WPS6738

Policy Research Working Paper 6738

Triggers of Contract Breach

Contract Design, Shocks, or Institutions?

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Multilateral Investment Guarantee Agency
Economics and Sustainability Unit
January 2014

Policy Research Working Paper 6738

Abstract

This paper constructs a large contract-level data set to examine factors that trigger breach of foreign investment contracts. Similar to the case of outright expropriation, political regime type is an important determinant of breach of contract. Furthermore, although investors' bargaining power becomes obsolete as contracts mature, contracts can be designed to mitigate the risk of breach of contract by involving multilateral organizations and creating buffers to absorb commodity price shocks. The paper examines the type of countries prone to contract breaches. After controlling for regional and sector fixed effects, less-democratic and resource-dependent governments are more likely to breach contracts, especially after large global shocks, notably natural disasters.

This paper is a product of the Economics and Sustainability Unit of Multilateral Investment Guarantee Agency. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org.
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Triggers of Contract Breach:
Contract Design, Shocks, or Institutions?[1]

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Key Words: Contract design, Obsolescing bargain, Natural resource curse, Natural disaster

JEL classifications: F21, H54, O10, O19

Sector Board: FPD, EPOL, SDN

[1] This paper was prepared as a background paper for Chapter 2 of the 2013 World Investment and Political Risk report annually published by the World Bank (Multilateral Investment Guarantee Agency). I benefited from useful inputs from Nathan Jensen and Thomas Mahaffey, and interesting discussion with Conor Healy and Cherian Samuel. Additional data supports from the World Bank's Infrastructure Policy Unit of Sustainable Development Network and Global Facility for Disaster Risk Reduction (GFDRR) are greatly acknowledged. Zuhaib Khero provides assistance with initial stage of contract-level data construction. The findings, interpretations and conclusions expressed in this paper are entirely those of the author, and do not necessarily represent the views of the World Bank or the IMF.

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1. Introduction

Recently, political risk has become a more multidimensional phenomenon from the outright takeovers of foreign-owned businesses to widespread indirect expropriations and breach of contract (BOC). Since 1990, the incidence of host governments' contract breach with multinational corporations (MNCs) has been increasing, but with a large variations across countries and over time (Wellhausen, 2013). This trend also seems to be reflected in firms' business perceptions in the business climate as evidenced by major firm-level surveys conducted by the World Bank (such as the Enterprise Surveys and the MIGA-EIU Political Risk Survey) that show that breach of contract has been the biggest concern for foreign investors.

An increase in BOC cases also reflects the reconsideration of the role of government in providing public services. Since the early 1980s, there has been a shift in the role of the public and private sectors in the provision of infrastructure (electricity, water and sanitation, telecommunication, road, railroad, port, and airport), which has increased public-private partnership (PPP) projects. The mainstreaming of PPP, however, has also accompanied the elevated tensions between host country and investors in resolving disputes on honoring contractual obligations. With an increasing number of private investments in infrastructure, it has become critical to understand risk management in countries where it is difficult for the parties to enforce contracts.

Despite an increase in BOC risk relative to outright expropriation risk, the triggers of breach of contract have not been separately studied in the literature. This paper fills in this gap by examining the key triggers of breach of contract.

Previous papers have discussed the wide variety of factors as potential triggers of breach of contract, which range from micro factors (i.e., contract design) to macro factors (such as external shocks (both economic and socio-political instabilities), political institutions, and level of development). Recent literature on FDI focuses more on macro factors, especially host country governing institutions, and claims the importance of democratic and more cohesive economic and political institutions.[3] Some scholars put a particular focus on the effects of natural resources, arguing that governments in natural resource dependent economies are less sensitive to reputation costs from reneging on contracts, leading to higher probability of expropriation and contract disputes (Jensen and Johnston, 2011). The phenomenon of the natural resource curse would also be cyclical (Frankel, 2012), implying that the host government has stronger incentives to breach contracts during a commodity boom.

[3] MNCs are expected to enjoy more investment security either in democracies (Jensen 2008), in countries with strong property rights and a constrained executive (Li and Resnick, 2003; Li, 2009; Humphreys and Bates, 2005), or in countries with a stable government with lower political turnovers.

The literature on micro factors has mainly focused on the optimal design of incomplete contracts under the changing state of the world (Tirole, 1999), but the empirical studies are only a few. An interesting hypothesis was raised by Woodhouse (2006), which discusses the obsolescing bargaining power of foreign investors and describes the situation where an investor holds the upper hand in negotiations with a host government *ex ante* but it loses the bargaining power as the contract ages since exit from a committed investment is costly due to high sunk costs (Vernon, 1971). In these cases, host governments have leverage to break contracts, because the MNC's asset immobility makes the firm's threat of exit no longer credible. In general, the obsolescing bargain has been applied most often to investments in oil, natural resources, and metals, as well as infrastructure investments and other sites.

Given that the empirical facts have still not been fully investigated, this paper contributes to the literature by testing several theoretical hypotheses posed by previous papers in the area of political economics. The study highlights contract designs and economic cycles that could significantly affect host government's incentive to breach contracts or re-negotiate contractual terms. This paper also offers analysis on cross-country heterogeneity about the effects of micro and macro triggers on breach of contract. Following a recent theoretical literature on state capacity and development, it looks at how the causal relationship between the probability of contract breach and potential triggers differs by the level of state fragility, inclusiveness of political institutions, and natural resource dependency (Besley and Persson 2009, 2010).

A unique contract-level data set is constructed covering a universe of contractual disputes using two main data sets (World Bank's public-private infrastructure data and UNCTAD's dispute data) to address these questions. The new data set has contractual details and improves measurement of the strength of property at the project level, which allows me to test the relative importance of the variety of micro vs. macro triggers. The cross-section of about 5,237 contracts is covered from 1985 to 2012, building a large sample of both publicly and privately procured contracts. The contract-level data are aggregated to establish a cross-country panel covering 150 countries from 1985 to 2012, which allows me to conduct international historical comparisons of the event of contract breaches.

There are two key empirical findings. First, contract-level analysis supports the obsolescing bargain hypothesis; the hazard rate of contract breach exponentially increases as a project matures. The hazard rate is significantly lower if projects are implemented in politically stable and democratic countries, which is consistent with previous findings in the case of outright expropriation and nationalization (see Eden, Kraay and Qian (2012) and World Bank (2012)). Furthermore, as the stake of the private sector in PPP projects gets larger, BOC risk gets elevated, but contracts can be designed to mitigate BOC risk by working in

partnership with multilateral organizations and by ensuring contractual flexibility to absorb unexpected commodity price shocks. Second, cross-country panel regression shows that less-democratic and resource-dependent (i.e., dependencies in natural resources and in aid) governments are not likely to honor foreign investment contracts in weakly institutionalized political environments, and they tend to breach contracts especially after large global shocks, notably natural disasters. Finally, this paper shows that BOC events tended to be clustered in a particular region (such as Latin America and the Caribbean (LAC), Europe and Central Asia (ECA), and South Asia) in the past, and it is likely to be repeated in countries that had prior contract breach experiences. It appears that contracts in the energy sector face relatively higher BOC risk in general, but the risk is particularly high when input fuel costs rise.

The paper is structured as follows. Section 2 introduces the data and Section 3 explains the context. Section 4 provides theoretical predictions. Sections 5 and 6 carry out empirical analyses on the triggers of breach of contract. Section 7 concludes.

2. Data

This paper gathers contractual dispute information from several data sets to form a universe of dispute cases. Two main data sets are merged to establish my baseline sample.

The first main data set is taken from the World Bank's *Private Participation in Infrastructure (PPI) Database*,[4] which has details on contractual arrangements used for each project. The data set covers 5,237 public-private infrastructure projects from 1984 to 2012, and includes information including investing country, sponsors' originating country, project status (e.g., completed, under construction, cancelled, in distress), financial closure year (when contracts were agreed), contractual period, sectoral affiliation, procurement type, and supports of international financial institutions. If contracts are in distress or are cancelled due to some disputes, we defined them as "projects under contractual disputes". There are projects which were cancelled due to the sponsor's unilateral actions (e.g., change in business strategy), expiration of contracts, or war/civil conflict. These are excluded from dispute cases. Data on the exact timing of disputes were also collected from the detailed documentation available for each contract, which is used for the hazard analysis below.

As the PPI data only cover projects with significant private participation, they should be complemented with other data sets that cover general development projects without private participation. To this end, the PPI data are merged with the investment arbitration case data from *UNCTAD Database of Treaty-based Investor-*

[4] The data set is publicly available at http://ppi.worldbank.org/explore/Report.aspx.

State Dispute Settlement Cases.[5] By definition, all 394 cases from 1987-2010 experienced contractual disputes. The data set also has information on investing country, investor's originating country, and sectoral affiliation, as well as venues for arbitration. It reports the year when disputes were filed, but does not list data on when original contracts were signed. The contract year was manually identified by looking through each arbitration case document, which is used to define the contract age.

The PPI and UNCTAD data sets form the baseline sample at project level for my empirical analysis. Appendix 1 provides lists of the host countries that are included in my sample. I later provide country-year regressions as well. For this purpose, the project-level data are also merged with cross-country panel data that contains various macroeconomic variables and country-level political and institutional indicators from various sources.

3. Background

3.1. Recent Trends in Breach of Contract

Figure 1 depicts the historical trend of BOC risk (number of contract breaches divided by total surviving contracts).[6] Due to a boom in private participation in greenfield power generation projects in the mid- to end-1990s (as a result of increased demand in PPP financing), the total number of surviving contracts has increased over time (Woodhouse, 2006). At the same time, the risk of BOC has also risen since the late 1990s and peaked in 2000-05. The risk keeps rising in two regions (i.e., ECA and LAC).

This trend shows a clear contrast with the historical trend for outright expropriations and nationalizations, which peaked in the 1970s and 1980s (World Bank, 2012). This raises the question of how the nature of BOC risk differs from outright expropriation risk.

3.2. Countries and Sectors Prone to BOC Risk

Given an increase in BOC risk, the next question is how it is regionally clustered. Figure 1 provides a cross-regional picture of breach of contract events; disputes tend to be clustered and are recently increasing in the ECA and LAC regions. The Appendix map shows the distribution of total disputes that occurred in my sample from 1985 to 2012, confirming the descriptive facts in Figure 1. Political economy theories suggest

[5] The data set is publicly available at http://iiadbcases.unctad.org/.

[6] It can be defined as pure breach of contract (BOC) vs. contract renegotiation (CR) depending on the way the disputes will be resolved. Disputes are categorized as BOC for any repudiation or breach by the host government of a contract agreement with investors, including non-honoring of arbitral awards, which is sought to be resolved formally through local or international arbitrations. On the other hand, disputes are defined as CR for any repudiation or breach by the host government of a contractual agreement with investors, which is sought to be resolved through informal renegotiation on the contractual terms or obligations between the parties.

that property rights are more secured as an economy develops (Besley and Persson, 2009) and economic and political interests become more aligned and equal (Acemoglu and Robinson, 2005).

Figures 2 and 3 show the simple correlation between the insecurity of contract enforcement and both moments (income level and inequality). Contrary to my expectation, contract breaches tend to occur more as a country develops up to the upper-middle income level, which includes Argentina, Brazil, Malaysia, Mexico, and Turkey (see Figure 2).

Figure 3 shows the correlation between BOC risk and income inequality (measured by theh Gini coefficient from the World Bank's PovCal Net). Except for several countries that breached contracts more than ten times in history, non-parametric estimates of the probability of contract breach remains flat as income inequality rises. The little correlation remains even when different poverty measures, such as headcounts of the poor population and the poverty gap (which captures the depth of poverty), are used.

The two figures characterize a puzzling fact; higher incidence of dispute events in relatively wealthier nations as well as the little correlation of contractual disputes with inequality. This implies that wealthier countries have more resources and opportunities for coercive government to be extractive. This observation motivates me to investigate further the trigger of BOC, which can be explained by contractual design, external shocks, or political institutions.

Table 2 summarizes the sectoral distribution of contractual disputes. More PPP contracts have been signed in OGM, transport and energy sectors, leaving other sectors underrepresented. The table shows that the probability of BOC events differs by sector. Therefore, sectoral heterogeneity is controlled when estimating hazard rate (the likelihood of BOC in the next period on condition that the contract survives in the current period) and the probability of BOC in the following sections.

3.3. Existing Evidence

What are the potential triggers of BOC risk? Some anecdotal evidence exists, but the facts are scattered and do not answer which triggers are the most relevant. [7] Aside from academic papers, there is an accumulation

[7] Using the PPI data set, World Bank (2004) examines the determining factor of renegotiation on infrastructure concessions in Latin America, showing that country-level institutions (regulation) and concession award criteria explain larger part of the probability of renegotiation compared to macroeconomic factors. Woodhouse (2006) also use same data and offers case studies and highlights the importance of micro-level contractual factors which affect bargaining powers between host countries and international investors and the performance of PPP projects in the power sector. Jensen et al (2013) uses a different contract-level data from OPIC to address how external factors can drive governments to breach contracts, claiming that governments have less incentive to expropriate firms during the period of crisis and with larger foreign intervention (through foreign aid or IMF agreement) to avoid reputational cost.

of knowledge in the political risk insurance (PRI) industry to understand the determinants of BOC. MIGA (2013) reports 31 pre-claims on BOC incidence happened from 2006 to 2012. Three major factors (tariff adjustment, financing difficulty, inconsistent policies) are highlighted as potential threats to make projects unviable, which were triggered by economic crisis or political changes.

For example, after economic crisis in Latin America, a large number of contractual disputes occurred as a result of financing difficulty for the governments to honor payment obligations (in particular, many of the cases were related to the 2002 financial crisis in Argentina). In recent history, political change also created dispute cases, mainly in the energy sector. An example includes denial of tariff adjustments for a power project in Guatemala where there was a change in minister of mines in 2004. Reviews of privatization programs or the revision of existing contracts were also common, creating contractual frustrations in some development countries (such as the Democratic Republic of the Congo, Moldova, and Ecuador). There were also a number of cases which were related to corruption, i.e., governments favor a particular firm for them to extract rents from the targeted company, commonly observed in the post-communist countries. [8]

Despite the accumulation of anecdotal evidence, it is less clear whether there are systematic patterns for predicting BOC risk, which is the main theme to unpack in this paper.

3.4. Commodity Price Shock and BOC Risk: Energy Sector

The global prices of all commodities have dramatically increased throughout the 2000s, but with different growth rates and trends (see Figure 4). The commodity price boom in the 2000s created strong distributional impacts between commodity exporters and importers and by sector. For fuel importing countries with less fiscal space, higher fuel cost has led to elevated BOC risk in the power generation sector as the countries cannot insulate the local fuel market from rising global fuel prices. On the other hand, commodity exporting countries benefited from larger windfall revenues, which increased commodity-related tax revenues.

In the context of independent power projects (IPP), the sustainability of contracts signed between investors and the utility off-taker is largely affected by the price trends in fuel markets (oil, natural gas, and coal). Under the long-term power purchase agreements (PPAs), electricity retail price is usually regulated in a power sales arrangement with state utilities, and retail price is controlled by the government. Under a fuel purchasing contract, on the other hand, operating costs of power plants keep rising in the factor market. As the import prices of major fuels go up, a negative terms-of-trade shock spills over into the local fuel market

[8] In Peru, contracts in the oil sector are regularly published on-line to improve transparency and to avoid corruption in contracting (http://www.perupetro.com.pe/wps/wcm/connect/perupetro/site-en/importantinformation/cont_contractsinforce).

and creates risk of cost overruns. During the period of recent commodity price crisis in the 2000s, mis-match of the price adjustment mechanism in the electricity sector (rigid retail price relative to rising fuel costs) made retail tariffs inadequate to cover operating costs for power generation companies. If price terms in the off-take agreement cannot be renegotiated, the contract may be breached.

