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Abstract

This paper introduces quality of government rather than regime type as dependent variable in studies of the political effects of natural resources. It consists of two parts. First, it theorizes the role of fiscal dependency of oil and gas rents in relation to three different dimensions of quality of government; low corruption, bureaucratic quality and legal impartiality. Second, it finds significant, negative effects of oil and gas rent dependency on all three dimensions of quality in a sample of 139 states in the period 1984 to 2006. The results hold for inclusion of control variables such as regime type, income, region and religion.

Key Words: Oil, gas, corruption, bureaucracy, legal impartiality, large-N

JEL Classification: N50, O13, O43, P48, Q34

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Introduction

A number of recent studies are concerned with effects of natural resource abundance on democracy.¹ This paper adds new insights in two ways: First, we theorize how oil and gas rents influence quality of government rather than regime type. Second, we test our model with a measure of resource wealth based on rent dependency rather than income: It is money made by the state on oil and gas resources *relative* to other state income that influences quality of government, not the existence of natural resources *per se* or a certain amount of production per capita. We find that fiscal dependency on natural resource rents has negative impact on three dimensions of good quality of government – low level of corruption, bureaucratic quality and strong and impartial legal systems, and that negative effects on bureaucratic quality and legal impartiality exist under control for corruption.

The main explanations are that there are no incentives for elites to develop well-functioning bureaucracies and judicial systems in states rich on oil and gas, *because money from natural resource extraction comes with absolutely no political conditions*, and that incentives for corrupt behavior increase, the larger the amount of money at stake is.

Research on effects of natural resources is growing (Ross 2001; Smith 2004; Ulfelder 2007; Dunning 2008; Ross 2008; Teorell 2008; Omgba 2009; Haber and Menaldo forthcoming). Yet, political effects of having sub-surface oil and gas reservoirs are far from fully investigated and we argue that it is relevant to further examine how such richness influences *the way politics meet citizens*. We propose quality of government as an essential dependent variable in further discussions about political effects of natural resources.

Our idea is this: Recent literature brings attention to the importance of institutions in good governance (Isham et al. 2005; Collier & Hoeffler 2005). We concur that it is pertinent to examine factors that influence the quality and endurance of good government institutions, because how well politics is implemented has profound and very concrete implications for

everyday lives of billions of human beings and because how well a state relates to its people adds valuable information about the actual state of a country. We see institutional quality as *the* important dependent variable, not as an intermediate in explaining economic effects of natural resources as is the case in other research (Mehlum et al. 2006; Robinson et al. 2006) .

In defining quality of government, we follow Rothstein and Teorell (2008), who argue that such quality is best understood as the impartiality of institutions that exercise government authority. Since the scope of institutional impartiality is broad, it encompasses concepts such as low levels of corruption, good bureaucratic quality and judicial impartiality, also included in discussions concerning good governance.

Natural resource rents are, by definition, different from other incomes, such as tax revenues or profit made on agricultural production, for two reasons. First, generating them involves the population to a minimal degree, because extraction is not very labor intensive. It follows that the vast majority of people living in resource rich countries only meet rent value if they become beneficiaries of welfare provisions. Second, prospects for *government* profit are enormous. The way we apply the concept here refers to a next to effortless and unconditionally accrued income (Beblawi 1990; Moore 2004; Morrison 2009).

We stress that it is state fiscal *dependency* on rents that is interesting, as opposed to the amount of money as such. We assume that the greater dependency on external sources of government income, the greater the likelihood for low vertical integration in society and consequently the greater likelihood for low quality of government. This leads to the assumption that fiscal dependency on oil and gas rents influence quality of government irrespective of level of democracy in a state, which is why we control for level of democracy in the empirical tests.

The hypotheses regarding rent dependency effects on corruption, bureaucratic quality and legal impartiality are tested empirically in time-series, cross-section analysis of 131 states

from 1984 to 2006 using Feasible Generalized Least Square (FGLS) with control for heteroscedasticity and autocorrelation over time. We discuss this as a more appropriate technique than the usually recommended panel corrected standard errors.

The main contributions are three: First, the theoretical clarification of quality of government as a relevant dependent variable in discussions on political effects of resource abundance. Second, the demonstration that states fiscally dependent on oil and gas rents tend to be more corrupt, have lower bureaucratic quality and less impartial legal systems and that this is not a phenomenon restricted to the Middle East. Third, the operationalisation of resource rents as share of GDP, rather than rent per capita, because it is *government financial dependency on unconditional income* that is the primary causal mechanism. Section two briefly discusses the concept of quality of government; thereafter we expand the theoretical argument before presenting the empirical tests and finally concluding.

Quality of Government

By bringing attention to how institutions *exercise* power through a certain level of quality of government, we move away from the issue of how government power is obtained or transferred, which is where focus has been so far in terms of relations between natural resources and politics. By defining quality of government as impartiality, focus is on procedures for exercising government authority, rather than on policy content.

Of course, the question of how power is obtained is related to how it is exercised, as stressed in literature on political accountability (Lindberg 2009). However, we agree that even if formal, constituent components of democracy are present, they may be nothing but close to theoretical constructs, outmaneuvered in practice by the ‘informal reality of personalized, unaccountable power and pervasive patron-client ties’ (Diamond 2008, 145).

Also, we argue that even if the ability to hold government responsible in regular, free and fair elections is indeed important for the legitimacy of government, the output side is crucial – only if redistribution functions fairly impartially do people experience their government as legitimate. When government is not exercised impartially, state resources are used ineffectively and by elites for their own private gain, with devastating results for health care, sanitation, education and legal systems (Rajkumar & Swaroop 2008). Further, bad governance leads to disillusionment with government institutions and democracy, as well as decreasing levels of social trust in society at large and in some instances even to civil war, which of course further exacerbates the magnitude of challenges faced by countries with low government quality (Bratton 2007; Diamond 2007; Kaldor et al. 2007; Tavits 2008).

In defining quality of government as the impartial institutional exercise of government authority, we apply a broad notion of the concept, which allows for examination of various aspects of government exercise. This paper is concerned with three interrelated elements: Low levels of corruption, bureaucratic quality and legal impartiality.

We want to stress that rent dependency effects are assumed to be seen *directly* and also indirectly on levels of corruption, where effects are assumed to be filtered through the level of democracy in a country. The mechanism is then hypothesized to be that higher level of democracy in itself has a dampening effect on corruption.

