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## **The impact of oil rents on military spending: Does corruption matter?**

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### **Abstract**

This study shows that the level of corruption matters in how oil rents affect the military spending within countries. Using panel data covering the 1984–2014 period for the Middle East and North Africa –MENA-countries (including Gulf Cooperation Countries-GCC), we find that the effect of oil rents on military budget depends on the extent of political corruption. Oil wealth boosts military spending when corruption (measured by the re-scaled ICRG index) exceeds a critical score of 5 (out of 6) in the MENA region. The intermediary role of corruption in the military–oil nexus is robust, controlling for country and year fixed effects, and a set of control variables that may affect military spending.

*Keywords:* Military spending, Corruption, Oil rents, Panel regressions, Marginal Effects, Middle East, MENA, GCC

*JEL classification:* H10; H56; H57

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## 1. Introduction

The countries in the Middle East and North Africa (MENA) have the highest level of military spending (as a percentage of their economies) worldwide. According to the World Bank (2017), the average of the military spending burden from 2000 to 2014 in the MENA region was 5.1%, standing over the average of this indicator for the North America (3.6%), Europe and Central Asia (1.9%), East Asia and Pacific (1.6%), Sub-Saharan Africa (1.5%) and Latin America and Caribbean (1.3%). How we can explain this worldwide high record of the MENA countries in spending on the military? Is this due to the so-called *curse of oil* in which higher oil wealth hinders the region's long term economic development through a couple of factors such as military spending burden? Do higher oil rents automatically lead to more militarization of their economies? Are such high records in military spending due to specific domestic socio-economic, demographic or institutional factors? To what extent the internal and external conflict risks and regional military competition may be able to explain such a significant allocation of budget to the military?

We contribute to the literature on political economy of military spending by taking into account the *joint effect of oil rents and political corruption* in explaining militarization of the MENA economies. There are studies which have investigated the independent effects of oil rents and corruption on conflict and military spending. However, to the best of our knowledge, the combined effect of oil rents and corruption on militarization of economies is neglected. We fill this gap in our analysis.

We use panel data country and year fixed-effect regressions for 15 MENA countries from 1984 to 2014. By controlling for the main drivers of military spending, our results show that the final effects of oil rents on military spending burden depend on the level of political corruption. This result is robust to different set of control variables. Increasing oil rents in

countries that have a high level of corruption (scores 5 and 6)<sup>1</sup> leads to higher militarization in the MENA region.

The remainder of this paper is structured as follows. Section 2 reviews the related literature. Section 3 presents the data and our empirical strategy. The results are presented and discussed in Section 4. Section 5 concludes the paper.

## **2. Review of literature**

Understanding the determinants of military burden is important as military spending can have both positive and negative effects on economic growth. A group of studies which have found a positive effect of military spending on economic growth refers to the Keynesian hypothesis. Keynesian theory focuses on military spending as a part of total aggregated demand. Assuming the existence of idle economic resources (labor and capital), higher military spending increases total demand for goods and services, leading to higher national outputs and employment. Using a panel of the MENA countries, Yildirim et al. (2005) show a positive growth effects of military spending from 1980-1999. Farzanegan (2014) examines the case of Iran from 1959-2007. He shows that the response of income growth to increasing shocks in the military budget is positive and statistically significant.

The other part of literature suggests a negative effect of higher military spending on economic growth. The main argument works through supply-side channel. This channel focuses on the opportunity cost of scarce resources. Military spending diverts scarce economic resources (labor and capital) from a more productive activities and spending such as education and health. In a case study of Iran, Farzanegan (2011) shows that following a positive oil revenues shocks, the response of military spending is positive while that of education and health is negative and statistically significant.

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<sup>1</sup> We use the International Country Risk Guide (ICRG) corruption index. It is originally from 0 (most corrupt) to 6 (least corrupt). We have re-scaled it from 1 (least corrupt) to 7 (most corrupt). In the MENA sample this re-scaled corruption index varies from the minimum of 2 (e.g., Israel in some years) to the maximum of 6 (e.g., Iraq, Lebanon, and Libya in some years).

Higher military spending may also increase budget deficit and external debt. This is more problematic in oil poor countries. Higher budget deficits following higher military burden may also increase tax rates, discouraging private investment and slow down economic growth (see, for example, Chan, 1988; Lebovic and Ishaq, 1987; Mintz and Huang, 1990; Asseery, 1996). In addition, it is shown that military spending is accompanied by higher corruption (Gupta et al., 2001) which in turn can sand the wheels of economy.

### *Oil and military spending*

Understanding oil rent-internal conflict nexus helps us to shed more light on the possible effect of oil rents on military spending. How does internal stability of countries get affected by their oil rents? Political regimes in oil rich states are interested to stay in power, protecting their economic rents for a longer term. One mechanism is to buy the political support of potential oppositions through distribution of oil rents in a form of large scale subsidies and provision of public jobs. Such cash transfers which are not funded by tax revenues can reduce the political pressure for accountability from the side of people, assisting the political power to consolidate its influence as far as oil rents are available. The financial leverage of oil rents is higher, the smaller the size of population is. For example, according to the OPEC Annual Statistics (OPEC, 2017), the average per capita oil revenues for Qatar from 1960-2015 was 10,994 USD while the same figure for Iran was 392 USD. This shows a significantly higher financial leverage of Qatari government over her population at the time of crisis. If this financial leverage buys peace through (re-)distribution of rents one should not necessarily expect a positive and significant effect of oil rents on military category, *ceteris paribus*. The response of some GCC countries to the Arab Spring events can also show this channel (Bjorvatn and Farzanegan, 2015a): *“Shortly after the collapse of former Egyptian president Hosni Mubarak’s regime in February 2011, the Saudi Arabian government announced a social welfare program worth \$10.7 billion to spend on new employment opportunities and loan forgiveness, a program that reached \$93 billion in March 2011. Similar initiatives were*

