*FWU Journal of Social Sciences, Winter 2018, Vol.12, No.2, 160-178*

# Does Social Capital Greases or Sands the Wheels of Corruption: A Panel Data Analysis

**Farzana Naheed Khan and Muhammad Tariq Majeed**
Quaid-i-Azam University, Islamabad

The study investigates the relationship between corruption and social capital (trust) for a panel of 72 countries over the period 1984-2016. The study employs pooled OLS, random effects, two-stage least squares and GMM estimation techniques for empirical analysis. The main variable of interest "trust" enters significantly in all models and suggests that more trusting countries are less likely to experience corruption. Moreover, the results remain consistent even after the inclusion of control variables such as GDP per capita, government size and import openness. In general, regardless of the technique we apply and the model specification we follow, trust sands the wheels of corruption. Furthermore, the study conducts granger causality test to address the issue of reverse causation of variables and provides a clear identification of the causal link from trust to corruption. Our study identifies social capital as an important channel through which corruption can be controlled. Therefore, human capital investments should concentrate on the augmentation of social capital (trust) for the efficient control of corruption.

***Keywords***: social capital, corruption, openness to import, panel data.
*JEL Classification*: D71, D73, F10.

Corruption is an ancient problem and there is hardly any country which has been immune from it. As corruption is an evidence of dishonest behavior, it is assumed that it is related to social capital that is the ability of the individuals to cooperate with each other (Bjornskov, 2003). Although, social capital theorists believe that social capital translates into social and economic outcomes but do not provide conclusive evidence on the relationship of social capital with corruption. On the one hand, Uslaner (2009) argues that high level of social capital supports corrupt deals while, on the other hand, Graeff and Svendsen (2013) find evidence that low level of social capital is a good breeding ground for corrupt activities. While corruption is blamed to be a root cause of various socioeconomic ills, yet, there is insufficient research on social causes of corruption. In particular the literature on corruption offers inconsistent evidence on the role of social capital as a determinant of corruption, hence, it is important to investigate this issue in details.

According to Putnam (1993, p. 36) social capital refers to the "social organization, such as networks, norms, and trust that facilitate coordination and cooperation for mutual benefit". Besides, Arrow (1972) highlights that social capital offers positive externalities and reduces transaction costs among interacting parties. Moreover, social capital works as an informal institution and refers to the social conditions that lead to good economic outcomes (Coleman, 1988; Graeff & Svendsen, 2013). It suggests that social capital is an important component of a successful economic environment (Sobel, 2002; Bjornskov, 2012).

---

Correspondence concerning this article should be addressed to Dr. Farzana Naheed Khan, Assistant Professor at School of Economics, Quaid-i-Azam University, Islamabad, Email: farzanakhan@qau.edu.pk
Contribution of Authors:
Farzana Naheed Khan and Muhammad Tariq Majeed contributed equally to this research work.

In empirical research, perhaps, it is difficult to measure social capital with direct measures, therefore, the concept of social capital is operationalized as social trust (Morris & Klesner, 2010). Moreover, Bjornskov (2012) establishes that trust is the only determinant of the social capital, therefore, it should be taken as a proxy for social capital. Furthermore, Corbacho *et al.* (2015) focus on trust as it can boost social capital while Bozovic (2017) puts emphasize on trust because it is the most consistently measured aspect of social capital.

The concept of corruption is derived from the Latin adjective *corruptus*, meaning destroyed or broken. However, corruption is usually defined as the “use of public office for private gains” (Bardhan, 1997). According to World Bank (2004) more than one trillion dollars are paid in the form of bribes and estimated economic loss from corruption is even greater than this number. The literature considers corruption as the greatest barrier to development, as it hampers economic growth with increased transaction costs and “sands the wheels” of the economy by misallocating resources (Seligson, 2002).[1]

While the empirical literature on corruption is substantial, yet social capital is a relatively less established determinant of corruption. Seldadyo and De-Haan (2006) provide a very comprehensive review of 70 economic and non-economic causes of corruption but social capital as a cause of corruption is missing in their study. Likewise, Dimant and Tosato (2018) provide a detailed analysis of corruption in their study, however, they do not include social capital in their analysis of corruption. Conversely, Bjornskov (2012) argues that social capital is likely to be associated with the incidence of corruption.

