

## Analysis of the Effect of Corruption on Industrial Exports Value (Case Study: The Selected Developing Countries)

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### ABSTRACT

Owing to its close relationship with production, technology and governance, industrial exports have considerable effects on countries' economy. Export is affected by several factors and there are abundance of studies and theories in this field; however, the effect of institutional factors on exportation has not received much appropriate attention. This study, therefore, investigates the effect of corruption control indicator, as a key institutional component, on exportation of industrial products using Panel data. Furthermore, the population consists of 11 developing countries during the period 2002-2012. The results of the estimation model confirm the positive and significant effect of corruption control on export industries of the selected countries. Along with explanatory variable of the corruption control, the variables of exchange rate and income were examined as well, which indicate the negative and significant effect of the real exchange rate and positive and significant effect of countries' income on export industries. The results of the present study demonstrate that in these countries, in order to have an appropriate plan for the development of industrial exports from policymakers, proper assessment of institutional components like corruption control must be taken into account.

**KEYWORDS:** Corruption control, Value of industrial exports, Panel data, Developing countries, Export industries, Institutional components, Governance

### INTRODUCTION

One of the most outstanding factors to achieve sustainable economic growth and development is the improvement of the export, which is the most important goal of policy-makers in foreign trade section. In traditional theories of international trade, export is the indication of foreign trade and for many countries; it is still the chief strategy in foreign market entry. For developing countries, export means more foreign-exchange rate and from the viewpoint of the export countries, it means an assured way for domestic economic crisis, more progression, more earnings, and continually informed about the latest developments in technology. Because

of its numerous advantages such as increasing domestic production, foreign exchange earnings, employment levels and its help to balance the payments of a country, the majority of governments are on the side of increasing export strategies. Export, to put it another way, is especially in the domain of industrial products, paving the way for global trade to grow domestic production. Moreover, it enables manufacturing firms to escape from the limitations of domestic market and by export development; it targets global markets and exploits economic efficiency resulting from more production. On the other hand, to make profit from global trade, advantages for developing countries will come into existence when these countries revolve around the

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improvement of institutional input and facilitate their laws.

In recent decades, roles of institutions, formal and informal organisational arrangements in order to explain the differences between the countries have been highlighted. North (2000) believes the improvement of institutional organisational of the state which is observed from Egypt to Iran, Greece and Rome eventuate in reduction of transaction costs, security and protection of property rights, the growth of regional specialisation and market expansion. It is expected that good economic institutions, particularly non-corrupt and relatively balanced institutions act as a lever for the development of industrial exports. This study examines the effect of corruption control, as an institutional component, on the value of industrial exports in the selected developing countries during the years 2002-2012.

Accordingly, in the second section, the related studies will be treated and in the third section, theories and the effect of corruption control on industrial export will be taken into consideration. In section four, the model will be presented in form of control variables specification which has been used in the model and the analysis. At the end, the conclusions and recommendations will be provided.

## LITERATURE REVIEW

Many studies about the effect of government institutions on economic have been conducted which confirm the effectiveness of the entities. Anderson and Marcouiller (1997), for instance, examined trade and security and found out that some manufacturers may be adversely affected by increasing the security which had been observed in poor countries. Anderson and Marcouiller (2002), used the structural model of import demand in which lack of security act as a hidden tax and inadequate institutional restrictions act like tariff and have negative effect on trade. Gani and Prasad (2006), examined the effect of institutional quality on the trade of six Pacific countries and they used four indicators of government effectiveness, rule of law, quality of regulations and corruption control for institutional quality. They