*introduced in the UAE, Qatar, Oman and Bahrain*". Andersen and Aslaksen (2013) shows that type of government matters in final effect of rents on stability of regimes. Bjorvatn and Farzanegan (2015a) show not (only) the type of regime but the rather its *strength* matters in final effect of rents on stability. The relative strength of government is measured by index of government political fractionalization (varying from 0 to 1): "*the probability that two randomly picked members of parliament from governing parties belong to different parties*". Oil rents is promoting internal stability when the "incumbent is sufficiently powerful" as is the case in most GCC countries. In these countries the political fractionalization is rather low and there is a high degree of political imbalance. Bjorvatn and Farzanegan show empirical evidence for their theoretical predications by using data for more than 120 countries from 1984-2009. Bjorvatn and Farzanegan (2015b) examine the oil-stability for only MENA region and find similar results. They use panel data for 20 MENA countries from 2002 to 2012 and show that when the regime strength is high and factional politics is low then the rents may buy peace in the MENA region. Reducing oil financial leverage is a challenge for keeping the ruled people loyal to the system. In this case, the political establishment may investment more in repressive tools by expanding the military network and its equipment. The negative correlation between oil revenues per capita (as a proxy for financial and political leverage of government over the society) and the share of military spending in GDP (as a proxy for military burden) is evident in a couple of GCC countries. For example, for the case of Saudi Arabia this correlation is highly negative (-0.68). At times the Saudi government experiences lower financial leverage of oil revenues (from 9,000 USD in 2014 to 5,000 USD in 2015), we see a significant increase in military spending (from 10.7% of GDP in 2014 to 13.7% of GDP in 2015)<sup>2</sup>. Similar patterns can be also seen in other years since 1988.

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<sup>2</sup> It is less likely that this increase in Saudi military spending is due to the regional competition with Iran. Iran military spending in GDP was 2.3% in 2014 which reached to 2.5% in 2015. Israeli military burden even shows a decline for this example (from 6% to 5.4%).

### *Corruption and military spending*

The role of grand corruption in boosting military projects and related investments has been also investigated in literature. There are a few empirical studies on the effect of corruption on military spending. Contrary to anecdotal evidence, Mauro (1998) provides rather insignificant evidence on this link. Gupta et al. (2001) is one of few econometric analyses on this association. They use four different sources of information for corruption for about 120 countries from 1985 to 1998. Their cross country estimations show that corruption is significantly associated with higher military spending or higher arms procurement (as a share of GDP or as a share of total government spending).

The Transparency International has intensified attention to the corruption in defense industry of countries around the world recently. This has reflected in their novel project of the Government Defence Anti-Corruption Index (GI). The GI index examines the existence and effectiveness of institutional and informal controls to manage the risk of corruption in defense and security institutions and of their enforcement. Based on a wide variety of sources and interviewees across 77 indicators, the GI provides governments detailed assessment of the integrity of their defense institutions. Worldwide they classify countries in 6 different risk groups taking into account the situation of corruption and transparency in their military projects and institutions (i.e., A “very low”, B “low”, C “Moderate”, D “High”, E “Very high”, and F “Critical”).<sup>3</sup> The corruption risk in defense industry for Tunisia is “high” while it is “very high” for Iran, Jordan, Lebanon, UAE and Saudi Arabia. For all other countries in the MENA including GCC countries such as Bahrain, Kuwait, Oman, and Qatar, the corruption risk is at critical level. According to GI index report, those at the top of military establishments in many MENA countries control purchasing, and are subject to little if any oversight. Individual interests in defense projects decision making is a dominant fact in many studied states in the MENA by Transparency International: “Acquisition planning—the

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<sup>3</sup> Full country assessments and datasets available online: [www.government.defenceindex.org](http://www.government.defenceindex.org)

process through which the state identifies what arms it will buy—is unclear or non-existent in every state studied”. For the case of Saudi Arabia, the reports mentions that “tactic of using defense purchases to solidify alliances” has led to allocation of military budgets in a wasteful manner. As a result, the Saudi holds large numbers of duplicative weapons systems such as operationally similar Typhoon and F-15 fighter jets. In Kuwait, the state is struggling to train the highly qualified needed personnel for purchased Patriot missile system. There is a lack of meaningful legislative debate or oversight of the defense acquisition in the MENA region, which increases the risk of corruption in military related projects. Corruption in military has also significant negative consequences for overall security of country. For example, in an interview in 2014, the Iraqi Prime Minister Haider al-Abadi reported that the Iraqi army has been paying salaries to at least 50,000 soldiers who do not exist.<sup>4</sup> One of the reasons behind collapse of different divisions of Iraqi army confronting with the Islamic State terrorists was the widespread corruption in military, reflected in high numbers of “ghost soldiers”.

Next sections examine our hypothesis that the effect of oil rents on military spending depends on the level of grand (or administrative) corruption and its development over time across countries.

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<sup>4</sup> <https://goo.gl/8QpY5W>



### 3. Research design

#### *Data, specification, and empirical strategy*

Our main hypothesis is that the level of political and administrative corruption matters for the final effects of oil rents on military budget. Specifically, oil rents are more likely to be allocated to military when the extent of corruption is relatively large. In this context, we also control for other variables, which may influence the military–oil rents nexus (e.g., the economic development, size of population, risk of internal and external conflict, trade, total government spending, education level of population, rule of law and quality of democratic institutions). This strategy helps reduce the risk of ignoring other important determinants of military spending noted in the literature.

We test our hypothesis by using panel regressions for 15 Middle Eastern and North Africa (MENA) countries including five GCC countries from the 1984–2014 period. To estimate whether the relationship between oil rents and military spending varies systematically with the level of corruption, we use the following specification:

$$military_{it} = \alpha + \beta_1 \cdot oil_{it-1} + \beta_2 \cdot corruption_{it-1} + \beta_3 \cdot (oil_{it-1} \times corruption_{it-1}) + \beta_4 \cdot Z_{it-1} + u_i + \theta_t + \varepsilon_{it}, \quad (1)$$

with country  $i$  and time  $t$ , where *military* is a proxy for military spending burden, *oil* is a measure of oil rents dependency, *corruption* is a measure of the perception of corruption,  $oil \times corruption$  is the interaction of oil and corruption, and  $Z$  is the control variables. All explanatory variables are lagged one year to reduce the possible reverse feedback. According to our expectations, the sign of the interaction term coefficient should be positive ( $\beta_3 > 0$ ); the higher the level of corruption is, the higher the effect of oil rents on military spending should be.