4. Theoretical Framework

This section outlines the main hypotheses of how micro (contract-specific) and macro factors could trigger contract breach. The framework is based on an incomplete contract model (Tirole, 1999) where contract renegotiation is possible ex-post. Due to political and economic uncertainties, contingency cannot be perfectly defined in the contract ex-ante. This provides government a discretionary power to renege on contractual obligations ex-post.

There are two players: government and a private investor. There are three stages. In stage 1, government and an investor mutually agree and sign a contract. In stage 2, the state of the world changes, making the contract less efficient. Given this, in stage 3, government and the investor may renegotiate a new contract or go to the arbitration.

4.1. Micro Factors

Conditions specified in the initial contract determine the flexibility (buffers) to absorb the exogenous shocks in stage 2. For example, as a contract matures, investors are more exposed to experience several shocks during the contract which forces them to change contractual terms as the original bargaining power will be obsolete (obsolescing bargaining).

*Hypothesis 1: (**Obsolescing bargain**) As the contractual period gets longer, contracts are more exposed to economic fluctuations or political transitions, leading to higher probability of contract breach.*

The ownership type of project also affects BOC risk. When government owns a larger stake of the project (and holds stronger bargaining power), there is a wider scope for government to breach contract (Shleifer and Vishny, 1994). On the other hand, if government only owns a minority share of a project (and has little control over the contract), it may resort to takeover or breach of contract when the state of the world changes.

*Hypothesis 2: (**Ownership type**) The ownership type may have ambiguous effects on BOC risk. On one hand, as the share of state participation gets larger, government would have stronger incentive to breach contract as the major residual claimant of the property. With larger private sector participation, however,*

government has little control over private investors, and therefore may breach contract or take over private assets with desperation.

4.2. Macro Factors

Four types of macro shock - economic crisis, natural disasters, political transition, and global commodity price crisis - would happen and change the state of the world.

The effects of **economic crisis** and **natural disasters** on BOC risk would be ambiguous depending on *the incentive effects* which can go in both positive and negative directions. For example, government may be less willing to breach contracts during the period of economic crisis to avoid the loss of reputation which could affects the access to future foreign investments (Jensen et al, 2013). Or, government may be driven to take up private assets during the crisis as they need to honor payments specified in the contract. The similar logic applies in the post-natural disaster context.[9] In other words, government is concerned about liquidity constraint in the short-term, as well as the long-term relationship with foreign investors. The optimal decision depends on the time-preference of the host government and how binding the resource constraint is.

*Hypothesis 3: (**Incentive effects of macro shocks**) In a period of economic crisis or after natural disasters, governments will be less likely to breach contracts if the reputation cost of BOC dominates the benefit by taking over private assets in the short-term.*

The effect of **political change** on BOC risk depends on the direction of political shift, i.e., whether theh political regime transforms into a democratic and market friendly regime, or into an adverse and coercive autocratic regime (Acemoglu and Robinson, 2008).

*Hypothesis 4: (**Political transition**) An adverse change in political institutions (to less democratic policies) alters the distribution of de jure political power between incumbent and opposition parties,[10] triggering the adoption of antidiversive policies to foreign investors.*

[9] Previous empirical findings on disaster impacts on political institution are also divided. Negative income shocks from disasters could result in an increase in political conflict (Miguel, Satyanath, and Sergenti, 2004), while it could create an internal pressure to demand more accountable and well-functioning governments which could catalyze political reforms (Bruckner and Chiccone, 2012). Besides mega disasters, rainfall shock could trigger breach of contract as in the hydroelectric power contract in Uganda, which pushed much of the risk onto the host government, and created major financial losses by the government during a period of little rainfall.

[10] Right-wing originally designated traditional conservatives and reactionaries and recently also refers to nationalists, which generally accepts social hierarchy or inequality.

Finally, global **commodity price shock** during the contractual period could create windfall revenues for net commodity exporters, while it increases fuel costs for fuel importers. The net impact on the profit margin of infrastructure projects varies by sector. In the electricity sector, as input fuel cost rises, the profit margin gets smaller especially for the long-term power purchasing agreement (PPA) with fixed-price arrangements. This effect will be more pronounced in net fuel importing countries as they are exposed to global fuel price fluctuations.

On the other hand, as the commodity price rises, the profit margin gets bigger in net resource exporting countries. Whether the government uses extra profits productively or becomes extractive in capturing rents depends on the type of government.

*Hypothesis 5-1: (**Change in input commodity price**) Under a fixed price contract, as fuel price rises, it creates risk of cost-overrun. Besides, unexpected fuel price fluctuations would increase the risk of BOC, especially for fuel importers and in the electricity sector.*

*Hypothesis 5-2: (**Change in windfall revenue**) During a commodity price boom, the profit margin increases in the OGM sector as prices of oil, gas, and mining products rise, which may be used productively or captured depending on the type of government.*

What types of governments are more likely to engage in BOC? As mentioned above, government may lose reputation due to BOC, which affects the FDI inflows.[11] The marginal cost would be lower if the government has little access to the international capital market. The extreme situation will be fragile and conflict-affected nations or countries with weaker state capacity.[12] Foreign investors in countries under an IMF program or those working with international organizations (IFIs) are likely to face less BOC risk as reputation costs of BOC is large due to punishments from IFIs (Jensen et al, 2013).

*Hypothesis 6: (**Reputation cost**) In a repeated interaction between host government and investor, reputation cost of BOC constrains government not to breach contracts, especially when the investor*

[11] Tomz and Wright (2010) provides a formal model to analyze the patterns of "sovereign theft" (default on sovereign debt and expropriation of FDI) in which not only the state of the economy and the risk aversion of political leaders, but also the reputation cost of default and expropriation affect the incentive to trigger sovereign defaults and expropriations.

[12] The contractual disputes are especially common in countries with weak state capacity and property rights which constrain their long-term economic development (Besley and Ghatak, 2010). If extractive economic institutions prevail, it will distort economic incentives and reduce private sector participation. De-jure and de-facto political powers alter the bargaining powers between government and private actors, which determines the persistence of extractive institutions and brings about the reduction of productive investments (Acemoglu and Robinson, 2008).

works with international organizations. Politically stable government can invest resources in building state capacity, which helps it reduce the risk of contract breaches.

Finally, relating to Hypothesis 5-2, resource windfalls will be more effectively utilized in democratic governments, while resource rents could increase corruption in less-democratic countries (Arezki and Gylfason, 2011). If state capacity is likely to be eroded in a less-democratic regime, resource windfalls may increase BOC risk. A similar hypothesis may hold for fragile states. If a country is likely to benefit from higher commodity prices as a net exporter, it could simply create buffers to sustain contracts, while it can increase BOC risk for fragile states as they may be extractive in controlling larger resource rents.

*Hypothesis 7: (**Windfall management and state capacity**) In less democratic and fragile countries, resource windfalls could destroy state capacity, increasing BOC risk. In resource dependent countries, resource windfalls can reduce BOC risk if government can appropriately manage their windfall revenues.*

5. Empirical Strategy

5.1. Contract-level Regression

Contract breach is a rare event, taking place in only 8% of all contracts in the sample, which could be triggered by both micro-level contractual terms and macro factors (country-level institutions and economic cyclical factors).

First, I exploit contract-level variations from two data sets to estimate the probability of contract breach using the hazard model. The duration of the contract A_i is the number of years a project survives before it ends either due to contract breach or termination of the investment period as defined in Eq. (1).

$$A_i = t_1 - t_0 \quad (1)$$

where t_0 is the year when the contract was signed, and t_1 is the year when the dispute occurred. The data are right-censored if the project is still ongoing in 2012 (the censoring time is denoted as *c* which is the same for all contracts). The observed duration A_i is defined as follows.

$$A_i = \min(A_i^*, c)$$

If the duration is not censored, the density of A_i is simply $f(A_i|x_i;\theta)$. The probability of A_i is censored if $P(A_i^* \geq c|x_i)$, and therefore the MLE of θ can be obtained by maximizing the following log-likelihood function.

$$\mathcal{L} = \sum_{i=1}^{N} \{d_i log[f(A_i|x_i;\theta)] + (1-d_i) log[\, P(A_i^* \geq c|x_i)]\}$$

where d_i is a censoring indicator. $x_i = [X_{1,i}, X_{2,c}, \kappa, D_j]$ are covariates for project i in sector j, country c. $X_{1,i}$ is project-specific characteristics per contract which includes procurement type (competitive bidding or negotiated contract), the share of private investment in the contract, and the supports from international financial institutions. The majority of contracts in the sample involve a significant share of private sponsorship, but only 13% of them involved multilateral institutions.

$X_{2,i}$ includes macro shock variables such as change in real per capita GDP growth and terms of trade during the contractual period $t \in [t_0, t_1]$ defined as $\Delta g = g_{t_1} - g_{t_0}$ and $\Delta TOT = TOT_{t_1} - TOT_{t_0}$. Two measures capture improvement in the economic situation and foreign trade term which is likely to create buffers to reduce BOC risk.

As a part of $X_{2,i}$, each country's political institutions, such as democracy (defined as Democracy=1[Polity IV>0]) and ideology of the incumbent government (right wing government or not), are included in the regression. Contractual terms ($X_{1,i}$ and A_i) are expected to differ by sector and region. As the omission of sectoral and regional affiliations will bias my point estimates for these variables, regional fixed effects κ and a vector of dummies for sectoral affiliations D_j [13] need to be included in the likelihood function.

Assuming that $f(A_i|x_i;\theta)$ follows the Weibull distribution, the hazard function λ can be estimated with my MLE, $\hat{\theta}$, which is defined as Eq. (2).

$$\lambda(A_i; x_i) = \exp(x_i'\beta)\, \alpha {A_i}^{\alpha-1} \quad (2)$$

where α is the measure of duration dependence. I start regressions using the whole sample which includes both PPI and UNCTAD data sets.

5.1.1. Decomposing Commodity Price Shocks

[13] Dummies for sectoral affiliation are coded using ICSID's industrial classification which categorizes each project into one of the following sectors: (1) agriculture, fishing, and forestry, (2) oil, gas, and mining, (3) electric power and other energy, (4) water, sanitation, and flood protection, (5) construction, (6) tourism, (7) transportation, (8) information and communication, (9) finance, and (10) other industry.

To directly test Hypotheses 5-1 and 5-2, it is necessary to separately estimate the effects of an increase in input costs and an increase in windfall revenues during the contractual period. Domestic fuel prices are not observable, but country-level variations of the changes in input costs and windfall revenues can be constructed by weighting the global commodity price series by the compositions of input resources and resource rents. The global prices of three major commodities (oil, natural gas, and coal), which have risen dramatically since 2000 as shown in Figure 4, are used to construct country-specific variables of the *average* input and end-product price shocks as follows.

$$E[\Delta Input\ cost_i] = \sum_{t=t_0}^{t_1} \sum_{c=1}^{3} \phi_{ct} \left(lnp_{ict} - lnp_{ict-1}\right)$$
$$E[\Delta Windfall_i] = \sum_{t=t_0}^{t_1} \sum_{c=1}^{3} \omega_{ct} \left(lnp_{ict} - lnp_{ict-1}\right) \quad (2)$$

They are the weighted average of the log difference of the global prices of three primary commodities *c* for country *i* at year *t*. The share of a source of electricity production (either oil, natural gas, coal, or others) ϕ_{ct} is used to construct a variable of input price change, while the average value of exports of commodities (either oil, natural gas, mineral, or others) ω_{ct} is used for measuring an increase in windfall revenue during contracts. The data on the source of electricity production are from the World Bank's World Development Indicators, and the data on the value of commodity exports are from the United Nation's UN Comtrade database. Both ϕ_{ct} and ω_{ct} are country-specific characteristics, which are exogenous to BOC risk.

In some countries, there is one dominant fuel for electricity generation, and in others there is a mix of multiple fuels.[14] Depending on sources of electricity generation, the level of exposures to fuel cost increase would be different by country, which helps me identify the impact of cost increase in BOC risk.

5.1.2. Heterogeneous Impacts of Commodity Price Shocks

To test the heterogeneous impact of commodity prices on BOC risk by sector (Hypothesis 5-1 and 5-2), the interaction terms of sector dummies and two price shock variables (specified in Eq. (2)) are included. The

[14] Woodhouse (2006) and his research project in IPPs (see http://pesd.stanford.edu/ipps) detailed case studies on the structure of IPPs and the linkage with contractual disputes. Dominant fuel sources substantially differ by countries. In China, there are 32 coal-fired plants selling electricity to state utilities where contract enforcement is very weak. In Egypt, 3 gas plants sell electricity at low retail price ($2.3 cents/kWh) reflecting highly subsidized gas price from state gas monopoly. In Phil lines, more than 40 IPPs exist which vary in fuel choice, investor composition, and the identity of the off-taker. Finally in India, rough 22 IPPs have been built to sell electricity to state utilities which vary across critical variables including the mode of solicitation, fuel arrangements, and the type of sponsor.

interaction terms of a change in terms of trade with three state capacity variables (democracy, state fragility, and resource dependency) are also included later in Table 4 to test Hypothesis 7.

5.2. Cross-country Regression

Second, I use country-year panel data of contractual disputes and macroeconomic variables to highlight how each macro factor explains breach of contract over time.

$$y_{ct} = \alpha_0 + \alpha_1 X_{c,t-1} + \alpha_2 G_t + \kappa + D_j + t + t^2 + \varepsilon_{ijc} \quad (3)$$

where y_{ct} is a binary variable (disputes happened or not) to estimate the probability that disputes happened in country *c* in year *t* . As shown in the summary statistics of the country-year panel, about 9% of my country-year observations experienced disputes in the past. Many disputes occurred during the 2002 financial crisis in Argentina (maximum disputes during that crisis was 34). The pooled OLS is applied with regional fixed effects κ and a vector of dummies for sectoral affiliations D_j as in Eq. (1).[15]

In Eq. (3), $X_{c,t}$ includes three types of macro shocks: changes in real GDP growth, terms of trade shock, and natural disaster to test Hypothesis 3. Natural disaster is a dummy which takes one if some types of natural disasters caused fatalities in each country-year. All these shocks would create substantial economic pressures in the local economy, and at the same time they could worsen the state capacity of the affected countries (see Miguel et al (2004) for the effect of climate shocks on local security situation). It is expected to affect the government's stance for the foreign investors in the country, leading to higher risk of BOC. To address lagged effects of these shocks on breach of contract, one-year lags of X_c are controlled.

G_t includes political regime and state fragility measures from Polity IV. Two resource dependency measures (aid and natural resource rents) are also included to test if higher resource dependency increases BOC risk as predicted by the resource curse story. Log of GDP per capita in 2000 is included to control for level of development. To remove non-linear time trend of dispute histories (as shown in Figure 1), linear and square terms of year trends are included in all specifications.

6. Results

6.1. Obsolescing Bargaining

[15] A simple linear probability model is used to interpret within-country estimates in more straightforward manner, rather than using other non-linear panel model with unobserved heterogeneity.

As shown in Figure 5, the hazard curve is sloped upward. The curve is sloping fast up to 9 years of project life, which gets flatter and slopes up exponentially again as the contract matures further. This implies that the probability of BOC generally increases as the duration of projects gets longer, but government tends to be more extractive when the maturity of projects becomes more than about 14 years. This finding is supported in Tables 4-6, which report the ML estimates of the hazard model defined as Eq. (2). In any specification, the ancillary parameter is greater than one ($\alpha > 1$), confirming that there is a positive duration dependence, which is consistent with the obsolescing bargain hypothesis (Hypothesis 1).

