

Corruption Effect on Persian Gulf Countries' Environmental Policy

Maryam Asghari*

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Abstract

Environmental regulation has proceeded at different paces in different countries of the world. These differences are particularly pronounced between developing countries, and have given rise to much controversy and debate on the influence of corruption on environmental policies in an open economy (see, e.g., López and Mitra 2000; Fredriksson et al. 2004; Barbier et al. 2005).¹ The causes and effects of corruption have been discussed extensively in the literature (see, e.g., the surveys by Bardhan 1997; Jain 2001; Aidt 2003). We explore the joint effects of corruption level and energy efficiency (a major form of environmental policy). The paper discusses the prescription of Persian Gulf countries' environmental regulations over 1990-2012. We find that corruption level is the most important factor in explaining the variance in the region environmental policies and higher levels of the region corruption will lead to low stringent environmental policy.

Keywords: Corruption, Environmental Policy, Persian Gulf Region.

1- Introduction

Environment, as conceptualized in this discourse implies “the surrounding conditions that affect people and other organisms” (Adeyemo, 2008). Bothering about the environment cannot be helped. This is because the environment is the home of man and he depends on it for sustenance of his livelihood, thus “protection of the environment is also seen as an

* Assistant Professor at Shahid Ashrafi Esfahani University, Esfahan, Iran.

1- López and Mitra (2000) develop a theory of the effects of corruption on the shape of the environmental Kuznets curve, and Fredriksson et al. (2004) explore the interaction effects of corruption and industry sector size (lobby group organization costs) on energy policy outcomes. Barbier et al. (2005) examine the effect of corruption and trade policy on deforestation. None of these papers incorporate multiple government political units or federalism into the analysis, however.

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essential part of development.” (Salau, 1993: 425). On this premise, there arises the need for the protection of the environment. One of the means of protecting the environment is through the promulgation of the environmental policies, which “at governmental, institutional or corporate levels is concerned with protecting human health, natural resources, restoration and preservation of the environment” (Adeyemo, 2008).

It seems there is no hard and fast rule that a certain level of development will be associated with a certain level of pollution. Much depends on the environmental policies countries pursue. Indeed, many developing countries appear to have found that the benefits of pollution control outweigh the costs and are adopting innovative, low-cost strategies to limit pollution while also expanding economic growth. The developing countries may be able to achieve high levels of economic growth and high levels of environmental performance long before they reach the income levels of the industrialized countries. This is not to say that there are no tradeoffs between growth and the environment. Even with good environmental policies and clean technologies, continued increases in output may tend to increase the total volumes of various kinds of pollutants in many cases. Every society has to decide for itself on the relative value it places on economic output and the environment. The point about international openness, though, is that in general it appears to make this tradeoff less painful for developing countries, allowing more environmental protection for the same amount of growth, or more growth for the same amount of environmental protection.

Moreover, openness to trade and investment can provide developing countries with both the incentive to adopt, and the access to, new technologies, which may provide a cleaner or greener way of producing the good concerned. For example, much foreign investment is for export markets. The quality requirements in those markets encourage use of the latest technology, which is typically cleaner than old technologies.

Also, increased international competition for investment will cause countries to lower environmental regulations (or to retain poor ones), a "race to the bottom" in environmental standards as countries fight to attract foreign capital and keep domestic investment at home.

Corruption is a widespread phenomenon affecting all societies to different degrees, at different times. As corruption scandals have repeatedly shown, bribes are common in all countries notwithstanding differences in

income levels and law systems, as they are common in democracies and in dictatorships. Still, different countries are marked by large differences to the extent of corruption. In some societies, no transaction is finalized without corruption having an effect, while in other countries it is considered an exception and rarely tolerated.

In every instance in which the public interest is filtered by policy makers and bureaucrats (i.e. in any case of market failure correction), corruption is potentially an issue and environmental policy falls in this category. Therefore, the influence of corruption on the environmental regulatory systems deserves scrutiny. In the environmental sphere, political corruption can limit the scope of the state's intervention to solve environmental problems, and bureaucratic corruption can limit the implementation of environmental policies (e.g. Damania, 2002).

A strand of literature deals with the design and implementation of environmental policies when corruption is present. For example forestry policies in many developing countries are affected by the corruption of agents in charge of implementation coupled with the hierarchy of enforcers and controllers (e.g. Pellegrini, 2007). Corruption can evolve in an institutional system where rights – in the management and distribution of benefits of natural resources – have to be surrendered in exchange for gifts, and the poor are penalised (e.g. Robbins, 2000:440).