The marginal effect of oil rents on military spending can be calculated by examining the following partial derivative in Equation (1):

$$\frac{\partial(military_{it})}{\partial(oil_{it-1})} = \beta_1 + \beta_3 \cdot (corruption_{it-1}) \quad (2)$$

*Dependent variable: military spending (military)*

Our dependent variable is a measure of military spending burden. In this study, our main proxy for measuring this burden is the military expenditures (% of GDP). As for robustness check we also use per capita military expenditures in local currency. We take this data from the World Bank (2017). The World Bank reports the military expenditures data from the Stockholm International Peace Research Institute (SIPRI) which are derived from the NATO definition. The military spending data covers all current and capital expenditures on the armed forces, including peacekeeping forces; defense ministries and other government agencies engaged in defense projects; paramilitary forces, if these are judged to be trained and equipped for military operations; and military space activities. These expenditures cover military and civil personnel, including retirement pensions of military personnel and social services for personnel; operation and maintenance; procurement; military research and development; and military aid (in the military expenditures of the donor country). The reported military spending is not including civil defense and current expenditures for previous military activities, such as for veterans' benefits, demobilization, conversion, and destruction of weapons. In our sample of MENA countries, the lowest share of military spending (% of GDP) is observed for Malta (less than 1%) and the highest share is recorded for Kuwait in the year 1992 (31%). We take logarithm of both proxies, reducing the effect of extreme observations.

## *Independent variables*

### *Oil rents*

Our main focus is the effect of resource rents on military spending. In the MENA region (including GCC) which is our sample of analysis the main natural resource wealth is crude oil. In this study, following Atkinson and Hamilton (2003), Sachs and Warner (2001) and Bjorvatn and Farzanegan (2013, 2015), to measure the relative importance of oil in the economies of the region we use the share of oil rents as % of GDP. Oil rents are the difference between the value of crude oil production at world prices and total costs of production. This leads to a more realistic picture of the oil wealth than oil export revenues. In our sample, we have countries such as Israel, Jordan, Lebanon, Malta, Morocco and West Bank which have oil rents as share of GDP less than 1%. There are also countries which the oil rents comprise more than half of their economies such as Iraq, Kuwait, Libya, and Saudi Arabia. We extract oil rents (% of GDP) from the World Bank (2017). Oil rents estimates are based on sources and methods explained in "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium" (World Bank, 2011).

### *Corruption*

There are different definitions of corruption. We follow a larger part of related literature and define corruption as abuse of public office for private benefits (e.g., Shleifer and Vishny, 1993). Misusing of state resources to expand political power refers to political corruption which is a relevant factor in shaping the effects of oil rents on military (Rose-Ackerman, 1999 and Manzetti and Wilson, 2007). For our analysis, we follow corruption measurement by International Country Risk Guild (ICRG, 2015). The ICRG corruption index is from 0 (most corrupt) to 6 (least corrupt). We have re-scaled the index from 1 (least corrupt) to 7 (most corrupt).

The main focus of ICRG corruption index is on public sector. For this purpose, the ICRG corruption index covers "actual corruption in the form of excessive patronage,

nepotism, job reservations or quid pro quo deals, secret party funding, and suspiciously close ties between politics and business.” Of course, the ICRG corruption index does not neglect corruption at the private sector. They consider “financial corruption in the form of demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans”.

One of the advantages of ICRG corruption index is its long time coverage (since 1984). Another reason to use ICRG corruption index is due to the consistency in measuring the corruption over time and across countries. Given the fact that ICRG corruption is not a composite index its year-to-year comparisons are *more reliable* than other indicators such as Transparency International and World Governance Indicators which are composite indicators and their underlying data or weighting methods may change over time (Hessami, 2014).

Almost all corruption indicators such as ICRG, World Governance Indicator (WGI) and Transparency International are measuring the perception of corruption and are based on country experts, business owners, NGOs, and households’ opinion. There are pro and contra debates on the validity of subjective indicators of corruption. On one side, some studies such as Fisman and Miguel (2007) and Fisman and Wei (2009) present evidence on the objective validity of the corruption perception indicators. On the other side, some studies such as Olken (2009) and Donchev and Ujhelyi (2014) undermine a significant link between the perception indicators of corruption and real experience of corruption. Nevertheless, these perception-based indicators of corruption are widely used in related literature (e.g., Farzanegan and Witthuhn, 2016; Bjorvatn and Farzanegan, 2015). Treisman (2000) also shows that all of the corruption perception indicators are highly correlated, indicating the fact that they are measuring a similar concept. Another concern about the perception based indicators is related to the level of flow of information and press freedom across countries. Countries which have higher press censorship may restrict the flow of information about corruption scandals and thus the perception of people about the real extent of corruption maybe distorted. This

concern has been investigated in the literature and studies such as Besley and Prat (2006); Brunetti and Weder (2003); and Sung (2002) show that corruption perception is even higher in countries with lower press freedom. In the MENA sample, the re-scaled ICRG corruption index has a minimum of 2 (Israel) and maximum of 6 (Iraq, Lebanon, Libya) (from 1-7 scale). In GCC region, this index varies from minimum of 3 (Bahrain in the years 1992-1995) to the maximum of 5 (Bahrain (2002-2009), Kuwait (2000-2004), Qatar (1985-2004), Saudi Arabia (1988-2009), and United Arab Emirates (1992-2007)).

#### *Country and time fixed effects*

Military spending of countries may differ from each other for variety of time varying variables which we are controlling in this analysis. However, there are also some country specific characteristics which are also important for military budget of countries. These country-specific factors are time-invariant. For example, geographical location of countries is not changing over time and at the same time are relevant for stability of countries and the amount of budget which they allocate to military. Some countries which are located in geostrategic locations may attract attention and interventions of external power and in return shape the military budget of the affected countries. Another country specific characteristic which may affect the military budget is ethnical fractionalization. The fractionalization of countries may have implications for stability of political system. Especially it is shown that ethnical fractionalization increases the conflict risk of resource rents (Collier and Hoeffler, 1998). Such time-invariant factors are controlled in our estimations by country fixed effects. In addition, there are time-specific factors which can also shape the military budget of countries. A specific event which happens in one specific year such as terror attacks of 11.09 may increase the conflict risk around the world, affecting the military spending of many countries in our sample. Another example is the Arab Spring which also shapes the security risk of many countries in the MENA region and their military spending. Oil price or financial

crisis shocks in a specific year may affect military budget of many countries in our sample at the same time. Such time-specific factors are controlled in our analysis through time fixed effects.

### *Control variables*

In addition to our main variables of interest such as oil rents, corruption, and their interaction term, we also control for a set of other drivers of military spending in our estimations. We follow Gupta et al. (2001) in selection of control variables. The source for the control variables (with exception offset of ICRG political risk related variables) is the World Bank (2017). In the following, we briefly explain their association with military spending.