The existing literature provides inconsistent evidence about the relationship between social capital and corruption (Uslaner, 2009; Graeff & Svendsen, 2013; Bozovic, 2017). It is uncertain in the literature whether social capital greases or sands the wheels of corruption. Moreover, no agreement has been reached about the direction of causality between social capital and corruption. In the presence of ambiguity in the literature, an investigation of the relationship between corruption and social capital is relevant for this study.

Therefore, the objective of the present study is to examine the relationship between corruption and social capital for a panel of 72 countries over the period 1984-2016. Our study contributes to the existing literature by identifying social causes of corruption. Besides, our study conducts panel Granger causality tests and provides a clear identification of the causal link from trust to corruption. This identification of social causes of corruption and determination of direction of causality suggest the strategic direction for the control of corruption.

The remainder of the study is organized as follows. Section 2 explains theoretical links of trust with corruption. Section 3 illustrates the methodology for the study while Section 4 discusses data and variables used in the empirical analysis. Section 5 includes the discussion of the results followed by conclusion presented in Section 6.

---

[1] Huntington (1968, p. 386) argues that corruption improves efficiency, as it removes government imposed rigidities which impede investment. Hence, corruption “greases the wheels” of the economy. Bardhan (1997), however, discusses that corruption causes inefficiency in the economy and obstructs economic growth.

**Literature Review**

Scholars have devoted substantial attention in recent years to the concept of corruption. Nevertheless, a greater part of the earlier corruption research is either linked to economic growth or deal with the consequences of corruption (Treisman, 2000; Dimant & Tosato, 2018). One area of research that remains understudied is the role of social capital in controlling corruption. Social capital improves allocative efficiency of the economy and shows higher returns on physical as well as human capital (Sobel, 2002).

The concept of social capital does not have a single definition and almost everyone who writes about social capital finds it necessary to provide some definition. Coleman (1988) broadly defines social capital as people's ability to cooperate in common goals while Putnam (1993, p. 167) defines social capital as "trust, norms and networks". Besides, Sobel (2002) explains that social capital refers to the circumstances in which individuals can use membership either in networks or in groups to get benefits. Among these different definitions, empirical work usually focuses on the definition given by Putnam (1993).

While social capital consists of "trust, norms and networks", it is the first component "trust" that receives attention in the empirical work (Bjornskov, 2012; Corbacho *et al.*, 2015; Bozovic, 2017). Uslaner (2002, p.9) identifies trust as a key element in the formation and evolution of a society while Sobel (2002) determines trust as the strength of honesty in the society. The literature establishes trust as a symbol of legitimacy and finds it as a lubricant that makes group work more effective (Seligson, 2002). Moreover, trust is correlated with a number of other variables which are highly desirable, i.e. economic development, quality of life, economic efficiency and effective institutions (Bjornskov, 2012; Breuer & McDermott, 2013; Khalifa, 2016; Majeed & Aijaz, 2018).

However, the existing literature either does not consider trust as a determinant of corruption or if it is included in a few studies, then these studies test for a reciprocal relationship between corruption and trust rather than maintaining causality of the relationship (Morris & Klesner, 2010). This section of corruption literature interprets trust as both the cause and effect of corruption. These studies suggest that low levels of trust support corruption that in turn weakens trust in the government and as a result a vicious circle of trust and corruption is produced where systematic corruption is experienced in the society (Uslaner, 2002).

Bjornskov (2003) examines the relationship between trust and corruption and suggests that it is possible to build social capital (trust) which reduces corruption but the evidence of the reverse causal direction is weak. Similarly, Graeff & Svendsen (2013) find that low level of trust may lead to high level of corruption, but there is no "reverse" causality of corruption on trust. Therefore, it is suggested that the relationship between trust and corruption should be tested for a unilateral influence of trust on corruption.

