore, increasing oil prices may also affect food prices (Smith 2013: 1). As such, research on food prices is highly relevant for this study. Smith (2013: 9) looks at the relationship between monthly food prices

and social unrest in Africa, and finds that a one percentage increase in the domestic consumer food price index increases the odds of unrest with 24.1 percent. By conducting the study on a monthly basis, Smith illustrates the connection between the immediate consequences of increasing food prices and the population's response to short-term economic pressure. Others have done similar research on a yearly basis. Hendrix, Haggard and Magaloni (2009) conducted a study on food prices and protest with a sample from major cities in Asia and Africa from 1961-2006. They find that changes in the price of wheat is significantly correlated with the number of protests in the sample (2009: 23-24). This relationship is curvilinear, however, depicting that both high and low prices affect protest levels (through consumers and producers respectively) (ibid.: 25). Furthermore, their data show that the effect of food price changes is contingent on regime type (ibid.: 29). More specifically, they find a curvilinear relationship between regime type and the effect of food price changes. More democratic regimes are associated with higher levels of protest, with the predicted number of protests being highest in democratic-leaning hybrid regimes (ibid.: 28). Arezki and Brückner (2011) used an extended sample of 120 countries from 1970-2007 in their resembling working paper "Food Prices and Political Instability". They find that increasing food prices have a deteriorating effect on democratic institutions in low income countries (ibid.: 3). To explain this finding, they took a closer look at anti-government demonstrations, riots and civil conflict and found that the effect of international food prices had a highly significant positive impact on the incidence of protest in low income countries. These states often have a high poverty rate, and hence a large share of the population are severely affected by food price changes. In high income countries, on the other hand, food prices had no significant effect on protest levels (ibid.: 3-4).

These studies all illustrate that shifting economic conditions that have an impact on people's ability to obtain essential goods and run their daily lives can cause higher levels of protest and demonstrations, especially when the consequences are far-reaching (such as in low-income countries) or when the opportunity structure allows for it (such as in hybrid regimes). It is therefore natural to draw a parallel to oil price shocks. Because oil prices are so transmittable and because the consequences of fluctuations are so far-reaching, comparing the effects of oil price shocks with food price shocks and other economic shocks seems natural. Smith's (2004) research is interesting and highly relevant in regards to this topic. In his article "Oil Wealth and Regime Survival in the Developing World, 1960-1999", Smith examines the effect of oil wealth on social protest in 107 developing countries. He finds that oil rich countries have lower expected levels of protest overall (ibid.: 241). However, when taking boom and bust

periods into account, it becomes apparent that oil rich states tend to face higher levels of protest during bust periods (ibid.: 241). The boom-period, on the other hand, had no significant effect on protest levels. This article is interesting, because research on oil prices and the timing of political instability has been very limited so far. As far as I am aware, Smith's (2004) is the only study on this specific topic. Literature in the field of economic shocks and the timing of political instability mostly revolves around food prices. Because the effects of food price changes are very direct in nature, affecting the basis of existence for an extensive range of people, the reactions are accordingly comprehensive. The case of oil prices is somewhat more intricate because the effects of price changes are indirectly transmitted through diverse channels, and the theoretical framework is underdeveloped. Thus, not many studies have been conducted on this topic.

Oil abundance and oil prices have indeed been the focus of papers in various academic disciplines. Economists have generally focused on the macro-economic effects of oil price shocks (see for example Sachs and Warner 1995, Hamilton 2000, Hunt, Isard and Laxton 2001, Barsky and Kilian 2004 and Rasmussen and Roitman 2011). However, equally important is asking how these changes affect the population. Political scientists, on the other hand, have tended to focus on oil abundance and its effects on political instability and institutions (see for example Karl 1999, Wantchekon 2000, Ross 2001 and 2004, Bulte et al. 2005, Dunning 2005, Basedau and Lacher 2006). I contend that in addition to asking *whether* oil rents has an effect on political instability, one should ask *when* instability occurs. This paper draws on knowledge from both disciplines in order to ask the question: how do oil price fluctuations affect people in importing and exporting countries? And how are these effects translated politically? In other words, how do oil price fluctuations affect the number of anti-government demonstrations? These questions demand a more developed theoretical framework than previously offered. The aim of the paper is to gain a greater understanding of the relationship between the oil price cycles and political instability. The research question is inspired by current events which have yet to be explained by academic research. By using oil price fluctuations to account for the timing of demonstrations, and by directing focus towards importers as well as exporters of oil, I fill a gap in the literature. The following section will present the theoretical basis that the rest of the paper will be built upon.

# 3 THEORY

In this chapter, I build a theoretical framework which can explain how oil price cycles may affect anti-government demonstrations. Little research has previously been done on the relationship between oil price cycles and demonstrations, causing both the theoretical framework and the empirical findings to be underdeveloped. For this reason, different research agendas will be blended in order to create a basis for my research project. The aim of this section is ultimately to generate testable hypotheses.

I will start by presenting two characteristics of oil which may be of importance to the state's political stability: the characterization of oil as a point resource and the price volatility of oil. I then describe how boom and bust periods can be thought to affect exporters and importers of oil. Next, I will employ Davie's J-curve and the theory of relative deprivation to knit together the previous parts of this chapter and provide a link between anti-government demonstrations and oil price shocks at the macro level. Lastly, I illustrate the theory with current examples and present the hypotheses.

## 3.1 Characteristics of Oil

In this section, I describe the characteristics of oil as a natural resource which are relevant to political stability. First, I will explain why a resource such as oil can contribute to the concentration of economic and political power. This is an argument I will return to later in the theory chapter in order to account for government responsibility in an oil dependent economy. Second, I point to the inelasticities of supply and demand in order to explain the price volatility of oil.

A point resource can be defined as a natural resource which is extracted from a concentrated geographic area (Le Billon 2001: 570). Because of its concentrated location and the technical skills required to run the extraction process, oil is thought to be more easily monopolized than diffuse resources, which are widely spread and exploited by productive industries (ibid.: 570). As such, the state is often heavily involved in the extraction process of oil, for example through state owned enterprises. Point resources such as oil are thus thought to be more easily protected and less exposed to looting (Bulte, Damania and Deacon 2005: 1031). This is of importance to oil extracting states because it leaves the government in near complete control over the natural

resources and the generated revenues, with little possibility for the population to gain control. The political regime is by its very nature tasked with allocating these resources and managing rents in a responsible manner. The government and its chosen policies are thereby closely linked to the state's economic development and the perceived public welfare. For these reasons, point resources are associated with struggle over state control, secessionist conflicts and rent-seeking (Basedau and Lay 2009:759-760, Bulte et al. 2005: 1031). The option to direct control over the resource rich geographic area (secession) is control over the state. Intuitively, this also applies at the level of demonstrations, which provides a less direct path to influence than controlling the state. Anti-government demonstrations can be viewed as an attempt by the demonstrators to influence the incumbent government in any desired direction, but without gaining direct control over the natural resources (as opposed to looting and secession). The characteristics of a point resource may as such increase the possibility for political instability at different levels of intensity and violence in the oil exporting country vis a vis diffuse resources, which may be more prone to looting and warlordism (Le Billon 2001: 573). However, the main point to take away from this is that point resources often demand a certain concentration of political and economic power, closely associating the state and its policies with social and economic development.

Second, oil is characterized by its price volatility. In a study of price volatility from 1945 to 2005, Regnier (2007: 406) found that both crude oil and refined petroleum were more volatile than 95 percent of domestic products, according to the monthly producer price index (PPI)[1]. Compared to other crude commodities, oil had a level of price volatility which was lower than the median for primary commodities up until 1986 (ibid.: 406). In 2007, however, oil prices were more volatile than 65 percent of other crude products (ibid.: 406). The volatility of oil markets can, for the most part, be explained by the (in)elasticities of supply and demand (Smith 2009: 154). Elasticity defines the responsiveness of supply and demand to prices. An elastic supply/demand curve is sensitive to changes in the price, meaning that the quantity demanded or supplied vary relatively much as the prices changes. Likewise, an inelastic supply/demand curve is insensitive, and quantity does not vary much between changing prices (Begg, Vernasca, Fischer and Dornbush 2011). Elasticity of oil demand can hence be defined as "the percentage change in quantity demanded divided by the percentage change in price (...) along a given demand curve" (Hamilton 2008: 16). At a short run elasticity estimate of about -0.05, oil is

1 The PPI measures the average change over time in the selling prices received by domestic producers for their output (Bureau of Labour Statistics).

thought to have a rather inelastic demand curve (Smith 2009: 150). Demand is inelastic in the short run because reducing the use of oil in the production of goods require both time and access to a substitute or a solution that can make the use of oil more efficient (Smith 2009: 154). In other words, the cost of adjustment is high and time-demanding. The supply of oil is also inelastic in the short run. This is because increasing the productive capacity of oil fields requires planning and, in some cases, technological innovation (ibid.). Furthermore, the Organization of the Petroleum Exporting Countries (OPEC) has implemented policies to reduce the quantity of oil extraction as well as limiting the resources devoted to finding and developing new sources, adding to the inelasticity of supply (ibid.). Exporting and importing countries alike generally hold inventories, however these are not sufficient to reduce the effect of supply and demand inelasticities on the oil market (Smith 2009: 154-5). Because both supply and demand are inelastic in the short run, the price must be driven much further before an equilibrium is reached. This is the reason why inelasticities of supply and demand lead to volatility in the price of oil (Smith 2009: 155). These periods of price booms and busts is referred to as the oil price cycle, and the fluctuations in price naturally affect all countries, oil importing states as well as oil exporting states (Hunt, Isard, Laxton 2001: 7). The next section will show how fluctuations in the price of oil is thought to affect the political economies of exporting and importing states respectively.

## 3.2 Price Volatility and the Political Economy

In the previous section, I argued that the price of oil is very volatile and I explained why this volatility occurs. This section will address how oil price fluctuations are thought to affect the political and economic environment of both exporters and importers of oil. By doing this, I provide the link between oil price movements and the changes in the political economy that constitute the context for anti-government demonstrations. The mechanisms affecting importers of oil are somewhat different from the mechanisms affecting exporters of oil. However, for both groups of states, adverse fluctuations in the price of oil are thought to be detrimental to economic development. Oil exporting states will be affected by the rents that are generated by the resources. The contraction of the non-oil tradable sector and the reliance on the resource sector following Dutch disease effects will make the economy vulnerable to economic shocks. Unless institutions and policies are in place to reduce dependence upon oil, government spending tend to vary with oil revenues, causing economic contraction and higher levels of

unemployment in bust-periods. Oil importing states, on the other hand, will be affected mainly through the price mechanism influencing aggregate supply and aggregate demand. Individuals in these states will thus be directly and indirectly affected by an increase in the cost of living, which in turn is affected by a rise in fuel prices.

### 3.2.1 The Political Economy of Oil Exporting States

Prior to the late 1980's, natural resources were thought to have a positive impact on the abundant state's economic, political and social development (Rosser 2006: 7). As research accumulated, however, results did not support this idea. Rather, resource abundant states seemed to be worse off than their resource scarce equivalents in terms of economic growth, corruption, political stability, and social indicators, and thus the concept of a resource curse emerged. The resource curse refers to the apparent paradox that an abundance of natural resources are linked to detrimental economic and political consequences for the abundant country. This section will explain how resource rents can be thought to influence the oil exporting state's economic and political environment. Dutch disease theory will be employed to explain how boom-periods may increase the reliance on the oil sector in oil extracting states, and thus how states become vulnerable to oil price fluctuations. Subsequently, I will build my argument around the plausible effects of an overreliance upon oil rents. First, dependence on oil rents may affect the mechanism through which oil price cycles affect the state and its population. This is because government revenues and spending tend to follow the same volatile pattern as oil prices. Second, dependence on oil will inhibit the government's ability to respond to oil price fluctuations, ultimately affecting the population.

#### *3.2.1.1 Reliance on Oil and Vulnerability to Oil Price Cycles*

The concept of Dutch disease originates in the discovery of oil and gas in the North Sea in the 1970's and the following contraction of the non-oil tradable sector and rising unemployment in the Netherlands (Ismail 2010: 6). The theory is frequently used to explain the adverse economic outcomes of resource abundant states. Dutch disease theory provides an explanation of how price booms will economically affect the oil exporting state. In this paper, Dutch disease will be used to illustrate the emergence of resource reliance in oil abundant states and the following vulnerability to fluctuations in the price of oil on the global market.

The model assumes three sectors: a tradable natural resource (oil) sector, a tradable non-resource sector (usually agriculture and/or manufacturing) and a non-tradable sector (such as services and construction) (Sachs and Warner 1995: 6). The country is a price-taker in the global economy, so prices for both the tradable sectors (resource and non-resource) are set beyond the national market. Prices in the non-tradable sector, however, are set in the domestic market (Brahmbhatt, Canuto and Vostrokutova 2010: 2). The price, and hence the revenue from oil, is volatile due to a low short-term elasticity of output and demand. Corden and Neary (1982: 827) distinguish between two types of Dutch disease effects: the spending effect and the resource movement effect, both of which yield an appreciation in the real exchange rate.

An increase in the price of oil will effectively create extra revenue for an oil exporting economy and as such increase the state's wealth (Ismail 2010: 4). This is because the demand for oil is so inelastic that a great increase in price will have relatively little impact on the quantity demanded. The spending effect describes what happens when this extra revenue is injected into the economy, thereby spurring aggregate demand and spending by both private and public sectors (Brahmbhatt et al 2010: 2). As demand exceeds supply, prices will rise. Because the prices in the non-tradable sector are domestically determined, the increased demand for non-tradable goods causes the product prices and the wages in the non-tradable sector to go up. Meanwhile, the prices in the tradable non-resource sector are set by the global market, and hence do not change. In the tradable non-resource sector, income will stay the same while wages rise, causing profit to fall and the sector to shrink (Brahmbhatt et al. 2010: 2). The spending effect, in other words, draws resources from the non-resource tradable sector to the non-tradable sector (Gelb and Associates 1988: 22).

The resource movement effect describes the increased demand for capital and labour in the resource sector following a boom. The increased profit in the resource sector allows for the expansion of this sector, and the input is consequently drawn from other parts of the economy, namely the non-tradable and the tradable non-resource sectors. This reallocation of labour and capital tends to reduce output in the other sectors and hence causes prices to rise in the non-tradable sector. Reduced output and a fixed price in the tradable sector further decreases profit in the non-tradable sector.

As can be seen, both the spending effect and the resource movement effect draw resources away from the tradable sector. The spending effect draws resources from the non-resource tradable to the non-tradable sector, while the resource movement effect draws resources from both the non-tradable- and the non- resource tradable sector to the resource

sector (Gelb and Associates 1988: 22). Both effects hence contribute to a rise in the price of non-tradables relative to that of tradables – a real exchange rate appreciation (Brahmbhatt et al 2010: 2). In other words, the inflation in the national market of the oil exporting country is higher than the inflation in global markets. This is the core argument of Dutch Disease theory. However, in this paper, it will rather be emphasized that these effects may cause an overreliance on the resource sector and hence increase vulnerability to oil price fluctuations. The exchange rate appreciation reallocates inputs of production, resulting in worsened competitiveness, and ultimately a contraction of the exporting/tradable sector (Ismail 2010: 5). The non-resource tradable sector is believed to be driving long term growth through trade and positive externalities such as learning by doing and technological spillovers (van der Ploeg 2010: 12). Furthermore, the export sector is a source of income for any country. For these reasons, the non-resource tradable sector is important to the economy. However, for these exact reasons, the sector will also struggle to fully recover from the effects inflicted during the boom-period (ibid.). As such, an expansion of the resource- and non-tradable sectors will eventually lead to a contraction and a lack of diversification in the tradable sector. In the long term, this will make the resource abundant country and its population even more vulnerable to external economic shocks. Dutch disease, as conventionally employed, will cease to be a problem as the oil price declines. However, I argue that these effects conduce dependence on oil. An overreliance on oil will make the state more exposed to the boom and bust cycles of oil prices. Vulnerability to volatility is in itself an adverse development, with consequences for investment and growth (Brahmbhatt et al. 2010: 4). This will indirectly harm the country's population. However, being dependent on oil rents and prone to volatility will also have further consequences for the population. The next section will explore the political characteristics of such oil dependent states to determine more closely how vulnerability to booms and busts can be thought to affect the population.

#### *3.2.1.2 Oil Dependence and the State*

This section sets forth to show how oil dependence will increase the resource abundant state's vulnerability to oil price fluctuations. I argue that dependence on oil rents will increase government spending volatility and affect the government's ability to deal with the bust period's impact on economic indicators such as real GDP, income and unemployment. Hence, the population will be more exposed to the effects of oil price fluctuations.

Because oil is a point resource, extraction is mostly managed by state-owned enterprises, causing economic influence and political power to be highly concentrated (Karl 2004: 663). The supply of resource rents equals a non-tax revenue to the state (Morrison 2006: 2). As such, the state's political regime is tasked with managing and allocating these extra resources. How these resources are managed will be of utmost importance for the resource abundant country's development. While poor revenue management may lead to dependence upon oil and vulnerability to oil price fluctuations, responsible resource management can reduce symptoms of Dutch disease, and hence also reduce oil dependence. In this respect, preexisting institutions such as democracy, property rights, transparency and a functioning bureaucracy will influence the state's opportunity and possibly also the will to make appropriate policy choices (Eifert, Gelb and Tallroth 2002: 3, Mehlum, Moene and Torvik 2006: 3).

Dutch disease theory assumes that the boom-period may be harmful to the oil economy, while the bust-period is relatively harmless. However, in light of political stability, the bust-period is of great interest. The oil dependence possibly generated during the boom-period is crucial to understand how the bust-period might affect political stability. If governments are unable or unwilling to dampen the causes of rising resource dependence, the bust-periods will hit especially hard for two reasons. First, the failure to diversify away from the oil sector will enhance the effect of the bust due to the lack of a continuous and alternative source of revenue to alleviate the pressure on oil rents. In the long run, this will also inhibit economic growth and social development. Second, because government spending is found to be so closely related to resource rents in oil dependent states (Brahmbhatt et al. 2010: 5, Eifert, Gelb and Tallroth 2002: 2, Jonteira 2009: 21), the economy and the population will be extremely vulnerable to both negative and positive economic shocks. The price volatility of oil will in itself have a negative influence on investment, economic growth, income distribution and poverty alleviation, and the oil dependent country’s vulnerability to this volatility will enhance such effects (Karl 2004: 663, Brahmbhatt et al. 2010: 4). As was shown earlier, high price periods are associated with Dutch disease effects and the development of oil dependence caused by a contraction of the non-oil tradable sector and an expansion of the resource sector. Furthermore, resource rents make dependent states prone to economic mismanagement and excessive public spending in boom-periods (Brahmbhatt et al. 2010: 4-5). During boom-periods, the government typically increases expenditures through public sector employment, wage increases, generous unemployment benefits, lower taxes, food subsidies and spending on education and healthcare

programs (Basedau and Lay 2009: 761, Eifert et al 2002: 3, Devlin and Lewin 2005: 191). Expenditure levels are thus allowed to rise because governments tend to regard boom-periods as permanent and bust-periods as transitory (Devlin and Lewin 2005: 196). Furthermore, when foreign borrowing is of interest, borrowing often happens during the boom-period, because the resources are used as collateral (Manzano and Rigobon 2001: 20).