The environmental effects of corruption are investigated by Lopez and Mitra (2000) argued, in a theoretical paper, that corruption and environmental policy stringency are characterised by a monotonic (negative) relationship. They present a game theoretic model where the government has two objectives: to be re-elected and remain in power, and to receive direct transfers from lobby groups. Income transfers from lobby groups to the government are interpreted as a measure for the level of corruption. The model defines a Nash equilibrium game and a non-cooperative Stackelberg game with the representative firm as a leader and the authors show that an increased sensitivity of the bureaucracy to bribes both increases the level of corruption and lowers the level of environmental protection. When possible, firms will bribe the government to tolerate overexploitation of the natural resource. Fredriksson and Millimet (2001) elaborate on this result, but claim that there is a non-monotonic correlation between corruption levels and environmental protection. In their model, an increase in the number of

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corrupt bureaucrats leads to a decrease in the income transfer per bribe. After a certain threshold of corruption, proxied by the number of corrupt bureaucrats, a further increase in the number of bribes is more than offset by a decrease in the effectiveness per bribe.¹ Damania (2002) shows that environmental regulations are ineffective if bureaucrats are highly corrupt. He makes the case for complete deregulation if there is no possibility to reduce corruption. Fredriksson and Svensson (2003) present a theoretical model where environmental policy-making is influenced by political instability and corruption. In the model, political instability is interpreted as the replacement rate for the government administration in power.

Political instability makes it less effective for polluting industries to bribe the administration, and thus increases the stringency of environmental policies. Specifically, the model predicts that whereas, in general, corruption tends to decrease the stringency of environmental policies, its effect decreases with increasing political instability. The authors present econometric evidence supporting their predictions, based on the corruption proxy from the International Country Risk Guide (ICRG).² They also include a democracy dummy in most regressions, but as democracy does not enter the authors' model, they do not discuss its coefficients. It must be noted that, in most of their regressions, the sign of the democracy variable is negative and significant (at 10% level).³

Welsch (2004) estimates the direct and indirect effects of corruption in an EKC framework. The author argues that corruption affects environmental

1 - Fredriksson and Millimet support their finding with econometric data at state level for the USA, using as a proxy for corruption the number of civil servants tried for crimes related to bribery as a share of the total number of public employees. Such a proxy has the obvious shortcoming that it can reflect judicial efficiency.

Furthermore, trials are held only after some time following crimes, so there is a considerable time lag between the moment when the corruption related crime is committed and its relevance in the index. Judiciary initiatives can be a symptom of anticorruption campaigns rather than corruption itself.

2 - The ICRG index, which has been used extensively in the empirical literature (beginning with Knack and Keefer, 1995 who used it in an analysis of institutions on economic performance), measures political risk associated with corruption, rather than corruption itself. As such, the proxy for corruption chosen by the authors seems to be very much causally related to the other independent variable they use for political instability (see Lambsdorff, 1999).

3 - The authors do not produce a robustness analysis of the finding and their measure of democracy is from the Freedom House. This measure of democracy have been criticised because of opacity and ideological bias.

quality because it hinders the formation and enforcement of environmental regulations (direct effect). Furthermore, corruption has an additional effect on the environment because it decreases economic growth. Thus, corruption would have a further impact because income levels affect environmental quality (indirect effect). The indirect effect of corruption can be either positive or negative, depending on income levels (in line with the EKC hypothesis). The total effect of corruption on environmental quality, according to the estimates of the author, is always negative.

Finally, Wilson and Damania (2005) present a theoretical model that takes into account political competition for the electorate's votes, corruption, and environmental policy. The authors show that political competition (a fundamental component of democracy) increases the costs of setting up suboptimal environmental policies (i.e. the incumbent party would lose votes). It follows that political competition enhances the stringency of environmental policy. But the authors also notice that one has to differentiate between grand and petty corruption, where the former is linked to policy making, and the latter to policy implementation. Since bureaucrats' sensitivity to petty corruption is independent of political competition, corruption may still negatively affect the implementation of environmental rules not with standing high political competition.

Apart from its focus on the influence of corruption on environmental problems and solutions to them, the literature examines how natural resource abundant countries are characterised by higher corruption levels. Some authors suggest that the abundance of natural resources leads to engagement in rent-seeking and detracts resources from productive activities. Corruption is one of the tools used to appropriate rents (e.g. Leite and Weidmann, 1999).