Rose-Ackerman (1999, p.12), though, tests for a unilateral influence of trust on corruption, however, the study emphasized that trust facilitates corrupt deals. Corrupt officials need to be sure that their "partners" will deliver on their promises. Similarly, Rose-Ackerman and Palifka (2016) make a case that reputation system ensures realization of corrupt deals and corruption thrives upon trust. Bjornskov (2003), however, emphasizes that agents are unlikely to accept a bribe with higher level of social capital in society. Similarly, Graeff & Svendsen (2013) argue that distrust validates the justifications of corrupt deals. It means that low levels of trust may stimulate corruption in a society because people fail to develop cooperative ethos (Bjornskov, 2012; Kubbe, 2014).

The findings of these studies are not conclusive. Now an important question arises whether social capital promotes or hurts corruption. Since theoretical links of trust with corruption predict both positive as well as negative effects, therefore, the hypothesis to be tested is that:

Ho: Social capital does not affect corruption.

H1a: Social capital causes positive effect on corruption.

H1b: Social capital causes negative effect on corruption.

## Method

The methodology of the study is primarily based on the work of Becker (1968), which argues that illegal behavior has direct relation with the potential gains from illegal activity and inverse relation with the probability of detection and punishment. Therefore, the individuals make rational choices and make a comparison of relative costs and benefits of an illegal activity. This cost-benefit analysis depends on exogenous factors that, in turn, depend on the socio-economic environment of the country whereas social trust is believed to be an important element of the socio-economic environment.

However, there are two different points of view about corruption and trust. Uslaner (2002, p. 223-229) explains that trust level is an indication of the standard of formal institutions in a society where low trust levels are related with weak institutions. When institutions are weak, then the probability of detection of an illegal activity is low, therefore, the likelihood of occurrence of corrupt transactions is high. Similarly, Morris and Klesner (2010) discuss that the lack of trust shows lack of legitimacy and therefore, reduces the risk of detection and creates disincentives to follow the written rules and produces incentives for corruption. So, in this first case low trust level is related with high corruption level.

While according to second point of view when trust level is high, networks are strong, it is relatively easy to identify right person for illegal favors and in that case probability of getting benefit is high while probability of detection is low. It means networks and trust can prove helpful in identifying where payments need to be made to get things done more efficiently. So, according to this scenario high trust level encourages corruption (Rose-Ackerman & Palifka, 2016). The literature provides conflicting evidence about the relationship between corruption and trust. However, following these theoretical arguments corruption model is structured as follows:

$$Cor_{it} = \beta_1 + \beta_2\, trust_{it} + \beta_3\, X_{it} + \varepsilon_{it} \qquad (1)$$

where ($i$ = 1 ... ... .. $n$ and $t$ = 1 ... ... .. $T$)

Where $Cor_{it}$ is Corruption Perception Index, $trust_{it}$ is national trust score and it is a proxy for social capital, $X_{it}$ represents a set of control variables, $i$ refers to cross-sectional units, $t$ shows time period and $\varepsilon_{it}$ is the error term. As it is not clear whether trust promotes or hurts corruption therefore, the expected sign of the coefficient of trust may be positive ($\beta_2 > 0$) or negative ($\beta_2 < 0$) where $\beta_2 > 0$ indicates less corruption.[2]

The study includes control variables to check the robustness of the results. The set of control variables is based on the existing corruption literature. Saha and Ben-Ali (2017) reveal that economic variables are more important for controlling corruption. Hence, economic variables are included in

[2] Corruption has a scale from 0 to 6 where 0 means maximum corruption and 6 means absence of corruption.

our corruption model as control variables. The above relationships between "corruption and trust" along with control variable can be written as follows:

$$lnCor_{it} = \beta_1 + \beta_2\, lntrust_{it} + \beta_3 lnGDP_{it} + \beta_4 lnGS_{it} + \beta_5 lnIO_{it} + \varepsilon_{it} \quad (2)$$

here $GDP_{it}$ is real GDP per capita and it shows economic development, $GS_{it}$ is government size represented by the government final consumption expenditures as a percentage of GDP while $IO_{it}$ stands for import openness which is taken as import to GDP ratio. The equation 2 is our final equation for estimation. While the study uses log-log specification for efficient results.