- *GDP per capita*

We have controlled for GDP per capita (constant 2010 US\$) as a proxy for scale of economy. Increasing economic development can foster education and public awareness on the importance other critical socio-economic and environmental concerns, requiring the state to allocate more budget to public goods and services.

- *Secondary school education*

Secondary school enrolment indicates the country level of social development. This is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education provides the foundations for long term learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers. Educated people tend to interact with others due to their communication abilities gained through education. Hence, they are more able to participate in the public debates. The educated population is also aware of its legal rights such as voting leading to more demand for political reforms and restricting the military elites and their interest groups. This might increase the possibility of reducing the share of military

spending. The theoretical arguments are backed by the empirical evidence across countries (Barro 1999; Glaeser et al 2006; Castello-Climent 2008).

- *Population*

Population is a proxy for the available human capital for defending the security of a country. Populace countries may build up more labor intensive military units. The Arab countries of the Persian Gulf region with relatively lower size of population (compared with Iran, for example) have more capital intensive military organization and more dependent on imported arms. A higher size of population can also create a natural sense of security against external threats, lowering the need for capital intensive military projects. The negative association between population and military spending is also observed in other studies such as (Dunne and Perlo-Freeman, 2003a,b; Dunne et al., 2008; Collier and Hoeffler, 2007). Dunne and Perlo-Freeman (2003b) offer two explanations for this negative link: first, larger population offers security in itself and second, larger population may make needs for civil spending by the state more of a priority than security needs. We expect a negative association between size of population and military spending.

- *Government spending (% of GDP)*

The ratio of government spending to GDP is also often used as a predicator of military spending in structural models of military spending (Hewitt, 1992). We expect to see a positive association between total government spending and military spending. A channel through which higher income per capita may affect military spending is also through the total government spending. Although some authors such as Dunne et al. (2008) show a negative effect of income per capita on military burden but some others such as Collier and Hoeffler (2007) show a positive effect. The argument of the Collier and Hoeffler is that higher economic development increases the capacity of state to raise taxes and borrow, facilitating the funding of government spending including on the military.

- *Trade*

Trade as a share of GDP is a proxy for degree of integration of a country in international markets, a measure of openness. The higher level of economic globalization following higher intensity of trade in the economy may foster growth and political stability. As a result, the risk of external and internal conflicts may reduce. The lower instability risk may also reduce the necessity of spending military establishment. The positive role of trade in reducing conflict and thus military spending was also reflected by Montesquieu (1758)<sup>5</sup>: “*The natural effect of trade is to bring about peace. Two nations which trade together render themselves reciprocally dependent.*” However, higher intensity of trade may increase the competition in the market and significant adjustments in protected industries. This may cost jobs especially for lower skilled labor force. If trade globalization increases the income gap between the rich and the poor then the risk of conflict can also increase, pushing more the necessity of spending on security forces. We measure trade openness as a sum of total exports and imports divided by GDP. Since most MENA countries have significant oil exports, they may show higher intensity of trade. We also test the results by using share of total imports in GDP.

- *Rule of law, internal and external conflict, ethnical conflict, and democracy*

Besides the corruption which is a key moderating channel in military spending-oil rents nexus in our study, we also control for other institutional dimensions. One of these dimensions is law and order. The ICRG (2015) explains that the “Law” element considers the strength and impartiality of the legal system, while the “Order” element is an assessment of popular observance of the law. It ranges from 0 to 6; the higher scores show a better situation in rule of law and order in a country. A strong check and balance may increase the quality of government spending and the transparency of oil rents allocation in government budgets. It also increases the costs of corruption, hindering the shift of oil rents to capital intensive military projects which are more attractive for bribe-seekers. ICRG also provides country

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<sup>5</sup> <http://voxeu.org/article/trade-and-or-war>



scores on their internal and external conflict risks. Such conflict risk can increase the necessity of spending on military. The internal conflict index of ICRG is an assessment of political violence in the country and its actual or potential impact on governance. It ranges from 0 to 12. The highest score is for those countries with no armed or civil opposition to the government. In these highly internally stable countries the government does not indulge in arbitrary violence, direct or indirect, against its own people. The lowest rating is given to a country embroiled in an on-going civil war. There are three different sub-components in internal conflict index including civil war/coup threat, terrorism/political violence, and civil disorder. External conflict index has similar range (0 to 12). It is an assessment both of the risk to the incumbent government from foreign action. These risks can be in a form of non-violent external pressure (diplomatic pressures, withholding of aid, trade restrictions, territorial disputes, sanctions, etc) and/or violent external pressure (cross-border conflicts to all-out war). A highest score is given to countries with very low risk. The three subcomponents of this index are war, cross border conflicts and foreign pressures. We also consider ethnical conflict index of ICRG. It is an assessment of the degree of tension within a country attributable to racial, nationality, or language divisions. It ranges from 0 to 6. The lower ratings are given to countries where racial and nationality tensions are high. Such tensions may be caused by lack of social-political tolerance and inclusive growth policy in a country. Higher scores are for countries which such tensions are low. Quality of political institutions is also an important factor in allocation of oil rents to military and nonmilitary categories of spending (Dizaji et al., 2016). More democratic countries consider the needs and priorities of larger cohort of population in their spending behavior while autocratic regimes rely more on military elites. We use the ICRG democratic accountability index for this purpose. It is from 0 to 6, the higher shows a better quality of political institutions. This index is a measure of how responsive government is to its people. The lower accountability

increased the risk of political collapse either peacefully (in democracies) or violently (in non-democracies).

- *Military spending of border countries*

Countries may adjust their military budget taking into account the spending behavior their immediate neighbors. The concept of Security Web was introduced by Rosh (1988). The security web concept was a response to shortcomings of the Arms Race Model in explaining the drivers of military spending (Majeski and Jones, 1981). To control for the regional arms competition and regional tension which may influence a country military spending, we use the unweighted average of neighboring countries' ratio of military spending to GDP and/or the unweighted average of neighboring countries' ratio of armed force numbers to total labor force (see Davoodi et al., 1999 and Gupta et al., 2001 for similar approach). Dunne and Perlo-Freeman (2003b) also suggest that determinants of military spending have changed after the end of cold war. Since 1990s, we are observing a larger share of internal conflicts which highlights the importance of domestic socio-economic, demographic and institutional factors as determinants of military spending.