6.2. Hazard Analysis

In Table 3, the whole sample is used in column (1)-(3) and it is restricted to projects without government guarantees[16] in columns (4)-(9). Column (8) further removes 1,294 contracts signed in LAC countries as it is one of the epicenters of BOC events (see Map) like the case of expropriations (Weems and Salo, 2012), and the nature of BOC in LAC would be different from other regions, which tends to be politically motivated or explained by the 2002 financial crisis. Finally, column (9) runs the same regression without net fuel exporting countries (countries which are self-sufficient for the dominant fuel sources of electricity generation) to better identify the input price shock on BOC.

Column (1) is the benchmark regression. To better identify the threshold-level of private participation, separate dummies of the level of private participation (above 50% and 80%) are added. In column (2), the interaction term between a dummy of private participation above 80% and a dummy indicating multilateral organizations' (IFI) participation in the contract (in the form of lending of loans, equity investments, or provision of guarantees) is included to examine whether IFI involvement mitigates BOC risk for projects with larger private sector participations. Additional macro variables are controlled in the following columns.

For micro factors, it appears that as private participation gets larger (above 80%), the hazard rate significantly increases by 100[exp(0.433)-1]=54.2%, suggesting that proper mix with public investments would help foreign investors reduce BOC risk. The negative coefficient of IFI involvement in column (1) shows BOC risk is likely to be significantly reduced under the IFI's involvement in the contract. The interaction term is negative and significant, showing that the hazard rate can be 100[exp(0.437)-1]=54.8% lower for privately-funded risky projects (i.e., private share of project>80%) if IFI is involved than the contracts without. Contracts in energy sector (e.g., electricity generation) are likely to experience significantly higher BOC risk.

[16] Government guarantee is defined in the form of payment guarantee (e.g., guarantees of the fixed payment of an off-take agreement), debt guarantee for private entities, revenue guarantee for the private operator of infrastructure (e.g., roads), exchange rate guarantee, and construction cost guarantee for potential cost overruns.

The results for macro variables are broadly consistent with findings in prior empirical studies. As in the case of expropriation, political regime is found to be the most critical determinants in mitigating BOC risk. In column (2), democratic state is more likely to honor the contract by 100[exp(0.575)-1]=77.7% than for autocratic states. In column (3), as found in Figure 2, there is an inverse-U shape relationship between BOC risk and initial income level, implying that BOC risk is likely to be the most elevated for the middle-income countries. Higher GDP growth during the contractual period would significantly reduce the hazard rate, while the impact of the improvement in terms of trade is negative but less significant.

These micro and macro-level findings are robust (with the semi-elasticity of the hazard with respect to each covariate at the similar level) when projects with government guarantees are removed in column (4). Column (5) includes a dummy variable for the procurement type (competitive bidding vs. others). If the procurement is competitively processed, government can get the foreign investment at cheaper price and thus has less incentive to harass private investors. As there are many missing data, adding this variable reduces the sample size to 1,570. Although the variable is negatively signed, it appears to have no significant impact in reducing the hazard rate. In column (6), I controlled for politician's ideology (whether incumbent government is right wing or not just before the BOC event happens). Having a right-wing government in power is likely to reduce BOC risk, which is consistent with our general understanding that a left-wing government prefers public ownership of private assets compared with a right-wing government.

Column (7) replaces a change in terms of trade with two commodity price variables (i.e., the average increase in input cost and windfall revenues) as defined in Eq. (2-1). As predicted in Hypothesis 5-1 and 5-2, cost-overrun in PPP projects due to higher input costs significantly increases the hazard rate, while larger windfall revenues is likely to have opposite effects. I expect that the effects of changes in input cost and windfall revenues will vary by sector and by the type of country, which is examined in the next section 6.2.1.

Finally, column (8) and (9) offer robustness checks by restricting sample to non-LAC countries and non-fuel exporters. The above key findings remain to be robust. In column (9), larger elasticity to energy sector dummy is intuitive as the sample only includes net fuel importers in which contracts in power sector is persistently exposed to input cost fluctuations.

6.2.1. Robustness Check 1: Exposure to Commodity Prices: Heterogeneity by Country and Sector

Regressions in Table 4 examine the heterogeneous impacts of commodity prices on BOC risk by political regime type and by sector. In column (1)-(3), terms of trade shock variable is interacted with three political institution measures: democracy, state fragility, and resource dependency. In column (4), input cost and

windfall revenue variables are interacted with two sector dummies (i.e., projects in OGM or energy sector) to examine sectoral heterogeneities of changes in input costs and windfall revenues.

In column (1) and (2), a positive terms of trade change appears to reduce BOC risk only for democratic states and non-fragile countries. Positive changes in commodity prices create windfall revenues, but it could adversely affect state capacity by worsening property right protection or quality of law if countries tend to become more predatory. The result supports sovereign theft story that autocratic states or fragile countries are more likely to experience resource curse trap due to larger rents in natural resources. In column (3), net commodity exporters appears to benefit more from the improvement in terms of trade as they receive larger windfall revenues by exporting their commodities. Finally, estimates in column (4) reveal that energy sector is especially exposed to price risk of fuel inputs, increasing BOC risk as expected. Contrary to expectation, the riskiness of BOC does not significantly change in OGM sector in the period of larger windfall revenues.

6.2.2. Robustness Check 2: Cohort Analysis

As contracts were signed at different points in time, the results in Table 3 may systematically differ depending on the cohort. There was a clear structural change occurred in 2000s when the riskiness of BOC rose around the world (see Figure 1) and the global commodity prices discontinuously spiked up (see Figure 4). In this regard, the sample is divided into cohort 1(contracts signed before 2000) and cohort 2 (ones recently signed since 2000) and estimates are shown separately for each group.

In Table 5, the hazard rates for cohort 1 and 2 are reported separately, with change in terms of trade included in column (1) and input costs and windfall revenue variables controlled in column (2). For micro factors, the positive sign of private share participation (above 80%) dummy represents the elevated BOC risk for contracts with larger private participation which reflects higher risk appetite of private investors (in response to larger demand for PPP projects) in infrastructure projects. At the same time, the negative sign of IFI dummy suggests that IFIs play more important role in mitigating BOC risk for recently signed contracts. Interestingly, contracts signed in OGM sector before 2000 experienced higher BOC risk, but those signed after 2000 became less exposed to contract breaches. This is explained by a structural change in commodity markets after 2000 (see Figure 4) as higher commodity prices in 2000s were not expected ex-ante when long-term oil, gas, and mining contracts were signed before 2000, but contracts could be more flexibly designed to deal with the price risk amidst commodity price crisis after 2000.

For macro factors, negative sign of TOT variable in column (1) shows that favorable terms of trade situation significantly reduced BOC risk in both cohorts. In column (2), increase in input cost increased BOC risk only in cohort 1, while increase in windfall revenue reduced the risk only in cohort 2. This result suggests

that the long-term PPP contract signed prior to the higher fuel price regime missed buffers to absorb the cost-overrun, while those signed ex-post could be tailored to flexibly adjust the contractual terms to benefit from higher windfall revenues in the short-term.

6.3. Heterogeneity over Project Life

Figure 6 shows Kaplan-Meier survival estimates over the life cycle of contracts, grouped by different types of contractual arrangements. At any point of the project life, contracts with IFI involved and less private participation, and ones procured through competitive bidding are less likely to be breached. The second panel of Figure 6 shows survival rates depending on different level of private sponsorship of each contract, which clearly suggests that the survival rate gradually decreases as private participation gets larger from 50% to 90%. In OGM sector, the survival curve crosses around 10 years of project duration. All else equal, this suggest that contracts in OGM sector are likely to experience higher BOC risk as it matures above 10 years of project life. This finding is intuitive as government will have less incentive to breach contracts until the discovery, exploration, and production of oil, gas, and mining fields are complete; but the bargaining power will shift once the large capital investments are sunk, and government may be tempted to breach contract before marketing of these commodities starts. In terms of energy sector, the survival rate of contracts is always lower than other sectors for both short-term and long-term, showing that projects in energy sector always face relatively higher BOC risk.

Figure 7 illustrates the survival functions separately by the country type, showing that regime types have different effects over the project life cycle. First, democracy appears to have lower survival rate in the short-term but the survival rate improves as the contract matures. Foreign investment contracts will be strongly supported by the autocratic government in the short-term, but this result confirms that democracy is the critical factor for the long-term success and the sustainability of the PPP project. Second, projects operated in net commodity exporting countries are more likely to survive since projects in such host country were less exposed to permanent or temporary global commodity price fluctuations.

6.4. Cross-country Regression: Probability of Breach of Contract

Table 6 uses country-year variations to estimate the probability of BOC events. Column (1) is the benchmark regression, column (2) adds controls on previous year's terms of trade shock and democracy, and column (4) includes a dummy indicating fragile countries.

Four findings catch our eye. First, among three macro-level exogenous shocks, natural disaster significantly increases the BOC risk by about 5%, while the impact of change in terms of trade appears to be statistically zero. This suggests that contract breaches are likely to be triggered by sudden natural shocks, rather than

cyclical commodity price cycles. Furthermore, as Jensen et al (2013) found using OPIC data, the positive sign of GDP growth represents governments' less incentive to breach contracts during economic crisis as they are concerned about the loss of reputation by breaching contracts, which creates the short-term financing difficulty during the economic crisis. This cross-country result deals with incentive effects of short-term economic cycles on governments' action to breach contracts (which tests Hypothesis 3), and therefore, it differs from my contract-level finding (in Table 3) in which higher growth during contractual period (the median contract age is 9 years that is relatively long-term; see Table 1) appears to improve the survival rate of contracts.

Second, in column (3), the marginal effect of democracy is small and does not significantly reduce BOC risk, which is contrary to my finding in the contract-level analysis. In column (3), instead of a static measure of democracy, I include dummies of democratization (with to 1-2 year lags). It shows that BOC is likely to be triggered 1-2 years after political transition took place which is consistent with Hypothesis 4 and confirms that an adverse political transition is likely to trigger BOC events. In column (4), a dummy of fragile states appear to be insignificant.

Third, resource dependency (in aid and primary commodities) appears to be a major determinant of BOC events. If a country is largely donor dependent (i.e., aid revenue is major non-tax revenue), the government would lose an incentive to invest in building fiscal capacity (Besley and Persson, 2013). The square term of Aid/GNI is positively signed, but the linear term is negatively signed. This indicates that aid could create fiscal buffers up to a certain level, but it destroys the fiscal capacity when the country becomes a *donor-darling* (i.e., Aid/GNI ratio is above a certain threshold dependency level), leading to higher BOC risk above the threshold. In addition, the log of resource rents is also positively signed and suggests that larger natural resource dependency increases the BOC risk, which supports the resource curse story.

Finally, the average propensity of BOC events (in the past five years) is included in column (1)-(4) that is consistently positive in all specifications, which suggests a significant evidence of state dependency of BOC risk. As in the case of expropriation, BOC events tend to repeat in the same set of countries. [17]

Columns (5)-(7) control for country and year fixed effects to check the robustness of my findings after removing unobserved heterogeneity. [18] As expected, the level of state dependency gets weaker (i.e., the magnitude of the average of BOC in the past 5 years gets smaller) in this specification. It also confirms my

[17] See Eden, Kraay, and Quan (2012) for the analysis on expropriations.

[18] Using the fixed effect model in column (6), Hausman specification test rejects the hypothesis that country-level effects are adequately modeled by a random-effect model (χ_7^2=115.12; p-value=0.000).

key finding explained above; countries under democratization faces less BOC risk and BOC is more likely to be triggered a year after natural disasters. Column (8) provides another robustness check which excludes 20 countries in LAC region. My key result remains robust, but the average propensity of BOC events (in the past five years) becomes insignificant, suggesting that BOC events tended to repeat in the LAC region in particular.

7. Conclusion

BOC events have been increasing since the late 1990s, which has become the top concern for multinational corporations. Using a new data set which covers the universe of contractual dispute cases, this paper investigates the triggers of such events.

As the obsolescing bargaining hypothesis suggests, the hazard rate of BOC rises as the contract matures, and governments tend to be more extractive when the contract gets very old. The involvement of IFIs could significantly reduce BOC risk as government tries to avoid losing the reputation with international community, which is consistent with the finding of Jensen et al (2013). Political institutions, such as democracy and political ideology, are major macro factors in predicting BOC risk, but the paper newly suggests the significant impacts of economic cycles (e.g., real GDP growth and commodity prices) during the contractual period. In general, better terms of trade reduces the BOC risk, but only in democratic states and non-fragile countries. For net commodity importers, increase in fuel input cost significantly increases BOC risk.

The cross-country estimation reveals that in the short term, the outbreak of BOC is strongly correlated with a large external shock such as a natural disaster and it tends to repeat in the countries which experienced BOC in the past five years. In the long term, BOC is more likely to happen in the middle income nations with poor political institutions.

This paper provides useful insights for investors as well as political risk insurers in two respects. For PRI industry, it suggests that longer tenor of the insurance could significantly increase BOC risk, especially under the elevated global uncertainties after 2000, which requires some buffers embedded when drafting contracts (e.g., IFI involvement, better mix or public and private funding). For both investors and insurers, autocratic regime and political turnover remain to be the long-term concern, and the event tends to be clustered in the energy sector. The risk will be elevated in periods of high commodity price volatility.

Some caveats remain. This paper provides a comprehensive assessment of the relative triggers of BOC empirically, but formal theory is necessary to derive the conditions to understand which micro and macro factors matter the most for breach of contract risk.

References

Acemoglu, D. and Robinson, J. (2005) Economic Origins of Dictatorship and Democracy, *Cambridge University Press*

--- (2008) Persistence of Power, Elites, and Institutions, *American Economic Review*, 98(1), pp. 267-293

--- (2011) Why Nations Fail: Origins of Power, Poverty and Prosperity, *Crown Business*

Arezki, R. and Gylfason, T (2011) Resource Rents, Democracy and Corruption: Evidence from Sub-Saharan Africa, *CESifo Working Paper #3575*

--- and Bruckner, M (2012) Commodity Windfalls, Democracy and External Debt, *Economic Journal*, 122 (June), pp. 848-866

Banerjee, A. and Duflo, E. (2000) Reputation Effects and the Limits of Contracting: A Study of the Indian Software Industry, *Quarterly Journal of Economics*, 111, pp. 989-1018

Bajari, P. and Tadelis, S. (2001) Incentives versus Transaction Costs: A Theory of Procurement Contracts, *RAND Journal of Economics*, 32(3), pp. 387-407

Besley, T. and Ghatak, M. (2010) Property Rights and Economic Development, in Chapter 68, *Handbook of Development Economics*, vol. 5

Besley, T. and Persson, T. (2009) The Origins of State Capacity: Property Rights, Taxation, and Politics, *American Economic Review*, vol. 99, no. 4, pp. 1218-1244

--- (2010) State Capacity, Conflict, and Development, *Econometrica*, 78(1), pp. 1-34

--- (2011) Pillar of Prosperity: The Political Economics of Development Clusters, *Princeton University Press*

--- (2013) Taxation and Development, in Chapter 2, *Handbook of Public Economics*, vol. 5

Blackman, A. and Wu, X. (1999) Foreign Direct Investment in China's Power Sector: Trends, Benefits and Barriers, *Energy Policy*, 27, pp. 695-711

Bourguignon, F. (2012) Commodity Price Volatility, Poverty, and Growth Inclusiveness in Sub-Saharan African Countries, in Chapter 11 of 'Commodity Price Volatility and Inclusive Growth in Low-Income Countries", IMF

Bruckner, M. and Ciccone, A. (2011) Rain and the Democratic Window of Opportunity, *Econometrica*, 79, pp. 923-947

Dell, M., Jones, B., and Olken, B. (2012) Temperature Shocks and Economic Growth: Evidence from the Last Half Century, *American Economic Journal: Macroeconomics*, 4(3), pp. 66-95

Cai, H. and Treisman, D. (2005) Does Competition for Capital Discipline Governments? Decentralization, Globalization, and Public Policy. *American Economic Review*, 95(3), pp. 817-30.