conclude that the issue of government effectiveness is more important for import countries than export ones. This is while an improved regulatory environment positively facilitates the trade level. The deterioration of the rule of law is also in conflict with the improvement of export. Furthermore, the presence of corruption significantly tends to the reduction of import. De Groot *et al.* (2004) have showed that institutional homogeneity and institutional quality have independent effect on the volume of trade between two countries. Moreover, they increase the presence of similar institutional framework of bilateral trade between two countries to the average of 13%. Furthermore, based on being an exporter or importer, an increase in institutional quality and generating a standard deviation of mean based on the estimation of 30%-44% will increase the mutual trade. Levchenko (2007) have examined the institutional quality and international trade in his study in which the obtained results demonstrate that institutional differences, as a source of advantage, is relative and in this regard developing countries may not gain much income due to their low institutional quality. He also regards the differences of institutional quality as a determinant in trade flows. De Jong and Udo (2005) draw this conclusion that bribery may be beneficial for those countries, which have low quality of customs and traditions; however, it leads to the reduction of trade. Many studies have confirmed the effectiveness of institutions on other economic sectors. Li and Filer (2007), for example, in their paper examined the effect of institutional environment in the method of investment and its strategic consequences. Virmani *et al.* (2006) argued about the issue of governance in the delivery of public goods in South Asia. Rodrik *et al.* (2002) discussed about the priority of institutions on geography and integration in economic development. Kaufmann *et al.* (1999), aimed at the relationship between governance institutions and economic growth.

## THEORETICAL HYPOTHESES

Corruption, as one of the oldest problems in societies, has had a variety of different forms and types. Experts believe that the prevalence of corruption is regarded as one of the main obstacles to economic progress. By

regarding corruption as an inevitable problem, different societies have sought to formulate its political structure and institutional arrangements with the lowest corruption rate. In Webster Dictionary, 'corruption' is defined as 'inducement to wrong by illegal reward or unlawful means'. Similarly, there are different definitions of the word 'corruption' in different economic texts among which 'infringement for securing personal gain and interests' is the simplest definition. International Bank have introduced six institutional indicators for describing an institutional environment including voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption (Kaufman *et al.*, 2009) and from 2002, it has begun publishing annual quantitative statistics in different countries. Control corruption indicator, as one of the defined indicators by this institute, refers to the relationship between citizens and government. Based on introduced sub-indications for this indicator, this matter includes partial and total forms of corruption, state capture by elites and policy-makers' personal interests. This indicator poses these questions, 'Do the public power have been presented to secure the interests of government officials and politicians?' Or 'Is it common that private entrepreneurs are obliged to pay additional and irregular sums to government officials to do their activities in community?'

Based on rent-seeking, the politicisation of the allocation of resources and the creation of artificial shortages by the government, through laws and regulations and their relatively low transparency, provide opportunities of rent extraction for politicians and executives. In the meanwhile, economic corruption achieves these rents by giving bribes to the employees who are in charge of regulating the economy. In fact, when allocation of resources is politicised, these government employees will be at the core of this allocation. In this regard, Tanzi and Davoodi (1998) believe that regulations and different licensing, especially in developing countries, are among the key factors of corruption. He goes on to state that these advantages give exclusive authority to government officials. This issue probably eventuates in taking bribes from individuals and enterprises that

need permission and government authority. This problem makes individuals spend a lot of time to obtain a license or offer some money to save their time. However, Tanzi mentions that for directing its economic activity and etc., the public sector with high quality must have clear and sufficient rules which should be nebulous to give extra authority to employees. It can be said that the factors such as lengthy bureaucratic process, complicated regulations, a lack of respect for property rights and to put it briefly, corruption and lawlessness increase transaction costs and make producers and exporters lose their motivation (Sekkat and Meon, 2004).

Among other adverse effects of corruption on economy, we can mention non-optimal allocation of society's talents. If corruption spreads in society, the individuals especially talented ones, instead of being initiative and innovative, attempts to obtain legal rent or governmental permission by bribery and collusion with government in order to maximise their private profit. While these individuals could potentially increase the capacity of society in terms of technical progress and promote products with high quality in global competition. Corruption also diverts government policies from its true objectives and reduces the legitimacy of government institutions, which are the supporters of the market. Accordingly, the incentives decrease for investment and innovative activities that encourage firms to achieve competitiveness at international level and also, rent-seeking activities increases among people (Badun, 2005).