To control for arbitrary heteroscedasticity and serial correlation in our estimations, we report cluster-robust standard errors at the country level (Wooldridge, 2002). This gives more reliable information on the statistical significance of variables in our models.

#### 4. Main results

Table 1 presents the country and year fixed-effects regression results, which show how *within-country* changes in the explanatory variables such as oil rents and corruption are affecting the *within-country* changes in military spending in the sample of MENA region.

In line with our theoretical expectation, the positive interaction term between oil rents and corruption is robust in its sign, size, and significance in almost all 14 Models.<sup>6</sup> The final effect of oil rents on military spending depends on the level of political and administrative corruption. At higher levels of corruption, more oil rents are channeling more significantly to military projects. The direct effect of oil rents in all models is negative on military spending but far from statistical significance. In other words, the military budget-oil nexus cannot be understood without taking the degree of corruption in government into account.

Another interesting observation in Table 1 is on the effect of corruption on military spending. The effect is positive and statistically significant in all 14 models. This is in line with earlier literature and our theoretical expectations. For example, Gupta et al. (2001) also find the similar positive effect of corruption on military in their cross country and panel data regressions for 120 countries during 1985-1998. There are many examples of bribes related to government spending on the military. According to Tanzi (1998), approximately 15% of total spending on arms are estimated to be related to payments of bribes. According to Transparency International estimations, at least US\$ 20 billion is lost to corruption in the military sector every year worldwide.<sup>7</sup> Our results can be read also as a double burden of corruption in oil rich countries of the MENA region. Not only in the MENA region more corruption leads to more spending on the military but such misallocation of government budget is higher in countries with more oil rents.

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<sup>6</sup> Except for Models 7, 9, 10 which in them statistical significance of interaction is close to 10% level.

<sup>7</sup> [https://www.transparency.org/topic/detail/defence\\_security/](https://www.transparency.org/topic/detail/defence_security/)

We have examined the robustness of our main finding (the interaction for oil and corruption) by including different set of control variables in Models 1 to 14. The changes in the sign and size of effects in Models 1-4 are not due to different sample of countries. We are using the same sample of countries in all these models.

Among control variable, we see the negative effect of economic development (real GDP per capita) on military spending. The negative effect is in line with our previous expectations that higher levels of development increase the economic perspective, employment, and investment among others. As a result of development countries experience a higher political stability, reducing the willingness to increase the size of military forces. The negative impact of income per capita on military is only statistically significant at 90% confidence intervals (CI) in Models 7, 10, and 11.

The effect of secondary education on military budget is not statistically significant. As in previous literature, we find also a highly significant and positive effect of total government spending (% of GDP) on military spending (% of GDP). Total government spending includes both military and nonmilitary categories such as education and health. The significant positive effect of government total spending (as a % of GDP) in MENA countries on military spending sheds more light on political economy of MENA governments fiscal behavior and leverage of military elites in budget allocation in this region. The negative effect of population size on military spending is robust and statistically significant. This is comparable to the rest of literature. Larger population may increase more pressure on provision of public goods such as education and health, reducing the size of military category from overall budget. The higher share of trade in GDP in the MENA countries does not show a dampening effect on military spending. The same results also are obtained when we look at the share of imports on GDP. As is shown by Farzanegan (2009), the effectiveness of trade openness on developmental outcome depends on quality of political institutions. Higher transparency and free flow of information as characteristics of a democratic regime may shed more lights on the quality of

imported goods (military vs. nonmilitary), especially in the MENA region which imports are funded mostly through oil exports. In an additional analysis (not reported in Table 1), we also controlled for interaction term between import (% of GDP) and quality of democracy institutions. As we expected, the effect of trade on military spending depends on quality of political institutions, reflected in negative interaction of imports and democracy.

Another interesting result is on negative and highly robust effect of law and order on military spending. Countries with more effective check and balance can deal with corruption effectively, reducing the potential benefits of channeling the oil rents to capital intensive military projects. Internal and external stability based on ICRG conflict indexes as well as lack of ethnical conflict show a negative effect on military spending. Their effect compared to other control variables, however, is not statistically different from zero.

The effect of democracy in the MENA region on military spending is positive and marginally statistically significant. By checking the data on ICRG democracy index for the MENA sample, we see good performing countries in this dimension are Lebanon with the score 5 out of 6 in most recent years; Israel with score of 6; significant increases for the case of Iraq; improvements in Bahrain up to the Arab Spring). Democratization over time in these and other similar countries in the MENA region may also have some negative effects on their political stability which in turn increases the necessity of spending more on their military sector.

Finally, we did not observe a significant effect from the average of bordering countries military spending on the respected country's military budget as the security web was suggesting. According to the R-squared values, Models 13 and 14 are explaining 67% of within country variation of military spending (% of GDP) in our MENA sample of countries. Note that we also use the one year lag of all explanatory variables which help to reduce the possibility of reverse feedback. It also helps to consider the time gap which requires transferring the effect of the right hand side variables on the military budget.

What is the threshold level of corruption beyond which more oil rents can lead to significant increase in military spending within the MENA region?

Table 2 shows the average marginal effects of share of oil rents in economy on the share of military spending in economy with robust standard errors. We can see that at the very low level of corruption (e.g., Israel with corruption score of 2 out of maximum 6) the final effect of increasing oil rents on military spending is even negative. This negative effect is, however, far from statistical significance. By increasing corruption, the effect of larger oil rents on military budget also increases. But this increasing effect becomes only statistically relevant when the corruption index exceeds score of 5. Which countries in the MENA samples is more likely experiencing militarization of their economies following increases in their oil revenues? Table 3 present a list of these countries in the latest year of our sample namely at the year 2014.