Eden, M., Kraay, A., and Qian, R. (2012) Sovereign Defaults and Expropriations: Empirical Regularities, *World Bank Policy Research Working Paper*, #6218

Frankel, J. (2012) The Natural Resource curse: A Survey of Diagnoses and Some Prescriptions, in Chapter 2 of "Commodity Price Volatility and Inclusive Growth in Low-Income Countries", IMF

Humphreys, M. and Bates, R. (2005). Political Institutions and Economic Policies: Lessons from Africa. *British Journal of Political Science*, 35(03), pp. 403-28.

ICC (2012, 2013) International Court of Arbitration Bulletin: Statistical Report

IMF (2013) Energy Subsidy Reform: Lessons and Implications, International Monetary Fund, Washington D.C.

Jensen, N. (2008) Political Risk, Democratic Institutions, and Foreign Direct Investment. *The Journal of Politics*, 70(4), 1040---52.

--- and Johnston, N. (2011) Political Risk, Reputation and the Resource Curse, *Comparative Political Studies*, 44(6), pp. 662-688

---, Johnston, N., Lee, C., and Sahin, A. (2013) Economic Shock, Political Shifts, and Sovereign Theft, mimeo

Li, Q. (2009) Democracy, Autocracy, and Expropriation of Foreign Direct Investment. *Comparative Political Studies*, 42(8), pp. 1098-208.

--- and Resnick, A. (2003) Reversal of Fortunes: Democratic Institutions and Foreign Direct Investment Inflows to Developing Countries. *International Organization*, 57(1), pp. 175-211.

Marsjall. G. and Cole, B. (2009) Global Report 2009: Conflict, Governance, and State Fragility, Center for Systemic Peace and Center for Global Policy

MIGA (2013) Pre-claims History, World Bank

Miguel, E., Satyanath, S., and Sergenti, E. (2004) Economic Shocks and Civil Conflict: An Instrumental Variables Approach, *Journal of Political Economy*, 112, pp. 725-753

Ramamurti, R. (2001) The Obsolescing "Bargaining Model"? MNC-host developing Country Relations Revisited, *Journal of International Business Studies*, vol. 32, no. 1, pp. 23-39

Roland, G. and Verdier, T. (2003) Law Enforcement and Transition, *European Economic Review*, vol. 47, pp. 669-685

Sauvant, K. and Sachs L. (2009). The Effect of Treaties on Foreign Direct Investment: Bilateral Investment Treaties, Double Taxation Treaties, and Investment Flows. Oxford, UK: Oxford University Press.

Tirole, J. (1999) Incomplete Contracts: Where Do We Stand?, *Econometrica*, 67(4), pp. 741-781

Tomz, M. and Wright, M. (2010) Sovereign Theft: Theory and Evidence about Sovereign Default and Expropriation, in *the Natural Resources Trap: Private Investment without Public Commitment*, eds. Cambridge, MA: MIT Press, pp. 69-110

UNCTAD (2005) Dispute Settlement: International Commercial Arbitration, Geneva, United Nations

Vernon, R. (1971). Sovereignty at Bay. New York: Basic Books.

Weems, P. and Salo, M. (2012) Mitigating Expropriation Risk of Natural Gas Projects, Energy Newsletter, July 2012

Wellhausen, R (2013) Investor-State Disputes: When Can Governments Break Contracts?, mimeo

Woodhouse, E. (2006) The Obsolescing Bargain Redux? Foreign Investment in the Electric Power Sector in Developing Countries, *International Law and Politics*, vol. 38, 121

World Bank (2004) Granting and Renegotiating Infrastructure Concessions: Doing it Right, World Bank Institute, Washington D.C.

World Bank (2012) World Investment and Political Risk 2012, Multilateral Investment Guarantee Agency, Washington D.C.

Table 1: Summary Statistics (Project-level)

	Source	N	Mean	SD	P50	Min	Max
Disputes	PPI and UNCTAD	5237	0.080	0.272	0	0	1
Micro variables							
Duration (Contract age)	PPI	5237	9.569	5.999	9	0	28
IFI involvement	PPI	5156	0.131	0.338	0	0	1
Private share > 50%	PPI	4989	0.905	0.293	1	0	1
Private share > 80%	PPI	4989	0.755	0.430	1	0	1
Competitive bidding	PPI	1987	0.724	0.447	1	0	1
Macro variables							
Change in real per capita GDP (during contract)	WDI	5199	0.009	0.056	0.002	-0.360	0.563
Change in term of trade (TOT) (during contract)	WDI	4991	0.114	0.380	0	-0.684	5.139
Increase in input cost (average)	World Bank	4722	0.064	0.060	0.057	-0.272	0.446
Commodity windfall revenue (average)	World Bank, UN Comtrade	5191	0.081	0.053	0.091	-0.230	0.345
Democracy	Polity IV	5187	0.741	0.438	1	0	1
Right wing government (last year)	Database of political institution	3846	0.197	0.398	0	0	1
Log income per capita in 2000	Besley and Persson (2011)	5162	8.504	0.656	8.373	5.790	10.561
Primary commodity exporter	UN Comtrade	5237	0.258	0.437	0	0	1
Resource rents	WDI	5215	9.415	10.103	6.546	0	89.511
High state fragility	Marshall and Cole (2009)	5126	0.272	0.445	0	0	1
Sector dummies							
Oil, gas, and mining (OGM)	PPI and UNCTAD	5233	0.067	0.250	0	0	1
Energy	PPI and UNCTAD	5233	0.362	0.480	0	0	1
Region dummies							
East Asia and Pacific (EAP)	PPI and UNCTAD	5237	0.299	0.458	0	0	1
Europe and Central Asia (ECA)	PPI and UNCTAD	5237	0.144	0.351	0	0	1
Latin America and the Caribbean (LAC)	PPI and UNCTAD	5237	0.300	0.458	0	0	1
Middle East and North Africa (MENA)	PPI and UNCTAD	5237	0.027	0.164	0	0	1
South Asia	PPI and UNCTAD	5237	0.147	0.354	0	0	1
Sub-saharan Africa (AFR)	PPI and UNCTAD	5237	0.083	0.277	0	0	1

Summary Statistics (Country-year Panel)

	Source	N	Mean	SD	P50	Min	Max
Disputes	PPI and UNCTAD	4200	0.086	0.280	0	0	1
# of disputes	PPI and UNCTAD	4200	0.159	0.902	0	0	34
Macro shock variables							
Real per capita GDP growth	WDI	3601	0.044	0.067	0.047	-0.484	0.963
Change in terms of trade (TOT)	WDI	2462	0.009	0.124	0	-0.826	1.316
Natural disaster	EM-DAT	4200	0.315	0.465	0	0	1
Political institution							
Democracy	Polity IV	3300	0.555	0.497	1	0	1
Democratization	Polity IV	2993	0.056	0.230	0	0	1
Resource rents	WDI	4116	9.981	15.740	3.541	0	89.511
High state fragility	Marshall and Cole (2009)	3500	0.448	0.497	0	0	1
Aid/GNI in 2000	Besley and Persson (2011)	3864	0.086	0.099	0.048	0.000	0.483
Other variable							
Log income per capita in 2000	Besley and Persson (2011)	3948	8.247	0.942	8.386	5.790	10.561
Gini index	World Bank (PovCal net)	3360	41.545	9.200	39.995	25.620	65.770
Region dummies							
EAP	PPI and UNCTAD	4200	0.133	0.340	0	0	1
ECA	PPI and UNCTAD	4200	0.207	0.405	0	0	1
LAC	PPI and UNCTAD	4200	0.207	0.405	0	0	1
MENA	PPI and UNCTAD	4200	0.093	0.291	0	0	1
South Asia	PPI and UNCTAD	4200	0.053	0.225	0	0	1
AFR	PPI and UNCTAD	4200	0.307	0.461	0	0	1

Table 2: Breakdown of Disputes (by Sector)

	# of contracts in the sample	# of dispute (incl. expropriation)	# of BOC dispute
Agriculture, fishing and forestry	17	17	17
Construction	31	31	31
Electric power and other energy	2022	206	175
Finance	26	26	26
Information and communication	869	114	95
Oil, gas, and mining	406	84	75
Tourism	8	8	8
Transportation	1409	106	99
Water, sanitation, and flood protection	787	93	76
Other industry	60	60	60
Total	5635	745	662

(Source) World Bank PPI database, UNCTAD database

Table 3: Parametric Hazard Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Total sample			Excl. govt guaranteed contracts					
Micro factors									
IFI involved	-0.234***	0.136	-0.0666	-0.0518	-0.558***	0.0422	-0.0664	-0.111	-0.114
	(0.0453)	(0.103)	(0.109)	(0.111)	(0.187)	(0.126)	(0.127)	(0.146)	(0.152)
Priv. share>50%	0.115*								
	(0.0620)								
Priv. share>80% = x	0.433***	0.523***	0.475***	0.481***	0.321***	0.494***	0.340***	0.388***	0.423***
	(0.0457)	(0.0410)	(0.0423)	(0.0432)	(0.0731)	(0.0496)	(0.0518)	(0.0574)	(0.0571)
x * IFI involved		-0.437***	-0.301**	-0.295**	0.193	-0.383***	-0.298**	-0.330*	-0.269
		(0.114)	(0.120)	(0.122)	(0.207)	(0.140)	(0.139)	(0.169)	(0.165)
Competitive bidding					-0.0997				
					(0.0622)				
OGM sector	0.0380	0.0319	-0.00218	0.0350	-0.171	0.125*	-0.0908	-0.122	-0.104
	(0.0618)	(0.0618)	(0.0626)	(0.0633)	(0.128)	(0.0683)	(0.0663)	(0.0775)	(0.0714)
Energy sector	0.235***	0.235***	0.190***	0.211***	0.173***	-0.0248	0.113***	0.0941*	0.148***
	(0.0321)	(0.0321)	(0.0329)	(0.0341)	(0.0580)	(0.0405)	(0.0397)	(0.0511)	(0.0451)
Macro factors									
Democracy	-0.561***	-0.575***	-0.502***	-0.551***	-0.134	-0.762***	-0.223***	-0.241***	-0.466***
	(0.0466)	(0.0466)	(0.0533)	(0.0543)	(0.0955)	(0.0715)	(0.0629)	(0.0668)	(0.0810)
Log income pc in 2000 = y			4.136***	4.191***	2.761**	5.619***	4.573***	1.600	7.805***
			(0.614)	(0.635)	(1.210)	(0.855)	(0.813)	(1.073)	(1.191)
y^2			-0.263***	-0.265***	-0.178**	-0.356***	-0.298***	-0.122*	-0.474***
			(0.0365)	(0.0378)	(0.0726)	(0.0510)	(0.0480)	(0.0649)	(0.0699)
Change in real pc GDP growth			-3.482***	-3.369***	-1.154*	-4.749***	-1.077***	-1.753***	-0.999**
			(0.316)	(0.324)	(0.609)	(0.425)	(0.376)	(0.451)	(0.479)
Change in TOT			-0.0750	-0.0690	-0.652***	0.212***			
			(0.0509)	(0.0520)	(0.154)	(0.0656)			
Right wing government (last year)						-0.393***			
						(0.0595)			
Increase in input cost (avg)							12.46***	14.48***	11.50***
							(0.597)	(0.728)	(0.648)
Commodity windfall revenue (avg)							-2.757***	-2.639***	-7.026***
							(0.249)	(0.303)	(0.943)
Constant	-4.135***	-4.102***	-20.34***	-20.68***	-14.19***	-28.40***	-23.58***	-11.38***	-37.25***
	(0.0937)	(0.0855)	(2.545)	(2.633)	(4.968)	(3.539)	(3.423)	(4.416)	(5.000)
Observations	4,923	4,923	4,695	4,382	1,570	3,291	3,388	2,094	2,606
Regional fixed effect included	Y	Y	Y	Y	Y	Y	Y	Y	Y
Robustness checks								Without LAC region	Without fuel exporters
Ln(α)	0.529***	0.530***	0.560***	0.575***	0.553***	0.951***	0.850***	0.855***	0.804***
	(0.0120)	(0.0120)	(0.0123)	(0.0128)	(0.0201)	(0.0142)	(0.0146)	(0.0185)	(0.0166)

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

Table 4: Parametric Hazard Regression: Heterogeneity of Commodity Price Shocks

VARIABLES	(1)	(2)	(3)	(4)
	Hazard rate			
Micro factors				
IFI involved	-0.0940	-0.0529	-0.0116	-0.0519
	(0.112)	(0.111)	(0.111)	(0.127)
Priv. share>80% = x	0.438***	0.490***	0.501***	0.349***
	(0.0443)	(0.0434)	(0.0435)	(0.0520)
x * IFI involved	-0.255**	-0.284**	-0.331***	-0.313**
	(0.123)	(0.122)	(0.122)	(0.139)
OGM sector	0.0321	0.0277	0.0440	-0.0966
	(0.0633)	(0.0633)	(0.0634)	(0.0761)
Energy sector	0.195***	0.221***	0.214***	-0.0382
	(0.0343)	(0.0341)	(0.0342)	(0.0734)
Macro factors				
Democracy	-0.580***	-0.467***	-0.564***	-0.240***
	(0.0531)	(0.0574)	(0.0560)	(0.0631)
High state fragility		-0.370***		
		(0.0761)		
Change in TOT = y	0.620***	-0.209***	0.0374	
	(0.175)	(0.0616)	(0.0703)	
y * Democracy	-0.732***			
	(0.177)			
y * High state fragility		0.702***		
		(0.108)		
y * Net commodity exporters			-0.222**	
			(0.107)	
Net commodity exporters			-0.138***	
			(0.0492)	
Increase in input cost (avg) = z1				11.70***
				(0.682)
z1 * Energy sector				2.555**
				(1.036)
Commodity windfall revenue (avg) = z2				-2.826***
				(0.258)
z2 * OGM sector				0.639
				(0.795)
Constant	-22.11***	-15.69***	-21.95***	-23.66***
	(2.638)	(2.696)	(2.731)	(3.427)
Observations	4,382	4,379	4,382	3,388
Ln(α)	0.575***	0.580***	0.576***	0.851***
	(0.0128)	(0.0128)	(0.0128)	(0.0146)

*** p<0.01, ** p<0.05, * p<0.1; Standard errors in parentheses. Sample excludes government guaranteed contracts. Log of income per capita in 2000 and the square term, as well as change in real GDP per capita growth are controlled.