Corruption is the antithesis to impartial government exercise, as it maximizes private interests at the expense of the public good. Corruption has many sizes and shapes, the aim here is not to engage in a lengthy discussion of the concept itself; we abide to the widely used ‘abuse of public power for personal gain’ (Rose-Ackerman 2004; Kauffmann et al. 2008).

High bureaucratic quality is at the heart of impartial exercise of government power, as it refers to the strength and durability with which the output side of government *resists* corruption and in a *responsive* and *efficient* manner provides goods for the public. The degree

of bureaucratic quality hinges on the ability to function somewhat autonomously from political pressure and on the ability to recruit staff based on merit and competence (Rauch & Evans 2000; Pellegrini & Gerlagh 2008) and possibly also on the capacity for handling bad bureaucratic behavior, including corrupt practices.

Rule of law is usually included in measures of good governance. Here, we are not concerned with the ability of legal systems to enforce property rights and contracts as discussed by La Porta et al. (1999), but rather think of it as procedural justice; more precisely, we think of fair treatment of inhabitants by legal systems as a defining element of quality of government and therefore talk about strong and impartial legal systems. Such systems include the ability for individuals to operate in a predictable environment – concretely, it provides better life quality if you know, what is lawful behavior and what is not and you can count on this distinction to be equal for everybody living in your country. So, we narrow rule of law down to strong and impartial legal systems and treat it as an element of quality of government in parallel with bureaucratic quality.

As is clear, the three dimensions of quality of government are intrinsically related (Uslaner 2008). For example, the higher level of quality in bureaucracy, the lower level of corruption as shown by Dahlström et al. (2009). Also, the ability of any legal system to function impartially hinges on the degree of professionalization of legal civil servants and the degree of corruption in the system, ranging from the ability to ‘buy’ law-making to the ability to influence law-implementation (You & Khagram 2005). In sum, the elements of quality of government are interdependent and tied to each other in various feedback mechanisms. Still, we treat them separately, both conceptually and empirically, because we want to examine whether rent dependency have different effects on each of them, as elaborated in the next section. However, since the idea of negative corruption effects on bureaucratic quality and the judiciary are hard to ignore, we demonstrate that effects of rent dependency on the

bureaucracy and the degree of legal impartiality indeed remain significant under control for corruption.

Oil and Gas Rent Dependency Influences Quality of Government

When there is a lot of oil and gas in a country's underground, the state potentially generates a lot of money – without the conditions otherwise associated with state income in terms of public demands in return for tax payments. Ruling elites therefore have a free choice of what to spend oil and gas money on – it *does not* automatically have to spend it on repression or corruption, even though this is often a scenario associated with oil states.

Ruling elites can choose to spend rent money on provision of services and welfare for the public. This can happen through more or less well-functioning institutions, with varying degrees of corruption, bureaucratic quality and degree of legal impartiality. The underlying assumption here is that the size of rents relative to GDP leading to different levels of quality of government may be the same. We argue that different trajectories are results of intentional choices by governments and elites as well as path-dependency in government institutions. The hypothesis is that the greater the rent dependency, the greater the likelihood for choices leading to low quality of government.

How the state makes money and how it spends them shapes its institutional make-up. So, for example, countries with large agricultural sectors develop different institutions for revenue collection than countries depending on foreign aid, and different again from countries with large extractive industries (Karl 1999; Sokoloff & Engerman 2000). Government institutions reflect where state money comes from (the input), and are also indicators of how the state redistributes its revenues (the output). Our concern here is the effect of rents on how states redistribute wealth – the output. We thus look at consequences of the economy on provision of public goods, rather than equating public goods with economic growth as for example

Collier and Hoeffler (2005). Redistribution of state wealth includes both actual *level of sharing* and *procedures* for sharing – here, in relation to resource rents, we are concerned with the procedures for redistribution in a broad sense.

Effects of natural resources is often discussed in relation to rentier states – oil and gas are indeed the rentier commodities *par excellence*, due to the enormous surpluses easily captured by the state, and the non-labor intensive extraction. Few other commodities than oil and gas have the potential to dominate state budgets (Karl 1997) and to do so without any conditionality. To illustrate the volume, consider the case of Angola: Within the next five to ten years, investments required in the country's petroleum sector amount to between eight and ten billion USD per year. The estimated revenues are in the range of seventy to eighty USD billion annually during peak producing years 2010–15, and the estimated annual government receipts would range between fifty and fifty-five USD billion (McPherson & MacSearraigh 2007). Angola's GNI per capita in 2006 was 1,970 USD.

History is ample with examples of corrupt activities generated by such rents (La Porta et al. 1999; Leite and Weidman 1999). The common denominator used to explain corruption and corrupt behavior or rent seeking in existing research is the 'human love of reward' in combination with the path dependency that corrupt behavior shapes. It is the size of possible gains that corrupt, and the corrupt effects are reinforced by lack of transparency in the extractive sector and institutionalized over time (Ades & Di Tella 1999; Teorell 2007).

The traditional take on corruption in resource rich states is that ruling elites hold the incumbency advantage via direct access to oil and gas revenues, and thus use rents as a means to stay in power through, for example, patronage. The benefits of holding power in a rentier state are of course, for any politician or civil servant bent on self-enrichment, substantial. Large rents make the state a prize to be possessed, rather than a forum for consensual rule (Jensen & Wantchekon 2004).

We think of this as a systemic perspective in which resource rents are like a bag of money that ruling elites can use to secure autonomy from its population through corrupt behavior and thus uphold non-democratic regimes. In such a perspective, it is rents *per se* that lead to corruption. However, we are not interested in durability of regimes, but rather in the quality of government they provide, and therefore do not focus on rents as such.

We have a more agency-oriented view on how rents cause corruption with focus on rent *dependency*: Think of the individual tax official, who seeks to maximize expected utility when collecting tax revenues from the oil industry. He has a choice; either he can be honest and report the factual costs of any one company, and receive his fixed wage. Or, he can be corrupt and accept a company bribe in return for reporting a greater cost, thus reducing company tax (Kolstad & Wiig 2009).