Therefore, this paper examines the relation between corruption level and environmental policy over the period from 1990 through 2012 with special reference to Persian Gulf selected countries: Bahrain, Iran, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Jordan, and Yemen.

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2- Corruption and its Causes

Corruption is a complex and multifaceted phenomenon with multiple causes and effects, as it takes on various forms and functions in different contexts. The phenomenon of corruption ranges from the single act of a payment contradicted by law to an endemic malfunction of a political and economic system. The problem of corruption has been seen either as a structural problem of politics or economics, or as a cultural and individual moral problem.

Theories of the determinants of corruption (and more generally of the quality of government) abound. We will take as a starting point the theories on the sources of corruption that are mentioned in some studies are considered a benchmark in the literature and they provided a powerful battery of empirical tests.

2-1- Natural resources

The rent-seeking literature emphasizes the link between corruption and possibilities for economic agents to gain access to sources of higher-than-average rents, when state intervention prevents free entry (see Rose-Ackerman, 1999). In this perspective, the fight against corruption is helped with a reduction of non-generic state regulation. Thus, corruption would be associated to the size of government activities (Chafuen and Guzmán, 1999; Acemoglu and Verdier, 2000). On a similar train of thought, increasing supply of foreign products on the domestic market enhances competition, thereby reducing rents and corruption.

Natural resources are a common source of high rents, available to those that have obtained the rights for their exploration and extraction. These rents promote activities aiming at influencing policymakers who have power on the distribution of exploitation rights, drawing away resources from other productive activities (Leite and Weidmann, 1999). Thus abundance of natural resources would be associated to higher corruption, though we cannot take this effect for granted since revenues from natural resources could also be used in order to increase the availability of state-provided goods, decreasing the need to revert to bribing in order to access them.

Ades and Di Tella (1999) and Leite and Weidemann (1999) argue that abundance of natural resources creates opportunities for rent-seeking behavior, and gives rise to corruption. Both studies measure the first variable

as a country's exports of fuels and minerals as a share of GNP. Throughout various specifications this variable is found to significantly increase the level of corruption. These results are robust to the inclusion of various explanatory variables, different samples of countries and the use of different indicators of corruption. A similar finding is reported by Kunicova (2002). Montinola and Jackman (2002) argue similarly, but employ a dummy variable for OPEC member states instead, which relates to abundance of oil.

This variable also significantly increases a country's level of corruption. Another study by Gylfason (2001) argues that the abundance of natural resources can be measured by the proportion of the labor force employed in primary production. He reports a positive association of this proxy with corruption, controlling for income per head.

2-2- Wages level

Apart from the duration of a job in the administration, the wages may also affect the vulnerability to corruption. Higher wages imply higher costs when a position in the civil service is lost, and a cost-benefit analysis suggests that higher wages thereby provide an incentive to restrain from corruption (Becker, 1968; Treisman, 2000). Furthermore, at higher income levels additional income – obtained through corruption – could be less tempting because of decreasing marginal utility of income (see also Schulze and Frank, 2003).

To what extent the level of public sector salaries is linked to the amount of corruption was examined by van Rijckeghem and Weder (2001). They argue that low salaries force public servants to supplement their incomes illicitly. At the same time, high salaries are a premium that is lost if a public servant is caught and fired. In a small sample of 31 developing countries, they find a significant negative influence of civil service wages relative to manufacturing wages on the level of corruption. Doubling the civil service wage will improve the corruption index by the order of 1 point of the TI index. However, they employ the corruption data by PRS, bringing about our repeated concern. The authors also point out that the association may be driven by reverse causality: Corrupt countries tend to have a poor budgetary

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performance or may subscribe to the view that civil servants earn sufficient income from corruption, and may reduce civil service pay as a consequence. Such endogeneity problems diminish the prospects of fighting against corruption by increasing wages. Even disregarding these issues, it becomes apparent that pay increases turn out to be a costly approach to fight corruption.

2-3- Population

Some authors observe a positive correlation between corruption and a country's size, measured by total population, (Root 1999; Fisman and Gatti 2002; Treisman 1999). These correlations are robust to the inclusion of further variables. This might be taken as an indicator in favor of decentralization. Smaller countries might be in a better position to establish a decent administration and to monitor their politicians. Using the results from a cross-section of countries might be taken as an indicator that decentralizing government power could be a means to curb corruption. But Knack and Azfar (2003) provide a clear warning against these findings. They show that the correlation between corruption and population size results from sample selection problems. Ratings on corruption are only provided for those countries in which multinational investors have sufficient interest. These tend to be large nations and among the small nations only those which are well governed. Knack and Azfar (2003) conduct regressions for larger samples of countries and observe that the relation between corruption and population disappears.