Table 5: Parametric Hazard Regression: Cohort Analysis

	(1)		(2)	
VARIABLES	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Micro factors				
IFI involved	0.0366	-0.246***	-0.00178	-0.343***
	(0.0725)	(0.0690)	(0.0799)	(0.0789)
Priv. share>80%	0.0232	0.265***	-0.254***	0.217***
	(0.0700)	(0.0531)	(0.0854)	(0.0600)
OGM sector	0.345***	-0.421***	0.472***	-0.428***
	(0.122)	(0.0771)	(0.128)	(0.0795)
Energy sector	0.118**	0.364***	0.173***	0.249***
	(0.0578)	(0.0443)	(0.0621)	(0.0531)
Macro factors				
Democracy	-0.211**	-0.198***	0.0483	-0.0473
	(0.0962)	(0.0768)	(0.104)	(0.0885)
Change in TOT	-0.349***	-0.707***		
	(0.0907)	(0.109)		
Increase in input cost (avg)			20.42***	-0.485
			(1.523)	(0.692)
Commodity windfall revenue (avg)			0.209	-4.759***
			(0.286)	(0.542)
Constant	-41.78***	-11.92***	-58.51***	-10.97**
	(4.023)	(3.615)	(5.585)	(4.677)
Observations	1,841	2,541	1,482	1,906
Ln(α)	1.872***	0.605***	1.907***	0.869***
	(0.0174)	(0.0164)	(0.0198)	(0.0187)

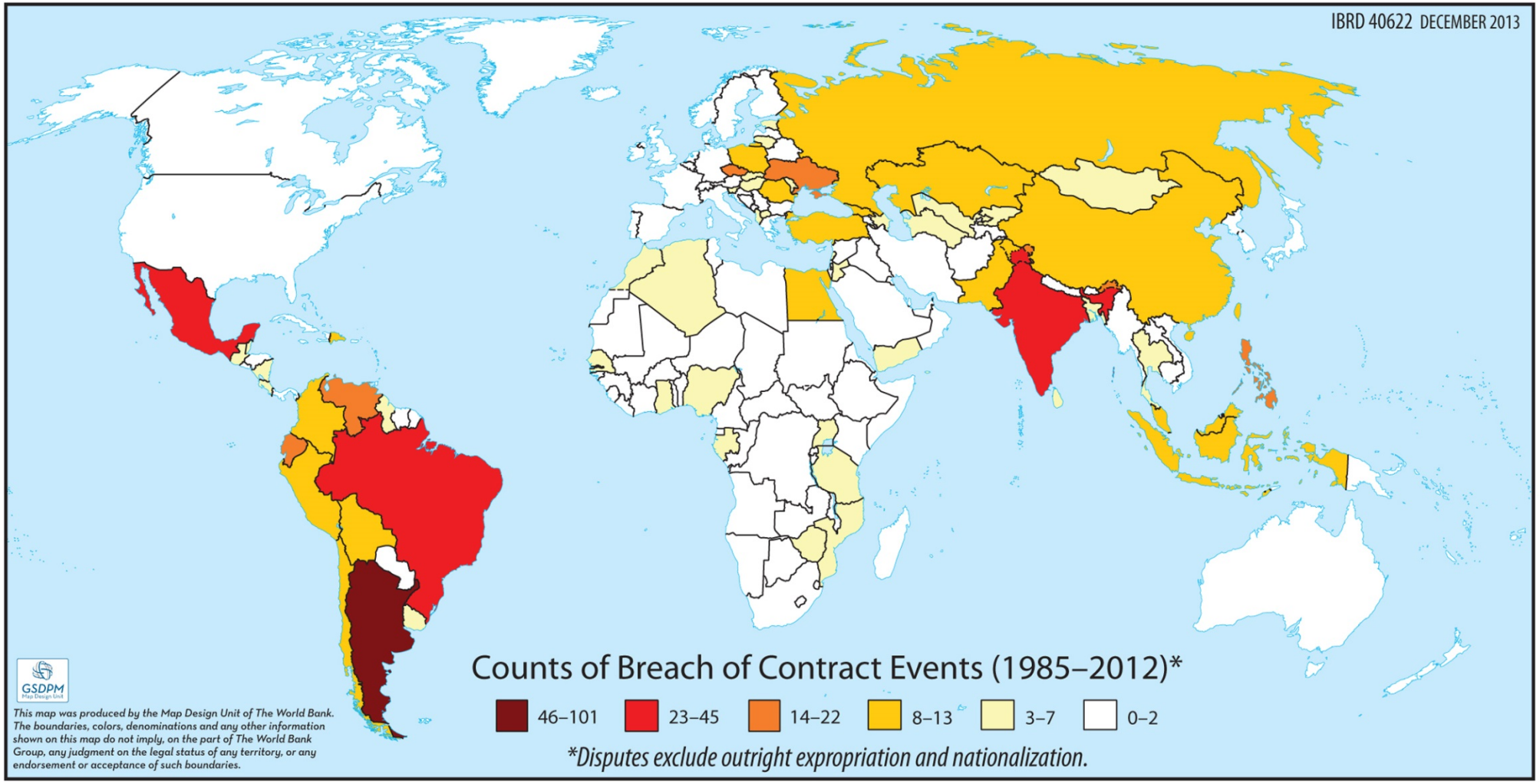
*** p<0.01, ** p<0.05, * p<0.1; Standard errors in parentheses. Sample excludes government guaranteed contracts. Log of income per capita in 2000 and the square term, as well as change in real GDP per capita growth are controlled.

Table 6: Country-year Panel Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	D_dispute	D_dispute	D_dispute	D_dispute	D_dispute	D_dispute	D_dispute
Macro shocks							
Real per capita GDP growth (1)	0.152**	0.203*	0.208	0.165	0.265*	0.318*	0.350*
	(0.0617)	(0.113)	(0.135)	(0.102)	(0.154)	(0.179)	(0.206)
Change in TOT (1)		-0.00361	-0.00211	-0.00737	-0.000298	0.0175	0.0412
		(0.0408)	(0.0494)	(0.0397)	(0.0332)	(0.0379)	(0.0377)
Natural Disaster (1)	0.0543***	0.0515***	0.0510***	0.0560***	0.0365**	0.0332**	0.0466**
	(0.0115)	(0.0150)	(0.0159)	(0.0150)	(0.0158)	(0.0162)	(0.0183)
Political institution							
Democracy		0.00143			-0.0332		
		(0.0145)			(0.0276)		
Democratization			0.0425			0.0357	0.0465
			(0.0339)			(0.0380)	(0.0479)
Democratization (1)			-0.0318			-0.0362	-0.0334
			(0.0293)			(0.0278)	(0.0345)
Democratization (2)			-0.0564*			-0.0594*	-0.0683*
			(0.0294)			(0.0339)	(0.0391)
High state fragility				-0.00528			
				(0.0190)			
Aid/GNI	-0.423***	-0.616*	-0.634*	-0.743**			
	(0.148)	(0.340)	(0.357)	(0.343)			
(Aid/GNI)^2	0.887***	2.152**	2.315**	2.461**			
	(0.277)	(1.068)	(1.144)	(1.037)			
Log of resource rents	0.0115**	0.0152**	0.0154**	0.0123*			
	(0.00455)	(0.00668)	(0.00709)	(0.00668)			
Other control							
Avg. of D_dispute in previous 5 years	0.497***	0.516***	0.514***	0.484***	0.267***	0.226***	0.0890
	(0.0450)	(0.0541)	(0.0552)	(0.0510)	(0.0639)	(0.0679)	(0.0717)
Log income per capita in 2000	0.00235	0.0121	0.0133	0.00854			
	(0.00800)	(0.0130)	(0.0138)	(0.0146)			
Regional dummies							
EAP	-0.00334	0.000367	0.00527	-0.00443			
	(0.0134)	(0.0266)	(0.0278)	(0.0259)			
ECA	0.0436***	0.0540**	0.0634***	0.0430**			
	(0.0168)	(0.0212)	(0.0229)	(0.0205)			
LAC	0.0328**	0.0623***	0.0698***	0.0520***			
	(0.0140)	(0.0202)	(0.0215)	(0.0196)			
MENA	-0.00201	0.00742	0.0110	0.0116			
	(0.0199)	(0.0236)	(0.0248)	(0.0230)			
South Asia	0.0160	0.0692*	0.0704*	0.0703*			
	(0.0218)	(0.0412)	(0.0408)	(0.0407)			
Year	0.0223***	0.0290***	0.0373***	0.0348***	0.0292***	0.0357***	0.0275***
	(0.00220)	(0.00401)	(0.00457)	(0.00365)	(0.00584)	(0.00663)	(0.00755)
Year^2	-0.00064	-0.00079	-0.001	-0.00099	-0.00066	-0.00083	-0.0006
	(7.49e-05)	(0.000139)	(0.000155)	(0.000119)	(0.000189)	(0.000214)	(0.000241)
Constant	-0.155**	-0.310***	-0.388***	-0.295**	-0.162***	-0.231***	-0.183***
	(0.0742)	(0.120)	(0.130)	(0.132)	(0.0398)	(0.0481)	(0.0537)
Observations	3,458	2,178	1,982	2,259	2,178	1,982	1,525
R-squared	0.180	0.200	0.202	0.188	0.099	0.096	0.063
Country FE					Y	Y	Y
Year FE					Y	Y	Y
Robustness check							Without LAC region
Number of country_number					100	100	80

*** p<0.01, ** p<0.05, * p<0.1; Robust standard errors in parentheses. Variables noted with (1) and (2) beside the name take one-year and two-year lag.

Map: Counts of Breach of Contract Events (in 1985-2012)



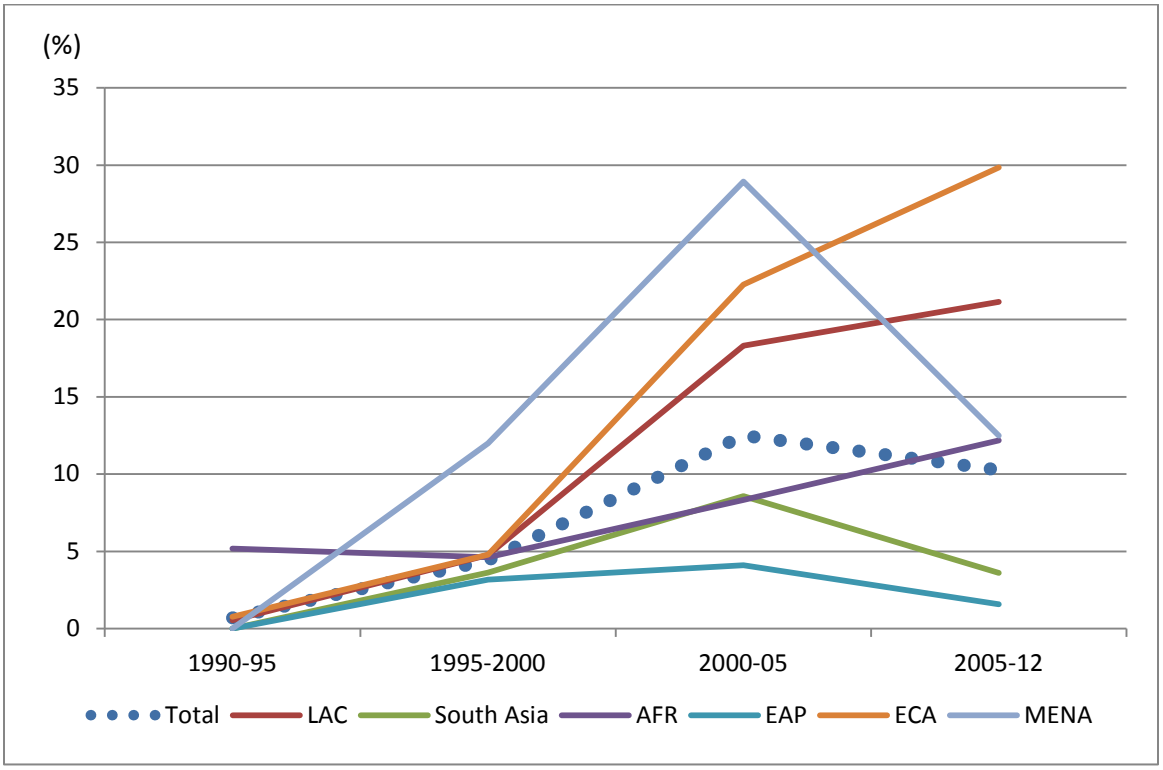
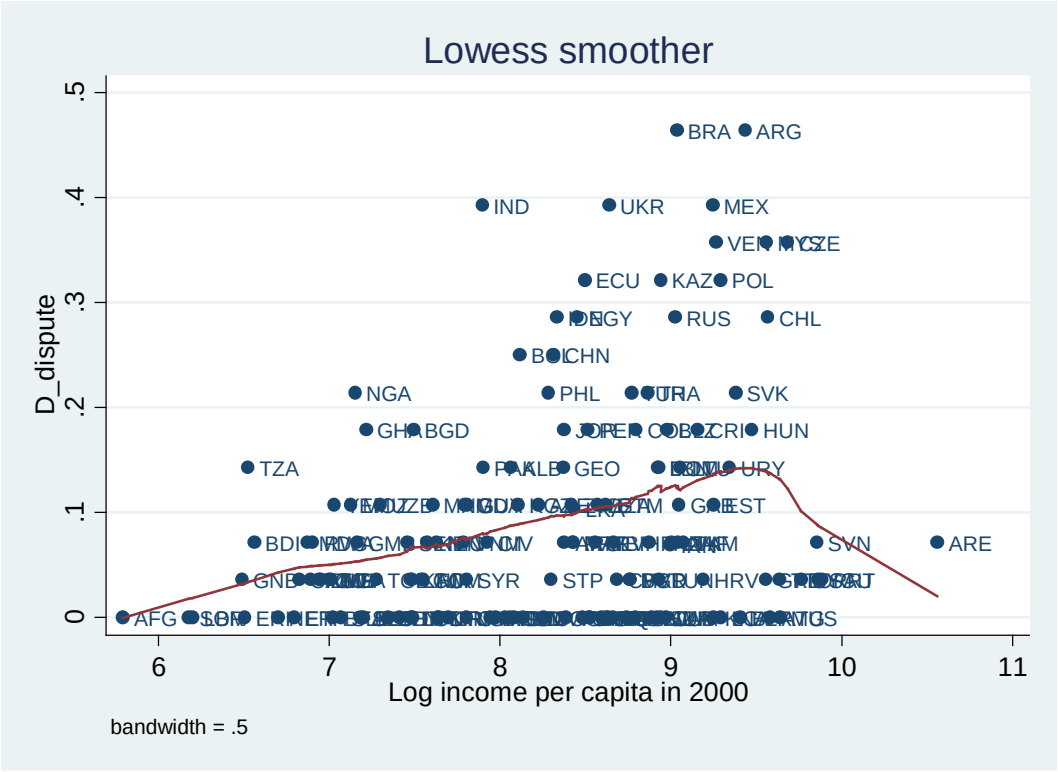