On the other hand, lack of strong legal and institutional framework to control corruption in the society and the very existence of lobbying among politicians and their supporters who gain personal interests make government officials not distribute the exact information in society and therefore, they maintain some level of illiteracy among citizens by limiting training and education especially general education. It is expected that lower education and skills in the community lead the production and exports of goods that require greater expertise to the production of goods that require less skill. Therefore, natural resources which requires little

skill, allocate more physical and human resources and as a result, it allocates more volumes of total export to itself (Mauro, 1998). Also, low corruption in the government makes people try to gain the necessary skills to have jobs in the services sector and this enables them to use their knowledge for more and more production (Badun, 2005).

Besides, corruption decreases economic attractions for domestic and foreign investors and leads economic institutions to informal and non-productive activities, which are accompanied by paying less tax to the government. Thus, corruption is able to decrease tax revenues of states and prevent governments from executing their duties, which are providing infrastructure services and public goods in production process (ibid). To put it another way, the more we generate legal procedures of corruption control, regulatory frameworks and judicial system, the less we have the authority of government officials, policymakers and affiliated groups in fulfilling their personal interests and consequently, private sector investors worry less about the risk of confiscation of property, records assets, changes in laws and regulations of business environment, changes in tax rates and tariffs, violating mental and physical property rights such as patents, etc. As a result, by providing a good level of control of corruption, incentives for investment in productive and innovative activities relatively increase and directly lead to the increase of competitive production in global markets.

## RESEARCH METHODOLOGY

Prior to experimental test of corruption effect, as institutional component, on industrial exports, it is necessary to choose an appropriate quantitative indicator for this component. Determining this indicator especially considering its appropriateness by regarding the econometric methods, is among the most important issues in this domain. In the meantime, among the proposed institutional indicators we can refer to indicators of good governance compiled annually by

the World Bank since 2002. As mentioned before, one of these indicators is corruption control indicator, which is used in the present study. One of the advantages of this indicator is that it covers about 212 countries. This indicator is obtained by hundreds of variables from 35 different data sources, which proves its high accuracy and comprehensive codification.

Moreover, before more explanation about the proposed model, some points should be taken into consideration the first of which is that due to presenting more specified logarithm, it is provided so as to obtain dependent variable to each of the independent variables which paves the way for the effect of variables on dependent variable to be examined with more attention and sensitivity. Because of the fact that the quantitative amount of corruption controls indicator distributed by the World Bank is in the range of  $2/5 - -2/5$  (larger numbers indicate better governance) and some negative data does not allow the use of a logarithmic form in these circumstances; therefore, by following Lio and Liu (2008) with a simple scale change, governance indicators is at the distance of between 0–1 and then logarithmic form is used. By and large, this change does not undermine the results of this study. Thus, in the present paper, by considering the theoretical hypotheses and review of literature, the equation during the years 2002\_2012 is as follows:

$$LEX_{it} = C + \beta_1 LRE_{it} + \beta_2 LGD_{it} + \beta_3 LCC_{it} + U_{it}$$

where  $LEX_{it}$  is the logarithm of manufactured goods export of country  $i$  in time  $t$ , (exports in thousands of dollars),  $LRE_{it}$  is the logarithm of exchange rate (2000) of country  $i$  in time  $t$ ,  $LGD_{it}$  is the logarithm of GDP (constant 2005 US\$) of country  $i$  in time  $t$ , and  $LCC_{it}$  is the logarithm of corruption control indicator of country  $i$  in time  $t$ .<sup>1</sup>

In selecting control variables used in this study and the effect on export industries, we can say that one of the major functions that are used in the calculation of the current account of the countries is the export function. Based on the theoretical hypotheses in macroeconomic,

<sup>1</sup>Required data extracted from WDI, WGI and UNCTAD databases.