Economic development is the most frequently used determinant of corruption and almost every study on corruption includes economic development (Gokcekus & Suzuki, 2013). It is typically added as a control variable to minimize the effect of omitted variable bias and generally, proxied by GDP per capita income (Kalenborn & Lessmann, 2013; Shabbir & Butt, 2014; Majeed, 2014). Bardhan (1997) explains that the richer country devotes more resources towards the control of corruption. It means there are more chances of detection in rich countries. Therefore, the expected sign of $\beta_3$ is positive.

It is generally assumed that government size has an important role in the control of corruption. Larger government size encourages a system of checks and balances which can support accountability and therefore corruption is controlled (Billger & Goel, 2009; Shabbir & Butt, 2014). So, the expected sign of the coefficient of government size is also positive.

Treisman (2000) finds that the countries which are more open to imports are less corrupt. The literature also suggests that import openness improves efficiency and brings transparency of transactions which discourages corruption in a country (Ades and Di-Tella, 1999; Majeed, 2014). Our study also includes import openness as a control variable and its expected sign is positive ($\beta_5 > 0$).

The empirical analysis is based on the pooled OLS, random effects model (REM), two-stage least squares (2SLS) and generalized method of moment (GMM) techniques. We have applied pooled OLS technique because it is considered most efficient technique and REM is one of the most widely used techniques for the analysis of a panel data set. Although the study has chosen random effects model (REM) on the basis of Hausman test however, according to Breuer and McDermott (2013) when trust is taken as an explanatory variable, it is quite difficult to estimate its effects accurately with fixed effects model (FEM) as trust is less variant over time within a given cross-section, however, it is highly variant across countries.[3] Thus, REM is considered suitable estimation technique to deal with cross country effects. Moreover, REM is considered suitable when cross-sections are chosen randomly or there is a large number of cross sections.

The study also employs 2SLS technique to tackle the issue of measurement error, omitted variables bias and simultaneity while GMM technique has been applied to deal with the expected problem of endogeneity in our models that may arise due to the endogenous nature of trust.

Finally, to empirically investigate the causal relationship between trust and corruption, the study employs panel Granger causality tests which utilizes both of the cross-sectional and time-series

[3]The trust scores exhibit less variation over time within a given cross-section, however, they show high variation across countries. In our sample, the lowest trust score is 3.2 while the highest trust score is 73.7.

data, and thus is more efficient than solely utilizing the time-series data. The following autoregressive models are estimated.

$$Corruption_{it} = \omega_0 \sum_{j=1}^{p} \alpha_{j\,Corruption\,it-1} + \sum_{j=1}^{p} \beta_{j\,X\,it-1} + \mu_{it} \quad (3)$$

$$X_{it} = \varphi_0 \sum_{j=1}^{p} \gamma_{j\,X\,it-1} + \sum_{j=1}^{p} \delta_{j\,corruption\,it-1} + v_{it} \quad (4)$$

here $X_{it}$ denotes trust in country *i* in year *t* in the regressions that investigates the causal relationship between trust and corruption while $X_{it-1}$ indicates the past values of trust (initial conditions) and $\mu_{it}$ and $v_{it}$ are the error terms which are assumed to be distributed normally and independently with zero mean and constant variance. The study conducts Granger's causality test for following hypotheses.

Null hypothesis: Trust does not Granger cause corruption.
Alternative Hypothesis: Trust does Granger cause corruption.
Null hypothesis: Corruption does not Granger cause trust.
Alternative Hypothesis: Corruption does Granger cause trust.