Figure 1: Historical Trend of Contract Breach Risk



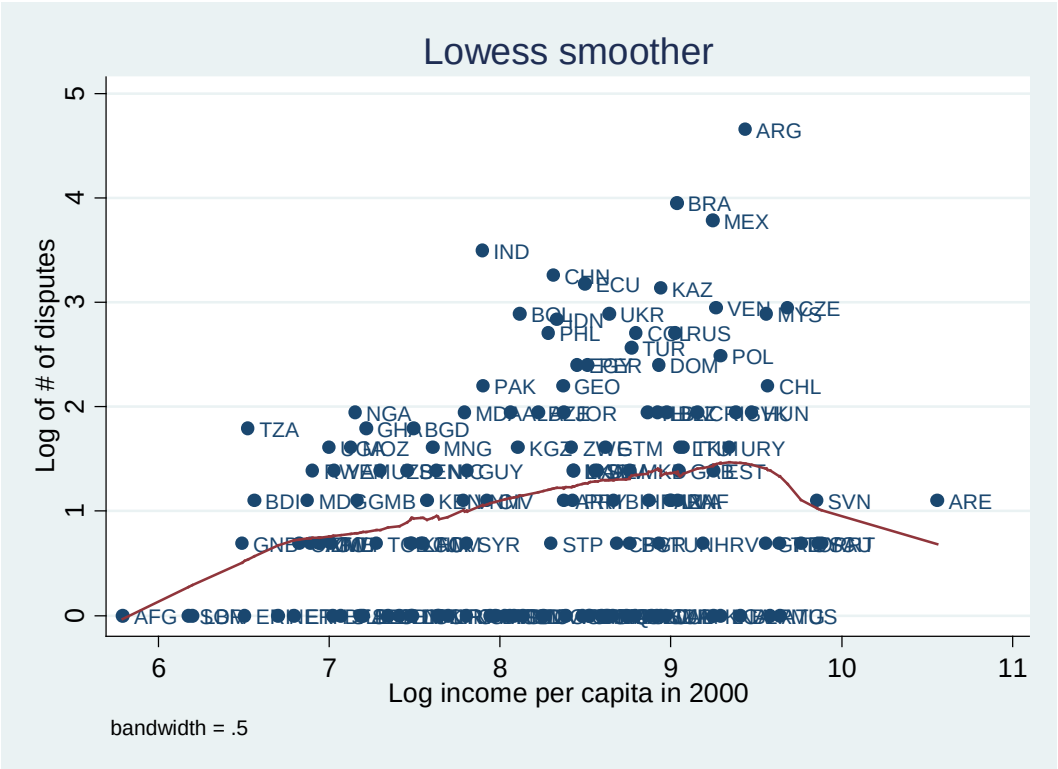
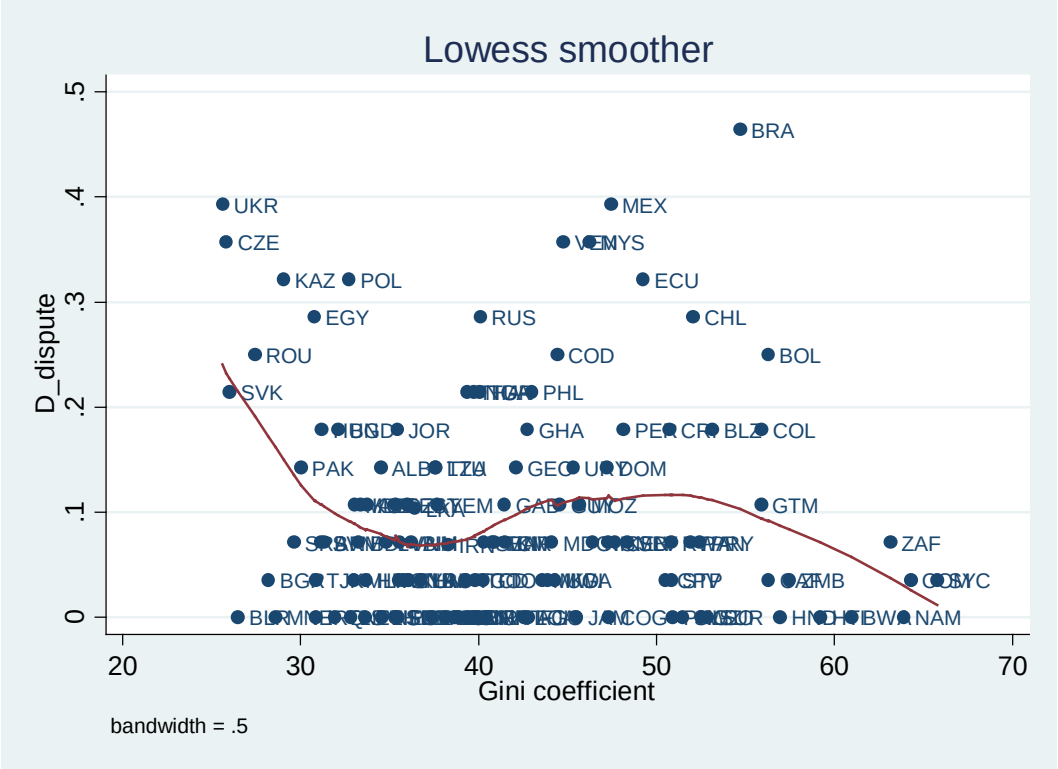


Figure 2: Disputes and Economic Development



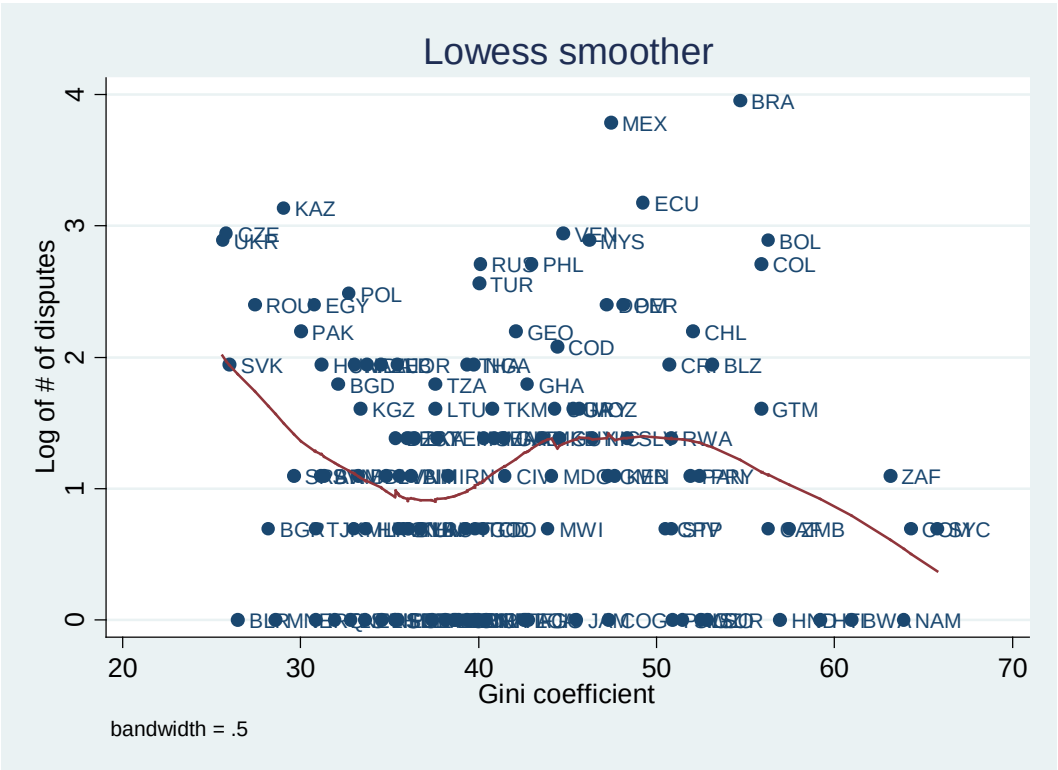
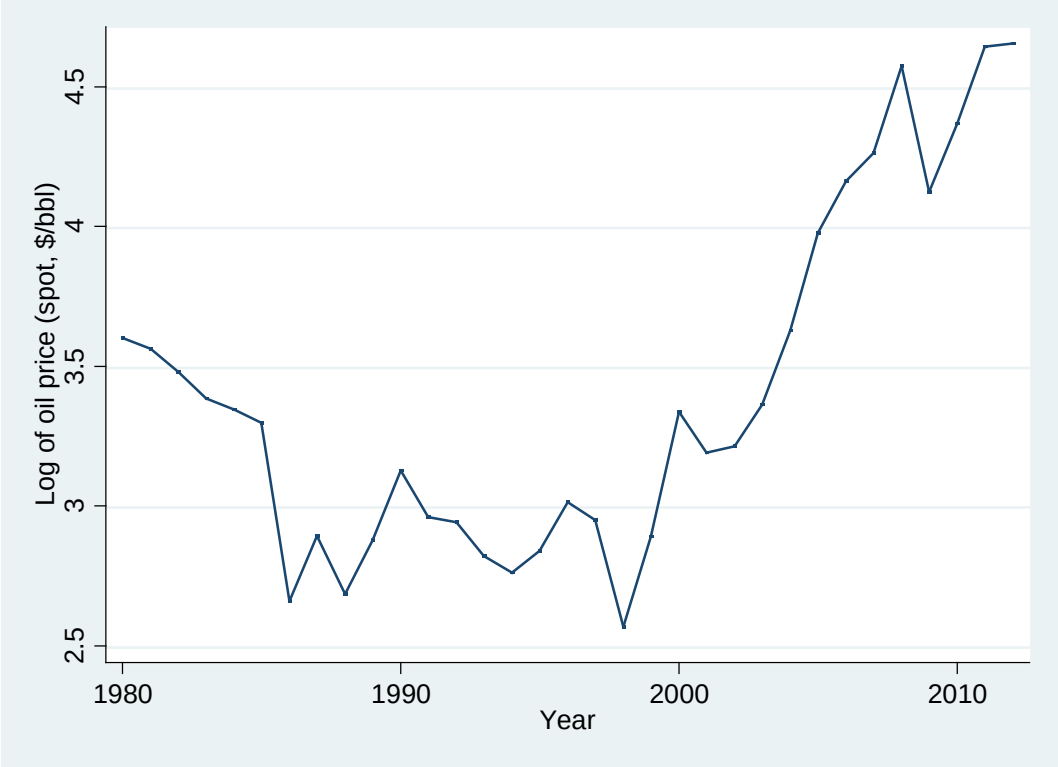
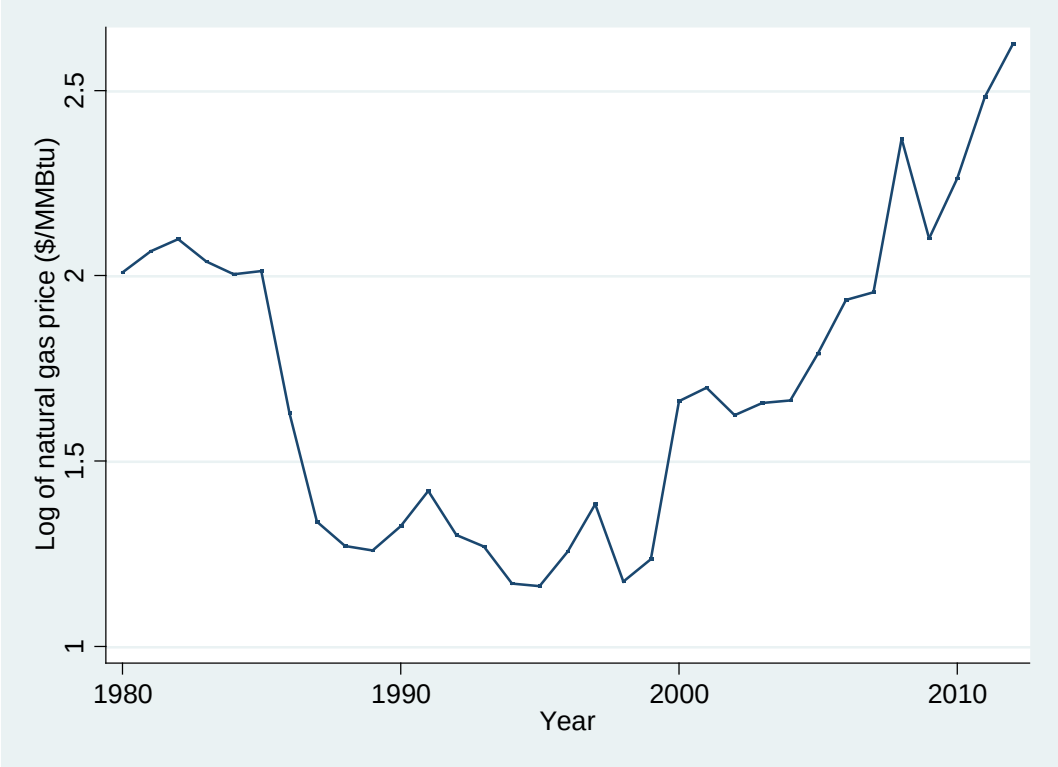
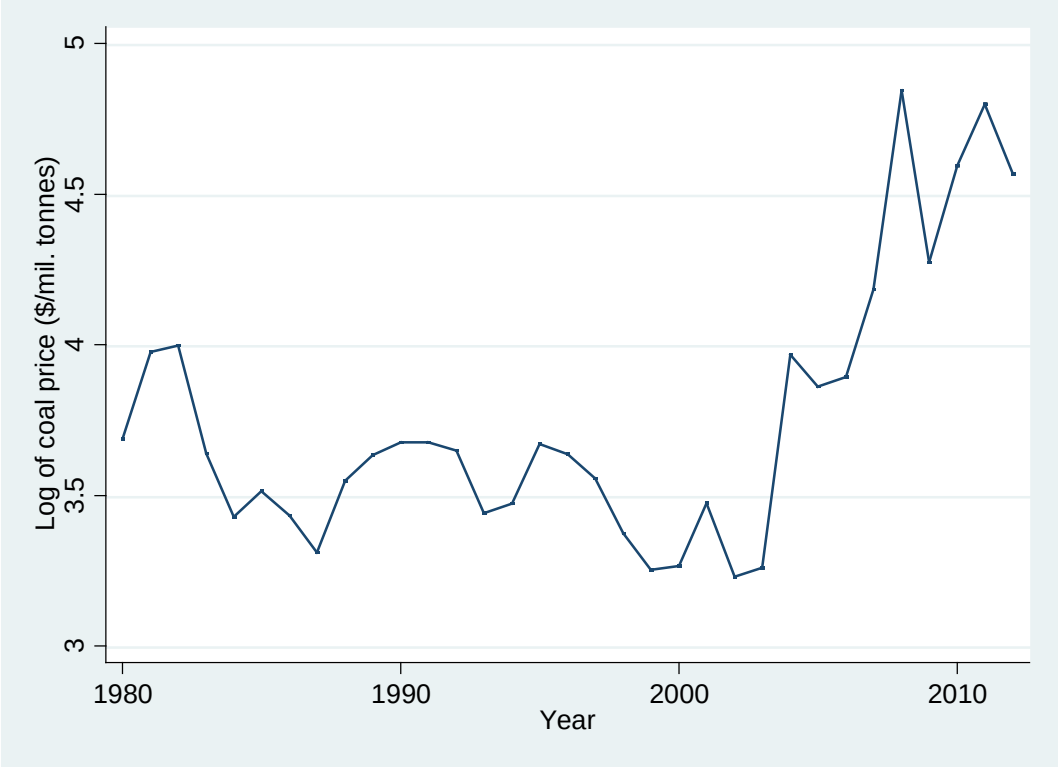