**Table 1.** Military spending, oil rents and corruption (country and time fixed effects OLS panel regressions). **Sample** of MENA countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dep. variable: log of military spending ( % of GDP)													
<i>oil</i>	-0.032	-0.024	-0.023	-0.024	-0.045	-0.027	-0.015	-0.014	-0.016	-0.015	-0.035	-0.040	-0.040	-0.040
	(-0.41)	(-0.37)	(-0.37)	(-0.39)	(-0.94)	(-0.49)	(-0.32)	(-0.31)	(-0.34)	(-0.33)	(-0.78)	(-0.98)	(-0.98)	(-0.98)
<i>corruption</i>	0.138	0.162*	0.158**	0.138**	0.136**	0.137**	0.117**	0.116**	0.105**	0.091*	0.084*	0.081*	0.081*	0.081*
	(1.62)	(1.89)	(2.26)	(2.27)	(2.45)	(2.32)	(2.72)	(2.75)	(2.29)	(2.07)	(1.97)	(1.86)	(1.86)	(1.86)
<i>oil*corruption</i>	0.024**	0.020*	0.020*	0.017*	0.016*	0.016*	0.012	0.012*	0.013	0.013	0.017*	0.017**	0.017**	0.017**
	(2.35)	(2.11)	(2.05)	(1.80)	(1.92)	(1.82)	(1.75)	(1.76)	(1.69)	(1.73)	(2.14)	(2.34)	(2.34)	(2.34)
<i>GDP per capita</i>	0.100	-0.159	-0.532	-0.825	-0.681	-0.799	-0.787*	-0.749	-0.740	-0.773*	-0.722*	-0.707	-0.707	-0.707
	(0.20)	(-0.32)	(-1.17)	(-1.54)	(-1.49)	(-1.56)	(-1.78)	(-1.73)	(-1.71)	(-1.82)	(-1.80)	(-1.73)	(-1.73)	(-1.73)
<i>secondary education</i>		0.509	0.314	0.208	0.078	0.091	0.081	0.083	0.078	0.059	0.104	0.118	0.118	0.118
		(1.73)	(1.42)	(0.96)	(0.44)	(0.48)	(0.40)	(0.41)	(0.38)	(0.29)	(0.67)	(0.72)	(0.72)	(0.72)
<i>government spending</i>			0.815***	0.682***	0.588***	0.437**	0.504**	0.500**	0.507**	0.529**	0.570***	0.574***	0.574***	0.574***
			(5.00)	(4.06)	(4.08)	(2.38)	(2.81)	(2.85)	(2.85)	(2.88)	(3.83)	(3.78)	(3.78)	(3.78)
<i>population</i>				-0.658*	-0.507	-0.660*	-0.755**	-0.739**	-0.717**	-0.724**	-0.678**	-0.682**	-0.682**	-0.682**
				(-1.85)	(-1.63)	(-2.04)	(-2.35)	(-2.36)	(-2.52)	(-2.56)	(-2.55)	(-2.52)	(-2.52)	(-2.52)
<i>trade openness</i>					0.500**									
					(2.57)									
<i>import openness</i>						0.346**	0.318**	0.311**	0.316**	0.291**	0.226**	0.229**	0.229**	0.229**
						(2.81)	(2.60)	(2.54)	(2.69)	(2.26)	(2.18)	(2.21)	(2.21)	(2.21)
<i>rule of law</i>							-0.102**	-0.091**	-0.089**	-0.087**	-0.104**	-0.097**	-0.097**	-0.097**
							(-2.58)	(-2.26)	(-2.21)	(-2.16)	(-2.97)	(-2.41)	(-2.41)	(-2.41)
<i>internal stability</i>								-0.009	-0.007	-0.003	-0.005	-0.007	-0.007	-0.007
								(-1.07)	(-0.82)	(-0.33)	(-0.54)	(-0.88)	(-0.88)	(-0.88)
<i>external stability</i>									-0.014	-0.012	-0.010	-0.010	-0.010	-0.010
									(-0.86)	(-0.86)	(-0.75)	(-0.79)	(-0.79)	(-0.79)
<i>lack of ethnical conflict</i>										-0.028	-0.029	-0.033	-0.033	-0.033
										(-0.93)	(-0.99)	(-0.94)	(-0.94)	(-0.94)
<i>democracy</i>											0.042*	0.042*	0.042*	0.042*

											(1.80)	(1.78)	(1.78)	(1.78)
<i>Ave. military spending of neighbors</i>												-0.045		
												(-0.39)		
<i>Ave. arms imports by neighbors</i>													-0.045	
													(-0.39)	
<i>Ave. armed force of neighbors</i>														-0.045
														(-0.39)
observations	247	247	247	247	247	247	247	247	247	247	247	247	247	247
R-sq	0.43	0.47	0.57	0.59	0.63	0.61	0.65	0.65	0.65	0.65	0.67	0.67	0.67	0.67

Robust *t-statistics* are in parentheses (clustered standard errors at country level). All independent variables are lagged by one year. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. All variables (except for ICRG indexes) are in logarithmic form. Country and time fixed effects are included in all models.

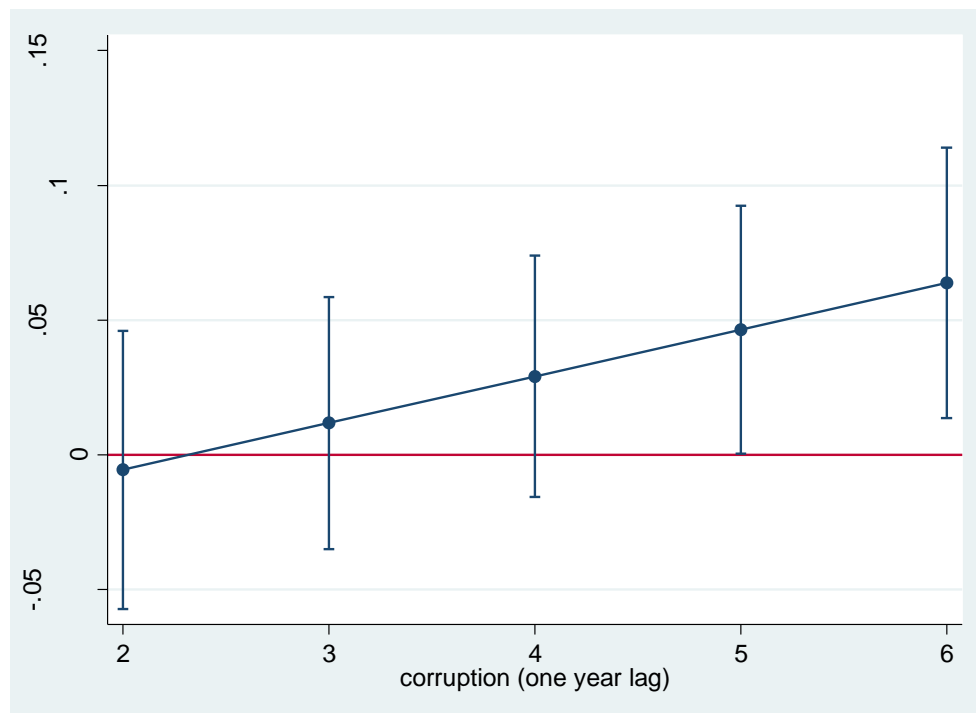


**Table 2.** Average marginal effects of oil rents on military spending at different levels of corruption (based on Model 14 in Table 1)