2-4- Government Size

Government involvement in private markets is commonly seen as a source of corruption. This impact appears almost tautological: the misuse of public power will increase with the extent of public power. Such a tautological correlation would be obtained if the Corruption Perceptions Index is distorted towards countries with a large government share, assessing more corruption in countries with a larger public sector. With large governments, bribes to public servants might increase relative to firms' revenues. This might induce respondents to surveys on corruption to assess higher levels of corruption in countries with a larger public sector. It has thus been suggested that the overall size of the government budget relative to

GDP may be positively correlated with levels of corruption. This is shown by La Palombara (1994: 338) who used a sample of countries in which Scandinavian countries were disregarded by assuming them to be an exception.

Increasing government size enhances the discretionary power of government by enlarging the social resource that it controls. La Palombara (1994) used a sample of countries excluding Scandinavian countries to show that the size of the government budget relative to GDP is positively correlated with levels of corruption. La Porta et al. (1999) also found empirically a positive relationship between the government transfers and subsidies and corruption. However, using the index of state interference from the *World Competitiveness Report*, Treisman (2000) could not find any solid evidence that greater state intervention is related to higher corruption.

2-5- Democracy

Another strand of the literature considers the relation between political institutions and corruption, starting with democracy. A negative correlation between democracy and corruption is tautological when based on a substantial definition of democracy, since corruption favours the interests of the individual, or a minority, as opposed to the interests of the majority. Once we consider democracy from a procedural perspective (free elections and electoral competitions) the association is less straightforward. Most indexes of democracy are based on the procedural aspects of democracy, and previous empirical studies have found contrasting results. Many papers that focus on democracy and employ few control variables find contemporary democracy to decrease corruption levels (e.g. Chowdhury, 2004 and Bohara, Mitchell *et al.*, 2004), while more comprehensive studies do not find such a correlation (Treisman, 2000).

The impact of the Gastil index (Freedom House) for political rights, i.e. democracy, on corruption is tested by Paldam (2002). While the correlation between these variables is large, in multivariate regressions this relationship breaks down as soon as GDP per head enters into the equation. Similar results are reported by many others, (Sandholtz and Koetzle, 2000; Goldsmith 1999; Persson, Tabellini and Trebbi, 2003). But Treisman (2000) finds a significant impact for a selection of 64 countries, including only those countries which have been democracies without interruption since

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1950. He argues that while the current degree of democracy is not significant, a long period of exposure to democracy lowers corruption.

2-6- Income Level

Higher level of income accelerates the spread of education and democratic institutions and therefore enhances individuals' political involvement. It consequently enables private individuals to better identify corrupt behaviour and to punish the malfeasance of officials. As a result, regions with richer and more educated citizens are assumed to be less corrupt. According to Treisman (2007), the negative relationship between the incidence of corruption and the income level is the strongest and most consistent finding of the empirical studies on corruption (see, e.g., La Porta et al., 1999; Ades and Di Tella, 1999 and Treisman, 2000).

2-7- Trade Openness

Another source of economic rent is the lack of competition. Economic rents will decrease with intensive competition in economic activities. Government restrictions on economic freedom are likely to reduce competition and thus encourage corruption. Henderson (1999) argues that corruption is negatively correlated with different indicators of economic freedom. This result is largely supported by Goldsmith (1999) for a sample of 66 countries, where the regression is controlled for GDP per head and by Paldam (2002) in multivariate regressions that include further explanatory variables for a sample of 77 countries. Such arguments, however, might be tautological. The Heritage Foundation's Economic Freedom measure, e.g., includes an assessment of corruption. This implies that a measure of the dependent variable is placed on the independent variable side of the equation, (Sandholtz and Gray 2003).

As an alternative indicator of competition Ades and Di Tella (1995, 1997 and 1999) suggest a country's openness. The authors argue that openness, defined as the ratio of import to GDP, is negatively associated with corruption. They apply corruption data from BI (in cross-section of 55 countries) and IMD (in cross-section of 32 countries). With both approaches the results are robust to the inclusion of further explanatory variables. The authors conclude that economic competition as measured by the degree of a country's openness reduces corruption. A similar finding is reported by Sung

and Chu (2003) and Gerring and Thacker (2005). Treisman (2000) also provided evidence that the share of imports in GDP is negatively associated with the corruption level. Recently, Gerring and Thacker (2005) find a similar relationship between trade openness and corruption. However, Treisman (2000) did not find significant evidence for such an impact using the TI index.