two important and influential variables in export supply function are countries' income and exchange rate so that by increasing the income of countries and their production capacity, it is expected that exporters, because of providing more profitable circumstances, increase the supply of goods for export. Thus, increasing domestic production will have a direct relation with the export supply. Furthermore, about the real exchange rate we should mention that this variable has monetary meaning and evaluates the purchasing power of money. Therefore, we can use this rate to analyse the balance of payments, measure the cost of advertising and detect the competitive position of the country. Additionally, export of industrial goods in most developing countries largely dependent on imported raw materials, intermediate and capital goods for such products. The increase in real exchange rate can increase the cost of raw materials, intermediate, capital goods for industrial production and export and ultimately, with increase of the cost of all industrial exports, it can have a negative effect on the exports of these countries (Bahmani and Goswami, 2004). It should be noted that the selected countries in this study consist of 14 countries including Bahrain, Bangladesh, Colombia, Costa Rica, Iran, Iraq, Jordan, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, and Tunisia. Among the common features of most of these countries, we can refer to their little volume of industrial exports in the period. In this respect, they have homogeneity in export supply.

### MODEL ANALYSIS

Due to the fact that this study is a cross-country study, therefore, the most appropriate estimation method is the panel data which is one of the new and practical subjects of econometrics because applying this model in recent years have caused the formation of more efficient and consistent estimates of the regression of various sciences especially socio-economics. Due to limitations of time-series analysis and the lack of dynamic variables in cross-sectional data, by Panel data (time-series cross-sectional data) the scope of the research can be expanded and overcome most of the limitations of the statistical data in cross-sectional and

time-series data. In this model, variables are measured over time and among the sections of statistical population. Using Panel data is important from other perspectives first of which is that this pattern allows more flexibility by increasing the sample size and to the standard time-series and cross-sectional data, it has higher degree of freedom and flexibility. In this regard, the efficiency of econometrics estimates and the accuracy of estimation increases, which lead more trust to the estimations. On the other hand, since Panel data includes information about time and section level, it provide more help to control omitted variables or unobserved works (Hsiao, 2006). In addition, it largely solves the number of observations of liner problem in econometrics. Since the data change over time and among the sections, there is less possibility of multicollinearity in variables. Moreover, by using this method, estimation bias largely disappears. The overall shape of Panel data is as follows:

$$Y_{it} = \alpha + X_{it}\beta + \dots + U_{it}$$

where  $i$  is the indication of the cross-sections (Individuals, institutions, countries, etc.) and  $t$  is the indication of time.  $Y_{it}$  is a matrix in  $NT \times 1$ ,  $X$  is a matrix in  $NT \times K$  size and  $\beta$  is also a vector in  $K \times 1$  size. Where  $K$ , is the number of explanatory variables in  $X_{it}$ . It is also assumed that there are maximum  $N$  of cross-sectional and  $T$  of time. In Panel models, some of the variables change in sectional units or in over time. For taking these differences unto consideration two patterns of fixed and random effect models are used. The distinctive feature of fixed effects model is that by adding dummy variables to the original model, the intercept can vary for different sections and over time and it consists of:

1. Fixed cross-sectional unilateral effects model: intercept varies between different sections.
2. Fixed unilateral time effects model: intercept varies over the time-period.
3. Fixed bilateral effects model: intercept varies in different levels and in different time-periods.

The problem with this method is that if we add too much dummy variable to the model, we face with

diminishing degrees of freedom. If we select  $N$  random samples from a large community, the random effects model is appropriate. In this case,  $N$  is usually big and calculating using the fixed effects method leads to great loss of degrees of freedom. Contrary to the fixed effect model that presumes that the difference between the sections cause the transference of regression function, this model assumes that the intercept has random distribution and has two forms of fixed and random. Hypotheses of the random component are similar to the dominant hypotheses of error term and these two components produce new error term (Gujarati, 2006). Taken as a whole, in the fixed effects model, it is assumed that the difference between the sections can appear in fixed term but in the random effects model, it is assumed that the difference between the sections can appear in error term.