The choice of any one bureaucrat is expected to result from a relative weighing of at least his wage level, the bribe size and the risk of detection (Van Rijckeghem and Weder 2001). It follows that the combination of low wage, a possibility for great bribes in combination with low social/judicial risk increases the probability for corrupt behavior

Now, oil and gas rents transfer directly to state coffers and margins for profit are extremely wide (Shaxon 2007). In theory, there is nothing to prevent states rich on oil and gas to pay their bureaucrats a wage level that would reduce the temptation to accept bribes. However, the greater the share of state budgets that are made up of such money – that is, the greater rent dependency – the greater likelihood for a) large bribes and possibly also of b) low social/judicial risk. Whether or not an individual bureaucrat faces a social or judicial risk by accepting a bribe is assumed to be influenced by the level of democracy in a country – the more democratic, the greater the potential cost.

All other things being equal, the greater the fiscal dependency of oil and gas rents is in a country, measured as per cent of GDP constituted by such rents, the greater the likelihood is

for situations of ‘low wage + great bribes + low risk’ to occur (Tornell & Lane 1999; Torvik 2002). In short, we argue that rent dependency matters for levels of corruption and specify the following hypothesis:

H₁: the greater the rent dependency, the higher the level of corruption

Regarding other effects of rent dependency on the output-side of politics, we hypothesize that large rents lead to low bureaucratic quality as well as weak judicial systems unable to provide impartial treatment of their subjects. Importantly, we argue that such effects exist irrespective of corruption, but that they are probably exacerbated by corruption.

We consider bureaucratic quality and legal impartiality as the same type of indicators of quality of government and our aim is not to theorize their relation further. Concerning effects of rent dependency on bureaucratic quality and on legal systems, we think like this:

In states that can *extract* wealth, rather than depend on the willingness and consent of the people to *create* it, governing elites do not have to constrain their discretion by institutional settings, but can use state bureaucracy and legislature to buy off or beat down political opposition (Wright 2008).

Previous research has highlighted taxation and subsequent accountability as central in understanding relations between public and government. A central dimension of statehood is the ability to tax, and the relation between taxation and institutional development is assumed to function so that revenues from below are exchanged for representation and accountability from above. Taxes can thus form a vital democratic leverage between citizens and political elites, creating a state-society balance that encourages bargaining and consensus (Moore 2004; Moore 2007; Persson 2008).

Crucially, in states rich on resource rents, taxation is not necessary – or indeed constitutes a very little part of government finances (Ross 2008). So, government does not depend on money from its citizenry and does not have to offer representation or accountability in exchange for citizens' payments. Rather, state budget rests primarily on natural resource rents that are money with 'no strings attached' – extracting oil and gas from underground or subsurface sources is a transfer of wealth into state pockets without having to pay back. So, the greater the share of GDP that rents constitute, the less the need is for the state to offer anything in return in terms of for example good quality of government. Consequently, the positive trade-off between state and citizens does not occur (Chaudry 1997).

As a result of increasing rent dependency, the state apparatus not only becomes more distant from the country's inhabitants, it might also become smaller and less efficient in dealing with people. Rent dependency therefore not only leads to thin vertical, societal integration between state and people, but consequently also to institutional deterioration since demands for impartiality are not absorbed into the bureaucracy and the legal system. This would constitute the negative effects of oil and gas rent dependency on bureaucratic quality and legal impartiality.

The *modernization* argument, as discussed by Bräutigam (2008), holds that when states develop capacity to tax, this increases professionalization of the bureaucracy. Modernization theory argues that democratization comes about with higher education levels, urbanization and greater occupational specialization. In parallel, better institutional quality is hypothesized to evolve, not only because it becomes technically possible, but also because it reduces transaction costs. Over time, state capacity improves through government's fiscal contract with the public (Levi 1988). However, when rents reach a certain level, the modernization effect does not come into play, as increased corruption that comes with inflow of large sums devastates bureaucratic and legal impartiality. So, in *combination with* the lack of public

pressure, economic boosts in the form of oil and gas rents inflow may indeed have negative effects on the likelihood for impartial governance. This would constitute a more indirect effect, working through corruption. Tuan Minh Le of the World Bank argues that motives and possibilities for corruption in revenue administration are plentiful and that

‘revenue administration in many developing countries is characterized by complex tax and trade regimes including multiple discretionary exemptions, confusing and nontransparent procedures for tax compliance, and excessive discretionary power of tax inspectors’ (Le 2007, 336).

With regards to bureaucratic quality and impartiality of the judicial system, we therefore formulate the following hypotheses:

H₂: the greater the rent dependency, the lower the bureaucratic quality

H₃: the greater the rent dependency, the less impartial the judicial system

Concerning the three elements of quality of government under scrutiny in this paper, we take note of their close, positive correlation with level of democracy pointed out in existing research (Treisman 2007) and in testing the above three hypotheses include regime type as a control variable.

Importantly, while we hypothesize direct effects of rent dependency on bureaucratic quality and legal impartiality, our theoretical discussion concerning vertical integration and modernization effects respectively underlines the need to examine corruption as a *control variable* in the model of rent effects on bureaucracy and legal systems to tease out the levels

of direct and indirect effects. We argue that effects probably exist, irrespective of corruption levels and specify the following hypothesis:

H₄: direct rent dependency effects on bureaucratic quality and the judicial system exist, even after control for corruption

Rentier scholars see the state as close to a private enterprise, providing the citizens with certain benefits without emptying their pockets. Relieved from taxation, citizens presumably do not demand anything from the state in return. Such ‘democratic apathy’ can of course be pursued more or less consciously through for instance low quality education as discussed by Birdsall et al. (2001), but evidence suggests that even if rents are used as lubricant to dampen dissent and buying off opposition for example through non-taxation, popular demands for proper democracy and impartial treatment remain to be voiced (Okruhlik 1999; Lowi 2004; Bratton 2007).

Interestingly, Halliwell and Huang (2008) find that in poorer countries, public emphasis is on the honest and efficient delivery side of government, while in richer countries, emphasis is on accountability and stability. This underlines the relevance of including the output-side in analyses of political effects of resource rents, as indeed natural resources in many cases are located in poor countries. The following section tests our four hypotheses with data from the World Bank and the International Country Risk Guide, published by the PRS Group.

Data and Estimation Results

When assessing political effects of natural resources like oil and gas, it is not the existence of such resources *per se*, which is assumed to generate effect, but the money made by the state

on these resources *relative to other state income*. We therefore argue that it is *rent dependency* that matters.