Apart from the mixed evidence, the ratio of import to GDP is a distorted indicator of competitive pressure. This variable depends to a large extent on the size of a country, measured for example by its total population. This is because large countries can compensate for a low ratio of import to GDP by more competition within their own country. The usefulness of this variable has, therefore, been put in question. Wei (2000a) provides an approach to disentangle the various facets by which openness affects corruption. He determines a measure of "natural openness" as the extent of openness which is caused by a country's total population and its remoteness from world trading centers. Both these measures tend to lower a country's openness, the former because large countries tend to trade less with the outside world, and the latter because transport costs make foreign trade less attractive. These indicators are independent of a country's trade regime, and thus exogenous to a regression. He finds that natural openness significantly lowers a country's level of corruption, pointing to the helpful role of competition in reducing corruption.¹² The residual openness (i.e. that part which is not explained by country size and geography) is a measure of a country's trade regime and its policy decision in favor of global competition. Yet, Wei does not find a significant impact of this variable, casting doubt on trade policy as a cause of corruption.

2-8- Press Freedom

In addition, press freedom plays an important role in detecting corruption as independent journalists have incentives to investigate whether there is corruption. As a particular mechanism of external control, press freedom appears to reduce corruption. Firms and individuals can reveal the corrupt behaviour to a journalist and the possibility of a media report increases the costs for bureaucrats to be corrupt (The probability of being detected increases). In other words, the media can be seen as a platform for voicing complaints (Brunetti and Weder, 2003).

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By regressing various indices of corruption on indicators of press freedom, Brunetti and Weder (2003) show that a free press effectively deters corruption. The latter variables consist of "laws and regulations that influence media content", "political influence over media content", "economic influence over media content" and "repressive actions" as compiled by Freedom House. These four separate indices and an aggregate index of press freedom all impact negatively on the level of corruption in various specifications. This negative association between freedom of the press and corruption is also confirmed by Lederman, Loayza and Reis Soares (2001). Also Sung (2002) reports this result, albeit missing to control for income per head. A free press appears to be a solid deterrent to corruption. However, the corruption index used in both studies has been that of PRS. But, Brunetti and Weder (2003) corroborate their findings also by using alternative indicators, providing us with some more confidence with respect to their findings. Corrupt authoritarian regimes may restrict press freedom, suggesting that part of the causality may run the other way. Nevertheless, Brunetti and Weder (2003) show that their findings survive the use of instruments, claiming that a good share of the causality runs from a free press to less corruption. Adsera, Boix and Payne (2000) employ data on daily average newspapers per person. These figures vary from 0.7 daily copies per person in Hong Kong to 0 in Mauritania. They show that the amount of newspapers per person is negatively associated with corruption. This equally suggests that a successful media is a strong impediment to corrupt politics by making it difficult for elites to get away with corrupt behavior.

2-9- Gender

The impact of gender on corruption has been investigated recently by Swamy et al. (2001) Dollar et al. (2001). The authors determine the percentage of women in the labor force and in parliament. Both indicators negatively impact on the level of corruption in a cross-section of up to 66 countries. The influence is large in magnitude, highly significant and robust throughout a large variety of regressions, controlling for various variables. These findings are in line with some micro-evidence reported by Swamy et al., and suggest that policies designed to increase the role of women may

help lower the level of corruption. Similar results are reported by Sung and Chu (2003).

3- Trade, Foreign Investment and Environmental Policy

Could globalization trigger an environmental "race to the bottom," in which competition for investment and jobs relentlessly degrades environmental standards? In the race-to the bottom world, decent environmental standards impose high costs on polluters in high income economies. To remain competitive, these firms relocate to low-income countries whose people are desperate for jobs and income. Local governments ignore regulation to promote investment and economic growth, allowing businesses to minimize costs by polluting with impunity. Driven by shareholders to maximize profits, international firms follow suit. Rising capital outflows force governments in high-income countries to begin relaxing environmental standards, but this proves fruitless because the poorest countries have no environmental standards at all (pollution haven hypothesis). As the ensuing "race to the bottom" accelerates, all countries converge to the hellish pollution levels that afflict the poorest.