Figure 3: Disputes and Inequality


Log of oil price (spot, $/bbl)
2.5
3
3.5
4
4.5
1980
1990
2000
2010
Year


Log of natural gas price ($/MMBtu)
1
1.5
2
2.5
1980
1990
2000
2010
Year



(Source) World Bank

Figure 4: Time Series of Global Commodity Prices

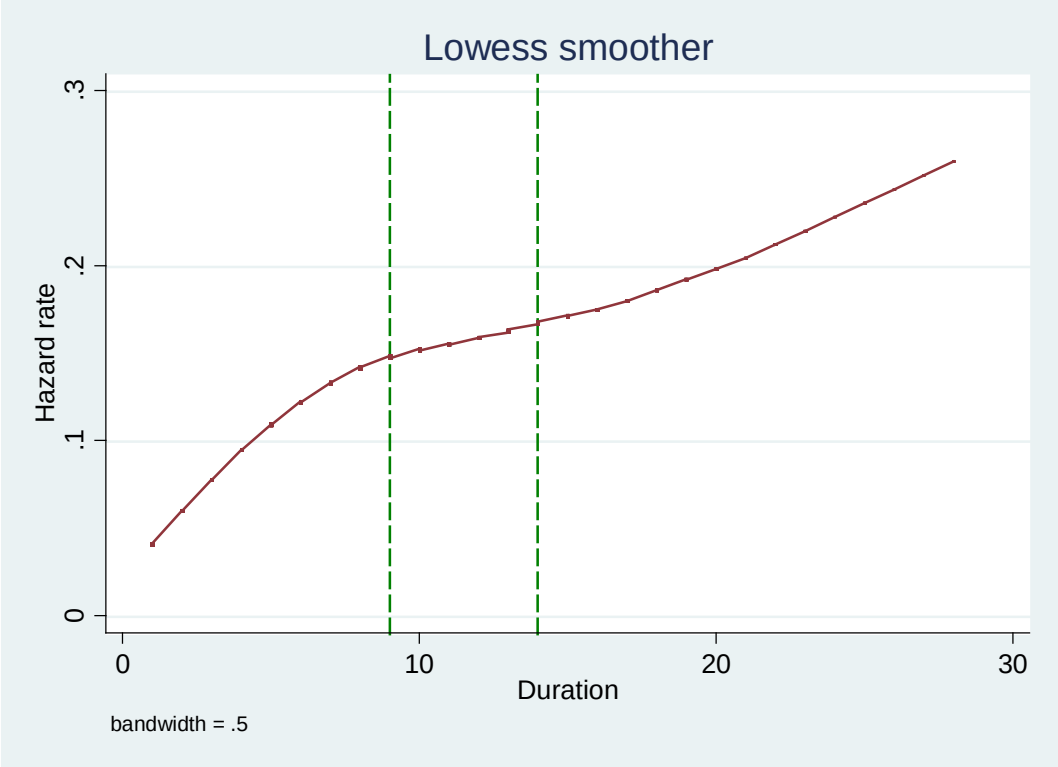
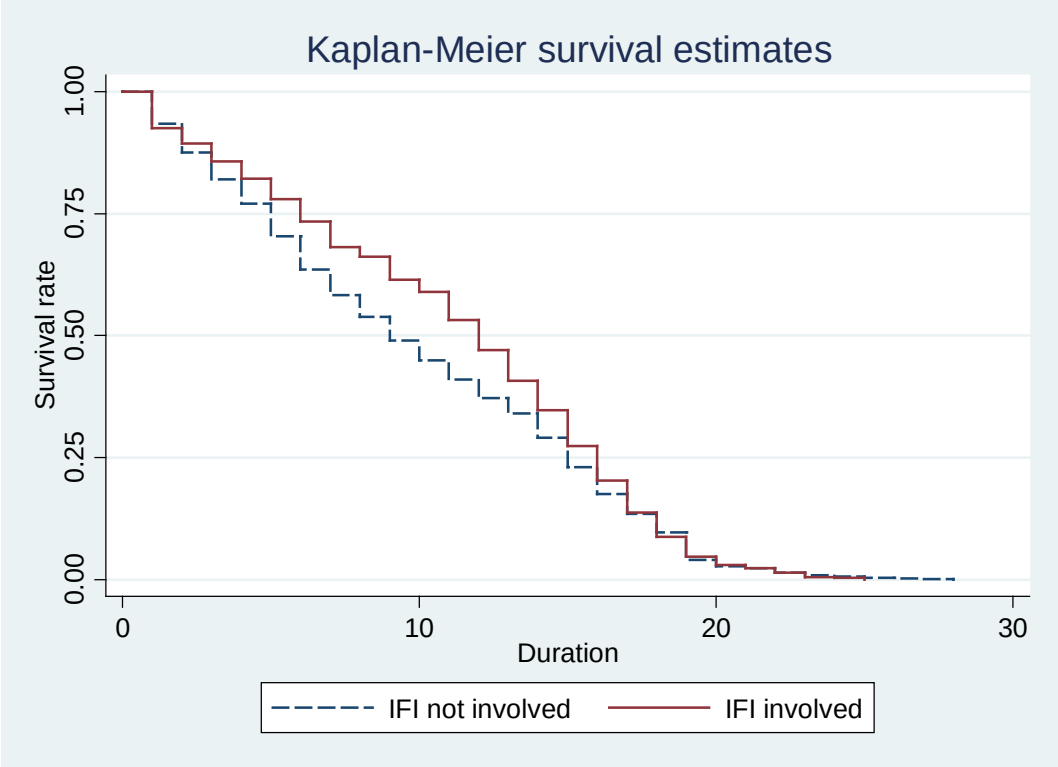
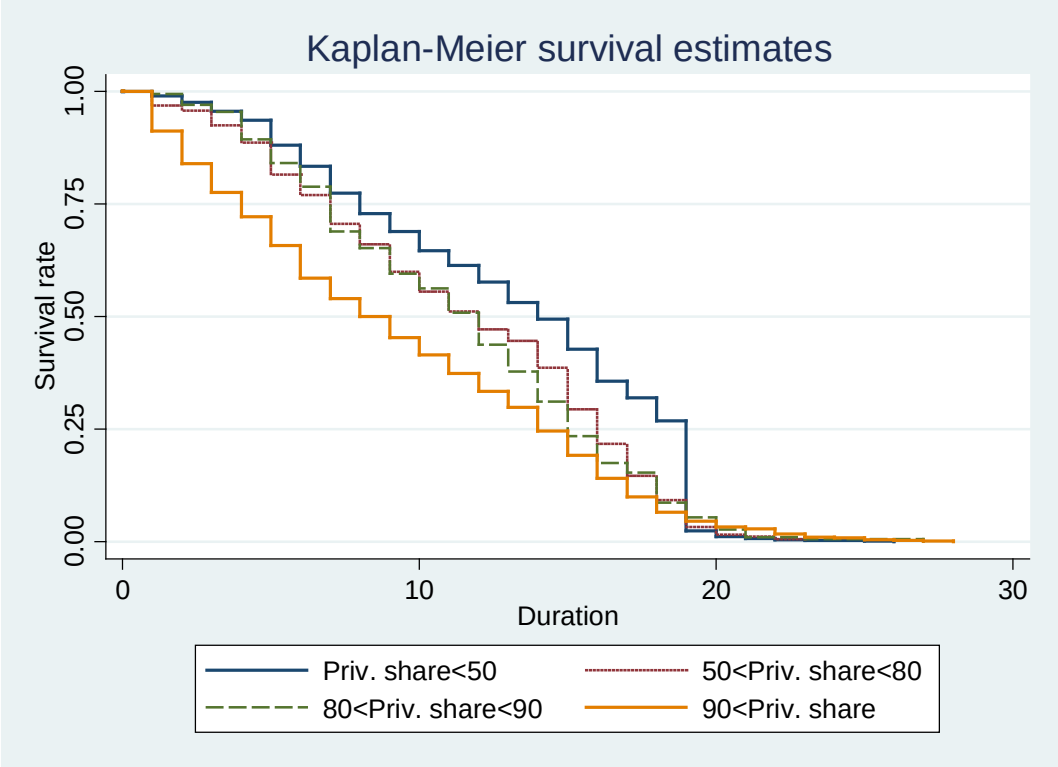
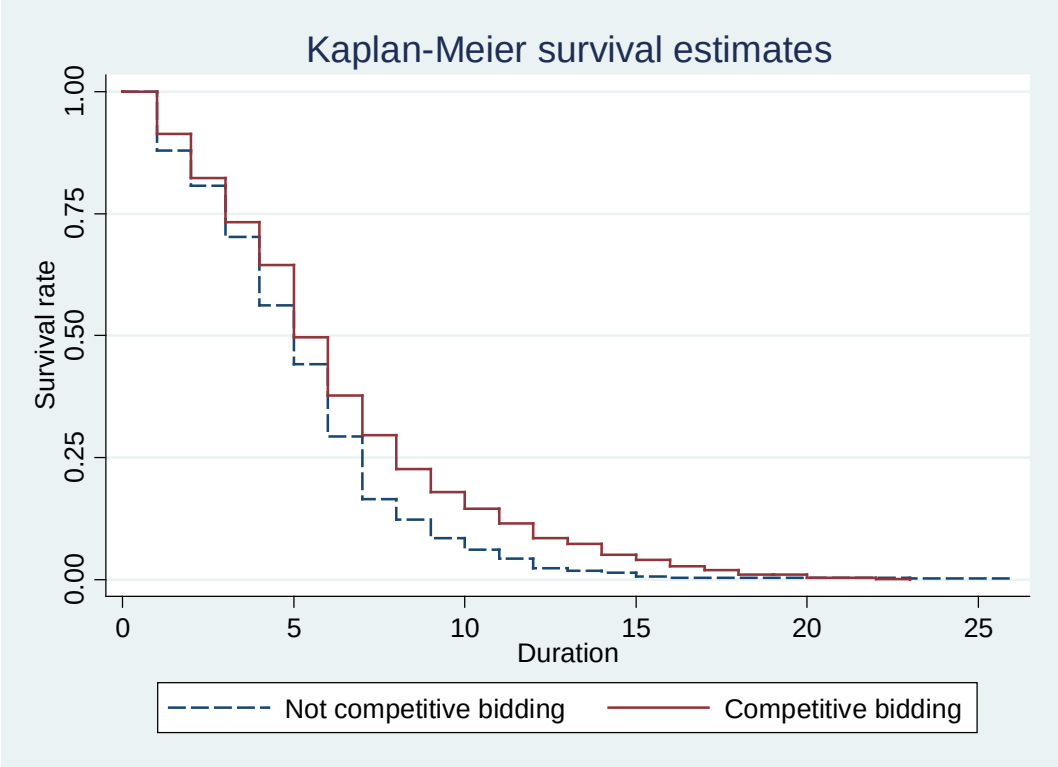
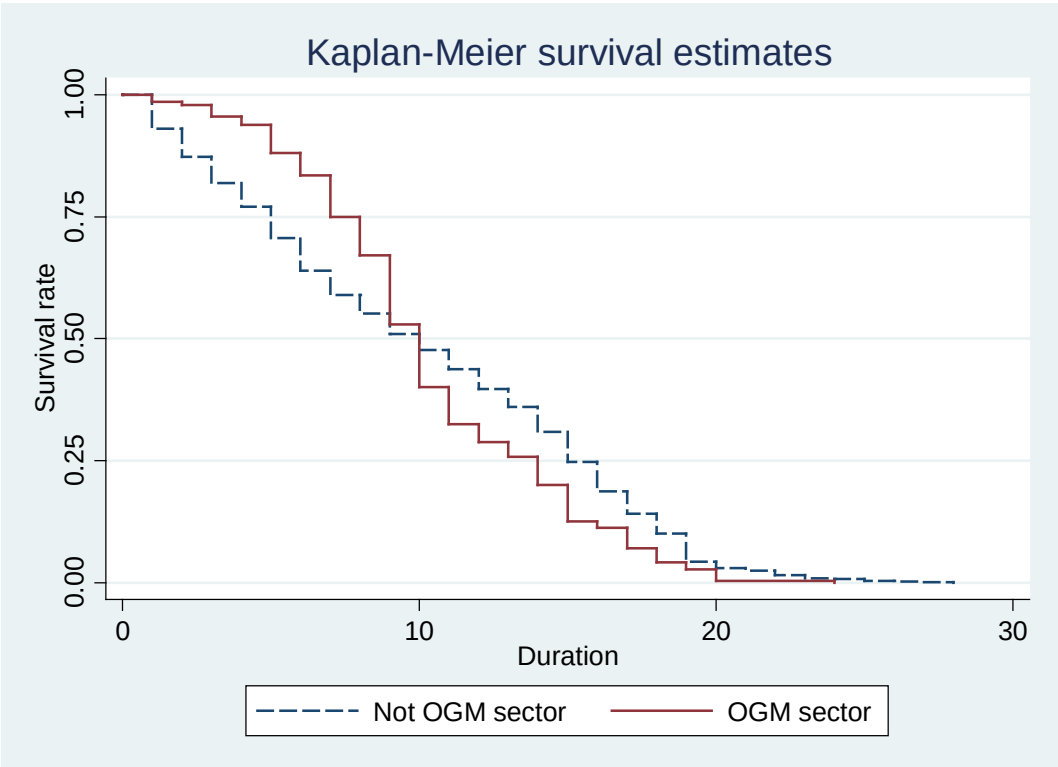


Figure 5: Hazard Rate by Contract Duration


Kaplan-Meier survival estimates
Survival rate
0.00
0.25
0.50
0.75
1.00
0
10
20
30
Duration
IFI not involved
IFI involved


Kaplan-Meier survival estimates
Survival rate
0.00
0.25
0.50
0.75
1.00
0
10
20
30
Duration
Priv. share<50
50<Priv. share<80
80<Priv. share<90
90<Priv. share


Kaplan-Meier survival estimates
Survival rate
0.00
0.25
0.50
0.75
1.00
0
5
10
15
20
25
Duration
Not competitive bidding
Competitive bidding


Kaplan-Meier survival estimates
Survival rate
0.00
0.25
0.50
0.75
1.00
0
10
20
30
Duration
Not OGM sector
OGM sector