By using a rent-based measure, we take *country-specific production costs* into account. When we speak of rent, we therefore refer to the difference between country-specific extraction costs and international market value that accrues to the state (Dunning, 2008). For example, the cost of lifting a barrel of oil from beneath the sand dunes of the Ghawar Field in Saudi Arabia is less than five USD, whereas it costs ten times more to extract it in the North Sea Ekofisk field, and around seventy USD to extract one barrel from tar sands in Canada. Such differences in cost are of course important for the size of government rent. A rent-based measure is therefore a more valid estimate of the final size of revenues for governments than an exports-based one (Herb 2003; Rosser 2006; Humphreys et al. 2007, Moore 2007).

Data used for constructing this more precise variable is available from the World Bank and covers the period 1970-2006.² A potential weakness of this data is that adjustment for country-specific extraction costs is not completely accurate (Hamilton and Clemens 1999; Bolt et al. 2002). Other drawbacks are that:

a) Gas does not have a universal world market price, and therefore annual averages have been derived from existing prices. This means that the world market price may be overstated in some contexts and understated in other.

b) Average extraction cost for most countries is in fact *not* country-specific but obtained from a surrogate country with similar conditions. These figures are therefore approximations.

c) Countries may sell their product for internal consumption for a price well below the international price.³ This may give an overestimation of resource rents.

d) Of course, every cost *not* calculated would induce rent-overestimations.

In general, however, we think that the advantages of using this rents-based measure are larger than the drawbacks.

A recent research trend is to apply a per capita measure of rents and thereby eliminate the risk of endogeneity (Humphreys et al. 2007; Ross 2008; Morrison 2009; Haber and Menaldo forthcoming). Such endogeneity may occur if the size of the economy affects both the independent variable (rent dependency) and the dependent ones (measures of quality of government). And indeed, it may be argued that it is poverty not large oil revenues that causes both great rent dependency *and* bad quality of government. Even so, we apply a rent-by-GDP measure for two reasons:

Firstly, a rent per capita measure is at odds with existing theory. Rentier scholars, such as Beblawi (1990), explicitly hypothesize that it is the dependency on rents that matters, not their size. Angola and the Netherlands may indeed score equally high on a rent per capita measure, as Ross (2008, 4) claims, but this fact is irrelevant to rentier state theory since the dependency is much greater in the former country. We believe that the impact of oil revenue in Angola are distinct from that in the Netherlands and seek to capture this difference.

Secondly, the use of the rent per capita measure arguably makes more sense if we were to study authoritarianism (Ross 2008), or regime stability (Dunning 2008; Morrison 2009). Such research naturally focuses on the ability of the state to either buy consent or to repress opposing political fractions, which makes the size of rents relative to the size of the population interesting. However, we maintain that when it comes to the relationship between natural resource revenues and quality of government, rent by GDP is the more valid variable. In short, it is the state's financial dependency on income with no political obligations that is of interest for how well the government meet its citizens – not oil dollars in relation to size of the population.

For every year and every country, we divide oil and gas rents by GDP to construct a valid, independent variable that measures rent dependency, and we call it Rent/GDP.⁴ To counter the risk of endogeneity in our approach, we control for income.

We derive our *dependent* variable from the International Country Risk Guide (ICRG) as provided by the PRS Group and available through the Quality of Government database (Teorell et al. 2008). The PRS group publishes country specific risk analyses and available data covers the period 1984-2006. Concretely, we apply their measures of corruption, bureaucratic quality and law and order. We chose these data over those provided in the World Bank Governance Indicators (Kauffmann et al. 2008) because they cover a greater time-span. The ICRG data are included in, and correlate highly with the World Bank's indexes.⁵ The ICRG data are indexes made on yearly expert ratings, and we, pragmatically, value their time-span and subject coverage over the possible drawbacks pointed out in earlier research (Treisman 2007).

The measure of *corruption*, ranging from zero to six, refers primarily to 'excessive patronage, nepotism, job reservations, "favor-for-favors", secret party funding, and suspiciously close ties between politics and business' (PRS 2008). The lower the country scores, the more corruption. The main difference from this operationalisation to that of the World Bank is that it does not refer to perceptions of corruption held by people in a country, but is strictly an evaluation made by outside experts.

The measure of *bureaucratic quality*, ranging from zero to four, refers to whether a country's bureaucracy has 'the strength and expertise to govern without drastic changes in policy or interruptions in government services [and whether there is an] established mechanism for recruitment and training' (PRS 2008). Again, the lower the score, the less bureaucratic quality.

The measure of law and order, ranging from zero to six, consists of two subcomponents, each comprising zero to three points. 'The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment

of popular observance of the law' (PRS 2008). As with the other two independent variables, the lower the score on this index, the less the impartiality in the legal system is.

Using this variable is obviously not optimal for our purpose here, as we are really only interested in the Law component when analyzing whether rents may have a negative effect on the strength and impartiality of the legal system. However, the PRS Group does not provide a split index. We have chosen to use the index, because of the obvious advantage by the time-span covered, but realize that due to the imprecision in relation to our theoretical argument, the results may have low validity.

In sum, our empirical analysis is dependent on the coverage of the ICRG dataset. As it runs from 1984 to 2006 and includes a maximum of 139 states, the theoretical maximum of observations is 3197. However, due to the use of time lags and some missing data, the actual number of observations is smaller than that. For each regression, we are able to work with 1932 observations.

To simply regress Rent/GDP on any one quality of government indicator is of course not satisfactory. We follow existing literature, and include the following control variables.

Lagged dependent variable: The strongest predictor of a state's quality of government is often its earlier level of quality of government. We therefore include a lagged version of each of the three quality of government indicators – low corruption, bureaucratic quality and law and order, and thereby obtain an estimate of the size of institutional path-dependency.

Apart from diminishing country-specific historical and cultural biases, this method has two additional advantages: It makes it possible to measure dynamic change over time and corrects for first-order autocorrelation. This process is panel-specific in that it allows the degree of autocorrelation to vary from country to country.

The other control variables serve no other purpose than merely being control variables – we are not concerned with the possible effects on quality of government by any of these variables as such.

Regime is theoretically important because of the positive correlation between degree of democracy and indicators of quality of government, as discussed in section 3. We include it as a lagged control variable, operationalised by an eleven-point index constructed from both Freedom House and Polity IV data.⁶ This combined measure of democracy has been shown to outperform its constituent parts (Hadenius & Teorell 2005). The scale ranges from zero to ten, where ten is the most democratic.