The establishment of an additional foreign plant (given the number of domestic firms) has two main effects on local environmental policymaking. First, foreign direct investment leads to a greater output level produced for the local market. Thus, more is at stake in the policy outcome because the tax applies to a greater output level. This increases the size of the bribe offered by the foreign lobby for a lower pollution tax. This "bribery effect" of foreign investment leads to a lower pollution tax. Second, in an imperfectly competitive market, the government has an incentive to lower the pollution tax below the first-best level (equal to marginal damage) in order to stimulate output and raise consumer surplus (see Katsoulacos and Xepapadeas, 1995). An increase in the number of firms increases the level of competition and therefore reduces the government's incentive to lower the pollution tax. This "welfare effect" of foreign direct investment leads to a higher pollution tax.

The net effect of an additional foreign subsidiary is conditional on the government's weight on the "bribery effect" relative to the "welfare effect", i.e. the degree of corruptibility. We find that foreign direct investment and trade raise (reduce) local environmental policy stringency when the degree

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of government corruptibility is relatively low (high). Thus, when the degree of corruptibility is relatively high, foreign direct investment and trade may create pollution havens (i.e., increase pollution levels). However, when corruptibility is low, it may result in a decline of the pollution damage, despite an increase in total output produced and sold in the domestic economy.

The empirical analysis lends support to these theoretical predictions. For example, Cole et al. (2004) using a panel of 33 developed and developing countries for the years 1982-1992, they find that inward FDI has a positive impact on the stringency of environmental regulations when the level of corruptibility is low. At higher levels of corruptibility this impact is lessened and eventually becomes negative. This is consistent with the “bribery effect” dominating (being dominated by) the “welfare effect” of FDI for high (low) levels of corruptibility. The sensitivity analysis reveals that their empirical findings are robust across a range of different specifications.

4- The Model

The corruption causes are becoming an environmental policy challenge for Persian Gulf countries. This article suggests the Persian Gulf countries needs to elaborate and apply an effective strategy to meet and overcome this challenge.

We have also account for the *efficiency of energy consumption*. Increasing energy efficiency means a better use of energy. For a given level of production, progress in energy efficiency may have a decreasing effect on pollution. The efficiency is measured as energy use per unit of GDP.

We measure environmental policy stringency implicitly through its consequences for energy use. Our dependent variable, *EP*, defined as aggregated physical energy units per unit of GDP (tons of oil-equivalent per dollar), identifies the effect of environmental as well as energy policy. Energy consumption, and the consumption of fossil fuels in particular, has been a focus of both energy and environmental policies over the last few decades in the countries we study.¹

1- By restricting energy use per unit of output, e.g. by using performance standards, countries aim to make their economies less dependent on fossil fuels, and to internalize several air pollution externalities directly related to fossil fuel combustion, including smog, acid rain

The influence of corruption on environmental policies is taken for granted a question arises on the implications for policy prescriptions. The environment is a normal (or even a luxurious good) and the willingness to pay for it increases with income. We can derive that each country should be able to adjust its own environmental policies to its income levels, and to the preference for environmental protection of the polity in order to obtain the socially optimal level of environmental protection.

When trade and investment liberalization combined with innovative formal and informal domestic regulation, they can instead help to rise rather than lower environmental standards. Rising incomes increase the ability and willingness of countries to protect their environments. Openness to foreign trade and investment can improve access to new, cleaner technologies and sharpen the incentives to adopt them to remain competitive. Economic openness can be combined with reforms that directly address environmental objectives, such as removing subsidies for environmentally harmful activities, creating local environmental institutions to monitor and protect sensitive sectors, and introducing innovative and cost-effective approaches to formal environmental regulation, such as tradable pollution permits and other market-based mechanisms. These formal regulations can be accompanied by informal regulatory mechanisms such as the publication of easily understood information on pollution and its impact, together with education of local communities about environmental problems.

We estimate a system of simultaneous equations, in which environmental policy and corruption level are endogenously determined by country-specific characteristics. This system approach takes into account the endogeneity of corruption level.

Our hypothesis explaining the relationship between corruption level and environmental policy, based on a review of the theoretical and empirical

(SO₂ and NO_x), and climate change (CO₂) (see Helfand 1992). Restrictions on energy related emissions have an impact on energy use by raising the cost of using these inputs. See Joskow (2002) on the importance of energy efficiency measures as an indirect way to implement environmental policy and for an overview of U.S. energy policy.

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literature and on the ideas we presented above in our theory section, are represented by the equation below:

$$F(EP, Corr) = G(PI, FDI, OP, Corr, FDI \times Corr, OP \times Corr)$$

To conserve notation we suppress time and country subscripts in describing the model. We assume that measure of the degree of corruptibility and environmental policy are joint products, produced by country-specific factors: per capita income (PI), foreign direct investment (FDI), trade openness (OP); that is, the ratio of imports+exports to GDP, interaction between corruption level and FDI and trade openness.