Future expenditure commitments are established during boom-periods, limiting the government's ability to adjust fiscal policy when oil prices and revenue fall (Devlin and Lewin 2005: 191). The government's heavy spending and intervention in the economy therefore becomes problematic when resource revenues decline and the expenditure levels become unsustainable (ibid.: 191-2). In states that are dependent upon oil, government expenditure is likely to (at least partly) be determined by current revenue because alternate sources of income are lacking. I previously argued that other non-oil (private) sectors (especially the non-oil tradable sector) will shrink when a state is dependent on oil. As such, a large part of total spending will likely consist of government expenditures, causing government spending patterns to be highly influential in the economic environment. When oil prices and revenues are volatile, then, fiscal policy and government (welfare) spending will be volatile, as will aggregate demand and the supply of welfare services (ibid.: 192). Borrowing countries will also have to repay their debt with interest, causing further discrepancy between disposable income and expenditure commitments (Manzano and Rigobon 2001: 22). These fluctuations thus create spill-over effects throughout the whole economy. In addition to the cuts in welfare spending (health care, education, labour market benefits), low price periods have been associated with decreased real GDP, lower income and higher unemployment rates in oil exporting countries (Cantore, Antimiani and Anciaes 2012: 8).

Because the oil economy is so hard to manage, government response to a downturn in the price of oil will take time to set in. Increasing production, and hence revenues, may require new hit/miss drillings or the reallocation of factors, which are time-demanding tasks. As such, it will take time to generate the resources needed to lessen the crisis in an economy that is dependent on oil revenues. Unless strict fiscal rules and spending policies are in place to counter spending volatility and dependence, negative oil price shocks can create ripple effects throughout the economy. The government is forced to reduce spending during bust-periods, causing the population to experience a negative shift in economic welfare caused by contractive policies, a setback of income levels, higher unemployment rates, cuts in direct subsidies and welfare spending (Brahmbhatt et al. 2010: 4-5, Karl 2004: 664).

### 3.2.2 The Political Economy of Oil Importing States

Oil price volatility affects importers as well as exporters of oil. While oil exporting countries face difficulties directly related to the abundance of resources and the management of oil rents, oil importing countries are mostly affected through the price mechanism. Individual actors and firms as well as the state are vulnerable to these price fluctuations. An increase in the price of oil can constitute a negative economic shock on a fuel importing economy. Its effects can largely be divided into explanations of aggregate supply and aggregate demand.

Because oil is so widely used in production and transportation and because petroleum products are so widely purchased, a high oil price is thought to have ripple effects throughout the economy of the importing state. Oil is a key input for several manufacturers, and as such a high oil price makes production more costly, thereby decreasing aggregate output (Hamilton 2000: 4-6, Dogrul and Soytas 2010: 1523). Periods in which oil prices are high are associated with lower growth rates, declining productivity, rising unemployment and higher inflation in oil importing countries (see for example Dogrul and Soytas 2010, Hamilton 2000, Cantore, Antimiani and Anciaes 2012). This is often explained by classic economic supply theory. As the price of an input good goes up, aggregate output and productivity decline (Brown, Yücel and Thompson 2002: 3). The reduction in output and productivity thus reduces real GDP and causes inflation. The impact of an oil price spike on economic growth have further consequences for employment levels. As marginal cost rises and productivity falls, unemployment rises, to large social and economic cost (Dogrul and Soytas 2002: 1523-4). In the long run, these effects can be offset by the reallocation of labour and may change the entire production structure. In the short run, however, the economy is incapable of absorbing the excess labour, causing unemployment. One would think that because an increase in the price of oil affects the importing economy negatively, a price decline would constitute an equivalent positive effect. However, the effect of an oil price shock on economic growth is asymmetric. While oil price spikes have empirically been shown to have a negative effect on the importing economy, the magnitude of a price drop is smaller, if existent at all (Hamilton 2000: 3-4,34, Jiménez-Rodríguez and Sánchez 2004: 2).

Oil price increases are also thought to affect aggregate demand in oil importing countries. As

aggregate output declines in some sectors, the price of these goods increase, causing the price spike to have the effect of a tax on consumption, reducing aggregate demand. This can also be viewed as a shift in purchasing power from importers to exporters (Brown, Yücel and Thompson 2002: 3). Consumers are exposed to volatility because oil is relevant for the production, consumption and transportation of a host of other goods, affecting price levels of for instance cars, heating and food (Hamilton 2000: 6). These price changes are more easily transmitted for oil based products than most other raw materials, reducing consumer demand in oil importing states (Regnier 2007:421). Oil based goods, taken together, make up a very large portion of the basket of goods that producers and consumers purchase in any economy, meaning that the impact of an oil price shock will be far-reaching (ibid.: 407). Important in this regard is perhaps especially the transportation costs of vital non-durable goods such as food. This will cause food prices to increase, affecting particularly the poorer parts of the population.

Private actors are affected by price shocks both directly, for instance through the cost of petrol, and indirectly, through the increase in marginal cost of producers and increased transportation costs as well as through the macroeconomic effects like the contraction of GDP and declining growth rates. After the initial increase in the prices of various goods following an oil price increase, the decline in aggregate demand puts a downward pressure on prices. But because nominal prices are assumed to be sticky downwards, prices will not fall back to the preshock levels (Brown, Yückel and Thompson 2002: 4). An oil price spike can therefore be said to disrupt purchasing patterns, slow the business cycle and reduce real GDP.

Additionally, oil price fluctuations will affect terms of trade by changing the ratio between the value of imports and exports (Cantore, Antimiani and Anciaes 2012: 11). This has implications for the state's balance of payments. The following contraction of the economy to restore equilibrium after an oil price spike will have further effect on GDP and economic growth (Bacon 2005: 1). At the same time, an increase in the price of oil will increase purchasing power and consumer demand in oil exporting states. Through trade between importers and exporters, the adverse economic effects of a price shock on oil importing states may be restrained. Rasmussen and Roitman find that an increase in the price of oil is associated with increases in imports and exports in both importing and exporting states (2011: 8). This reflects what they call the recycling of petroleum-dollars, indicating that through increased imports, remittances and investments, dollars are flowing from oil exporting states back to oil importing states. Historically, however, this effect has not been enough to offset the development in oil importing states because the increase in demand in oil exporting countries have been smaller than the

reduction in demand in oil importing states (Brown, Yücel and Thompson 2002: 3).

In this section, I have shown how an increase in the price of oil is thought to affect the oil importing economy in order to create an understanding of the economic changes that the population is exposed to during an oil price spike. A steep increase in the price of oil can be expected to have an adverse effect on several macroeconomic indicators, such as growth, inflation and unemployment. This can be said to constitute a change in the circumstances for the individuals that make up the population of the oil importing state. This contextual change has implications on the micro level, which may explain how people are affected and why they would want to demonstrate. Oil based products and oil intensive products are used to a great extent in people's daily life, from heating to petrol to the manufacturing of hundreds of goods, making it more expensive to live. In this regard, the association between oil prices and food prices may the most important, seeing as an oil price change often constitutes a change in the costs of good which are necessary for survival. Because fuel prices are so transmittable, the consequences of volatility are far-reaching in nature, affecting producers and consumers alike. Every citizen of an oil importing state will be affected through the mechanisms presented here, either directly, indirectly or both. However, oil exporting and oil importing countries both subsidize petroleum product prices through implicit as well as explicit policies (Baig, Mati, Coady and Ntamatungiro 2007: 11). Additionally, as I have previously pointed out, both types of states hold inventories, although it is costly. This indicates that governments acknowledge the far-reaching consequences of oil price shocks and wish to pacify the population. Yet, inventories are not sufficient to offset the rigidity of demand and supply, and oil subsidies have been criticized for being inefficient and poorly targeted (Smith 2009: 155, Baig et al.: 11). Try as they may, governments may not be capable of sufficiently countering the effects of a negative oil price shock. In the extension of sections 3.1 and 3.2, section 3.3 will build a bridge between the effects of oil price fluctuations and the propensity to demonstrate against the government.

## 3.3 Grievances and Demonstrations

Hitherto, the paper has focused on explaining the mechanisms that expose the vulnerability of oil exporting and oil importing states to fluctuations in the price of oil. I have argued that oil price fluctuations have consequences for people and society in both oil exporting and oil importing states. Now, the focus turns to their reactions. This section sets out to look at why

and when people protest. It can be viewed as an effort to make a link between state vulnerability to oil shocks and political protest at the macro level. At the micro level, theory on the participation in political protests needs to evade the problem of collective action. However, this is not a paper at the micro level. The focus must lie at the relationship between boom/bust cycles and demonstrations, and hence at the macro level. The problem will thus be noted, but as the occurrence of demonstrations is empirically proved, I will simply proceed to explain account for anti-government demonstrations at the macro level.

Grievances have been highly criticized as a transmission channel for civil war (see for example Fearon and Laitin 2001, Collier and Hoeffler 2003). Anti-government demonstrations, however, can be defined as an act of collective action which publicly signal a grievance against the incumbent government or their policies (Hendrix, Haggard and Magaloni 2009: 6). Demonstrations is an inherently different phenomenon than civil war, distinguished by the lower intensity as well as the lesser cost of mobilization and participation. In order to explain why and when people become aggrieved, I will employ Davies' J-curve and account for relative deprivation. It has been stated that grievances is a common condition in risk prone countries (Regan and Norton 2005: 8). Davies' J-curve offers an extension of the grievance-perspective by including the element of timing. By explaining when relative deprivation occurs, Davies incorporates the criticism and turns it to an advantage. J-curve theory was originally developed to account for the occurrence of revolution. I argue that the J-curve theory is applicable also to anti-government demonstrations because both phenomena represent states of political instability which are rooted in a grievance against government policies or the state itself, however at different levels of intensity and violence. Grievances may be a common condition in risk prone countries, but adverse economic shocks can explain when relative deprivation leads to demonstrations.

### 3.3.1 Davies' J-curve

James C. Davies draws on insights from theorists Alexis de Tocqueville and Karl Marx in building a framework for explaining the timing of revolutions (1962). He proposes that political stability and instability are closely associated with the trajectory of economic and social development. In his own words: "Revolutions are most likely to occur when a prolonged period of objective economic and social development is followed by a short period of sharp reversal"

(Davies 1962: 6). The logic is built upon the feelings of expectation and frustration that accompany good and bad economic times respectively. Preceding actions of revolution or demonstration is a period of relative prosperity, giving people the opportunity and ability to satisfy a rising number of needs. Simultaneously, expectations about future economic and social circumstances are created and raised. However, if a period of sharp economic decline succeeds, these expectations are in danger of remaining unfulfilled. Instead, one experiences a relapse and a backwards development in circumstances, causing frustration and, in some cases, anxiety. As the gap between people's expectations and their perception of what they actually will be able to obtain grows, the likelihood of demonstration rises. This temporal comparison of perceived and expected personal circumstances can be embodied in the concept of relative deprivation. The combination of economic and psychological factors explains how temporal changes in economic indicators like income, the cost of living and welfare goods affect absolute and perceived perceptions of one's personal situation, and results in the manifestation of these feelings in anti-government demonstrations (Hendrix et al. 2009: 6). As people compare their current situation with past experiences and future prospects, they feel deprived when the perceived current and future situations are considerably worse than before. Demonstrations are thus thought to occur when a period of adverse economic development succeeds a period of economic prosperity.

As previously pointed out, the fluctuations in the price of oil tend to provide just this situation in countries which are vulnerable to oil price shocks. In oil importing countries, a sudden steep increase in the price of oil equals a tax on consumption and a loss in purchasing power. In oil exporting countries, a bust-period equals a loss of important revenue for any state dependent on oil rents, and may cause unemployment, reduced income levels and even a reduction in welfare services provided by the government. For both groups of countries, then, a negative oil price shock will constitute a period of reversal in economic and/or social development. The experience of frustration and broken expectations may be worse in oil exporting countries, because resource abundance in itself creates hopes and anticipations for the future, causing a bigger gap between expectations and the current reality. This gap may be further reinforced by government spending volatility. In prosperous times, government spending is often allowed to increase, creating expectations which cannot be met as revenue falls. Oil importing countries are not affected by issues of economic rents, but the population may experience unemployment, decreased wages and higher costs of living. Because oil prices are so transmittable, the consequences are thought to be far-reaching. For a demonstration to

occur when the consequences of the oil price shock hits, it is necessary that the affected are many, so that they are able to join forces and express their frustration, and in sections 3.2.1 and 3.2.2, I argued that this is likely to be the case (Davies 1962: 6).

Jacques J. A. Thomassen develops the J-curve framework further in his article "Economic Crisis, Dissatisfaction, and Protest" from 1990. Although he is focused upon parliamentary democracy, he makes some points which are relevant to anti-government demonstrations as well. First, relative deprivation should be translated politically, meaning that people should hold government responsible for their dissatisfaction (Thomassen 1990: 123). And furthermore, their personal dissatisfaction should lead to dissatisfaction with government policy (ibid.). These points build the bridge between a dissatisfied population and demonstrations directed towards the government. As the next two paragraphs will show, I argue that governments will be held responsible for the consequences of an oil price shock in oil dependent as well as oil importing countries. The government will certainly not be to blame for the price shock itself, but through its policies governments can be held responsible to the people for its response to the shock, as well as the consequences that the shock may cause.

In oil exporting countries, the government is the distributor of oil rents and welfare goods. Because economic and political power tend to be concentrated in oil extracting states, governments can be held responsible by the population for public economic welfare, to the extent that any policy may remedy the situation. The government is the only institution which is able to reduce symptoms of Dutch disease to make the country less dependent upon oil and less vulnerable to oil price shocks. For these reasons, it is natural that people in these states hold their government responsible and that economic dissatisfaction caused by oil price shocks also causes a dissatisfaction with government policy. In states that are dependent on oil rents it will take time to sufficiently respond to a negative shock because government income varies with oil revenue. Ramping up the production cannot be done overnight. As the bust-period hits and the population experience a drop in welfare indicators, demonstrations ensue to signal discontent and to urge (further) government intervention.

In the case of oil importing states, the link between the state and the responsibility for dissatisfaction may be less clear. However, one should distinguish between personal and societal problems. The government is responsible for societal problems, but has little responsibility for personal problems (Thomassen 1990: 125). Because the consequences of an oil price spike is so far-reaching in nature, the adverse consequences of an oil price shock must

be classified as a societal problem. To the extent that people distinguish between personal and societal problems, the government will be perceived as responsible even in oil importing countries. Governments in several countries take responsibility of these societal problems by working to diminish the impact of such shocks through subsidizing the price of oil and oil based goods. This reinforces the view that governments and their chosen policy should and do take responsibility for such problems.

## 3.4 Empirical Examples

The previous sections have been concerned with the theoretical framework. This section exemplifies the mechanisms presented in sections 3.1-3.3 by describing a handful of occurrences where oil price fluctuations is thought to be the trigger of political instability. Due to the largely indirect effects of oil price volatility, identifying instances where oil price fluctuations are the main causal factor of grievances causing demonstrations can be tricky. However, the following examples illustrate how important oil prices are in exporting and importing countries alike.

During periods of low oil prices, governments in countries that are dependent on oil may struggle to cover their expenses, such as subsidies and extensive welfare programs. This can be compared to the situation which arises in any country (regardless of status as importer or exporter of oil) when subsidies are reduced or even completely cut. One example is the situation in Sudan in 2012. After the secession of South Sudan (and with it, approximately 75 percent of the oil reserves), the Sudanese government was forced to cut fuel subsidies as well as government jobs, causing people to demonstrate and protest in several Sudanese cities (IRIN 2012a). Likewise, Jordan experienced demonstrations and strikes in the capital and at least 12 other cities in 2012, when the government cut subsidies in order to offset $5 billion in losses from rising fuel bills (IRIN 2012b). In Nigeria, similar reactions arose when the government ended a fuel subsidy-program that constituted approximately 25 percent of the national budget, leading to a sharp increase in the local price of oil and other oil intensive products (Nossiter 2012). These issues are likely to be relevant also in the future. Several countries that are dependent on oil rents continue to follow the government spending pattern described in section 3.2.1.2, putting them at risk to experience a higher number of anti-government demonstrations

during low price periods in the future. In Saudi Arabia, for one, total government expenditures increased from US$1.6 billion in 1970 to US$158.9 billion in 2010 in order to meet the growing welfare needs of the population (Alshahrani and Alsadiq 2014 :4). And yet, subsidies and welfare spending have been further boosted after the Arab Spring emerged in 2011, causing the country to depend on oil prices of nearly US$100 per barrel in order to balance the budget (Hargreaves 2013). Iran, Venezuela and Nigeria are all in similar situations (ibid.). When (oil) revenues dry out and governments need to cut expenses, the population pays the price, causing popular dissatisfaction and encouraging demonstrations.

There are also several instances in which the effects of high oil prices not caused by a change in subsidy levels have led to political protests and anti-government demonstrations. For instance in 2008, when fishermen, farmers and occupational drivers in several European countries protested against the high fuel prices and urged their governments and the European Commission to take action (Ira and Lantier 2008). Protests do not only occur among producers experiencing increased production costs, higher oil prices affect consumers as well. In 2011, rising oil prices caused the price of several different food commodities to increase in Kenya, encouraging hundreds of people to demonstrate against the government (Integrated Regional Information Networks 2011). Likewise, higher costs of living due to increased prices of basic commodities like rice, oil and fuel drove people out in the streets to demonstrate in Burkina Faso several times during 2011 and 2012 (IRIN 2012b). These are only a handful of empirical examples. Their purpose is to illustrate how the effects of oil price increases can affect different sections of the population and thus provoke demonstrations in countries of all income groups.

## 3.5 Hypotheses

On the basis of the theoretical framework described above, I have formed two testable hypotheses.