Income is widely held as a powerful predictor of the level of democracy in a state and is included in much other research on natural resource effects (Ross 2001). Data are obtained from Penn World Table 6.2 by Heston et al. (2006).

We also want to uncover possible region-specific effects, since particular focus in the existing research has been on the Middle East, and we therefore add a regional dummy variable to the regression, *Mideast*, gathering data from the World Bank country classification (World Bank 2008).⁷

Another variable of importance is *religion*, or more specifically Islam. Many Muslim countries are also great oil producers and since Islam correlates positively with oil and gas resources and negatively with democracy, we follow earlier research and control for Islam in order not to confuse the different effects (Ross 2008). We use the data provided by La Porta et al. (1999), available through Teorell et al. (2008).

Islam is measured as the Muslim percentage of the state's population.

In order to avoid the discussion of whether quality of government influences the size of rents (Sokoloff & Engerman 2000; Easterly 2002; Mehlum et al. 2006; Rosser 2006), and to

ensure greater confidence that the causal direction is not reverse, we use a five year lag on all independent and control variables.

Testing our hypotheses regarding rent dependency effects on quality of government, we use statistical analysis of a cross-sectional time-series (CSTS) data set, in which we pool annual data from all sovereign states with a population of more than one hundred thousand.⁸ This approach ensures as much variance on all variables as possible. While using CSTS data offers great analytical strength, it obviously also have pitfalls because of two-dimensionality (Stimson 1985). With CSTS data, at least three violations of the standard OLS assumptions occur: Firstly, observations of different panels of units may be correlated to each other, leading to *cross correlation* of errors, secondly, the errors of one single unit could correlate over time, i.e. *autocorrelation*, and finally, the variances of errors may be unit-specific, not equally distributed over time, a phenomenon known as *heteroscedasticity*.

We deal with cross correlation by controlling for the relevant country specific characteristics. Further, using the test derived by Wooldridge (2002) for autocorrelation in panel-data models, we find significant autocorrelation in all our models.⁹ We do an LR test to test for heteroscedasticity (using iterated GLS with heteroskedasticity to produce maximum likelihood parameter estimates), and we find evidence of heteroscedasticity for the model with corruption as dependent variable, but not for the models with bureaucratic quality or law and order as dependant variables.¹⁰ Following these test results, we apply a *feasible generalized least squares* (FGLS) estimation method, correcting for heteroscedasticity and AR(1) autocorrelation.

Well aware of the arguments for using panel corrected standard errors (PCSE) presented by Beck and Katz (1995), we apply FGLS *because it provides more efficient estimates* (given that the assumed covariance structure is correct). Now, Beck and Katz (1995) argue that if the panel of data is small (less than 10 to 20 panels with 10 to 40 time periods per panel), the full

FGLS variance-covariance estimates could be incorrect, creating too low standard errors. We work with a large panel of 136 countries and a number of years (1984-2006), which is why we opt for the more efficient estimates.¹¹

In order to ensure robust and sound results, we have conducted several robustness checks of our results. Firstly, by doing a cross-section analysis, we estimate ordinary least square regressions for each model using the mean values for each dependent and independent variable. The mean values are calculated for each variable and the countries are divided by the number of years, hence corresponding to a “long-run” cross-section analysis. The results corroborate those presented in Tables one to four. Secondly, we control for time effects by including time specific intercepts (e.g. shocks affecting all countries in a specific year). Again the results are robust. Since the different model specifications provide very similar results, in particular regarding the sign and magnitude of the estimated coefficients, we are confident about the robustness of the estimates.¹²

Table 1: Oil and Gas Rent Dependency Effects on Corruption

	1	2
<i>Corruption</i> _{<i>t-5</i>}	.33*** (.0203)	.32*** (.0203)
<i>Rents/GDP</i> _{<i>t-5</i>}	-.60*** (.1789)	-.60*** (.1767)
<i>Regime</i> _{<i>t-5</i>}		.013*** (.0057)
<i>Income</i> _{<i>t-5</i>}	.00006*** (3.59e-06)	.00006*** (3.62e-06)
<i>Islam</i>	-.004*** (.0011)	-.003*** (.0012)
<i>Mideast</i>	-.04 (.1231)	-.06 (.1236)
Number of Observations	1932	1932
Number of States	132	132

Dependent variable is the ICRG measure of corruption (index 0-6). Unstandardized coefficients. *significant at the .05 level; **significant at the .01 level; ***significant at the .001 level. Standard errors are in parentheses below the coefficients. Feasible Generalized Least Squares regressions run with Stata 10; corrected for first-order autocorrelation and heteroscedasticity. *Rents/GDP* is measured as oil and gas rents as a fraction of GDP, per state and year.

Table one clearly demonstrates a significant effect of oil and gas rent dependency on levels of corruption, as expected in H₁. As reported in the descriptive statistics, there is a quite strong

positive significant correlation between GDP and corruption level (the higher the GDP, the lower the level of corruption). Many countries with rent dependency have large GDP, and arguably inclusion of income as control variable could therefore be seen as a hard test of our hypothesis. Still, we find empirical support for the hypothesis that the greater the rent dependency, the higher the level of corruption.

The interpretation of the magnitude of rent dependency effect on corruption is best illustrated by assuming two different countries: one with zero rent dependency and one country with 0.1% rent dependency. The second column in Table one then suggests that a country with a higher rent dependency has 0.060 lower score on the corruption index compared to the country with no rent dependency. It is worth noting that the total effect of rent dependency on corruption also includes the indirect effect of rents on income. Income has a significant positive effect on corruption, and since rents are included in the income measure this means that the total effect of rent is a compound effect of the negative direct effect of rent on corruption and the indirect positive effect via increased income.

Controlling for level of democracy does not qualitatively change our results. This runs counter to expectations generated in the theoretical discussion, which argues that part of the explanatory power of rent dependency can be attributed to regime type, since the more democracy in a country, the lower level of corruption.

Our results indicate that the negative effects of rent dependency – in terms of higher levels of corruption – remain, irrespective of level of democracy. In sum, we interpret the results in Table one as supporting the hypothesis that the greater rent dependency, the more corruption. Earlier research on the huge temptations inherent in rent value thus receives support.