	$d(\text{military})/d(\text{oil in previous year})$	robust s.e.	z	p-value
<i>corruption index</i> (previous year)				
2	-0.006	0.031	-0.18	0.859
3	0.012	0.028	0.41	0.679
4	0.029	0.027	1.07	0.284
5	0.046	0.028	1.66	0.097
6	0.064	0.031	2.09	0.037

Figure 1 is a graphical presentation of Table 2. It shows the marginal effects of (the lag of) oil rents on military spending at different levels of (the lag of) corruption while reporting the 90% confidence intervals around the marginal effects. The results show that the marginal positive effects of oil rents on military spending are statistically significant at corruption level of 5 and beyond.

**Figure 1.** Marginal effects of *oil rents* (previous period) on military spending at different levels of the previous period *corruption*



**Table 3.** List of countries beyond corruption critical level in 2014 (> score of 4)

country	Corruption score (>4)	oil rents % GDP
Algeria	5	15.74
Egypt	5	5.86
Iran	5.5	19.95
Iraq	6	41.22
Jordan	4.46	0.0016
Kuwait	4.46	53.39
Lebanon	5.5	0
Libya	6	54.11
Morocco	4.96	0.003
Oman	4.46	35.27
Saudi Arabia	4.46	38.94
Syrian Arab Republic	5.54	N/A
Tunisia	4.5	3.44
Yemen	5.54	9.83

For robustness check, we use the per capita military spending instead of military spending as share of GDP and estimate the models for sample of MENA and GCC countries. The results are presented in Appendix (Tables A and B). The main results remain robust. We can also see that GCC sample follow the MENA results on moderating role of corruption in military-oil nexus qualitatively. In some general specifications, the interaction of corruption and oil is even statistically significant for GCC sample.

## **5. Conclusion**

The Middle East and North Africa (MENA) region is not only well-known for its rich oil resources but also for its worldwide records in military spending. We aim to understand the connection between oil wealth and military budget in the MENA region. We investigated how the effect of increases in oil rents on military spending may be contingent on the level of corruption in the MENA region.

To test this hypothesis, we employed panel data covering the 1984–2014 period and 15 MENA countries. Our theoretical expectation is supported by the data. The higher share of oil rents in the economy increase the share of budget to the military sector in the MENA when corruption index (of ICRG) exceeds a critical level of 5 (out of maximum 6). Some of the Gulf Cooperation oil rich countries such as Saudi Arabia, Kuwait, and Oman are close to our estimated critical level of corruption.

Our main results hold when we control for a set of internal and external determinants of military spending such as real income per capita, education, size of population, intensity of trade, share of total government spending in the economy, risk of internal and external conflicts, risk of ethnical tensions, rule of law and quality of democratic institutions. Furthermore, our main results are not biased due to omitted country and year specific factors. Our finding helps to understand better the complex association between oil rents and militarization of economies in the MENA region. Corruption and its development over time matter significantly in this nexus.

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## Appendix

**Table A.** Per capita military spending, oil rents and corruption (country and time fixed effects OLS panel regressions). **Sample** of MENA countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dep variable: log per capita military spending													
<i>oil</i>	-0.273**	-0.269**	-0.270**	-0.270**	-0.316***	-0.273***	-0.266**	-0.265**	-0.284**	-0.282**	-0.289**	-0.370***	-0.370***	-0.370***
	(-2.52)	(-2.54)	(-2.53)	(-2.67)	(-3.24)	(-2.99)	(-2.85)	(-2.86)	(-2.93)	(-2.93)	(-2.73)	(-3.05)	(-3.05)	(-3.05)
<i>corruption</i>	0.445***	0.455***	0.454***	0.416***	0.410***	0.414***	0.402***	0.402***	0.316**	0.297**	0.295**	0.229*	0.229*	0.229*
	(3.53)	(3.38)	(3.35)	(3.24)	(3.26)	(3.19)	(3.32)	(3.26)	(2.68)	(2.53)	(2.44)	(1.98)	(1.98)	(1.98)
<i>oil*corruption</i>	0.076***	0.074***	0.075***	0.069***	0.066***	0.066***	0.064***	0.065***	0.072***	0.071***	0.073**	0.083***	0.083***	0.083***
	(3.50)	(3.32)	(3.21)	(3.09)	(3.85)	(3.52)	(2.99)	(2.99)	(3.23)	(3.23)	(2.92)	(3.25)	(3.25)	(3.25)
<i>GDP per capita</i>	0.865	0.749	0.518	-0.017	0.322	0.022	0.029	0.102	0.169	0.127	0.144	0.418	0.418	0.418
	(1.03)	(0.87)	(0.57)	(-0.02)	(0.40)	(0.03)	(0.03)	(0.12)	(0.21)	(0.16)	(0.18)	(0.50)	(0.50)	(0.50)
<i>secondary education</i>		0.228	0.112	-0.087	-0.393	-0.261	-0.267	-0.262	-0.300	-0.325	-0.309	-0.067	-0.067	-0.067
		(0.39)	(0.23)	(-0.17)	(-0.88)	(-0.52)	(-0.55)	(-0.53)	(-0.64)	(-0.70)	(-0.72)	(-0.13)	(-0.13)	(-0.13)
<i>government spending</i>			0.498	0.258	0.048	-0.102	-0.063	-0.075	-0.030	-0.001	0.013	0.102	0.102	0.102
			(1.23)	(0.62)	(0.12)	(-0.23)	(-0.13)	(-0.16)	(-0.06)	(-0.00)	(0.03)	(0.22)	(0.22)	(0.22)
<i>population</i>				-1.208	-0.849	-1.209	-1.266	-1.237	-1.075	-1.084	-1.069	-1.121	-1.121	-1.121
				(-1.19)	(-0.94)	(-1.24)	(-1.32)	(-1.30)	(-1.34)	(-1.36)	(-1.36)	(-1.31)	(-1.31)	(-1.31)
<i>trade openness</i>					1.157**									
					(2.63)									
<i>import openness</i>						0.511*	0.495	0.482	0.520	0.488	0.466	0.503	0.503	0.503
						(1.77)	(1.66)	(1.58)	(1.59)	(1.39)	(1.45)	(1.56)	(1.56)	(1.56)
<i>rule of law</i>							-0.060	-0.038	-0.026	-0.023	-0.029	0.094	0.094	0.094
							(-0.48)	(-0.29)	(-0.19)	(-0.17)	(-0.22)	(0.57)	(0.57)	(0.57)
<i>internal stability</i>								-0.017	-0.002	0.002	0.002	-0.023	-0.023	-0.023
								(-0.58)	(-0.07)	(0.09)	(0.06)	(-0.95)	(-0.95)	(-0.95)
<i>external stability</i>									-0.102**	-0.100**	-0.099**	-0.098***	-0.098***	-0.098***
									(-2.44)	(-2.41)	(-2.40)	(-3.01)	(-3.01)	(-3.01)
<i>lack of ethnical conflict</i>										-0.036	-0.036	-0.095*	-0.095*	-0.095*
										(-0.59)	(-0.61)	(-1.85)	(-1.85)	(-1.85)