On the other hand, if all of the coefficients are constant over time and for sections, Pooled data must be used in which all the data are combined together and estimated by the Ordinary Least Squares (OLS) method. Since in this method the effect of different sections are not considered and data are homogeneous, by using this estimating method, there will be, in fact, many restrictions within the model and we face with specification error. Therefore, it is less used in functional analysis. For detecting an appropriate estimation method, F-ANOVA and Hausman tests are used in this study<sup>2</sup>. In F-ANOVA test, which is a likelihood function, there are five general hypotheses:

$H_0^a: \delta_\mu^2 = 0$  (Null hypothesis is Pooled data and one is one-sided Panel cross-sectional data);

$H_0^b: \delta_\lambda^2 = 0$  (Null hypothesis is Pooled data and one is unilateral time Panel data);

$H_0^c: \delta_\mu^2 = \delta_\lambda^2 = 0$  (Null hypothesis is Pooled data and one is bilateral Panel data);

$H_0^d: \delta_\mu^2 = 0 / \delta_\lambda^2 > 0$  (Null hypothesis is unilateral time Panel data and one is bilateral Panel data)

$H_0^e: \delta_\lambda^2 = 0 / \delta_\mu^2 > 0$  (Null hypothesis is unilateral cross-sectional Panel data and one is bilateral Panel data) (Baltagi, 2008).

The advantage of this test to other tests is that according to defined hypotheses, both Panel and Pooled data i.e., test panels of model, Panel methods (unilateral cross-sectional or time, bilateral cross-sectional and time) are compared with one another (ibid., 2008). In addition, the Hausman test is used for determining the proper estimation model (fixed or random effects) for the appropriate fitting method. In this test, null hypothesis is random effects model and its statistic has chi-squared distribution with  $K$  degrees of freedom (the number of explanatory variables). If the obtained number of the Hausman test is smaller than the table of chi-square statistic (i.e. Hausman probability statistic is higher than 5%) null hypothesis based on the random effects model cannot be rejected. Thus, the random effects model is more appropriate to estimate the mode. On the contrary and with rejecting the null hypothesis (i.e. Hausman probability statistic is lower than 5%), the model should be estimated by fixed effect (ibid., 2008). Accordingly, the obtained results of the mentioned test were calculated by Eviews Software (Table 1).

As shown above, the obtained results of the Hausman test show that the statistic related to this test in the section equals with 46/850 and in time equals with 28/309 both of which in the region of rejecting null hypothesis show the presence of random cross-sectional or time effects. Therefore, the model should be estimated by fixed effects. Furthermore, the obtained results of F-ANOVA show that based on hypothesis  $H_0^c$ , the significant unilateral cross-sectional effects is confirmed against bilateral cross-sectional and time effects. However, hypothesis  $H_0^d$  does not confirm significant unilateral time effects against bilateral cross-sectional and time effects. Accordingly, the best model for estimating this equation is unilateral cross-sectional fixed effects. Therefore, in order to prevent time correlation of the cross-section in data, by the presence of heter-oscedasticity during the sections, the cross-section weight method will be used for model estimation.

<sup>2</sup>It should be noted that by regarding null hypothesis, the degree of freedom and related statistic to this test changes.

**Table 1: The results of F-ANOVA and the Hausman tests in the proposed model**

Test	Hausman test		F-ANOVA test				
	Time	Section	H <sub>0</sub> <sup>c</sup>	H <sub>0</sub> <sup>d</sup>	H <sub>0</sub> <sup>c</sup>	H <sub>0</sub> <sup>b</sup>	H <sub>0</sub> <sup>a</sup>
Model	28/309 (0/000)	46/850 (0/000)	11/834 (0/296)	285/888 (0/000)	315/336 (0/000)	29/001 (0/001)	294/406 (0/000)

Numbers in parentheses indicate the critical value at 5%.

It should be noted that the pre-requisite for Panel data estimation models is the rejection of null hypothesis of unit root test or to put it another way, it is the confirmation of durability (reliability) of dependent and independent variables. Levin and Lin (2003) suggested inter-group unit root test. Levin and Lin (2002) conducted the first studies about unit root tests of Panel data variables. Then, Im *et al* (2003) suggested intergroup unit root test. Breitung (2000), Maddala and Wu (1999) and Chu (2001) are among those researcher who conducted some studies about the unit root test and each of them provided some tests. In this study, the Levin\_Lin\_Chui test was used in which null hypothesis is the presence of unit root. The obtained results of these tests for all of the used variables in the model (Table 2) indicate the rejection of null hypothesis and the acceptance of variables durability. Consequently,