We now proceed to a test of H_2 : the greater the rent dependency, the lower the bureaucratic quality and present the results in Table two: .

Table 2: Oil and Gas Rent Dependency Effects on Bureaucratic Quality

<i>Bureaucratic Quality</i> _{<i>t-5</i>}	.43*** (.0172)
<i>Rents/GDP</i> _{<i>t-5</i>}	-0.30*** (.0696)
<i>Regime</i> _{<i>t-5</i>}	.019*** (.0043)
<i>Income</i> _{<i>t-5</i>}	.00005*** (1.88e-06)
<i>Islam</i>	-.004*** (.0006)
<i>Mideast</i>	.36*** (.0649)
Number of Observations	1932
Number of States	132

Dependent variable is the ICRG measure of bureaucratic quality (index 0-4). Unstandardized coefficients. * Significant at the .05 level; ** significant at the .01 level; ***significant at the .001 level. Standard errors are in parentheses below the coefficients. Feasible Generalized Least Squares regressions run with Stata 10; corrected for first-order autocorrelation and heteroscedasticity. *Rents/GDP* is measured as oil and gas rents as a fraction of GDP, per state and year.

Table two shows a significant, negative effect of rent dependency on bureaucratic quality and we take this as empirical support of H₂. Again, the magnitude of the rent dependency effect on bureaucratic quality can be illustrated by assuming two countries: one with zero rent dependency and one country with 0.1% rent dependency. Our results suggest that the country with a higher rent dependency has 0.03 lower score on the bureaucracy quality index compared to the country with no rent dependency.

Our results thus support existing research on how vertical integration between state elites and society suffers, when a state depends on rent instead of taxation, and therefore do not experience a need or pressure to modernize bureaucracies that meet citizens well.

Income and regime have the positive effects on bureaucratic quality as were expected. While Islam has a negative significant effect on bureaucratic quality, Mideast has a positive effect. However, since these two variables suffer from multicollinearity, we refrain from interpreting their respective parameter estimates.

We now turn to the test of the third hypothesis, concerning the negative effects of rent dependency on legal impartiality: H_3 : *the greater the rent dependency, the less impartial the judicial system.*

Table 3: Oil and Gas Rent Dependency Effects on Legal Impartiality

<i>Law and Order</i> _{t-5}	.21*** (.0208)
<i>Rents/GDP</i> _{t-5}	-.53** (.1800)
<i>Regime</i> _{t-5}	.053*** (.0090)
<i>Income</i> _{t-5}	.00007*** (3.95e-06)
<i>Islam</i>	-.004** (.0014)
<i>Mideast</i>	.61*** (.1482)
Number of Obs.	1932
Number of States	132

Dependent variable is the ICRG measure of law and order. Unstandardized coefficients. * Significant at the .05 level; ** significant at the .01 level; ***significant at the .001 level. Standard errors are in parentheses below the coefficients. Feasible Generalized Least Squares regressions run with Stata 10; corrected for first-order autocorrelation and heteroscedasticity. *Rents/GDP* is measured as oil and gas rents as a fraction of GDP, per state and year.

Results reported in Table three indicate that even the third hypothesis receives empirical support – if a great part of the GDP stems from oil and gas rents, then this is bad for legal impartiality.

However, we do not draw too bold conclusions with this third indicator of quality of government. As discussed above, available data conflates degree of public observance of the law with judicial impartiality, which is what we really are interested in. For that reason, and because of the lower level of significance, results in Table three are interpreted more cautiously than those in the two former tables.

In sum, however, we think the analysis of this indicator of quality of government supports the general picture: *Rent dependency influences quality of government negatively.*

This means, in other words, that rent dependency not only hampers quality of government by increasing levels of corruption, but also that devastating impacts of fiscal dependency on

oil and gas income hit directly on state bureaucracies and on impartiality of their legal systems.

The theoretical parts of the paper also suggest that corruption may be a channel through which rents indirectly influence bureaucratic quality and degree of legal impartiality. We therefore run the effects of rent dependency on these two indicators of quality of government and control for corruption, and present the results in the final table:

Table 4: Oil and Gas Rent Dependency Effects on Bureaucratic Quality and Legal Impartiality, Controlling for Corruption

Bureaucratic Quality		Legal Impartiality	
<i>Bureaucratic Quality</i> _{t-5}	.41*** (.0178)	<i>Law and Order</i> _{t-5}	.21*** (.0218)
<i>Rents/GDP</i> _{t-5}	-0.24*** (.0686)	<i>Rents/GDP</i> _{t-5}	-0.60* (.1071)
<i>Corruption</i> _{t-5}	.04*** (.0074)	<i>Corruption</i> _{t-5}	.10*** (.0146)
<i>Regime</i> _{t-5}	.02*** (.0043)	<i>Regime</i> _{t-5}	.04*** (.0086)
<i>Income</i> _{t-5}	.00004*** (1.84e-06)	<i>Income</i> _{t-5}	.00007*** (3.46e-06)
<i>Islam</i>	-.004*** (.0006)	<i>Islam</i>	-.002* (.0013)
<i>Mideast</i>	.36*** (.0631)	<i>Mideast</i>	.59*** (.1478)
Number of Observations	1932	Number of Observations	1932
Number of States	132	Number of States	132

Dependent variable is the ICRG measures of bureaucratic quality (column 1) and law and order (column 2). Unstandardized coefficients. * Significant at the .05 level; ** significant at the .01 level; ***significant at the .001 level. Standard errors are in parentheses below the coefficients. Feasible Generalized Least Squares regressions run with Stata 10; corrected for first-order autocorrelation and heteroscedastity. *Rents/GDP* is measured as oil and gas rents as a fraction of GDP, per state and year.

Effects of corruption on bureaucratic quality and law and order are as expected: The fact that coefficients are positive has to do with data coding (zero = full corruption, six = no corruption, whereas bureaucratic quality and law and order are also coded so that the higher the value is, the more positive is the output). In practice, this means that a decrease in levels of corruption leads to an increase in bureaucratic quality and more law and order.

When controlling for corruption, as suggested in the theoretical discussion of its relation to bureaucratic quality and legal impartiality, we find that negative effects of rent dependency remain robust when compared to the coefficients reported in Tables two and three. This is as expected and underlines that there is a significant, negative effect of making a lot of money to the state budget on oil and gas on bureaucratic quality and legal impartiality and that this effect exists irrespective of corruption.