In section 3.2.1, I argued that dependence on oil rents can have adverse consequences for the competitiveness and the robustness of the host economy. Economies which experience an overreliance on the resource sector are therefore vulnerable to economic shocks, such as a decrease in the price of oil. I then made the link between oil dependence and government spending volatility and the lack of economic diversification. Increasing production to create

extra revenue will demand time. Provided that a possible subsidy or loan is insufficient, people will be affected by the economic contraction through indicators like income and unemployment. The J-curve theory has shown that periods such as these may cause relative deprivation and demonstrations. $H_1$ is therefore as follows:

$H_1$: Countries that are dependent on oil rents experience higher levels of anti-government demonstrations during bust-periods.

While oil dependent countries experience negative consequences in the bust-period, oil importing countries experience negative economic consequences in the boom-period. High oil prices are thought to affect individuals indirectly through macroeconomic indicators such as growth and inflation as well as more directly on the micro level. Because oil based products and oil produced products are used to such a great extent in people's daily life, an increase in the price of oil will make living more expensive. Thus, $H_2$ is presented:

$H_2$: Resource scarce countries experience higher levels of anti-government demonstrations during boom-periods.

# 4 DATA AND METHODS

In this chapter, I present the methodological and practical choices that I have made in order to empirically explore my hypotheses. The first section accounts for the operationalization of the theoretical concepts that will be employed in the analysis. Second, I present the estimation specification and discuss the methodological issues relevant to this paper. More specifically, I devote space to deciding between the Poisson estimator and the Negative Binomial estimator as well as the issue of fixed- and random effects. Lastly, I present the assumptions of the Negative Binomial Time-Series Cross Section and discuss their potential impact upon the analysis.

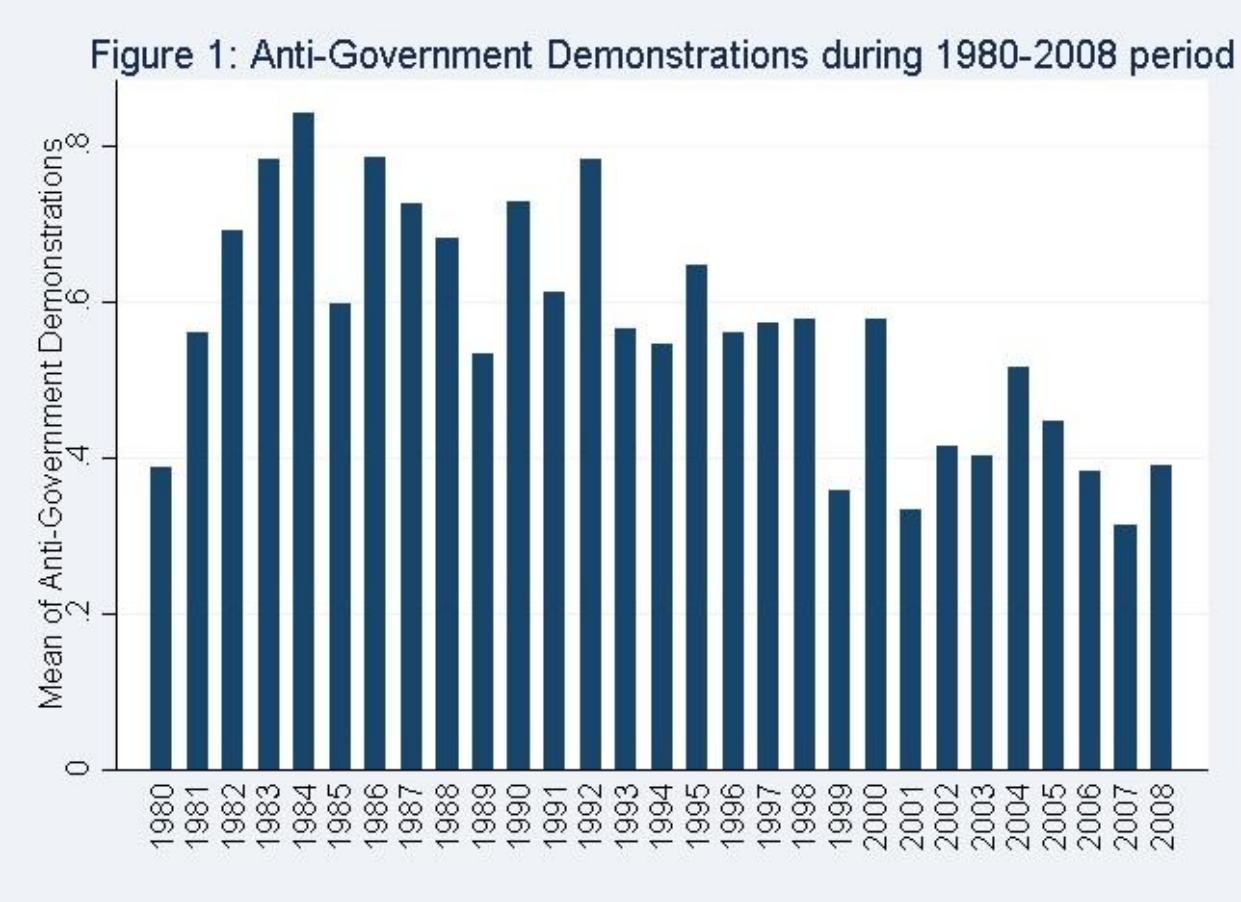
## 4.1 Data and Operationalization

### 4.1.1 Dependent Variable

The theoretical argument presented in chapter 3 asserted that grievances and relative deprivation may occur in periods of high and low oil prices in oil importing and exporting states respectively, due to the effects of fluctuating oil prices. Grievances trigger protests and anti-government demonstrations when the population holds the government responsible for its policies.

My dependent variable is an event count on anti-government demonstrations, *antigovdemonstrations,* sourced from Arthur Banks Cross-National Time-Series Data Archive (CNTS hereafter). The operationalization of protests and social unrest in similar instability studies differ in their degree of displayed violence. While some prefer to separate non-violent occurrences from violent incidents (such as Smith 2004: 235, Regan and Norton 2003: 17), others employ a joint measure of incidents with various degrees of violence (for example Hendrix et al. 2009: 20, Smith 2013: 6). This analysis looks at non-violent anti-government demonstrations only. Accordingly, the dependent variable is defined as any peaceful public gathering of at least 100 people for the purpose of displaying or voicing their opposition to government economic policies, excluding demonstrations of a distinctive anti-foreign nature (CNTS Data Archive). My theory suggests that people will hold the government and its policies responsible for the economic woes which are caused by oil price fluctuations. The *antigovdemonstrations*-variable is thus suitable in this case because it captures dissatisfaction

against the government and its policies while excluding demonstrations and grievances directed towards other (intra- or interstate) causes of dissatisfaction. According to the CNTS data set, at least 100 people need to demonstrate in order for the event to be counted. The number of demonstrators required is relatively high, but works here to account for the extensive effects of oil price changes. For these reasons, Arthur Banks' anti-government demonstrations variable should be considered a valid measure of political instability on a lower level, especially suitable for this analysis. Figure 1 captures the trend of anti-government demonstrations over the years. As can be seen, there is a general declining trend in anti-government demonstrations in the 1990s and 2000s in comparison to 1980s. Overall, the sample mean is 0.55 demonstrations per year with a maximum value of 26 with a minimum value of 0.



### 4.1.2 Independent Variables

The main explanatory variables in this analysis are both oil related. The first is a measure capturing a country's dependence on oil. The second measures international oil prices over the study period.

The oil dependence variable, *oilrents*, measures total oil rents as a share of GDP and is sourced from the World Bank's World Development Indicators-data (2013). Oil rents are defined as the difference between the value of crude oil production at world prices and total costs of production (WDI 2013). Following Basedau and Lay (2009: 760), I differentiate between oil dependence, understood as the importance of oil relative to other value-adding activities, and oil abundance, being the absolute oil rents measured in per capita terms. Oil dependence, not abundance, is linked to the Dutch disease framework and the government spending volatility mentioned in theory section 3.2.1.2. My theory stated that as the economy's dependence on oil increases, so does its vulnerability to fluctuations in oil price. For this reason, I employ a measure of oil rents as a percentage of GDP in this study. This is generally seen as a valid measure of oil dependence because it captures oil rents' impact on both domestic economy and export-revenue (Smith 2004: 236).

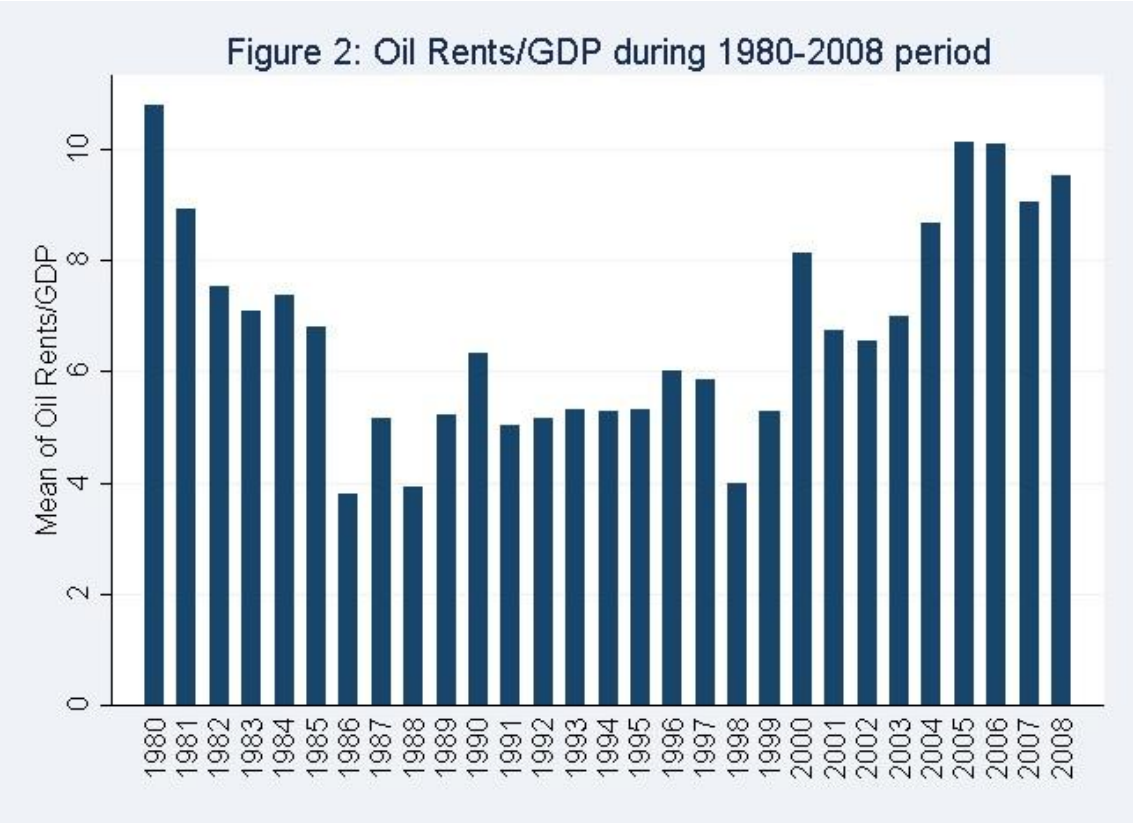
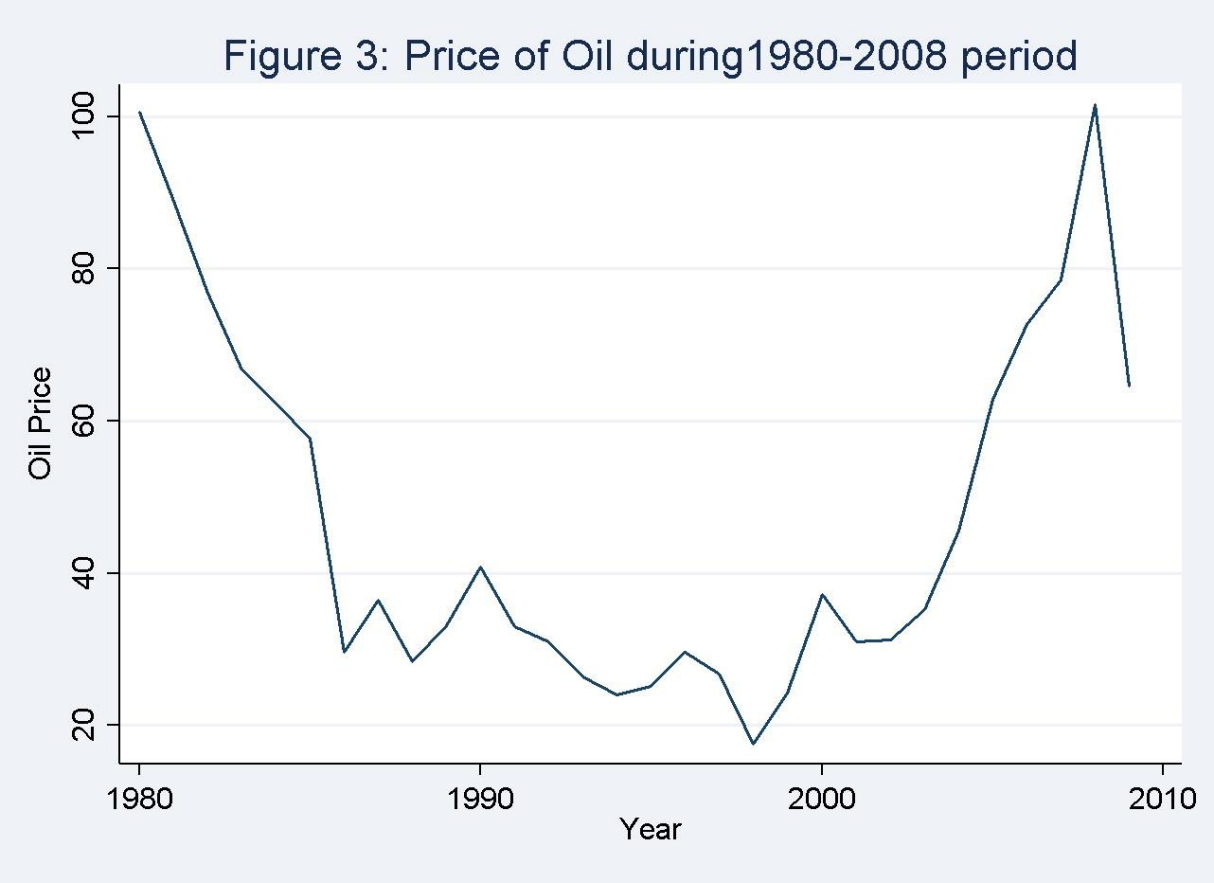


Figure 2 shows the mean of oil rents as a share of GDP during the study period. It shows an increasing trend from the late 1990's onwards. It is interesting to note that the rise in the mean of oil rents coincides with the drop in the average number of anti-government demonstrations illustrated in Figure 1, working as a preliminary indicator of an association between oil rents and anti-government demonstrations. More precisely, it seems like oil dependent countries experience lower levels of demonstrations compared to countries that do not have access to natural resources like oil, as noted by Smith (2004: 241). The oil dependence-variable has a sample mean of 6.74 percent. The minimum value in the sample was 0, while the maximum value was an oil rents share of 80.64 percent of GDP.

The oil price data was gathered from British Petroleum, and measures the price of crude oil in dollars per barrel in 2011-prices (British Petroleum). Figure 3 illustrates the price of oil during the 1980-2008 period. Like expected, the oil prices have been volatile during the study period, ranging from a minimum value of US$17.55 and a maximum value of US$101.61, the mean being US$47.3.



The oil price-variable has been recoded into two dummy variables to capture the boom and bust effects of the oil price cycle. Studies conducted on food prices and protest often measure food prices by the annual percentage change, see for example Hendrix et al. (2009) and Smith (2013). The annual percentage change can be thought of as a direct measure of the year-to-year relative deprivation. However, in countries that are dependent on oil rents, government income will be undoubtedly lowest during periods when the absolute price of oil is low. Suffering from Dutch disease effects and spending volatility, the effects on political stability can thus be thought to be greater when the oil price is the lowest than when the percentage drop is the highest, because this is when the government needs to cut expenses. It is also important to capture years in which the percentage change may be small, but where the price of oil is still at a low point. Likewise, in oil importing countries, high absolute prices will lead to correspondingly higher costs of living. Furthermore, I believe that relative deprivation is not rigidly assessed from one year to the next, but rather that the current situation is compared to other situations within a certain time span. For this reason, I employ absolute prices in this study, recoded into two dummy variables to capture the boom and bust periods. In order to generate the dummies, a cut-off point/definition of a high and low price period must be in place. The high price-dummy was created on the grounds of a natural cutoff point in the oil price-variable's distribution. As can be seen by Figure 7 in Appendix 1, a natural point can be found at US$63. The cutoff point is thus set here. The variable *boom* measures periods of high oil prices. Years in which the price exceeds the 63 US$-limit has been coded 1, while the rest have been coded 0. Similarly, the *bust*-variable is a measure of the bust-period, when oil prices are low. Seeing as such a large number of the observations lie between US$20 and 40, it was impossible to obtain a natural cutoff point for this variable. Rather, one must be chosen. Because it is crucial that the variable captures only years in which the price of oil is very low, the cutoff point for low price periods has been set at 24.69 dollars, at the $10^{th}$ percentile. Accordingly, years in which the price of oil has fallen below US$24.69 has been coded 1, and the remaining years have received the value 0. The cutoff points presented here are thought to adequately capture the boom- and bust periods because they represent rather rare occurrences in which the oil price is at one of its highest/lowest points during the study period.

### 4.1.3 Control Variables

Following established literature on determinants of political instability, I control for the following variables[2]:

Two control variables measuring economic development are included in the models. First, the variable *lngdppc* is included to control for per capita income. GDP per capita is often used as a proxy for economic development and will capture economic welfare levels that distinguish developed and developing countries (Fearon and Laitin 2001: 10). The variable employed in this analysis is sourced from the World Development Indicators, and measures the gross domestic product measured in constant 2005 US$ prices divided by midyear population (2013). In order to correct for the skewness of the data, the variable has been logged. A higher per capita income has been found to be robustly associated with civil war onset in a sensitivity analysis conducted by Hegre and Sambanis (2006: 524). I thus expect a negative relationship between GDP per capita and anti-government demonstrations.