**Table 2: The results of the unit Root test in the proposed model**

Variable	The Levin-Lin-Chu statistic	Probability
LnEX	-2/5579	0/0053
LnGD	-10/4973	0/0000
LnRE	-8/3464	0/0000
LnCC	-2/0011	0/0227

Source: Computations of the research

**Table 3: the results of the estimation model using unilateral cross-section weight fixed effects model**

Variable	Estimated coefficient	t-Statistic	Significant level
LRE	-0/696	-5/057	0/000
LGD	1/224	17/395	0/000
LCC	0/873	2/290	0/004
Intercept	-12/301	-73102	0/000
14 = No. of sections	153 = No. of observations	0.95 = Adjusted R <sup>2</sup>	F = 208/1228

Source: Computations of the research

the stability of the data used in the study is confirmed before estimation the proposed mode.

With the provided explanations and manipulating required tests in order to achieve an appropriate method of estimation, the results of the estimation model using unilateral cross-section weight fixed effects model are shown in Table 3.

As shown above, adjusted R<sup>2</sup> is the indication of well-fitting model so that 95% of the Dependent variable is explained by independent variables. F-statistic also indicates the significant model in totality. Besides, in this equation, t-statistic and its probability of level show that all coefficients are significant at the level of error of less than 1%.

The obtained results of the model estimation show that in the selected countries, there is a positive and significant relationship between the corruption control indicator and industrial supply indicator and the amount of this ratio is 0/873. In other words, by change 1% in this indicator, industrial export 0/873% which is in agreement with theoretical framework. Therefore, if we use public authority for community's interests and welfare and restrain corrupted politicians for their illegal activities such as bribery, rent-seeking and executing legal power in favour of affiliated groups, government economic policies for improving business

environment, the use of community capacity and potentiality, increase of competitiveness of firms from investing in research and development activities and the use of natural and acquired advantages will be competition-oriented in international competition. Moreover, this variable, after countries' income, is in the second rank of effecting on dependent variable and is considered as one of the most influential variables in industrial export which indicates that in these countries the control corruption indicator has more priority than monetary variable of foreign exchange rate. Export attraction to this variable (by regarding fixed status for other circumstances) in selected countries is about one which shows the export attraction to this indicator.

Furthermore, domestic production variables and the real exchange rate are in accordance with the theoretical expectations. As it can be observed, in the selected countries of this study, there is positive and significant relationship between the income of the countries and export of industrial goods. By increase of 1% in the variable, industrial export increase to 1/224% which is in agreement with theoretical framework. For that reason, the more the income and welfare of countries, the more the supply of goods become. Based on the mentioned information about the real exchange rate, the results show that this variable is accompanied with the increase in the cost for the production of industrial goods and eventuated in the decrease of these goods so that by 1% change in this variable produce 0/696% negative and significant sensitivity for industrial goods. By and large, the results indicate the proper selection of control variables.

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## CONCLUSION AND SUGGESTIONS

It seems that the spread of corruption in society leads to diversion of resources, financing of investment projects regardless of their efficiency, bargaining and rent-seeking in favour of some political elites and their relatives, employment of unskilled people in chief positions and many other problems all of which can cause uncertain environment with high transaction costs in the society that undermines the development of industrial exports. On the other hand, because of the large size of government in the economy of developing countries, the study of corruption is more common and accordingly corruption control can significantly create positive effect on the improvement of industrial products exports of such countries. This study shows that the selected countries can improve their industrial exports as long as they take the issue of corruption into consideration. To this end, principle strategies such as establishing appropriate, legal and clear rules in order to prevent public power from gaining personal interests or inhibit influential groups from changing the rules to their advantages by bargaining unilateral policies for themselves rather than for citizens and private sector firms are among leading solutions. In this case, the legal framework of corruption control strongly inhibits the waste and lack of optimal allocation of resources in the community. Moreover, a strong independent judicial system with effective regulatory enforcement in detecting corruption offenses can increase corruption penalties and reduce the possibility of committing corruption in society.



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