5. Conclusion

The paper shifts attention from effects of natural resource abundance on how political power is obtained and sustained, to effects on *how political power is exercised*. This is important for further understanding the much examined resource curse, but also because implementation of politics has very direct effects on everyday lives of billions of people. Concretely, quality of government, defined as impartiality of institutions that exercise government authority, influence health, education, judicial impartiality and a range of other output variables that in many places are matters of life and death.

Further, in examining the impact of natural resource abundance, we apply a measure of *rent dependency* that focus on rent value as relative share of GDP, as opposed to the recently debated rent-per-capita and this increases the external validity of our findings.

The main finding is that government fiscal dependency on oil and gas resource rents negatively influences quality of government, measured here by indicators of corruption level, bureaucratic quality and legal impartiality. These effects are found in time-series with global span, and are statistically robust.

Moreover, we show that robust, negative effects of rent dependency on bureaucratic quality and legal impartiality remain, even under control for corruption. So, it is not just because oil ‘corrupts’ that natural resource abundance leads to low bureaucratic quality and

lack of legal impartiality. We suggest that the main explanation for these negative effects should be found in the absence of taxation: When a country can rely on resource rents, it does not have to tax its citizens. The lack of development of a tax administration hampers bureaucratic professionalization. Moreover, natural resource rents are per definition money with no political conditions attached and since the public is bypassed by this stream of income to state coffers, there is no incentives for elites to secure government responsiveness to public demands for, for example, impartiality in the legal system.

We argue that whether or not rents from oil and gas lead to low quality of government is the result of intentional choices by governments and elites. Our results bring support to this argument: Indeed, where some degree of path-dependency in government institutions can be inferred from the reported lagged effects of each dependent variable reported here, the coefficients are no bigger than to leave plenty of space for political choices.

Also, should one concentrate on the *size* of coefficients, as opposed to their significance, and infer actual effects on the dependent variables of rent dependency, one sees that these are indeed very small. For example, if we compare two countries: one with zero rent dependency and one country with 0.1% rent dependency our results suggest that the country with a higher rent dependency has 0.06 lower score on the corruption index than the country with no rent dependency. We take this as an important indicator that there is plenty of room for maneuver for political elites, should they wish to counter the negative effects of making large amounts of money on oil and gas reserves.

Despite the consistent and negative effects of rent dependency on aspects of quality of government demonstrated here, it is perfectly possible to think that natural resource rents can be used to provide public goods, which people would not have to provide bribes to access (Pellegrini & Gerlagh 2008).

Acemoglu and Robinson (2006) list the following reasons why elites could choose to provide good quality of government to the public: a) because of perceived health and productivity benefits of the population, b) a desire to limit emigration or to increase immigration of non-elites, c) as response to a threat of revolution or d) as a bribe to attract votes or to get support for increased military activity or other government action.

We would add: Because of external pressure, be it either from neighboring states, civil society or aid donors. This is of course ultimately an empirical question. This paper adds to ongoing research about the political effects of natural resources as well as to research on quality of government. The policy implications are how to overcome the challenge of institutional improvement in states rich on oil and gas, when this richness in itself gives rise to bad institutions, and the rents to be generated on these natural resources do not seem to become smaller in light of rising world market prices.

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Appendix: Variables and Descriptive Statistics

1. *Rent/GDP* = the rent as a fraction of GDP, per country, per year. [0.00 – 1.00]. N = 5725.

Mean = .06. Std. Dev: .16. Rent = \$ worth per unit of oil/gas with country-specific production costs subtracted.

2-4: Variables from the International Country Risk Guide (ICRG).

Corruption = Primarily an assessment of actual or potential corruption in the form of

excessive patronage, nepotism, job reservations, 'favor-for-favors', secret party funding,

and suspiciously close ties between politics and business.[0-6]. N = 3271. Mean = 3, 1. Std

Dev = 1.4.

Bureaucratic Quality = Measures the institutional strength and quality of the bureaucracy. [0-

4]. N = 3271. Mean = 2, 1. Std Dev = 1.2.

Law and order = an assessment of the strength and impartiality of the legal system in

combination with assessment of popular observance of the law. [0-6]. N = 3271. Mean =

3,6. Std Dev = 1.5.

5. *Lagged dep. var.* is the dependent variable lagged with one and five years, respectively.

This corrects for the autocorrelation over time in a panel-specific manner. [0-6; 0-4; 0-6]

6. *Regime* is a measure of country democratic performance. Constructed from two sources;

Freedom House (combined measure of Civil Liberties and Political Rights) and Polity IV,

which are averaged into one index. We use the imputed version, which has better coverage.

Data available through Teorell et al. (2008). Countries graded between 0 (perfect

autocracy) and 10 (perfect democracy). [0-10]. N= 5264. Mean= 5.22. Std Dev= 3.52.

7. *Income* is based on real GDP per capita measured in constant dollars chain series. Base

year is 2000. The data originate from Penn World Table version 6.2, by Heston et al.

(2006). [171-844028]. N = 5180. Mean = 7712.8. Std. Dev.: 8744.

8. *Islam* is a variable measuring the Muslim percentage of a state's population in 1980. We use only this year since the proportion of the population with religious affiliation tends not to change much over time. For countries formed more recently, figures of later date have of course been used. Data from La Porta et al. (1999). [0.0-99.9]. N = 6732. Mean = 23.21412. Std. Dev.: 35.7

9. *Mideast* is the dummy variable that corrects for region-specific influence. States Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen are coded as 1, and all others as 0.