Second, I include an economic growth variable. Previous sections pointed out that shifts in the economic conditions could be an important factor in determining the timing of demonstrations and protests, and the growth rate is a direct measure of the economic trajectory of a country. Economic growth is related to the pace of improvement in economic conditions, affecting indicators such as rising average income levels and even unemployment rates (Hendrix et al. 2009: 9). Although the causal relationship between economic growth and political instability is somewhat uncertain, several studies have found a negative correlation between economic growth and political instability (see for example Alesina, Özler, Roubini and Swagel 1996, Miguel, Satyanath and Sergenti 2004 and Collier and Sambanis 2002). The variable *gdpgrowth* from World Development Indicators, measuring the annual percentage of GDP growth, is hence incorporated in the models (WDI 2013). In accordance with earlier research, a negative sign is expected from this variable.

Third, a measure of the government's final consumption expenditure is included in the models. The variable *govtfinalconsumption* is sourced from WDI and measures the government's current consumption expenditures as a percentage of GDP (2013). Consumption expenditures include goods and services as well as defense and security, but excludes military

[2] Variable overview and descriptive statistics for all variables can be found in Table 3 in Appendix 1.

economic costs. As such, *govtfinalconsumption* captures government spending volatility in the broadest sense. The theory section suggested that governments in oil dependent states will suffer from government spending volatility following the fluctuations in the price of oil and that boom periods would be characterized by excessive public spending. It was also pointed out that both oil importing and oil exporting countries often subsidize the price of oil. Final expenditures may work as a proxy for subsidies, seeing as these costs will be included in the final consumption expenditures-post along with every other expense. Although an indirect measure, a direct measure of oil subsidies has proven to be hard to obtain. Higher government consumption spending is expected to be associated with lower demonstration levels.

One last economic variable, *inflation*, is added to control for inflation. Dutch disease theory predicts high levels of inflation in resource abundant countries, and as such this effect should be controlled for. Furthermore, it has been shown that oil importing countries are exposed to inflation during price shocks as well (Barsky and Killian 2004). The inflation variable was obtained from the U.S Economic Research Service, and is a measure of the change in Consumer Price Indices for all consumer goods and services, with 2005 as the base year (United States Economic Research Service). The inherent skewness of the variable has been countered with the formula applied by Vadlamannati and de Soysa (2013): [(p/100)/(1+(p/100)] where p represents the consumer price index. This is intended to control for extreme values in the sample.

Next, two demographic variables are included. First, following other studies on political instability, a variable measuring the size of the population, *lnpop*, is controlled for (Fearon and Laitin 2003, Basedau and Lay 2009, Hendrix et al. 2009). *Lnpop* is a logged measure of the total population size sourced from the World Bank Indicators (2013). Previous research have found a positive correlation between population size and political instability and several causal mechanisms have been proposed (see Hegre and Sambianis 2006: 524, Smith 2004: 237, Regan and Norton 2003: 20, Hendrix et al. 2009: 22, Hegre and Raleigh 2007: 2). Among them, it has been argued that larger populations will generate greater pressure on governments to deliver public services. Supporting this notion, Helen Ladd found that public spending generally increased in highly populated areas in her study on American counties (1992: 273). I thus expect a positive sign for *lnpop*, meaning that states with larger populations experience a higher number of demonstrations.

The second variable measures population concentration. People living in highly

populated areas are more likely to organize protests and demonstrations because they overcome collective action problems more easily (Hegre and Raleigh 2007: 8). Close proximity eases communication, coordination and transportation while lowering organizational costs. This also allows for discontent to spread and even escalate through interaction, and ensures that the cost of joining the protest is kept low. Typically, urban areas hold larger numbers of people within a restricted space, so demonstrations and protests should be easier to organize in these areas. I thus include the variable *urbpop*, sourced from World Development Indicators, measuring the share of urban population to total population, expecting to find that larger shares of urban population is associated with a higher number of anti-government demonstrations (WDI 2013).

With respect to political variables, *polity2* is included to control for regime type. Intuitively, it is plausible that protest levels are affected by regime type. One line of argument asserts that while authoritarian regimes are able to suppress dissent and citizens of democracies have multiple channels to influence the government, hybrid regimes are often in a transitional state without the means to employ either strategy (Fearon and Laitin 2001: 25, Hendrix et al. 2009: 5). In accordance with this, Hendrix, Haggard and Magaloni have found that democracies experience higher levels of protest than autocracies, but levels of protest were even higher in hybrid anocracies than in democracies (2009: 5). Additionally, regime type works as a proxy for institutional framework, seeing as different regime types are associated with different types of institutions. Taken from the Polity IV data set, the *polity2* variable measures the prevailing regime type in a given country on a scale from -10 to +10 (Polity IV Project 2011). -10 indicates a full autocracy, meaning a regime which restricts or suppresses competitive political participation, with few or no institutional constrains on the executive branch (ibid). +10 is the score of a full democracy, a regime in which electoral institutions and procedures are established, where civil liberties are respected and there are institutionalized constraints on the executive power in place (ibid.). Because theoretical notions and empirical evidence indicate a non-linear effect of regime type on protest levels, *polity2* has been recoded into a dummy set consisting of three categories. Regimes with a polity score of -5 or less are coded as autocracies. Similarly, regimes with a polity score of 6 or more are coded as democracies. The regimes with values in between are labeled anocracies, and constitute the reference category.

Lastly, I consider a measure of civil war because political instability on one level may cause spillover effects. Including a civil war-variable in a study on demonstrations cannot tell us whether civil war causes a higher level of anti-government demonstrations or vice versa,

only that instability on one level correlates with instability on another level. Yet, ignoring a possible association between the two would lead to omitted variable bias. The civil war variable used here is sourced from the Uppsala Conflict Data Program's data set, and measures the incidence of intrastate conflict (Onset of Intrastate Armed Conflict 1946-2011). Accordingly, *civilwar* is a dummy variable, coded with the value 1 for each country-year that there is an active conflict, and 0 otherwise (UCDP 2012). I expect a positive sign for this variable, showing that political instability on the level of civil war is associated with political instability on the level of protest and demonstrations.

## 4.2 Estimation Specification

In order to empirically test my hypotheses, I employ a Time Series Cross-Section (TSCS) data set covering 122 countries over the 1980-2008 period (28 years). Because observations are made on several units over time, TSCS data will allow more complex and realistic models (Beck 2008: 474, Baltagi 1995: 5). Due to the focus on timing of political instability, the time-series dimension of the dataset is central. The cross-sectional aspect offers the opportunity to distinguish between units on account of certain characteristics, in this case importers and exporters of oil. Together, the units and time points ensure a large N and improve the ability to prove causality and (Beck 2008: 475, Menard 1991: 17). Accumulated, there are 2898 country-year observations in this sample.

TSCS samples with a medium to large number of units are generally characterized by country heterogeneity, meaning that countries differ in characteristics other than those measured by the explanatory variables (Beck 2001: 282). As this sample includes 122 countries it would be incorrect to assume that all units are homogeneous. If unit heterogeneity is left untreated, unmeasured unit specific characteristics may affect coefficients. The problem is addressed by employing either fixed or random effects, two techniques which reduce omitted variable bias without using theoretical explanatory variables. In TSCS estimations, fixed effects are generally viewed to be the appropriate estimator because it allows inferences to the observed (fixed) units (ibid.: 284). Random effects, on the other hand, assume that the variation across units is random and is thus more appropriate when the observed units can be viewed as a sample drawn from a larger population (ibid.: 283-284). In order to choose between fixed- and random effects, a

Hausman test was performed (see Table 5 in Appendix 1). The test result shows a significant Hausman statistic, rejecting the null hypothesis that fixed- and random effects are no different, and accept the alternative hypothesis that random effects are inconsistent. Fixed effects is therefore preferable in this case. The fixed effects are represented by an intercept dummy variable specific to each country (N-1) in the sample. The dummies control for observed as well as unobserved time-invariant attributes of the units. As such, country fixed effects will have multicollinearity issues with any explanatory variable that is country invariant or changing slowly by time (Beck 2001: 285). It is therefore noteworthy that one of my main independent variables, the measure of oil rents, as well as some of the theoretically interesting control variables are nearly time-invariant. The two remaining independent variables, the high/low price dummies, are country invariant. If left in the analysis the fixed effects would cause problems of collinearity as well as generate biased estimates (Beck 2001: 285). Because of this evident trade-off, the main models will not include unit specific fixed effects. Despite the significant Hausman result I employ random effects in my models. The random effects are represented by a composite error term, consisting of two parts (Kennedy 2008: 284). The first part measures the extent to which a certain country's intercept differs from the overall intercept, while the second part is the traditional error term (ibid.: 284). This allows for the inclusion of time-invariant variables while controlling for country heterogeneity. Random effects are known to be biased when the error term is correlated with the explanatory variable(s) (ibid.: 285). However, not attempting to model country heterogeneity would be more problematic. The models will also include time fixed effects in order to control for common-year economic shocks.

The baseline specification estimates the number of anti-government demonstrations ($agd_{it}$) in country *i* in year *t* as a function of a set of my hypotheses variables $h_{it}$ and other control variables, $Z_{it}$:

$$agd_{it} = \gamma h_{it} + \beta Z_{it} + \lambda_t + \omega_{it} \qquad (1)$$

Where $\lambda_t$ denotes time specific dummies, $\omega_{it}$ is the error term and the $Z_{it}$ represents the vector of control variables.

Because the dependent variable ( $agd_{it}$ ) is a non-negative integer, counting the number of anti-government demonstrations in country *i* in year *t*, I employ an event count regression estimator. The Poisson regression is generally considered the starting point for count data analysis. However, the model is often too restrictive for count data (Cameron and Trivedi 1999: 2-5). First, there is the problem of excess zeroes, referring to a situation in which the observed sample contains more zeroes than the Poisson distribution predicts (ibid.: 5). Second, the Poisson estimator will be deficient if the data is overdispersed, a condition in which the variance is greater than the mean (ibid.: 5). As is illustrated in Figure 6 in Appendix 1, the data on anti-government demonstrations is strongly skewed to the right with an accumulation of observations at zero. A closer look reveals that 77.4 percent of the observations are country-years counting zero anti-government demonstrations, meaning that the sample does display excess zeroes. Furthermore, the data are overdispersed, with a mean of approximately 0.55 and a variance of about 2.56. As such, Poisson regression is not applicable in this case. The equidispersion presupposed by the Poisson model implies that the anti-government demonstration events are independent, meaning that the occurrence of one demonstration does not affect the probability of the event occurring in the future (Long 1997: 219). This assumption is clearly breached, because some countries will have a greater propensity to experience a larger number of anti-government demonstrations. Mathematically, this results in a variance which is greater than the mean because such heterogeneity is not accounted for (ibid.: 221). For data with these characteristics, and where there is no reason to believe that the zero counts are generated by a different process than the positive counts, the Negative Binomial model is relevant (ibid.: 242). The Negative Binomial estimator models in overdispersion with a random error term, meaning that variations in the distribution are caused by variations in the explanatory variables as well as by unobserved heterogeneity (as introduced by the random error term) (ibid.: 231). Because the Negative Binomial distribution has a conditional variance which is higher than in the Poisson distribution, the relative frequency of low counts increases (ibid.: 233). This makes the Negative Binomial model more fit to samples with a higher number of zeroes. Note also that the 'goodness of fit' test supports the Negative Binomial over the Poisson estimation (see Table 7 in Appendix 1)[3]. For these reasons, the regressions will be estimated using a Negative Binomial estimator.

3 The Pearson Chi-Square goodness-of-fit test ensures the selection of the correct statistical model by identifying the distribution of the data (Piza 2012). The significant p-value asserts that the distribution of anti-government demonstrations differs from a Poisson distribution, favouring the Negative Binomial model.

### 4.2.1 Interaction Effects

My theory suggested that the effect of oil prices (boom/bust periods) on political instability will be conditional upon the level of oil rents, id est whether the country is an importer or an exporter of oil. More specifically, my hypotheses stated that low price periods are thought to be associated with higher levels of anti-government demonstrations in countries that export oil (oil rents > 0), while high price periods are thought to be associated with higher levels of anti-government demonstrations in countries that import oil (oil rents = 0). Therefore, two interaction terms modeling the interaction between oil rents and high and low price periods respectively are included in the analysis, as shown by equations (2) and (3) below:

$$agd_{it} = \gamma\, rents_{it} + \varphi(rents \times highp)_{it} + \beta\, highp_{it} + \beta Z_{it} + \lambda_t + \omega_{it} \qquad (2)$$

$$agd_{it} = \gamma\, rents_{it} + \varphi(rents \times lowp)_{it} + \beta\, lowp_{it} + \beta Z_{it} + \lambda_t + \omega_{it} \qquad (3)$$

Where $(rents \times highp)_{it}$ and $(rents \times lowp)_{it}$ are the interaction terms between oil rents and the boom and bust-period. Like before, I control for time fixed effects. The interaction terms will be interpreted by examining margins plots.

## 4.3 Assumptions

All quantitative techniques are based on certain assumptions. When these are met, our estimates are known to be both reliable and efficient. Therefore, it is important to ensure that the data meet the requirements that are set by these assumptions. Any potential breaches of such assumptions should be corrected for, if possible. This section will deal with the underlying assumptions of Count Data TSCS.

Like linear regression, count data regression also have certain assumptions about the distribution of the variable. In the previous section, I argued and explained why the Negative Binomial estimator is a better fit for these data than the Poisson regression. Therefore, this issue

will not gain any attention here.

### 4.3.1 Multicollinearity

First, the absence of multicollinearity is assumed. Multicollinearity can be defined as a high intercorrelation between two or more of the explanatory variables (Field [2000] 2009: 223). Because each variable contributes with little unique variance, it becomes impossible to obtain the correct estimates of the explanatory variables in question (ibid.: 223). As multicollinearity increases, then, so do the standard errors of the b-coefficients or marginal effects. This is usually fixed by dropping one of the collinear variables. Multicollinearity commonly occurs with variables constituting an interaction effect. However, in the case of interaction terms and square terms, multicollinearity is thought to have no adverse consequences because the p-value of the interaction is not affected by it.

To check for multicollinearity, a correlation matrix of all the predictor variables was scanned. The matrix can be found in Table 8 in Appendix 1. Following Andy Field, I define problematic cases as variables with a value of 0.8 or higher ([2000] 2009: 224). Only one variable pair approaches this limit. The correlation between *urbpop* and *lngdppc* is 0.78. However, because *urbpop* and *lngdppc* are not included to measure similar theoretical aspects, I keep both variables in order to preserve their substantial and theoretical meaning.

### 4.3.2 Autocorrelation

Second, TSCS data is known to have frequent problems with autocorrelation, or correlation between the residuals of two or more observations in the model (Field [2009] 2011: 781). The error terms represent omitted variables, factors that are not explained by the independent variables, and correlated error terms is a sign of a common omitted variable (Beck and Katz 2011: 339). When these influences persist over longer time periods, the error terms will correlate with the error term subsequent in time (Hamilton 1992: 119). In TSCS, autocorrelation normally means correlation between the residuals within states, over time. If not detected and corrected for, autocorrelation biases the standard errors and t-tests of the analysis, causing a higher probability of rejecting the null hypothesis (ibid.: 120).

To the extent of my knowledge, there is no technically correct way to test for autocorrelation using a Negative Binomial TSCS model in STATA 13.1. However, knowing

that TSCS data often have such problems, it is important to be aware the data are likely to have some autocorrelation problems. In econometrics, including a lagged variable (LDV) is generally seen as an appropriate way to model autocorrelation. An LDV $y_{i, t-1}$ will most likely lower the degree of autocorrelation because it works as an explanatory variable containing the omitted variables at time *t*-1 (Beck and Katz 2011: 339). In other words, the unobserved variables are turned into a non-theoretical observed variable. The advantage of this solution is that it allows for serial correlation to be modeled in by an interpretable coefficient which additionally controls for any omitted lagged effect. However, the inclusion of LDVs to model dynamics and/or autocorrelation is subject to controversy. An LDV may bias the estimates by absorbing explanatory power from the theoretical variables, especially when time fixed effects and/or unit heterogeneity are also present (Plümper, Troeger and Manow 2005: 336, Keele and Kelly 2006: 189, Wilson and Butler 2004: 16-17). This can result in an underestimation of the effects of theoretical variables and an inflated LDV, to the point where the variable is statistically significant without having a real causal effect (Achen 2001: 4-6, 13). Furthermore, if there is residual autocorrelation present in the model after the inclusion of the LDV, estimates will be biased (Keele and Kelly 2006: 189-90, 192, Achen 2001: 5). This becomes even more problematic if the exogenous variable is simultaneously trended because it makes it impossible to determine the true effect of the LDV as well as the remaining variables (Achen 2001: 7, 9, 13-14).

Theoretically, the LDV uses the dependent variable to explain itself, which is not necessarily the aim of any paper (Wilson and Butler 2004: 13) Furthermore, in my case, the reactions to changes in the price of oil are thought to occur within a short (yearly) time frame because the effects are so extensive and because the oil prices are so transmittable. Additionally, mobilizing demonstrations is a considerably less demanding task than is mobilizing for civil war. As such, there is no theoretical reason to include an LDV. However, one cannot exclude the possibility that other factors associated with stability or instability cause the number of demonstrations the current year to be associated with the number of demonstrations last year. Due to the uncertainties surrounding LDVs and the lack of a theoretical need to employ an LDV, the main models will be calculated without an LDV. However, models with LDVs will be included as a robustness check in section 5.4.

### 4.3.3 Homoskedasticity

A third assumption of count data TSCS is homoskedasticity. Homoskedasticity refers to the constant variance of the error terms. In other words, the variance of the residuals should be constant at each level of the predictor variable (Field [2000] 2009: 220). Violating this assumption, a condition called heteroskedasticity, causes inefficiency as well as biased standard error estimates (Hamilton 1992: 116). Heteroskedasticity is common in count data, but is unfortunately not possible to test for (Cameron and Trivedi 1998: 226). Heteroskedasticity is normally easily corrected for through the use of robust standard errors, adjusted for the presence of heteroskedasticity (Beck and Katz 1995)[4]. However, robust standard errors are not compatible with the xtnbreg-command in STATA 13.1.

Unfortunately, the literature provides other solutions for autocorrelation and heteroskedasticity problems only for linear estimation techniques. For instance, serial correlation problems in an OLS estimation can be corrected for by utilizing the Newey-West estimation technique, which corrects for autocorrelation problems. Another solution may be to correct the standard errors to make them robust against heteroskedasticity and make use of clustering to relax the assumptions of independent error terms. Such alternative strategies to overcome these problems are absent in an event-count estimation technique like the Negative Binomial TSCS. Although autocorrelation and heteroskedasticity are not unproblematic issues, it is the cost for studying social phenomena using Negative Binomial TSCS.