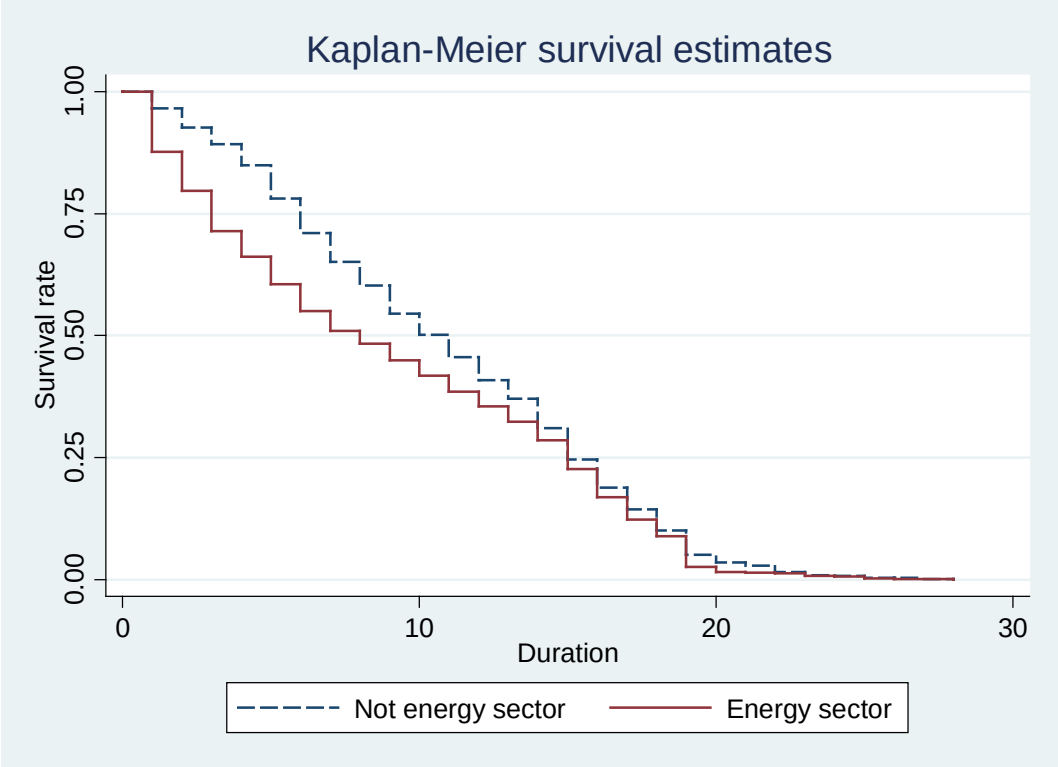
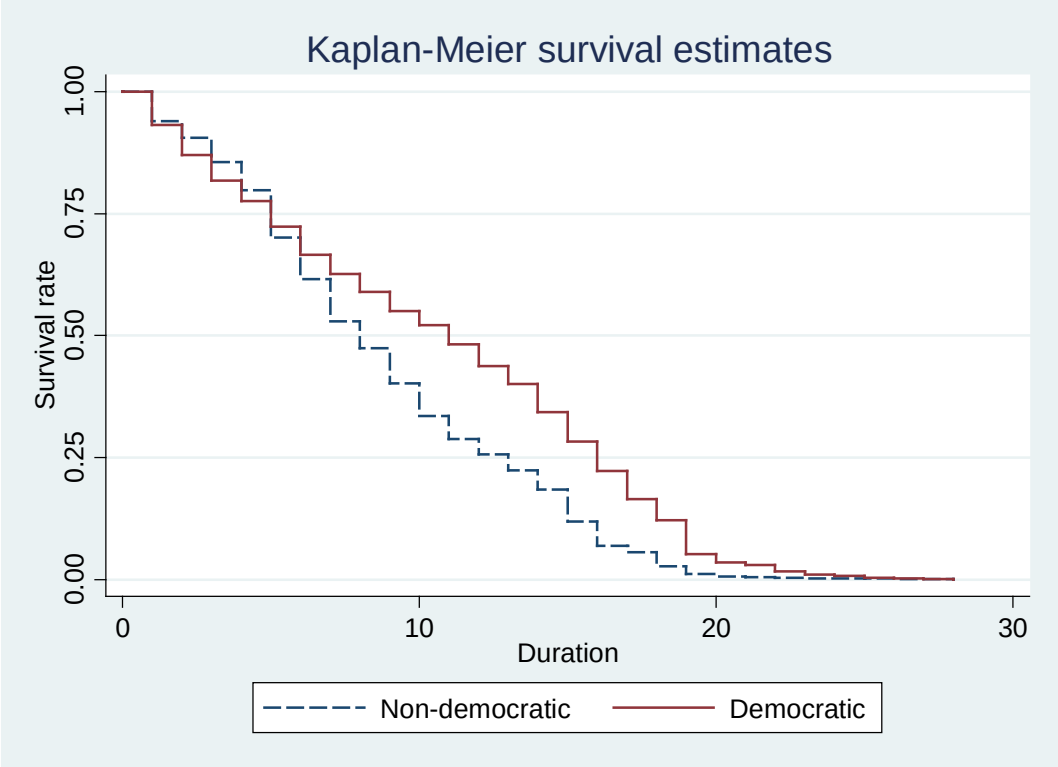
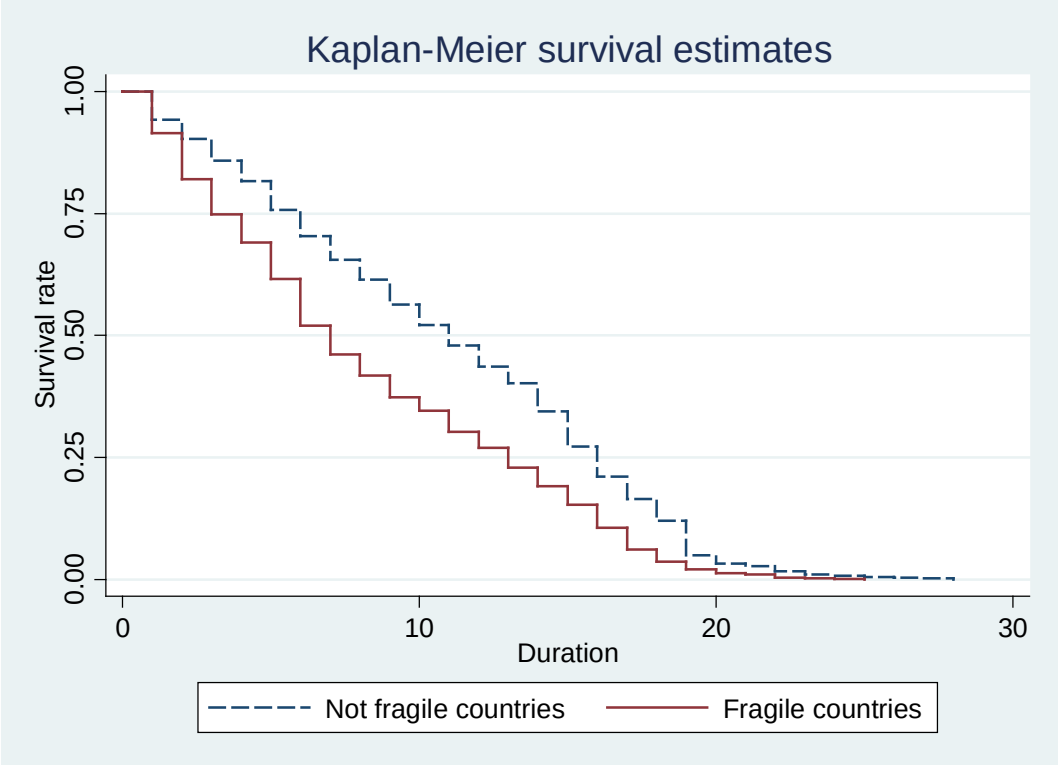


Figure 6: Survival Probability of Project (by Contract Type)


Kaplan-Meier survival estimates
Survival rate
0.00
0.25
0.50
0.75
1.00
0
10
20
30
Duration
Non-democratic
Democratic


Kaplan-Meier survival estimates
Survival rate
0.00
0.25
0.50
0.75
1.00
0
10
20
30
Duration
Not fragile countries
Fragile countries

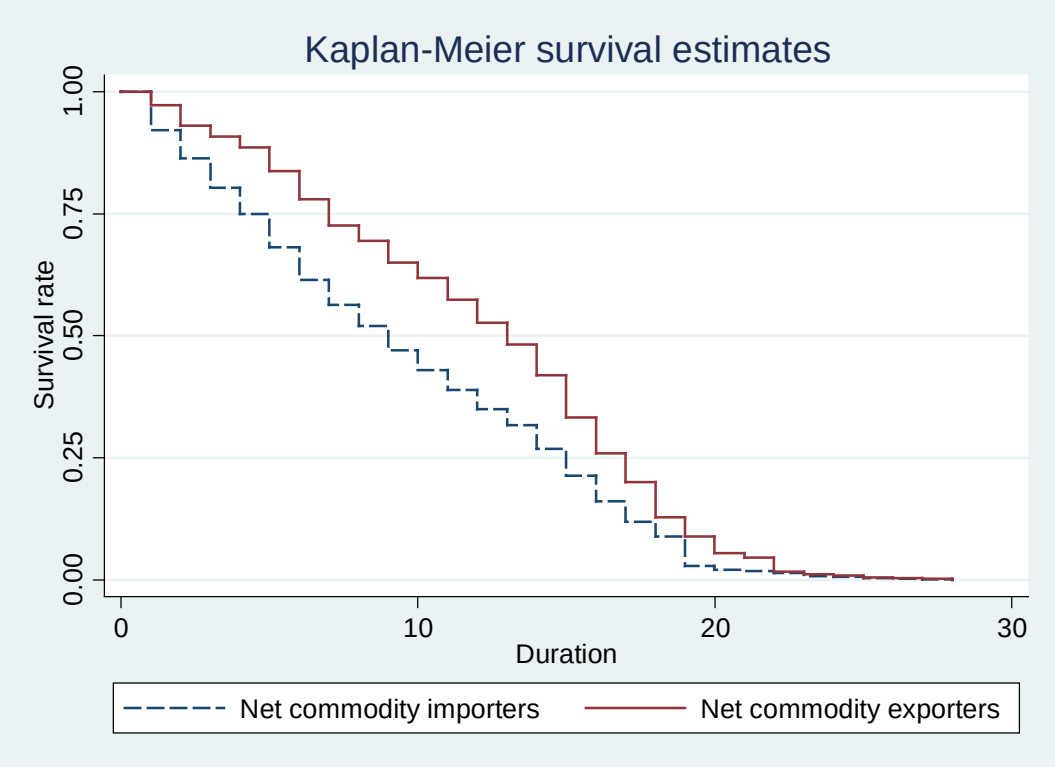


Figure 7: Survival Probability of Project (by Country Type)

Appendix 1: Lists of Country in the Sample

Low income (34)	Lower middle income (54)	Upper middle income (51)	High income (11)
Afghanistan	Angola	Albania	Croatia
Bangladesh	Armenia	Algeria	Czech Republic
Benin	Belize	American Samoa	Estonia
Burkina Faso	Bhutan	Antigua and Barbuda	Latvia
Burundi	Bolivia	Argentina	Poland
Cambodia	Cameroon	Azerbaijan	Portugal
Central African Republic	Cape Verde	Belarus	Saudi Arabia
Chad	Congo, Rep.	Bosnia and Herzegovina	Slovak Republic
Comoros	Cote d'Ivoire	Botswana	Slovenia
Congo, Dem. Rep.	Djibouti	Brazil	Trinidad and Tobago
Eritrea	Egypt	Bulgaria	United Arab Emirates
Ethiopia	El Salvador	Chile	
Gambia, The	Fiji	China	
Guinea	Georgia	Colombia	
Guinea-Bissau	Ghana	Costa Rica	
Haiti	Guatemala	Cuba	
Kenya	Guyana	Dominica	
Kyrgyz Republic	Honduras	Dominican Republic	
Liberia	India	Ecuador	
Madagascar	Indonesia	Gabon	
Malawi	Iraq	Grenada	
Mali	Kiribati	Hungary	
Mozambique	Kosovo	Iran	
Myanmar	Lao PDR	Jamaica	
Nepal	Lesotho	Jordan	
Niger	Mauritania	Kazakhstan	
Rwanda	Micronesia, Fed. Sts.	Lebanon	
Sierra Leone	Moldova	Lithuania	
Somalia	Mongolia	Macedonia	
Tajikistan	Morocco	Malaysia	
Tanzania	Nicaragua	Maldives	
Togo	Nigeria	Mauritius	
Uganda	Pakistan	Mexico	
Zimbabwe	Papua New Guinea	Montenegro	
	Paraguay	Namibia	
	Philippines	Panama	
	Samoa	Peru	
	Sao Tome and Principe	Romania	
	Senegal	Russian Federation	
	Solomon Islands	Serbia	
	Sri Lanka	Seychelles	
	Sudan	South Africa	
	Swaziland	St. Kitts and Nevis	
	Syrian Arab Republic	St. Lucia	
	Timor-Leste	St. Vincent and the Grenadines	
	Tonga	Suriname	
	Turkmenistan	Thailand	
	Ukraine	Tunisia	
	Uzbekistan	Turkey	
	Vanuatu	Uruguay	
	Viet Nam	Venezuela	
	West Bank and Gaza		
	Yemen		
	Zambia		

Appendix 2: Commodity net exporting countries

Net oil exporting countries	Net gas exporting countries	Net coal exporting countries
Algeria	Algeria	Botswana
Argentina	Argentina	Columbia
Azerbaijan	Azerbaijan	Czech Republic
Belarus	Bolivia	Estonia
Cote d'Ivoire	Columbia	Indonesia
Cameroon	Congo, Rep.	Kazakhstan
Columbia	Egypt	Lithuania
Congo, Rep.	Ghana	Latvia
Ecuador	Indonesia	Mongolia
Egypt	Iran	Mozambique
Gabon	Iraq	Poland
Ghana	Kazakhstan	Rwanda
Iran	Malaysia	Swaziland
Iraq	Mozambique	Timor-Leste
Kazakhstan	Myanmar	Venezuela
Malaysia	Nigeria	Vietnam
Mexico	Peru	South Africa
Nigeria	Saudi Arabia	Zimbabwe
Saudi Arabia	Trinidad and Tobago	
Sudan	Turkmenistan	
Syrian Arab Republic	United Arab Emirates	
Trinidad and Tobago	Yemen	
Turkmenistan	Zambia	
United Arab Emirates		
Venezuela		
Vietnam		
Yemen		

(Source) UN Comtrade

The export and import values of three major commodities are classified based on United Nation's Standard International Trade Classification (SITC) rev. 1. Net exporting position of each commodity is defined as follows.

$Net\ Exporter_C = 1[\frac{\sum_{t=2000}^{2010} Export_c - Import_c}{11} > 0]$ where c=1 (oil), 2 (gas), or 3 (coal).

Appendix 3: Variable definitions

Disputes: A binary measure to distinguish whether contracts experienced disputes or not. Contracts are classified as "dispute" case if; (i) there are some indications of contractual conflicts happened among relevant parties related to potential triggers (e.g., sponsor's financial problem, price adjustment required, tariff negotiation, distress after financial crisis/currency devaluation, disagreement on technical standard, government's buyout of equity), (ii) some re-negotiation took place, and (iii) renewal of contracts before the project completion. Even if projects are in distress or cancelled, they are classified as "non-dispute" cases if the disputes/project cancellation were triggered by (i) clear unilateral actions by sponsor (e.g., change in business strategy), (ii) the expiry of concession agreements, and (iii) worsened security situations (war and civil conflict).

IFI involvement: A dummy variable indicating the involvements of international financial institutions (e.g., Asian Development Bank, African Development Bank, European Investment Bank, Inter-American Development Bank, and World Bank (including International Bank for Reconstruction and Development, International Finance Corporation, and Multilateral investment Guarantee agency). The type of involvements can be in any type, but they are mostly in the form of loans and syndications (with guarantees in some cases).

Private share: The percentage of the project company that is owned by private sponsors.

Competitive bidding: A dummy variable indicating that government used competitive bidding method to award contracts to a private consortium and not other methods (i.e., direct negotiation, competitive negotiation, and unsolicited proposals).

Democracy: Democracy is a binary indicator, which is one if Polity IV score is greater than zero, and zero otherwise. Democratization dummy is one for the year when there was a political transition from autocratic to democratic regime.

Right wing government: A binary measure indicating political party orientation with respect to economic policy, which is one for right; and zero for other options (left, center, no information, and no executive cases) from Database of Political Institutions. Right government is defined as conservative, Christian democratic, or right-wing.

Primary commodity exporter: A dummy variable indicating that the country is a net exporter of either oil, natural gas, or coal, or not (i.e., union of countries listed in Appendix 2).

Resource rents: Total natural resource contributions to GDP, which is the total rents (including oil, natural gas, coal, mineral, and forest rents) in percent of GDP.

High state fragility: A binary measure indicating the country is in high political fragility state. This variable is built from the quantile of the fragility index (in the range from 0 (no fragility) to 4 (extreme fragility; from Marshall and Cole (2009)), which is one if the fragility index is above 2 (moderate fragility).

Natural disaster: This is a dummy variable generated from different disaster variables from EM-DAT database. It is equal to one if a country had any of the following natural disasters in a given year; extreme temperature, floods, tsunamis or tidal waves, and landslides or avalanches. It is zero otherwise.

Aid/GNI: This variable is constructed by dividing nominal value of total amount of aid divided by nominal GNI (following Atlas Method).

Log income pc in 2000: Log Income per capita in 2000

Gini index: It measures the extent to which the distribution of income or consumption expenditure among individuals or household within an economy deviates from a perfectly equal distribution. This paper uses the most recent index available in World Bank's PovCal net and it can be either income or consumption-based depending on the data availability of national surveys in each country.