<i>democracy</i>											0.014	0.019	0.019	0.019
											(0.28)	(0.37)	(0.37)	(0.37)
<i>Ave. military spending of neighbors</i>												-0.777		
												(-1.66)		
<i>Ave. arms imports by neighbors</i>													-0.777	
													(-1.66)	
<i>Ave. armed force of neighbors</i>														-0.777
														(-1.66)
N	248	248	248	248	248	248	248	248	248	248	248	248	248	248
R-sq	0.74	0.74	0.75	0.76	0.78	0.76	0.76	0.77	0.77	0.78	0.78	0.80	0.80	0.80

Robust *t-statistics* are in parentheses (clustered standard errors at country level). All independent variables are lagged by one year. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. All variables (except for ICRG indexes) are in logarithmic form. Country and time fixed effects are included in all models.

**Table B.** Per capita military spending, oil rents and corruption (country and time fixed effects OLS panel regressions). **Sample** of GCC countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Dep. Variable: log per capita military spending													
<i>oil</i>	-0.631 (-1.51)	-0.632 (-1.29)	-0.441 (-1.05)	-0.721*** (-14.53)	-0.662** (-2.98)	-0.724*** (-12.10)	-0.727*** (-12.15)	-0.722*** (-12.12)	-0.654*** (-5.43)	-0.660*** (-6.63)	-0.876*** (-7.20)	-0.836*** (-8.97)	-0.836*** (-8.97)	-0.836*** (-8.97)
<i>corruption</i>	0.022 (0.13)	0.140 (0.77)	0.142 (1.10)	0.116** (3.39)	0.123** (3.54)	0.109* (2.72)	0.106** (2.91)	0.114* (2.45)	0.124** (2.95)	0.122* (2.62)	-0.033 (-0.31)	-0.060 (-0.43)	-0.060 (-0.43)	-0.060 (-0.43)
<i>oil*corruption</i>	0.099 (1.25)	0.045 (0.58)	0.046 (0.76)	0.031 (1.78)	0.032 (1.78)	0.031 (1.75)	0.032 (1.81)	0.032 (1.66)	0.026 (1.75)	0.026 (1.66)	0.077* (2.45)	0.084* (2.30)	0.084* (2.30)	0.084* (2.30)
<i>GDP per capita</i>	1.450** (3.19)	0.961 (1.97)	1.512*** (5.09)	1.026*** (6.63)	1.026*** (6.61)	1.027*** (6.82)	1.036*** (7.46)	1.038*** (8.15)	1.073*** (6.20)	1.070*** (6.72)	1.123*** (7.24)	1.224*** (4.78)	1.224*** (4.78)	1.224*** (4.78)
<i>secondary education</i>		0.701 (1.94)	0.191 (0.90)	0.120 (1.01)	0.156 (1.12)	0.093 (0.70)	0.086 (0.71)	0.104 (0.72)	0.076 (0.41)	0.064 (0.26)	0.020 (0.10)	-0.114 (-0.30)	-0.114 (-0.30)	-0.114 (-0.30)
<i>government spending</i>			1.068** (3.07)	0.916** (4.31)	0.965** (3.47)	0.873* (2.32)	0.886 (2.13)	0.926 (1.92)	0.900 (1.93)	0.896 (1.85)	0.850 (1.67)	0.806 (1.50)	0.806 (1.50)	0.806 (1.50)
<i>population</i>				-0.800*** (-6.30)	-0.787*** (-5.95)	-0.806*** (-6.45)	-0.817*** (-4.80)	-0.836** (-4.48)	-0.833** (-4.20)	-0.837*** (-4.69)	-0.830*** (-5.03)	-0.796** (-4.22)	-0.796** (-4.22)	-0.796** (-4.22)
<i>trade openness</i>					-0.153 (-0.33)									
<i>import openness</i>						0.054 (0.22)	0.055 (0.22)	0.014 (0.05)	0.010 (0.03)	0.011 (0.03)	0.000 (0.00)	0.010 (0.03)	0.010 (0.03)	0.010 (0.03)
<i>rule of law</i>							-0.011 (-0.24)	-0.040 (-0.44)	-0.044 (-0.46)	-0.043 (-0.43)	-0.004 (-0.03)	0.007 (0.06)	0.007 (0.06)	0.007 (0.06)
<i>internal stability</i>								0.011 (0.60)	0.017 (0.84)	0.020 (0.63)	0.011 (0.37)	0.021 (0.68)	0.021 (0.68)	0.021 (0.68)
<i>external stability</i>									-0.017 (-0.68)	-0.017 (-0.63)	-0.024 (-0.76)	-0.026 (-0.76)	-0.026 (-0.76)	-0.026 (-0.76)
<i>lack of ethical conflict</i>										-0.012 (-0.15)	-0.094 (-0.94)	-0.134 (-1.06)	-0.134 (-1.06)	-0.134 (-1.06)
<i>democracy</i>											0.077 (1.82)	0.079 (1.85)	0.079 (1.85)	0.079 (1.85)
<i>Ave. military spending of neighbors</i>												0.314 (0.69)		
<i>Ave. arms imports by neighbors</i>													0.314 (0.69)	
<i>Ave. armed force of neighbors</i>														0.314 (0.69)
Obs.	72	72	72	72	72	72	72	72	72	72	72	72	72	72
R-sq.	0.70	0.77	0.85	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90