To test the robustness of my results to the potential changes in standard errors and t-tests due to autocorrelation and heteroskedasticity, the sensitivity section in chapter 5 will present alternative models calculated with the nbreg command employing clustered and heteroskedasticity robust standard errors.

[4] In STATA 13.1, the 'robust' command is commonly used.

# 5 ANALYSIS

In this chapter, I will present my results and discuss their theoretical implications. The analysis consists of three models. Model 1, shown in column 1 in Table 1, is the baseline model with time fixed effects. It contains only the measure for oil dependence and the control variables. Table 9 in Appendix 2 shows the baseline model with both time and unit fixed effects in order to allow for comparison between the two models. Models 2 and 3, presented in columns 2 and 3 in Table 1, introduce the interaction terms and thus present the main results. Model 2 adds the interaction term between oil dependence and low oil prices. Likewise, Model 3 incorporates the interaction term between oil dependence and high oil prices.

Because the interpretation of the coefficient estimates in the Negative Binomial Regression are highly unintuitive, the results are presented as marginal effects. The marginal effect is the partial derivative of the dependent variable (Long 1997: 5). The effect of a unit change in the independent variable will differ according to the levels on the control variables (ibid.: 5). For this reason, other variables are held at their mean. The marginal effect thus tells us how much the predicted mean number of anti-government demonstrations will change for one unit change in the independent variable when all other variables are set at their means. The significance levels of the variables will be indicated by stars next to the marginal effect. Interaction terms and dummy sets will additionally be tested by a Likelihood Ratio-test (LR-test), the significance levels of which can be found in footnotes. The LR-test tests a model containing the relevant variable(s) against a model without the variable(s) to check whether the inclusion of the variable(s) significantly improves the fit of the model.

## 5.1 The Baseline Model

The baseline model presented in Table 1 shows the oil dependence-variable and all the control variables in a model with time-specific fixed effects and random effects to control for country heterogeneity. I will first comment on the main variable of interest in the baseline model, the oil dependence-variable. Next, I will comment on the control variables, starting with the insignificant before I turn to the significant.

Figures 2 and 3 in sections 4.1.1-2 gave a preliminary indication that the relationship between

oil rents and anti-government demonstrations would be negative. This indication is confirmed by the results presented in Model 1, Table 1. The marginal effect of oil rents shows that a higher share of oil rents as a percentage of GDP is associated with a lower probability of anti-government demonstrations as a mean of all countries. More specifically, a one percentage increase in oil rents as a share of GDP will cause the average number of anti-government demonstrations to decrease by 0.029. The relationship is significant at the 0.001-level. Others who have found the same correlation provide differing explanations of this phenomenon. Some have proposed that oil rents provide the opportunity for governments to relieve social pressures through popular policies in order to maintain political stability (Smith 2004: 223). Others suggest that oil rents are being used to invest in repressive apparatuses (Ross 2001: 331, 356, de Soysa and Binningsbø 2009: 21). Interestingly, the effect of oil rents is significant even as regime type is controlled for, meaning that oil rents has an independent effect on the level of anti-government demonstrations, not working through the detrimental effect that oil has on democracy (see Ross 2001, Wantchekon 2000). However, the relationship between oil rents and anti-government demonstrations may be more intricate than the oil dependence-variable alone can show. For one, my theory section argued that the effect of oil dependence need not always be stabilizing. I argued that it is likely that states with a high share of oil rents to GDP (oil dependence) may suffer from a higher number of demonstrations during periods of low oil prices. Second, the oil rents-variable alone cannot reveal anything about the relationship between oil prices and political stability in oil importing countries, which are also of interest in this paper. Theory suggested that oil importing states may experience a higher number of demonstrations during high price periods. The interaction effects in Models 2 and 3 will allow me to explore these theoretical arguments further.

Inflation has no statistically significant effect on the number of anti-government demonstrations. Although fluctuations in the price of oil may cause inflation in oil exporting as well as oil importing states, there seems to be no direct effect of this inflation on the number of anti-government demonstrations. However, inflation may be a mediating factor, influencing the level of oil dependence and thus vulnerability to oil price fluctuations through channels like the Dutch disease without directly affecting political stability.

GDP per capita (logged) was theorized to be negatively correlated with anti-government demonstrations, indicating that higher levels of economic welfare is associated with fewer grievances and therefore higher political stability. A negative effect has been robustly

associated with political stability in a number of other studies. As can be seen, this finding supports such an association. The variable displays a negative correlation, and the effect is highly significant with a p-value of 0.001. This is the first indication in this analysis to show that changes in the economic conditions has an impact on political stability.

**Table 1: Negative Binomial Models for Anti Government Demonstrations, 1980-2008**

Marginal Effects (Delta Method Standard Errors)[5]

| | Model 1: Baseline | Model 2: Bust-period | Model 3: Boom-period |
|---|---|---|---|
| GDP per Capita (ln) | -0.192*** | -0.190*** | -0.192*** |
| | (0.0731) | (0.0730) | (0.0731) |
| GDP Growth | 0.0272*** | -0.0268*** | -0.0273*** |
| | (0.00721) | (0.00724) | (0.00721) |
| Population (ln) | 0.309*** | 0.311*** | 0.310*** |
| | (0.0417) | (0.0416) | (0.0417) |
| Civil War | 0.219** | 0.218** | 0.219** |
| | (0.101) | (0.101) | (0.101) |
| Autocracy | -0.654*** | -0.658*** | -0.661*** |
| | (0.133) | (0.133) | (0.133) |
| Democracy | -0.683*** | -0.680*** | -0.679*** |
| | (0.110) | (0.110) | (0.110) |
| Inflation | -0.268 | -0.282 | -0.277 |
| | (0.245) | (0.246) | (0.245) |
| Urban Population | 0.0293*** | 0.0291*** | 0.0292*** |
| | (0.00497) | (0.00497) | (0.00497) |
| Government Final Consumption | -0.0154* | -0.0157* | -0.0155* |
| | (0.00881) | (0.00881) | (0.00881) |
| Oil Rents/GDP | 0.0291*** | -0.0305*** | -0.0267*** |
| | (0.00615) | (0.00630) | (0.00680) |
| Bust-period | | -0.163 | |
| | | (0.280) | |
| Bust-period*Oil Rents | | 0.0246* | |
| | | (0.0135) | |
| Boom-period | | | -0.0836 |
| | | | (0.274) |
| Boom-period*Oil Rents | | | -0.00802 |
| | | | (0.0103) |
| Observations | 2,898 | 2,898 | 2,898 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[5] LR-tests:Aut/Dem dummy set: LR chi2(2)=49.97, Prob>chi2=0.000. Lowprice*oilrents: LR chi(1)=2.42, Prob>chi2=0.119. Highprice*oilrents: LR chi(1)=0.63, Prob>chi2=0.4262

Furthermore, economic growth is significant at the 0.001-level with a negative sign, as expected. More specifically, this means that a one percent increase in GDP will reduce the number of anti-government demonstrations by approximately -0.027 on an average across all countries. Because economic growth is highly correlated with real income growth, this finding, along with the sign and significance of GDP per capita, indicates that changes in personal economic conditions in fact do affect protest levels. Theoretically, this lends logical support to the argument that oil price changes which affect personal economic welfare can affect the number of anti-government demonstrations.

Next, the two demographic variables both show positive signs and statistical significance. Population size has significant impact on political instability. The variable is significant at the 0.001-level with a marginal effect of 0.309. Notably, the effect is quite large. Substantially, this shows that states with larger populations experience higher levels of anti-government demonstrations. It was suggested in section 4.1.3 that the association between population size and demonstrations could be due to the additional pressure that a larger population puts on government spending. However, the causal mechanisms are still unidentified. Explanations range from lack of central control to heterogeneity in the population, a larger pool of possible rebels, scarcity of resources and governance problems, but the causality of any of these arguments has yet to be proven (Smith 2004: 237, Regan and Norton 2003: 20, Hendrix et al. 2009: 22, Hegre and Raleigh 2007: 2).

Like expected, the share of urban population within the state had a positive and significant effect on the level of demonstrations, indicating that concentrated populations have advantages in regards to overcoming collective action problems. Civil war-literature often oppose the theoretical arguments brought forth by the grievance and opportunity structure frameworks (Hendrix et al. 2009: 7-8, Fearon and Laitin 2001: 28). Because the occurrence of demonstrations in itself can be interpreted as a way to signal grievance, the sign and significance of *urbpop* hints that opportunity structure can have an impact within a larger framework of economic grievances, at least in regards to demonstrations. In other words, people who are dissatisfied will be more prone to demonstrate if the opportunity structure ensures that the cost of demonstrating is not too high.

The civil war-variable shows that countries which experience civil war are more likely to notice an increase in the number of anti-government demonstrations compared to countries or periods in which there is no civil war. The effect is significant on the 0.05-level. Although causality is yet undetermined, this shows that instability on one level can transmit over to other

levels.

Regime type proves to be a strong predictor of anti-government demonstrations. As expected, the relationship seems to be curvilinear. Both dummies have a significant p-value at the 0.001-level, and the LR-test shows a significance of 0.000. Autocracy and democracy both have a negative sign, indicating that there are less occurrences of anti-government demonstrations in autocratic and democratic regimes compared to anocracies. In other words, hybrid regimes seem to be more prone to political instability than any of the other two regime types. While autocracies and democracies have different institutionalized means to deal with protests, anocracies are institutionally more vulnerable. These states are most likely in a transitory institutional upheaval, a situation which may in itself invite political instability. Hendrix, Haggard and Magaloni have found similar results, and interpret regime type as a proxy for the political opportunity structure, indicating further that structural conditions can adjust the cost, and thus the willingness of people, to demonstrate (2009: 31).

Meant to measure spending volatility and subsidies, government final consumption expenditure is weakly significant with a negative sign. With a p-value of 0.081, the variable is significant at the 0.01-level. The results show that as government consumption expenditure increases with 1 percent, the mean number of demonstrations fall by approximately 0.015. In other words, government spending appears to have a pacifying effect on the public. Because this measure does not include military costs, a normal oppression-proxy, one can assume that these funds do not go toward suppressing dissent in the population. Rather, this can be interpreted in relation to the supply of public goods. As government final consumption expenditure increases, it is likely that the amount of money spent on goods and services that benefit the population increases as well. In oil dependent states spending was theorized to increase when oil revenue increases, during periods when the oil price is high. The state may provide public goods in the form of unemployment benefits, state-led employment programs or free health services and educational systems. In oil importing countries, it is more relevant to link this consumption expenditure to oil subsidies and economic expansion. If one draws a parallel to the growth-variable, which indicated that economic indicators that has the potential to influence personal economic welfare, it is plausible that the mechanisms described above can cause dissatisfaction with government to fall as government consumption expenditure increases. However, remembering the proxy-like nature of this variable, other causal mechanisms may be plausible as well. One alternative interpretation could be that government

consumption expenditure is closely linked with other indicators which are likely to have a stabilizing effect on political stability, such as economic expansion or regime type.

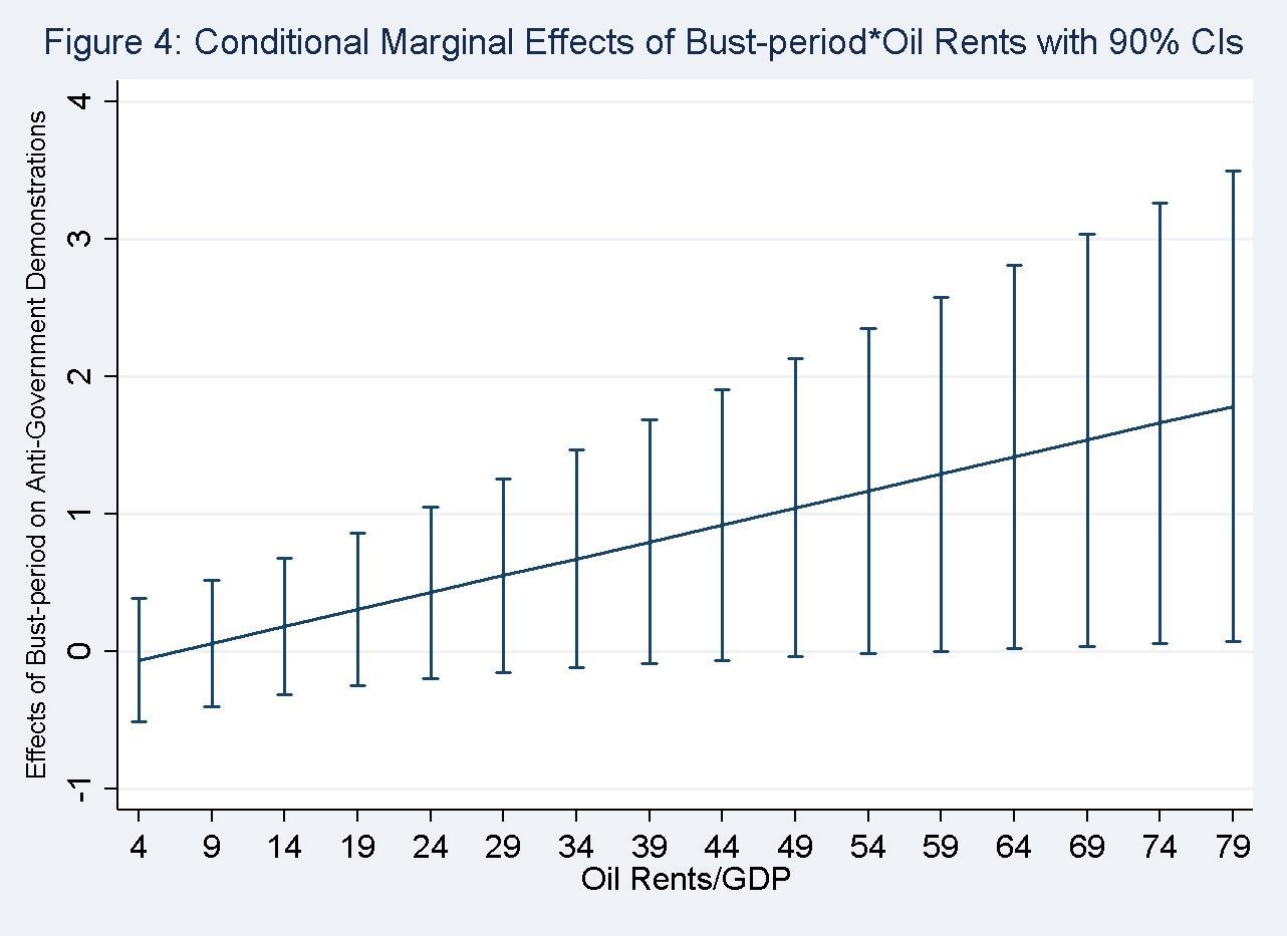
Comparing the baseline model with the country fixed effects-model in Table 9 in Appendix 2, it becomes apparent that the models are quite similar. Inflation, which was insignificant in the baseline model is, unsurprisingly, still not significant. Of the significant variables, marginal effects and significance levels of economic growth, population size, democracy, autocracy and oil rents are approximately identical to the baseline model. Three of the variables that were significant in the baseline model are no longer significant in the fixed effects model. This applies to the GDP per capita, civil war and government final consumption expenditure. The variables all have the same sign as before, but their effect has turned statistically insignificant. In the case of civil war, these results differ from the main model, indicating that the true effect of a spillover mechanism may be statistically insignificant. The common denominator for GDP per capita and government consumption is that they change only slowly over time. As such, the fixed effects will soak up most of the variable's explanatory power, rendering it statistically insignificant (Beck 2001: 285). Comparing the results of the models with and without unit fixed effects and knowing that they do not deviate much from one another is reassuring.

## 5.2 Oil Price Fluctuations and Demonstrations in Oil Exporting Countries

The second model introduces the interaction term between low oil prices and oil rents in order to explore $H_1$, which stated that oil exporting countries will experience higher levels of anti-government demonstrations during bust-periods. As can be seen by column 2 in Table 1, the control variables behave approximately identically to the baseline model, while the interaction term has a positive sign and a p-value of 0.067. The LR-test is, however, insignificant. In order to better interpret the interaction effect, the relationship between oil rents and oil price is illustrated by the conditional effect plot in Figure 4 below. The margins plot will give more detailed info than can be obtained by the marginal effects, the p-value and the LR-test alone, because it shows within which segments of the sample the interaction is statistically significant.

The conditional effect plot shows that a dependence on oil rents is positively associated with anti-government demonstrations during periods of low oil prices. In other words, oil dependent

states will experience an increase in the average number of demonstrations during bust-periods, compared to states which are not dependent on oil. As seen in the margins plot, the effect becomes statistically significant only when oil rents constitute more than 59 percent of GDP or more. This finding strengthens my theoretical argument, which is in large part based on the adverse effects of oil dependence. I argued that a dependence on oil rents will affect political stability through three stages. First, oil dependence will make the state more vulnerable to oil price fluctuations as well as the adverse effects of low oil prices during bust-periods. Second, dependence may interfere with the government's ability to deal with oil price volatility and its economic effects. And third, the population will hold the government responsible due to its central position in the oil economy.




My results note that when oil rents constitute 59 percent of GDP, there will be approximately 1.3 additional anti-government demonstrations during the bust-period. As the dependence on oil increases to 69 percent of GDP, the predicted number of anti-government demonstrations

will increase to 1.5. It becomes apparent that the effect is progressing as the oil dependence increases. This is important because it indicates that dependence on oil could be one of the causal mechanisms involved and that oil dependence (when severe) can have socio-economic effects which are of interest in the field of political stability. For a state with the heaviest dependence on oil rents (at approximately 80 percent of GDP), the predicted number of anti-government demonstrations will increase by about 1.8 demonstrations during bust-periods. Immediately, this may not sound like a large increase in the number of demonstrations, but keeping in mind that at least 100 people must have turned up to show their dissatisfaction with the government and their policies in order for the event to be counted (as per the variable definition), the effect is substantial.

In an economic Dutch disease-perspective, the boom-periods of the oil industry have been thought to be problematic, causing exchange rate appreciation and a shrinking non-oil export sector. At the same time, oil rents have been considered by some to have a stabilizing effect on political instability. As was shown in the baseline model, oil rents did appear to have a stabilizing effect, as an average across all countries. The interaction effect and the logical argument presented in this model, however, suggests that political and economic explanations could be integrated in order to create an understanding of the timing of political demonstrations. It seems that the economically adverse effects caused during the boom-period are politically relatively harmless until the oil price drops. Taking the perspective of timing and oil price cycles into account could increase our understanding of political instability in oil dependent countries, however more research is needed in order to substantiate these findings. The next section will explore whether this relationship could be relevant also in oil importing countries.