Our measure of corruptibility is the 'Transparency International *Corruption Perception Index*' variable reported by the Internet Center for Corruption Research. Transparency International Corruption Perception Index tracks and measures perceived levels of public sector corruption in countries and territories around the world.

We invert the relation $F()=G()$ to obtain the corruption level function: $Corr = f(OGP, W, P, GZ, DE, IL, OP, PF, GE)$, which represents the relation between corruption level and its causes: Oil and Gas exportation as a share GNP (OGP), Wages level (W), Population (P), size of the government budget relative to GDP as Government Size index (GZ), the Gastil index as Democracy index (DE), Income Level (IL), the share of (exports+imports) in GDP as Trade Openness variable (OP), the amount of newspaper per person as Press Freedom index (PF), the percentage of women in the labor force and parliament as Gender variable (GE).

We estimate a two-equation system using 1990–2012 panel data and fixed and random effects for Persian Gulf selected countries: Bahrain, Iran, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, Jordan, and Yemen. Data are obtained from the World Bank's 2013 World Development Indicators' (WDI's) CD-Rom and on-line WDI 2013 (<http://publications.worldbank.org/wdi>) and Undata, Freedom House and Internet Center for Corruption Research sites. All results are discussed in Table 2.

A Hausman specification test indicated that the effects are correlated with the independent variables implying that the random effects results are inconsistent. For this reason, as well as for space considerations, but we report the random effects results. A DWH test indicates that OLS yields inconsistent estimates. Thus, our focus will be on the IV results.

A Sargan test of over-identifying restrictions fails to reject the null that our IV equations are properly specified for the FE results. This would suggest that our instruments are valid.

Before we proceed with panel regression we test for the stationarity status of all variables. Therefore, we make the unit root test of Levin, Lin & Chu and Im, Pesaran & Shin W-stat to test for it. The results show that all variables are stationarity at level (Table 1).

Table 1: Variables Stationarity Tests in Region

Variables	Levin, Lin & Chu- Test		Im, Pesaran and Shin W-stat -Test	
	Statistic	Prob	Statistic	Prob
EP _{it}	3.36672	0.0000	4.84604	0.0000
Corr _{it}	-3.84767	0.0000	-4.20259	0.0001
IP _{it}	-4.76166	0.0000	-5.38136	0.0000
OP _{it}	-1.70375	0.0042	-9.23834	0.0001
FDI _{it}	3.95384	0.0000	3.84562	0.0000
FDI _{it} × Corr _{it}	-3.09564	0.0000	-3.37530	0.0000
OP _{it} × Corr _{it}	5.96677	0.0000	5.43564	0.0001
OGP _{it}	-3.76847	0.0001	-3.94342	0.0000
W _{it}	2.66335	0.0000	4.02245	0.0000
P _{it}	-5.33756	0.0000	-5.22526	0.0000
GZ _{it}	2.80451	0.0001	-2.69354	0.0000
DE _{it}	-3.28537	0.0000	4.56879	0.0001
IL _{it}	4.10562	0.0000	4.38320	0.0000
PF _{it}	3.95621	0.0001	3.56334	0.0001
GE _{it}	-5.58872	0.0000	-5.64345	0.0000

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TABLE 2: The Determinants of Environmental Policy

Variables	Random Effect		Fixed Effect(1)	
C	18.7082**	(2.60)	19.1569***	(3.33)
Corr it	2.1579*	(2.41)	3.1522*	(3.99)
IPit	-1.1373*	(-2.33)	-2.13913*	(-7.59)
FDlit	-1.4885*	(-0.18)	-1.4885*	(-2.18)
FDlit ×Corrit	5.08846**	(-2.09)	3.7456*	(5.26)
OP it	-2.5768* *	(-1.22)	-3.57968* *	(-2.38)
OPit ×Corrit	3.57960*	(3.02)	2.4372*	(6.24)
R2	0.6735		0.8191	
Groups	10		10	
Number of observation	230		230	
Time periods	23		23	
Sargan Test			0.73	
Prob> chi2			0.62	
Hausman Test (2)			10.67	
Prob> chi2			0.0000	

Note: T-statistics are shown in parentheses. Significance at the 99%, 95% and 90% confidence levels are indicated by *, ** and ***, respectively.