Table A1: Summary of variables

<i>Variable</i>	<i>Obs.</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Min</i>	<i>Max</i>
Corruption	2993	3.10	1.38	0	6
Bureaucratic Quality	2993	2.13	1.20	0	4
Law and Order	2993	3.65	1.52	0	6
Rent/GDP	3916	0.06	0.16	0	2.30
Regime	3586	5.66	3.45	0	10
Income	3231	8172	8486	171	50760
Islam	4114	23.21	35.69	0	99.90
Mideast	4715	0.10	0.30	0	1

Table A2: Pair Wise Correlations

	Corruption	Bur. Quality	Law and Order	Rent Dummy	Rent/GDP	Regime	Income	Islam	Mideast
Corruption	1.00								
Bur. Quality	0.67*	1.00							
Law and Order	0.61*	0.68*	1.00						
Rent/GDP	-0.20*	-0.12*	-0.07*	0.78*	1.00				
Regime	0.48*	0.54*	0.40*	-0.35*	-0.35*	1.00			
Income	0.55*	0.72*	0.68*	0.13*	0.13*	0.45*	1.00		
Islam	-0.27*	-0.27*	-0.17*	0.42*	0.37*	-0.52*	-0.16*	1.00	
Mideast	-0.12*	-0.08*	-0.01	0.48*	0.35*	-0.34*	0.12*	0.59*	1.00

* Significant at the 0.01 level, Pearson's r.

Table A3: Oil and Gas Rent Dependency Effects on Corruption (using OLS with PSCE)

	1	2
<i>Corruption</i> _{<i>t-5</i>}	.22*** (.0686)	.22*** (.0686)
<i>Rents/GDP</i> _{<i>t-5</i>}	-.69* (.3747)	-.62*** (.3762)
<i>Regime</i> _{<i>t-5</i>}		.2 (.0151)
<i>Income</i> _{<i>t-5</i>}	.00006*** (8.26e-06)	.00006*** (8.35e-06)
<i>Islam</i>	-.005** (.0020)	-.004** (.0019)
<i>Mideast</i>	-.09 (.1778)	-.06 (.1806)
Number of Observations	1935	1935
Number of States	135	135

Dependent variable is the ICRG measure of corruption (index 0-6). Unstandardized coefficients. *significant at the .05 level; **significant at the .01 level; ***significant at the .001 level. Standard errors are in parentheses below the coefficients. Ordinary Least Squares regressions with Panel Corrected Standard Errors run with Stata 10; corrected for first-order autocorrelation. *Rents/GDP* is measured as oil and gas rents as a fraction of GDP, per state and year.

Table A4: Oil and Gas Rent Dependency Effects on Bureaucratic Quality and Legal Impartiality (Using OLS with PCSE)

Bureaucratic Quality		Legal Impartiality	
<i>Bureaucratic Quality</i> _{<i>t-5</i>}	.30*** (.0780)	<i>Law and Order</i> _{<i>t-5</i>}	.11 (.0827)
<i>Rents/GDP</i> _{<i>t-5</i>}	-.42* (.2532)	<i>Rents/GDP</i> _{<i>t-5</i>}	-.65 (.4946)
<i>Regime</i> _{<i>t-5</i>}	.03*** (.0092)	<i>Regime</i> _{<i>t-5</i>}	.05*** (.0126)
<i>Income</i> _{<i>t-5</i>}	.00005*** (6.82e-06)	<i>Income</i> _{<i>t-5</i>}	.00008*** (.00001)
<i>Islam</i>	-.004*** (.0010)	<i>Islam</i>	-.001 (.0019)
<i>Mideast</i>	.16* (.0863)	<i>Mideast</i>	.33 (.2943)
Number of Observations	1935	Number of Observations	1935
Number of States	135	Number of States	135

Dependent variable is the ICRG measures of bureaucratic quality (column 1) and law and order (column 2). Unstandardized coefficients. * Significant at the .05 level; ** significant at the .01 level; ***significant at the .001 level. Standard errors are in parentheses below the coefficients. Ordinary Least Squares regressions with Panel corrected Standard Error run with Stata 10; corrected for first-order autocorrelation. *Rents/GDP* is measured as oil and gas rents as a fraction of GDP, per state and year.

Notes:

1 There is no agreed-upon definition of natural resources. Our concern here is solely with two of the most debated non-renewable resources – oil and gas, so-called point resources, as opposed to more diffuse resources such as cocoa or coffee.

2 <http://go.worldbank.org/3AWKN2ZOY0> for further information

3 Consider for example the presumably euphoric Venezuelan drivers who pay about 0.07 USD per gallon gasoline, according to recent figures. Source: The New York Times 30/10/07: Venezuela's Gas Prices Remain Low, but the Political Costs May Be Rising by Simon Romero.

4 In the Appendix, Table 1 presents descriptive statistics for all variables and Table 2 the pair wise correlations.

5 Spearman's Rho for the year 2007 between the two datasets ranges between .8 and .9.

6 We use the imputed version of this index in which missing data in Polity IV has been reconstructed by regressing Polity on the average Freedom House measure.

7 We do not include a dummy variable for Sub-Saharan Africa, as this is primarily used to control for impacts of minerals, and we are concerned with oil and gas.

8 CSTS data is characterized by its use of fixed units repeatedly observed over time. This distinguishes it from panel data which are built upon randomly selected units, and while the latter are in need of a large N sample frame, the usefulness of CSTS data is dependent on a large T. The twenty-three serial observations of this study are more than enough (Beck 2001).

9 Wooldridge test for autocorrelation in panel data H_0 : no first-order autocorrelation $F(1,121) = 423.85$, $\text{Prob} > F = 0.00$ for the model with corruption as dependant variable. For the model with bureaucratic quality as dependant variable $F(1,118) = 786.25$ $\text{Prob} > F = 0.00$. For the model with law and order as dependant variable $F(1,118) = 651.72$ $\text{Prob} > F = 0.00$ (Wooldridge 2002).

10 LR $\chi^2(132) = 693.47$ (Assumption: . nested in hetero) $\text{Prob} > \chi^2 = 0.00$ for the model with corruption as dependant variable. For the model with bureaucratic quality as dependant variable LR $\chi^2(122) = -15293.53$ $\text{Prob} > \chi^2 = 1.00$. For the model with law and order as dependant variable LR $\chi^2(122) = -6560.65$ $\text{Prob} > \chi^2 = 1.00$.

11 Since using panel corrected standard errors has become the standard procedure in political science, we present the result using this method in the appendix. Results are consistent with those obtained from the FGLS. As Beck and Katz observe, the standard errors for the FGLS is smaller than those for the OLS with PCSE, however, the coefficients are in the same magnitude and significance levels are not significantly affected, except for the dependent variable legal impartiality.

12 All results are available from the authors upon request. We did not include country specific effects (country specific intercepts) due to the low variation (over time for each country) in many of our explanatory variables. These variables could, if including country specific intercepts, incorrectly be interpreted as having no, or very little, effect since they would be collinear with the country effect.