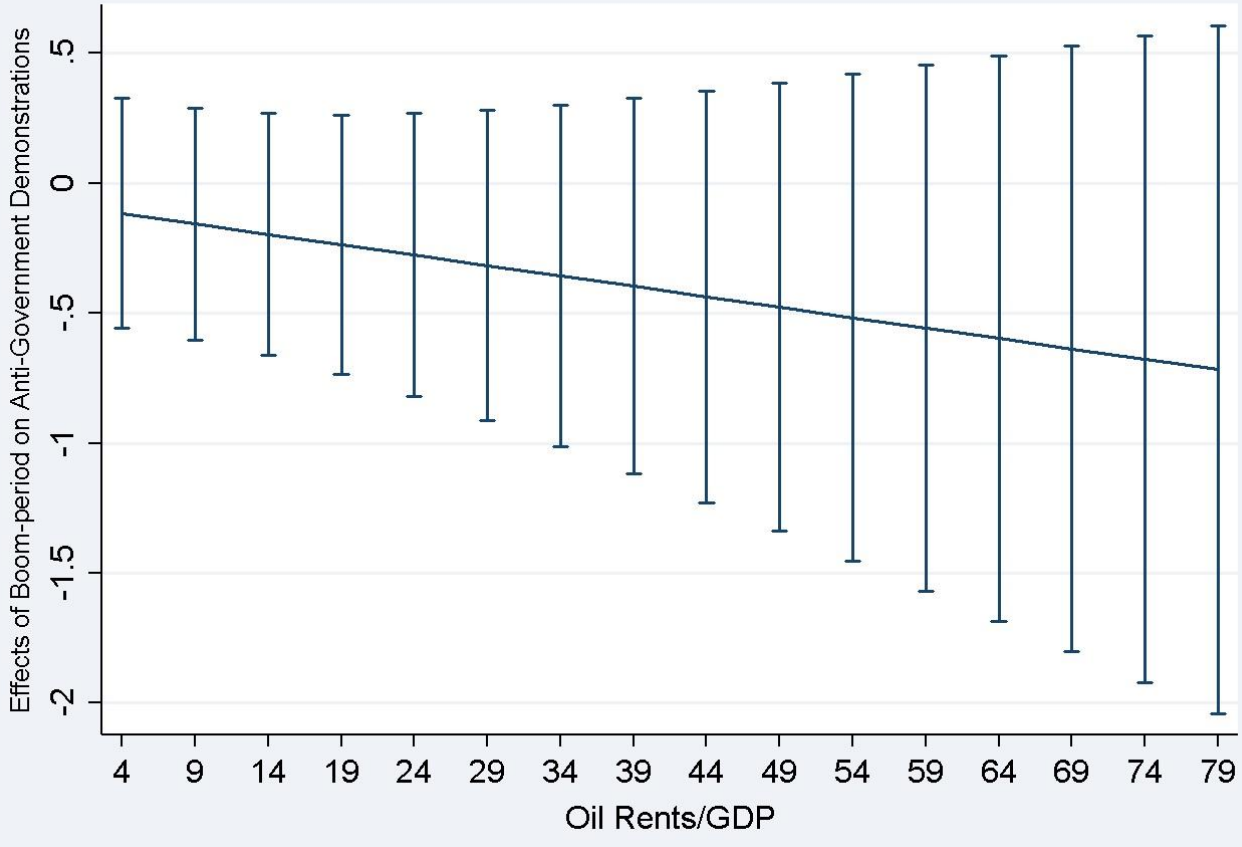
## 5.3 Oil Price Fluctuations and Demonstrations in Oil Importing Countries

The third regression model replaces the interaction term from model two with an interaction term between oil rents and periods of high oil prices and is shown in column 3 in Table 1. The interaction effect is illustrated by the marginal effect plot in Figure 5. As the effect plot shows, there is a negative tendency. The effect is, however, statistically insignificant with two following implications:

First, there is no significant correlation between high oil prices and a lower number of demonstrations in oil exporting countries. In the theory section, I pointed out that government

spending tends to follow the patterns of the oil price in oil exporting countries. Accordingly, the government could potentially use their increased income in boom-periods in order to pacify the population, buying political stability (Smith 2004: 233). This mechanism was supported by the sign and significance level of the government consumption expenditure-variable, suggesting that the number of anti-government demonstrations would sink when the government would spend more money. However, no evidence of a stabilizing effect during the boom-period was found in this analysis. If government spending patterns follow the oil price cycle, and a higher consumption expenditure affects the population's economic welfare, one would expect the effect of high oil prices on demonstrations to be stabilizing. The results have previously noted that a higher consumption expenditure affects the population's propensity to protest. From this, it follows that because oil dependent countries are not more stable during boom-periods, government spending patterns may not follow the oil price cycles to the extent that it affects the political stability.

Figure 5: Conditional Marginal Effects of Boom-period*Oil Rents with 90% CIs



Second, the insignificant interaction effect in column 3 in Table 1 means that there is no empirically proven association between a high oil price and demonstration levels in oil importing countries, contrary to what was expected. Periods of high and low oil prices have equally little effect on the number of demonstrations in oil importing countries, meaning that the element of timing has no significant effect in these states. Because oil price increases tend to disrupt production and purchasing patterns as well as affect important macroeconomic indicators in oil importing countries, importers were theorized to experience higher levels of anti-government demonstrations during periods when the oil price is high. However, the empirical data did not support this argument, and $H_2$ is thus rejected. The possible reasons for its insignificance can be distinguished into two main categories. First, the population does not demonstrate against the government when their economic conditions change. Second, periods of high oil prices do not constitute a shift in the population's economic welfare in oil importing countries. Below, I will discuss these possibilities further.

First, governments in oil importing countries (and oil exporting countries) generally acknowledge the extensive effects oil price increases can have, and have implemented various measures intended to dampen the potential consequences. Many oil importers hold inventories and subsidize the price of oil and petroleum products, and the empirical examples that were presented in section 3.4 indicated that such measures are important to the population (Smith 2009: 154, Baig et al. 2007: 11). The removal of or cuts in these programs led to protests and demonstrations in several countries. Although this study includes a measure of government final consumption expenditure, which ideally would have captured subsidy-levels, it is probable that the variable did not adequately control for subsidies. Unfortunately, longitudinal and reliable measures a cleaner variable was not obtainable. As such, it is possible that the level of inventories and subsidies have affected these results. This possibility will be further discussed in section 5.4.

On the other hand, my theory argued that importers and exporters of oil are affected by oil price fluctuations through different mechanisms. The main difference here is that in the oil dependent economy, oil rents is an integral part of the economic system. As the term dependence in itself implies, the significance of oil in the political economy is great. An important point in this regard is that oil dependence is thought to make the economy vulnerable to oil price shocks as well as undermine the government's ability to dampen the effects of the shock (see section 3.2.1). Oil importing countries, however, are affected mainly through the price mechanism. As such, the influence of oil prices is thought to be less pervasive than in the

oil wealthy economy. Although important economic indicators have been shown to be affected by an increase in the price of oil, oil importers suffer no Dutch disease-effects, and governments' efforts to deal with the effects are not inhibited by oil price cycles. As such, it is also plausible that the interaction effect would remain insignificant even if adequate measures of oil subsidies were included because high oil prices do not affect the population in oil importing countries to the extent that low oil prices affect the population in oil dependent countries.

Third, as was pointed out in section 3.2.2, the negative effect of high oil prices may be offset by the world economy. More specifically, if the high oil price is caused by higher demand in the world market, other economic indicators are likely to experience a positive trend (Rasmussen and Roitman 2011: 6). If the high oil price is caused by low supply of oil, on the other hand, oil importers will probably experience economic effects similar to those described by the theory chapter. As such, it might be appropriate to distinguish between supply and demand driven changes in the price of oil in the case of the oil importing countries. Kilian, Rebucci and Spatafora have earlier stressed that the effect of oil price changes on external balances is conditional upon the source of the change (2008: 1-2). My theory stated that changes in economic welfare on the individual level may induce anti-government demonstrations. Therefore, it is highly relevant how a price increase affects other economic measures. As such, it is plausible that a price increase caused by higher demand has no effect on anti-government demonstrations while price increases caused by an interruption in the supply of oil is associated with a higher level of demonstrations. Cashin, Mohaddes, Raissi and Raissi have found evidence of differential effects of supply and demand shocks on macroeconomic indicators in oil exporting countries, indicating that oil importing countries may experience similar effects (2012: 34). If demand-driven shocks do not adversely affect the population's economic situation, there would be no reason for them to demonstrate. Rather, supply shocks would be of greater interest in such a context.

Fourth, it may be that the effect of oil prices is conditional upon the state's oil import rates. As in the case of oil exporters, it is plausible that dependence is one of the causal mechanisms also in oil importing countries. Countries that use large quantities of oil are likely to be harder hit by a price increase either because oil is more widely used in different contexts or because oil is more intensively used in certain areas. Rasmussen and Roitman argue that the effect of an oil price increase on macroeconomic indicators is relative to the country's dependence on oil imports (2011: 3-4). Because theory was based on changes in the population's economic welfare, greater change in economic indicators can be thought to

increase demonstration levels.

So far, all four plausible explanations have belonged to the second category of possibilities mentioned earlier – that the interaction effect is insignificant because the boom-period does not affect the population's economic welfare to the assumed extent. However, it may also be that people simply do not demonstrate against the government, although their economic welfare is adversely affected by oil price increases. In the theory section, I made the assumption that people would distinguish between personal and societal problems. But if people recognize the diffuse effects of high oil prices as personal rather than societal problems, there would be no point in mobilizing for anti-government demonstrations. By diffuse, I mean that oil has importance beyond its impact on one type of product. Oil serves as fuel, which is in itself widely used, and is additionally used as an input in the production of a host of other goods. Several studies have found an association between food prices and protest levels (Smith 2013: 9-10, Hendrix et al. 2009: 23, 29, Arezki and Brückner 2011: 10). As opposed to the effects of food price fluctuations, which only affects the price of one type of product (food commodities), oil price fluctuations will affect the population through several indirect channels (unemployment rates, purchasing power and transportation costs). The empirical examples in section 3.4 suggested that in the event that people are being explicitly told about increases in the price of oil and they are able to link this price increase to the government (such as when the government has lifted oil subsidies), anti-government demonstrations will ensue. However, when the link between oil price changes and societal problems is less explicit, people might perceive the effects as personal rather than societal.

This section has focused on providing plausible explanations to account for why the empirical evidence does not support the theoretical framework. A negative result is in itself interesting, because it highlights flaws in the theory. The main points to take away from this is that there are two possible categories of explanations. First, the population does not demonstrate against the government when their economic conditions change. Second, bust/boom periods do not constitute a shift in the population's economic welfare in oil importing countries. Through the economic control variables, we have seen that economic conditions are indeed associated with the level of anti-government demonstrations regardless of a direct link to government responsibility. As such, the second category of explanations are more likely to be affecting these results. Most likely, a combination of one or more of these possible explanations and potentially undiscovered factors caused these results.

## 5.4 Sensitivity

In the data and methods chapter, I made a number of choices regarding the model specifications. Based on the discussion from sections 4.3.2 and 4.3.3 as well as the chosen definitions of high and low oil prices, three alternative models are presented here in order to explore the robustness of the results presented in the main models.

First, an alternative model in which the definition of high and low oil prices was slightly changed (to the 85$^{th}$ and the 15$^{th}$ percentile, respectively) is presented in Appendix 2, Table 10. As in the main results, the high price-interaction is insignificant. However, the interaction term between ths bust-period and oil rents also displays an insignificant effect in this model, although the effect plot shows the same tendency as in the main results. It should therefore be noted that the results from the section 5.2 are sensitive to changes in the operationalization of low oil prices. However, any operationalization of high and low oil prices could be the object of controversy due to the lack of a theoretical cutoff point. Because a large part of the observations of the oil price variable lies between 20 and 40, no natural cutoff point was available in this sample. It was necessary to find a value which would capture only the years in which the oil price was very low. As such, the 10$^{th}$ percentile was chosen, although the possibilities of different permutations is almost endless. Nevertheless, $H_1$ cannot be blindly accepted based on the main results alone. This sensitivity to changes in the definition of the bust period is of concern because it might be that the low price-dummy captures time rather than relative hardship, meaning that there might be no causal connection between low oil prices and anti-government demonstrations in oil dependent countries.

Second, in line with the discussion in section 4.3.3, I have estimated the models with robust and clustered standard errors. These specifications relax the assumptions of heteroskedasticity and autocorrelation respectively. Such a model is, however, incompatible with the xtnbreg-option for TSCS data. Hence, this model is defined only as a time series, ignoring the cross-sectional characteristics of the panel data[6]. As in the main models, the interaction effect between high oil prices and oil rents is insignificant. While the interaction between low oil prices and oil rents is significant, the margins plot reveals that the model does not support $H_1$, indicating that the bust-model is sensitive to changes in the model specifications as well. However, as noted above, neither these nor the main models are ideal, in the sense that

[6] The model was estimated using the regular nbreg-option in STATA 13.1.

the statistical tools are somewhat limiting in both cases.

Third, the models were estimated with a lagged dependent variable. Although this is not a common practice when employing Negative Binomial models, the inclusion of an LDV might reduce autocorrelation. The lagged term proved to be statistically significant at the 0.001-level in all three models, indicating that there might be lagged effects present. However, as Achen argued, this may or may not reflect a true dynamic effect (2001: 4-5). Otherwise, the LDV seems to have had little influence. All controls remained the same as in the main models, as did the high price-interaction. The low price-interaction proved to be statistical significant in this model, although the threshold of significance in the interaction between low oil prices and oil rents has increased to 74 percent of GDP.

Although these alternate models display sensitivity to model and variable specifications, evidence in this analysis do support the argument that changes in economic welfare do indeed affect political stability. In all three main models GDP per capita, government final consumption and GDP growth were all statistically significant and showing that better economic conditions are correlated with fewer anti-government demonstrations. As such, it is possible to make the argument that if bust periods do lead to worsened economic conditions in oil dependent countries, one would see an increase in the number of anti-government demonstrations. As previously mentioned, this study's perhaps biggest drawback is its lack of a clean measure of oil subsidies. Importers and exporters of oil both tend to subsidize the use of petroleum and other oil based products through implicit as well as explicit policies. Such a subsidy would be likely to take the edge off the effect of an oil price shock, causing oil price fluctuations to have a lower effect on relative economic welfare. As such, it would be more practical to use local oil prices, a measure of what the population in question actually pays for their petroleum and oil based products (Smith 2013: 2). This is because the population will not be affected by changes in the market price unless the local prices change accordingly. Ideally, this analysis would include data on oil subsidies and an index of local oil prices and prices of oil based goods. It is plausible that if such measures were included in the analysis, the models would be more robust to change. Evidence brought forward in this analysis suggests that economic conditions do affect political stability. To the extent that oil price fluctuations do change the population's relative economic welfare, $H_1$ is plausible, as the evidence in the main results indicate. The main results have, however, proven to be sensitive to changes in the definition of low oil prices and other model specifications. Although I cannot say that I find hard evidence of a significant effect of low oil prices on political stability, I will lend $H_1$ and its

underlying argument at least partial support. As for $H_2$, it has proven statistically insignificant in the main model as well as in all alternative models. I thus reject $H_2$. Yet, it is uncertain what would happen if measures of oil subsidies and local oil prices were included in the models. Future research, better specified models and developed statistical tools can help unveil the true relationship between oil price fluctuations and anti-government demonstrations.

# 6 CONCLUSION

In this paper, I have studied the relationship between fluctuations in oil price and anti-government demonstrations. The element of timing, introduced by the price of oil, has thus gained central focus in my research. Oil prices affect importers as well as exporters of oil, although at different price levels and through different mechanisms. As such, the aim of this paper was twofold: first, exploring the impact of low oil prices on political instability in oil exporting countries and second, exploring the effect of high oil prices on political instability in oil importing countries.

In order to explore my research question, I estimated a Negative Binomial regression model with random effects and time fixed effects. The panel data set employed covered 122 importing and exporting countries over the 1980-2008 period. According to my findings oil dependent countries, on average, experience a lower number of anti-government demonstrations than countries that are not dependent on oil rents. However, the results also indicate that the element of timing could be important to the political stability in oil dependent countries. In other words, oil rents may not always have a stabilizing effect on demonstrations. Rather, when the price of oil is low and the resource rents are correspondingly low, countries that are dependent on oil experience a higher number of anti-government demonstrations. In this analysis, I find evidence for such an effect in oil dependent countries in which oil rents constitute a minimum of 59 percent of GDP. This is important, because it indicates that dependence on oil is important for this mechanism, as suggested by my theory. The results show that the effect of oil rents on political stability may not be constant over time, but may fluctuate with the price of oil. These results are, however, sensitive to changes in model specifications as well as variable definitions.

Furthermore, my results showed that there was no statistically significant effect of high oil prices on the number of demonstrations in oil dependent countries. There was, in other words, no stabilizing effect during boom-periods that corresponded to the destabilizing effect of the price of oil during bust-periods. Low oil prices affect the political stability in oil dependent countries while high oil prices do not. Although more research is needed to better understand the causal mechanisms that are at play here, my paper underlines the complexity of the political economy and its relations to the society as a whole.

Because oil price fluctuations affect not only oil rich countries dependent on rents, but

nearly all states, I also concerned myself with oil importing countries. Contrary to theory, however, I found no indication of an association between oil prices and political instability in importing countries. The results showed that high oil prices had no statistically significant effect on the number of anti-government demonstrations in oil importing countries. Two categories of explanations can account for this result. First, people may not choose to demonstrate when their economic conditions change. Second, high oil prices may not adversely affect the population's economic conditions. Within these two categories, several explanations and factors may possibly influence the results, and future research can help unveil which.

One of the goals of academic research has always been explaining and categorizing empirical occurrences. This has been an attempt to account for the oil related protests observed over a range of different countries. It is likely that oil will continue to play the role of the blood in the human body in the world economy also in the foreseeable future. As oil continues to be an important resource, it also continues to affect both people and states through its impact on various socio-economic and political indicators. For this exact reason, charting oil's relationship to the political economy is a crucial step towards gathering more nuanced and accurate knowledge, which in turn can be used when building institutions and shaping policies. Much theoretical and empirical research remains on the timing of political instability. However, this paper illustrates some of the difficulties of conducting statistical analysis. First, a presumption for statistical analysis is the existence of good quality, longitudinal data. Reliable and extensive data is the foundation upon which robust research is built. A general problem for academic papers concerned with oil related topics is finding accessible data on relevant units. However, data collection requires transparency, and one can only hope that adequate data will be available in the future. Second, statistical analysis requires suitable tools and techniques. This is especially relevant in the analysis of non-linear data. OLS is the most developed statistical method, however in the social sciences, the dependent variable is often not appropriate for OLS analysis (Long 1997: 1). Unfortunately, the techniques and statistical software for such variables are somewhat underdeveloped, causing less properly specified models. Although statistical analysis with non-linear data can cause the researcher practical issues in building the models, the alternative is conducting no research at all on topics that require such dependent variables. Conducting research with the techniques that are available is important because it stresses a need to further develop applied statistics and statistical software. The insights we gain can be built upon and may direct future research in the endeavor to uncover the relationship between oil and political stability.