The robust standard errors are White's heteroskedasticity-corrected standard errors.

(1) The acceptance of model by the Hausman test.

(2) The Hausman test tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. If they are (insignificant P-value, Prob>chi2 larger than .05) then it is safe to use random effects. If you get a significant P-value, however, you should use fixed effects.

All coefficients of the variables are significant. The income variable has a statistically significant coefficient and a one standard deviation in the value of the income variable is associated with an increase of the environmental policy index (energy efficiency) by more than 2 standard deviations.

Income level is one of the principal factors affecting a country's environmental policy. The poor countries may put a higher priority on the benefits of production (such as higher employment and income) relative to the benefits of environmental quality than wealthy countries. As income levels increase, however, demand for environmental quality also rises.

The firm's willingness to reduce pollution depends on the costs it incurs to reduce pollution by, for example, changing to a more costly production or waste-disposal method, and the benefits it receives from polluting. These benefits are directly related to the costs it incurs from using a more costly

production or waste-disposal method. The amount of pollution agreed upon will be such that the added benefits to the town of a further reduction in pollution are less than the added costs to the firm of the further reduction.

The relationship between corruption level and energy efficiency is negative. In the presence of corruption, the environmental standard is chosen by a corrupt bureaucrat. Bribing the bureaucrat becomes a public good in the view of firm shareholders, since lower environmental standards imply higher profits. In this context, an increase in wealth inequality reduces the free rider problem among shareholders and reduces the environmental standard. In this case, a higher level of corruption should reduce the quality of environmental regulation.

The countries with high corruption, through non-transparent processes, highly specialized abatement polices and/or investment in high technology renewable energy, as a means of increasing the rent seeking rate associated with them. As a result, corrupt countries often face a lower environmental quality due to reduced overall tax revenue that leads to reduced public spending on environmental production.

We therefore expect the estimated coefficient on FDI to be negative, while the coefficients on $FDI \times Corr$ is expected to be positive. Because, foreign direct investment adopts energy efficient technology and the environmental policy effects of foreign direct investment are found to be conditional on the country's degree of corruptibility. Foreign direct investment leads to a lower stringency of environmental policy when the degree of local government corruptibility is high. The countries, which have the high degree of corruption, foreign direct investment contributes to the creation of the feared pollution havens.

Trade has positive effect on energy efficiency, while $OP \times Corr$ has negative effect on the environmental policy index. The higher levels of corruption to be associated with higher tariff and non-tariff barriers and conjectured that more corrupt countries delay their trade reform programs. The corruption affects trade volumes through the power that officials have to delay goods in transit. In effect, corruption may manifest itself as an actual delay or as a bribe payment exchanged for faster processing. The delay is more of an obstacle to trade for goods that are time-sensitive, i.e. goods for which the expected value of exporting decreases with time delays. By enabling countries to exercise their comparative advantage, trade makes it

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possible to produce more goods with the same amount of resources, increasing wealth. Trade may also create dynamic benefits by encouraging the spread of new technologies; by enlarging markets, trade can lead to the exploitation of economies of scale, again increasing wealth; increased wealth might promote policies that protect the environment.

5- Conclusion

The relationship between corruption and environmental standards is still a relatively new area of study. The costs of environmental policy interventions are different in different countries, depending on economic and environmental factors. Governmental efforts to combat environmental degradation are threatened by corruption. In emerging economies, corruption undermines the rule of law and creates uncertainty in enforcement, contributing to the failure of environmental regulations to protect the environment.

The focus of this paper is to evaluate the effects of corruption level in Persian Gulf countries on environmental and policy outcomes over 1990-2012. There is a growing literature on the causes and consequences of corruption. The results show corruption level in Persian Gulf countries lead to decrease environmental protection. Because, countries which exhibit a low level of political competition are more likely to suffer higher levels of corruption. Corruption may occur at different levels of government, such as the payment of bribes to politicians who determine policies, or bureaucrats who administer environmental regulations.

A polluting firm attempts to reduce the environmental policy it pays by bribing a low level bureaucrat to make false reports regarding emission levels. In addition, it also makes contributions to the incumbent and rival parties of government in order to influence key policy parameters.

Our results further reinforce the need for reforms that reduce the level of corruption in the countries in order to improve environmental policy. For example, political competition can force politicians to better consider the welfare of the citizens they purport to represent. This outcome may be taken to imply that policy makers have thus become less corrupt. In fact, political competition unambiguously brings about more stringent environmental policy and better environmental outcomes.

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