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# Appendix

## APPENDIX 1: DATA AND METHODS

### 1.1: Countries Included in the Analysis

**Table 2: Countries Included in the Analysis**

| Countryname | | | |
|---|---|---|---|
| Algeria | Denmark | Kuwait | El Salvador |
| Angola | Dominican Republic | Kyrgyz Republic | Saudi-Arabia |
| Argentina | Ecuador | Latvia | Senegal |
| Armenia | Egypt | Lebanon | Singapore |
| Australia | Eritrea | Libya | Slovak Republic |
| Austria | Equatorial Guinea | Lithuania | Slovenia |
| Azerbaijan | Estonia | Luxenbourg | South Africa |
| Bahrain | Finland | Malaysia | Spain |
| Bangladesh | France | Mexico | Sri Lanka |
| Barbados | Gabon | Mongolia | Sudan |
| Belgium | Germany | Moldova | Suriname |
| Benin | Georgia | Morocco | Switzerland |
| Belarus | Ghana | Mozambique | Sweden |
| Bolivia | Greece | Namibia | Syria |
| Botswana | Guatemala | Nepal | Tajikistan |
| Brazil | Haiti | Netherlands | Tanzania |
| Brunei | Honduras | New Zealand | Thailand |
| Bulgaria | Hungary | Nicaragua | Togo |
| Cambodia | Iceland | Nigeria | Trinidad and Tobago |
| Cameroon | India | Norway | Tunisia |
| Canada | Indonesia | Oman | Turkey |
| Chad | Iran | Pakistan | Turkmenistan |
| Chile | Iraq | Panama | Ukraine |
| China | Ireland | Papua New Guinea | United Arab Emirates |
| Colombia | Israel | Paraguay | United Kingdom |
| Congo, Dem Republic | Italy | Peru | United States |
| Congo, Republic | Jamaica | Philippines | Uruguay |
| Costa Rica | Japan | Poland | Uzbekistan |
| Cote d'Ivore | Jordan | Portugal | Vietnam |
| Croatia | Kazakhstan | Qatar | Yemen |
| Cuba | Kenya | Romania | Zambia |
| Czech Republic | Korea, Republic | Russian Federation | Zimbabwe |

## 1.2: Variable Overview

**Table 3**

| Variable | Source | Description |
|---|---|---|
| Anti-government demonstrations | Arthur Banks Cross National Time Series Data Archive | Measures the number of anti-government demonstrations in each country-year. Anti-government demonstrations is defined as any peaceful gathering of at least 100 people for the primary purpose of displaying their opposition to government economic policies. |
| Oilrents | World Bank's World Development Indicators 2011 | Measures oil rents as a share of GDP. |
| Oilprice | British Petroleum 2011 | Measures crude oil prices in US$ per barrel in constant 2011-prices. Recoded into two dummy variables. First, lowprice measures periods of low oil prices. Lowprice is coded 1 when the price of oil has fallen below US$25, and 0 otherwise. Second, Highprice measures periods of high oil prices, coded 1 when the price of oil is higher than US$63, and 0 otherwise. |
| Lngdppc | World Bank's World Development Indicators 2011 | Measures GDP per capita. The variable has been logged in order to correct for skewness. |
| Growthgdp | World Bank's World Development Indicators 2011 | Measures the annual percentage GDP growth in constant 2005 US$ |

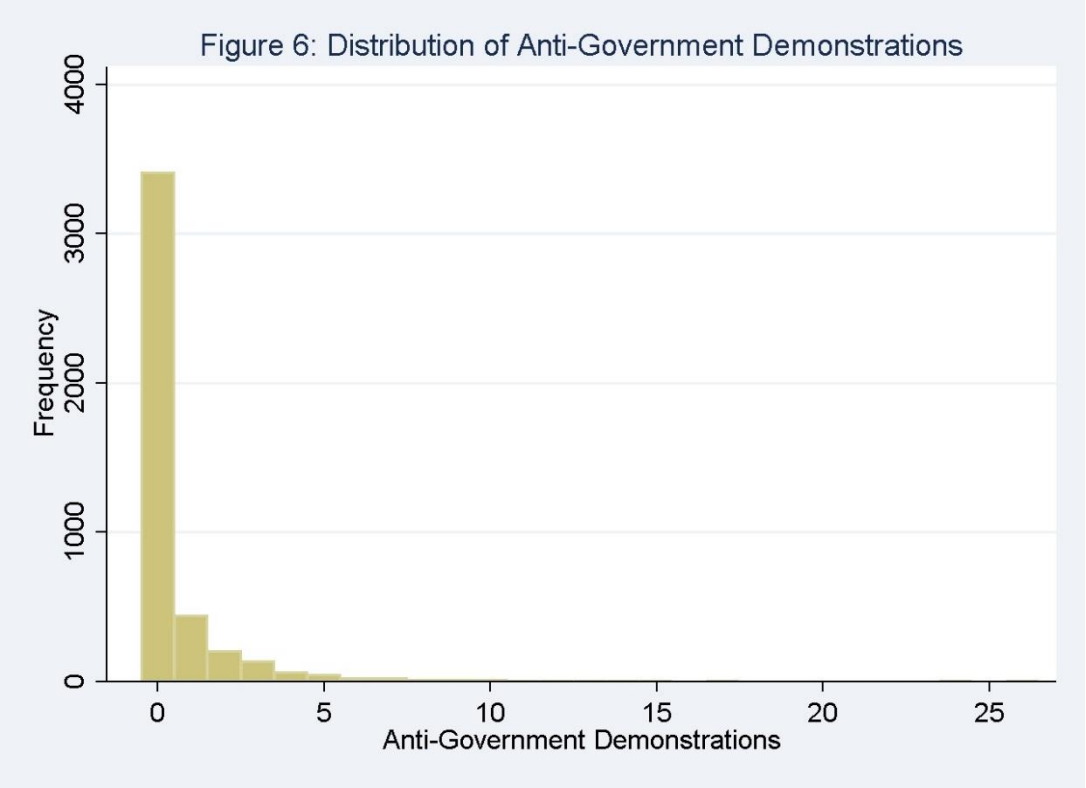
| | | |
|---|---|---|
| Inflation | U.S Economic Research Service | Measures the change in Consumer Price Indices for all consumer goods and services, with 2005 as the base year. Following Vadlamannati and de Soysa (2013), variable skewness was countered with the formula: [(p/100)/(1+(p/100)] |
| Lnpop | World Bank's World Development Indicators 2011 | Measures the total population size. Was logged in order to improve skewness |
| Urbpop | World Bank's World Development Indicators 2011 | Measures the share of urban population to total population. |
| Polity2 | Polity IV Dataset | Measures the prevailing regime type in a given state on a scale from -10 to +10, where -10 is a full autocracy and +10 is a full democracy. Recoded into a dummy set, where regimes with a polity score of -5 or less are coded as autocracies, regimes with 6 or more are coded as democracies and regimes with values in between are coded as anocracies. |
| Civilwar | Uppsala Conflict Data Program | Measures the incidence of intrastate conflict. Civilwar is a dummy variable, coded 1 for each country-year there is an active conflict, and 0 otherwise. |
| Govtfinalconsumption | World Bank's World Development Indicators 2011 | Measures the government's current consumption expenditure. This includes goods and services as well as defense and security, but excludes military economic costs. |

## 1.3: Descriptive Statistics

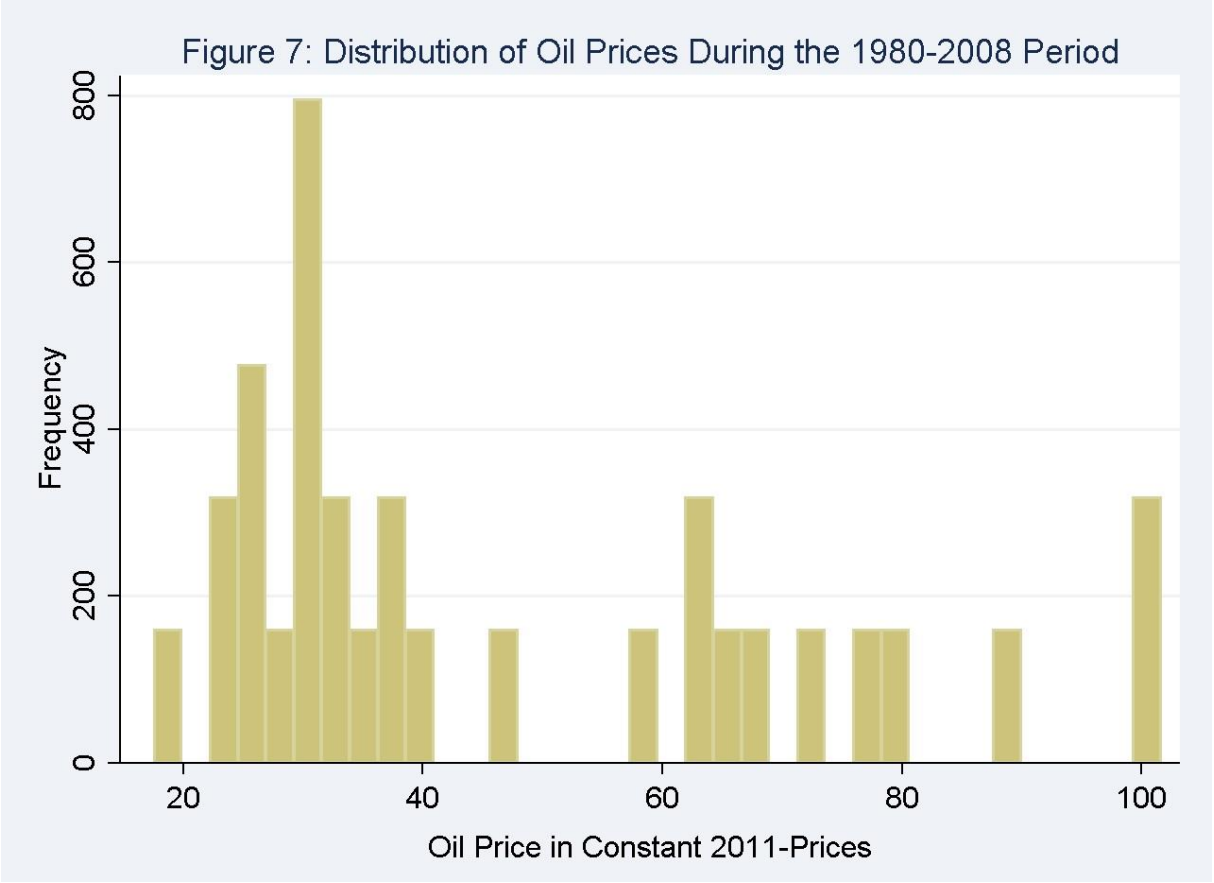
**Table 4**

| | Observations | Minimum Value | Maximum Value | Mean | Standard Deviation | Value=1 | Value=0 |
|---|---|---|---|---|---|---|---|
| Anti-government demonstrations | 4364 | 0 | 26 | 0,55 | 1,60 | | |
| GDP per capita (ln) | 4303 | 3,91 | 11,38 | 7,85 | 1,62 | | |
| GDP growth | 4300 | -50,03 | 106,27 | 3,33 | 6,36 | | |
| Population (ln) | 4767 | 11,87 | 21,01 | 15,86 | 1,66 | | |
| Civil War | 4539 | 0 | 1 | 0,17 | 0,38 | 17,40 | 82,60 |
| Democracy | 4282 | 0 | 1 | 0,39 | 0,49 | 39,09 | 60,91 |
| Autocracy | 4282 | 0 | 1 | 0,30 | 0,46 | 30,24 | 69,76 |
| Inflation | 4552 | -8,09 | 1 | 0,10 | 0,20 | | |
| Urban Population | 4740 | 4,34 | 98.41 | 51,70 | 23,45 | | |
| Oil Rents/GDP | 3485 | 0 | 80,64 | 6,74 | 13,43 | | |
| Boom-period | 4770 | 0 | 1 | 0,26 | 0,44 | 26,67 | 73,33 |
| Bust-period | 4770 | 0 | 1 | 0,10 | 0,30 | 10 | 90 |
| Government Final Consumption | 4248 | 1,38 | 76,22 | 16,26 | 6,81 | | |

## 1.4: Histogram Showing the Distribution of Anti-Government Demonstrations



## 1.5: Histogram Showing the Distribution of Oil Price




## 1.6: Hausman Test

**Table 5**

| | Fixed | Random | Difference | Std.Error |
|---|---|---|---|---|
| GDP per Capita (ln) | -0.086 | -0.146 | 0.059 | 0,065 |
| GDP Growth | -0,023 | -0,036 | 0,003 | 0,002 |
| Population (ln) | 0,169 | 0,275 | -0,105 | 0,029 |
| Civil War | 0,158 | 0,240 | -0.082 | 0,032 |
| Democracy | -0,772 | -0,742 | -0,030 | 0,029 |
| Autocracy | -0,408 | -0,502 | -0,093 | 0,041 |
| Inflation | 0,223 | 0,171 | 0,052 | 0,059 |
| Urban Population | 0,021 | 0,024 | -0,003 | 0,004 |
| Government Final Consumption | 0,003 | -0,011 | 0,014 | 0,004 |
| Oil Rents/GDP | -0,026 | -0,030 | 0,003 | 0,005 |
| Chi2(11)=85,67 | | | | |
| Prob>chi2=0,000 | | | | |

## 1.7: Overdispersion in Anti-Government Demonstrations

**Table 6**

| Variable | Observations | Mean | Variance |
|---|---|---|---|
| Anti-government demonstrations | 4364 | 0,55 | 2,56 |

As can be seen, the variance is greater than the mean, indicating overdispersion.

## 1.8: Goodness-of-Fit Test

**Table 7**

| Pearson goodness-of-fit = 7872.196 |
|---|
| Prob>Chi2(2860) = 0.000 |

The Pearson Chi-Square goodness-of-fit test ensures the selection of the correct statistical model by identifying the distribution of the data (Piza 2012). The significant p-value asserts that the distribution of anti-government demonstrations differs from a Poisson distribution, favouring the Negative Binomial model.

## 1.9: Multicollinearity Matrix

Table 8 shows a correlation matrix between all the variables in the regressions in order to detect signs of multicollinearity. Anti-government demonstrations has been abbreviated AGD, and government final consumption has been abbreviated GFC for practical reasons.

**Table 8: Correlation Matrix**

| | AGD | Lngdppc | Growth | Lnpop | Civilwar | Aut | Dem | Infl | Urbpop | GFC | Oilrents |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AGD | 1 | | | | | | | | | | |
| Lngdppc | 0,0532 | 1 | | | | | | | | | |
| Growth | 0,0545 | -0,0178 | 1 | | | | | | | | |
| Lnpop | 0,2568 | 0,1632 | 0,0241 | 1 | | | | | | | |
| Civilwar | 0,1574 | -0,0223 | 0,0591 | 0,2713 | 1 | | | | | | |
| Aut | 0,0583 | -0,0248 | -0,0408 | 0,0102 | 0,005 | 1 | | | | | |
| Dem | -0,036 | 0,5772 | -0,0656 | 0,0214 | -0,1004 | 0,5271 | 1 | | | | |
| Infl | 0,0618 | -0,2367 | -0,3655 | 0,0286 | 0,1553 | 0,0151 | 0,0746 | 1 | | | |
| Urbpop | 0,0054 | 0,7842 | -0,0729 | 0,1313 | -0,1929 | 0,1717 | 0,4606 | 0,0733 | 1 | | |
| GFC | 0,1018 | 0,3507 | -0,1528 | 0,2904 | -0,1075 | 0,0953 | 0,1078 | 0,0407 | 0,3059 | 1 | |
| Oilrents | 0,0923 | 0,0101 | 0,1753 | 0,1522 | -0,0107 | 0,3056 | 0,3412 | 0,0073 | 0,0361 | 0,0217 | 1 |
| Lowprice*Oil | 0,0099 | -0,191 | -0,0309 | 0,0478 | 0,019 | 0,0715 | 0,1025 | 0,0423 | 0,0054 | 0,0406 | 0,2211 |
| Highprice*Oil | 0,0545 | 0,0309 | 0,1034 | 0,0586 | -0,0121 | 0,0573 | 0,1473 | 0,1464 | 0,0241 | 0,0702 | 0,5297 |

# APPENDIX 2: ANALYSIS

## 2.1: Negative Binomial Model with Two-way Fixed Effects

**Table 9: Negative Binomial Models for Anti Government Demonstrations, 1980-2008**
Two-way Fixed Effects
Marginal Effects (Delta Method Standard Errors)

| | Baseline Model with Two-way Fixed Effects |
|---|---|
| GDP per Capita (ln) | -0.111 |
| | (0.101) |
| GDP Growth | -0.0243*** |
| | (0.00762) |
| Population (ln) | 0.209*** |
| | (0.0532) |
| Civil War | 0.142 |
| | (0.107) |
| Autocracy | -0.531*** |
| | (0.141) |
| Democracy | -0.722*** |
| | (0.115) |
| Inflation | -0.192 |
| | (0.259) |
| Urban Population | 0.0267*** |
| | (0.00698) |
| Government Final Consumption | -0.00290 |
| | (0.00995) |
| Oil Rents/GDP | -0.0279*** |
| | (0.00824) |
| Observations | 2,679 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

## 2.2: Negative Binomial Model with Different Operationalization of Boom/Bust

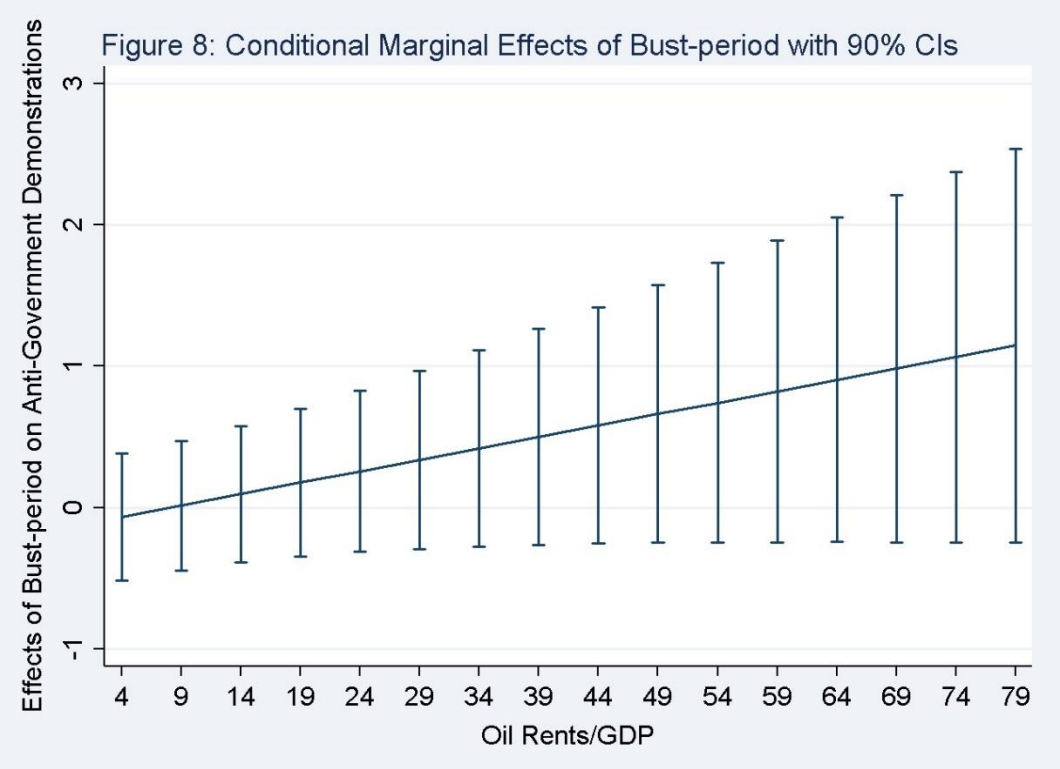
**Table 10: Negative Binomial Models for Anti Government Demonstrations, 1980-2008**

Marginal Effects (Delta Method Standard Errors)

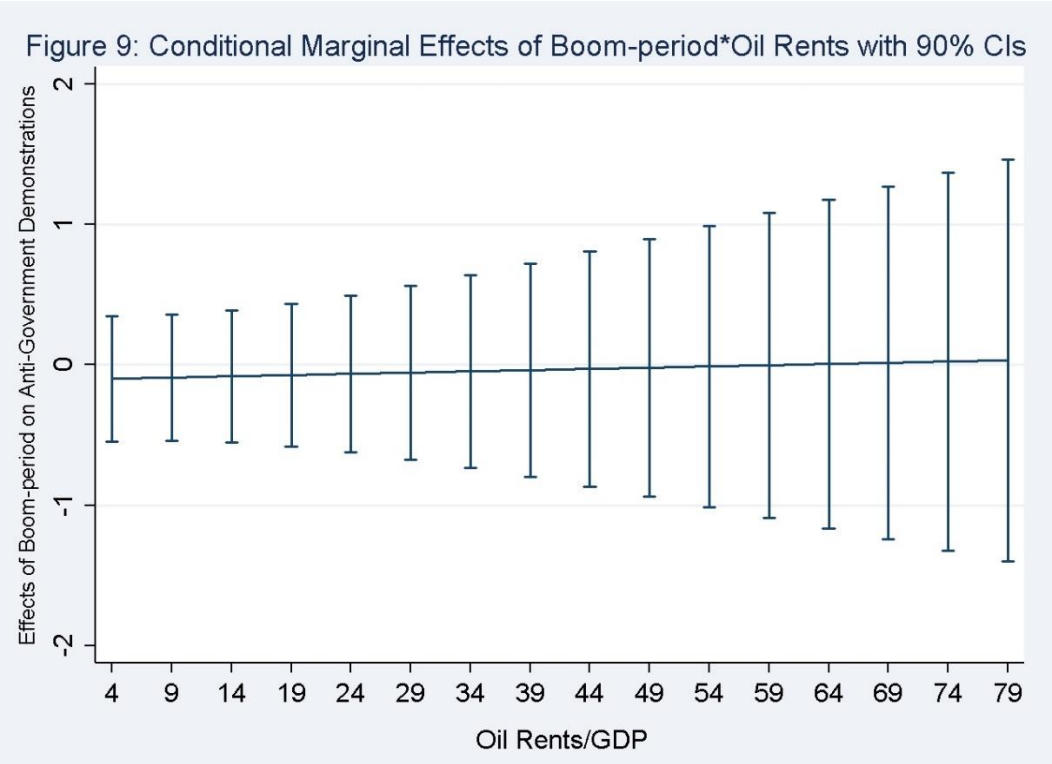
| | Model 1: Bust-period | Model 2: Boom-period |
|---|---|---|
| GDP per Capita (ln) | -0.192*** | -0.192*** |
| | (0.0731) | (0.0731) |
| GDP Growth | -0.0267*** | -0.0272*** |
| | (0.00725) | (0.00721) |
| Population (ln) | 0.311*** | 0.309*** |
| | (0.0416) | (0.0417) |
| Civil War | 0.215** | 0.219** |
| | (0.101) | (0.101) |
| Autocracy | -0.664*** | -0.653*** |
| | (0.133) | (0.133) |
| Democracy | -0.683*** | -0.683*** |
| | (0.110) | (0.110) |
| Inflation | -0.298 | -0.267 |
| | (0.247) | (0.245) |
| Urban Population | 0.0293*** | 0.0293*** |
| | (0.00497) | (0.00498) |
| Government Final Consumption | -0.0160* | -0.0154* |
| | (0.00881) | (0.00881) |
| Oil Rents/GDP | -0.0314*** | -0.0295*** |
| | (0.00646) | (0.00659) |
| Bust-period2 | -0.130 | |
| | (0.277) | |
| Oil Rents*Bust-period2 | 0.0162 | |
| | (0.0107) | |
| Boom-period2 | | -0.105 |
| | | (0.278) |
| Oil Rents*Boom-period2 | | 0.00174 |
| | | (0.0113) |
| Observations | 2,898 | 2,898 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.2.1: Margins Plot Bust-period*Oil Rents




3.2.1: Margins Plot Boom-period*Oil Rents



## 2.3: Negative Binomial Model with Robust and Clustered Standard-Errors

**Table 11: Negative Binomial Models for Anti Government Demonstrations, 1980-2008**

Robust and Clustered Standard Errors (Not Defined as Panel Data)

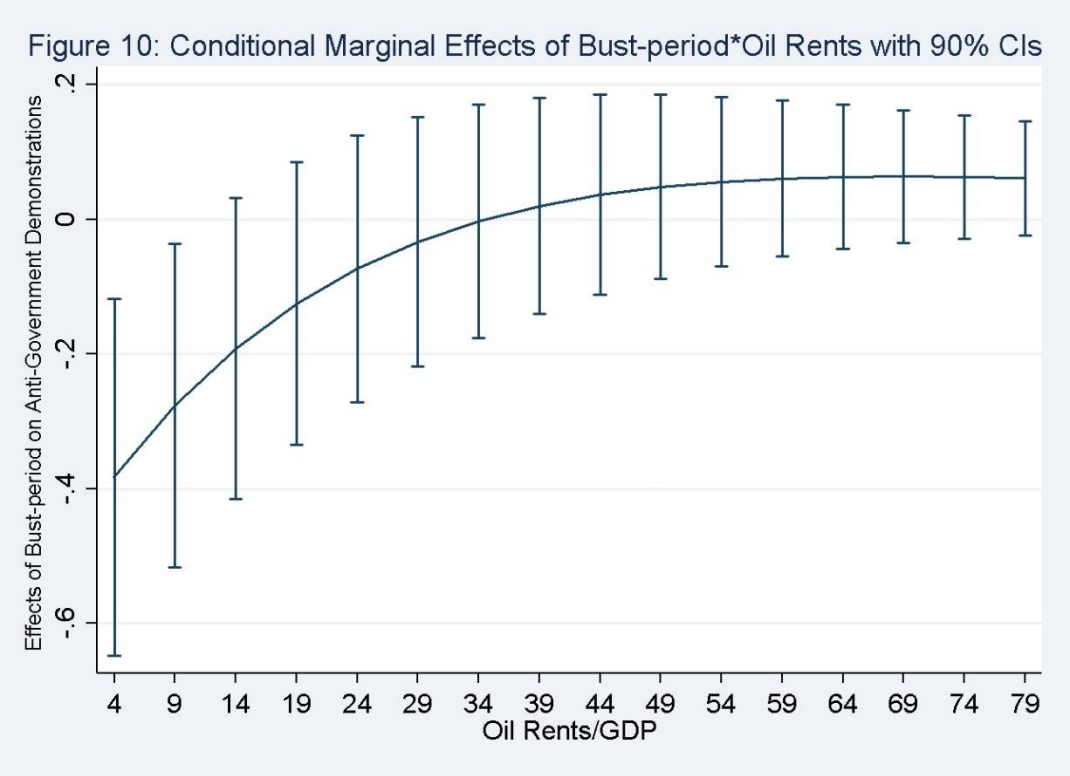
Marginal Effects (Delta Method Standard Errors)

| | Model 1: Baseline | Model 2: Bust-period | Model 3: Boom-period |
|---|---|---|---|
| GDP per Capita (ln) | -0.150*** | -0.149*** | -0.150*** |
| | (0.0498) | (0.0498) | (0.0498) |
| GDP Growth | -0.0103* | -0.00972* | -0.0103* |
| | (0.00566) | (0.00568) | (0.00565) |
| Population (ln) | 0.182*** | 0.180*** | 0.181*** |
| | (0.0246) | (0.0248) | (0.0245) |
| Civil War | 0.215** | 0.214** | 0.215** |
| | (0.107) | (0.107) | (0.107) |
| Autocracy | -0.315*** | -0.311*** | -0.314*** |
| | (0.0980) | (0.0973) | (0.0980) |
| Democracy | -0.257*** | -0.255*** | -0.257*** |
| | (0.0920) | (0.0909) | (0.0919) |
| Inflation | -0.101 | -0.0978 | -0.104 |
| | (0.175) | (0.175) | (0.175) |
| Urban Population | 0.0155*** | 0.0155*** | 0.0155*** |
| | (0.00330) | (0.00330) | (0.00329) |
| Government Final Consumption | -0.0104 | -0.0107 | -0.0104 |
| | (0.00692) | (0.00691) | (0.00691) |
| Oil Rents/GDP | -0.0128*** | -0.0141*** | -0.0125*** |
| | (0.00321) | (0.00349) | (0.00357) |
| Bust-period | | -0.404*** | |
| | | (0.151) | |
| Oil Rents*Bust-period | | 0.0117** | |
| | | (0.00559) | |
| Boom-period | | | 0.189 |
| | | | (0.132) |
| Oil Rents*Boom-period | | | -0.00144 |
| | | | (0.00532) |
| Observations | 2,898 | 2,898 | 2,898 |

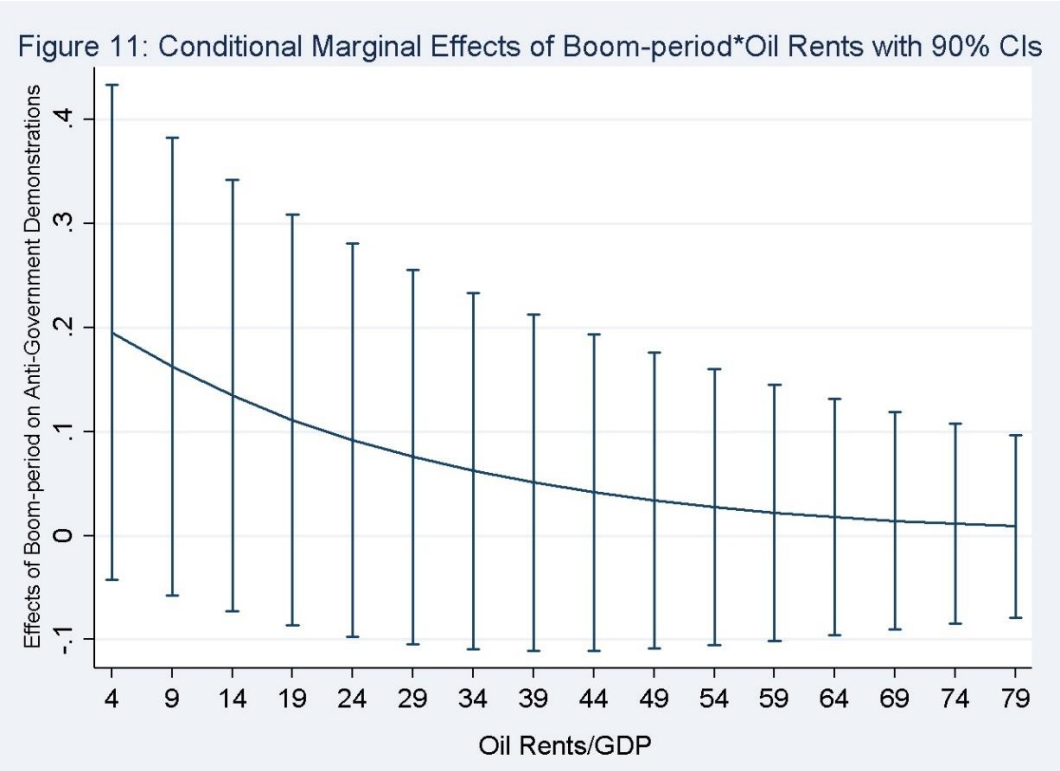
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.3.1: Margins Plot Bust-period*Oil Rents




3.3.2: Margins Plot Boom-period*Oil Rents



## 2.4: Negative Binomial Regression with Lagged Dependent Variable

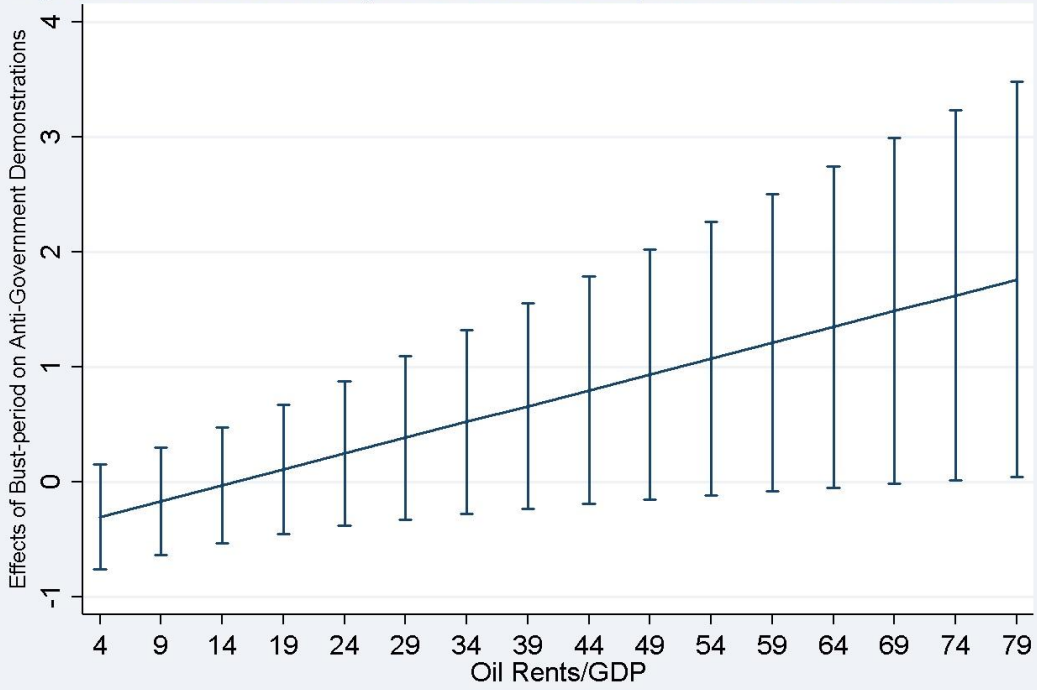
**Table 12: Negative Binomial Models for Anti Government Demonstrations, 1980-2008**
Models With Lagged Dependent Variable
Marginal Effects (Delta Method Standard Errors)

| | Model 1: Baseline | Model 2: Bust-period | Model 3: Boom-period |
|---|---|---|---|
| Anti-Government Demonstrations (1-year lag) | 0.0901*** | 0.0899*** | 0.0902*** |
| | (0.00954) | (0.00953) | (0.00954) |
| GDP per Capita (ln) | -0.211*** | -0.210*** | -0.211*** |
| | (0.0695) | (0.0695) | (0.0695) |
| GDP Growth | -0.0254*** | -0.0250*** | -0.0255*** |
| | (0.00773) | (0.00777) | (0.00774) |
| Population (ln) | 0.283*** | 0.285*** | 0.284*** |
| | (0.0404) | (0.0404) | (0.0404) |
| Civil War | 0.236** | 0.236** | 0.236** |
| | (0.101) | (0.101) | (0.101) |
| Autocracy | -0.590*** | -0.595*** | -0.595*** |
| | (0.130) | (0.130) | (0.131) |
| Democracy | -0.509*** | -0.508*** | -0.504*** |
| | (0.112) | (0.112) | (0.112) |
| Inflation | -0.456* | -0.468* | -0.466* |
| | (0.251) | (0.252) | (0.252) |
| Urban Population | 0.0288*** | 0.0287*** | 0.0288*** |
| | (0.00477) | (0.00476) | (0.00476) |
| Government Final Consumption | -0.0196** | -0.0198** | -0.0197** |
| | (0.00881) | (0.00880) | (0.00881) |
| Oil Rents/GDP | -0.0263*** | -0.0278*** | -0.0240*** |
| | (0.00596) | (0.00612) | (0.00659) |
| Bust-period | | -0.414 | |
| | | (0.284) | |
| Oil Rents*Bust-period | | 0.0275** | |
| | | (0.0135) | |
| Boom-period | | | -0.0351 |
| | | | (0.272) |
| Oil Rents*Bust-period | | | -0.00777 |
| | | | (0.0102) |
| Observations | 2,879 | 2,879 | 2,879 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.4.1: Margins Plot Bust-period*Oil Rents

Figure 12: Conditional Marginal Effects of Bust-period*Oil Rents with 90% CIs




3.4.2: Margins Plot Boom-period*Oil Rents

Figure 13: Conditional Marginal Effects of Boom-period*Oil Rents with 90% CIs