**Data**

The empirical analysis is based on panel data and the study covers 72 countries over the period 1984- 2016.[4] The study uses Corruption Perception Index (CPI) as a proxy for the measurement of corruption and its data is taken from International Country Risk Guide where the index has been constructed on a scale from 0 (most corrupt) to 6 (least corrupt). Although, CPI does not measure the true level of corruption in a country and it is based on the perception of corruption however, it works very well in macro models and it is considered highly reliable in empirical analysis (Graeff & Svendsen, 2013). Therefore, CPI is the most widely used measure of corruption in empirical analysis (Treisman, 2000; Bjornskov, 2003; Kalenborn and Lessmann, 2013).

The corruption index has its limitations as it is incapable of measuring the true level of corruption however, it has the advantage of being posted consecutively and it provides a comparable set of data to measure corruption levels across counties (Bjornskov, 2003). According to Billger and Goel, (2009), even if another corruption index is constructed, new index may not be better than existing one. Therefore, our study has used CPI following these studies and it captures a country's propensity to allow for corrupt transactions.

In our analysis, national score on generalized trust has been used as a proxy for trust level and its data is obtained from six different waves of World Values Survey (WVS). It is believed that trust level shows the strength of honesty of citizens of a country, therefore, it can be taken as a measure of social capital. For this reason, national trust score is almost universally employed as a proxy for social capital in empirically analysis (Graeff & Svendsen, 2013; Khalifa, 2016).

The data for GDP per capita, government expenditures and import openness is derived from World Development Indicators (WDI).

In order to tackle endogeneity issue, the study has used following instruments of trust such as population density, legal origin of the legal system, mean elevation and religion of the population.[5]

[4] The list of countries is given in appendix A1.
[5] An instrument is the exogenous variable which is greatly correlated with endogenous variable and shows no correlation with error term.

The first instrument used by the study is population density while it is assumed that low population density is shared with the helpful behavior of local residents towards strangers (Seldadyo & De-Haan, 2006). The data for the variable is taken from International Database of US Census Bureau. The legal origin of the law systems is a dummy variable with 1 as British law and 0 otherwise (Treisman, 2000). The data is taken from La Porta *et al*. (1999). The study includes mean elevation following Khalifa (2016) and its data is taken from Centre for International Development. It shows natural obstacles which hamper people to communicate and cooperate with each other. Finally, the last instrument is religion of the population where, population is either identified as Muslim, Catholic or Protestants (Breuer & McDermott, 2013). The data for the religion is also taken from La Porta *et al*. (1999).

The study includes different variables for sensitivity analysis. Democracy is an important determinant of corruption, therefore, it has been included for sensitivity analysis following Kalenborn and Lessmann (2013). Polity 2 variable is used for democracy index while the data is taken from Polity IV data set. The study also includes education level for sensitivity analysis because it is believed that education is associated with different non-market outcomes (Khan and Majeed, 2018). Therefore, it may significantly impact corruption level. To capture the effect of education, secondary school enrollment ratio has been used and the data is taken from WDI.

The study includes government effectiveness, rule of law and regulatory quality following Kalenborn and Lessmann (2013) and data for these variables is derived from Worldwide Governance Indicators. The last sensitivity analysis variable is economic freedom and its data is taken from the Heritage Foundation Index.

## Results

Table 1 presents the estimation results obtained using pooled OLS method of estimation. The results reported in column 1 show that trust has significant negative impact on corruption. It is reminded here that corruption has a scale from 0 (max) to 6 (min). Hence, a positive coefficient indicates less corruption associated with the higher levels of trust. It means trust (social capital) can be supportive in combating corruption. Moreover, distrust increases the likelihood of corruption as it substantiates the justification of corrupt activities and reduces the probability of detection (Seligson, 2002; Morris & Klesner, 2010).

**Table 1**

*Pooled OLS Results for the Impact of Trust on Corruption*

| Variables | Corruption (1) | Corruption (2) | Corruption (3) | Corruption (4) |
|---|---|---|---|---|
| Trust | 0.0349*** | 0.0346*** | 0.0288*** | 0.0297*** |
| | (0.0069) | (0.0073) | (0.0072) | (0.0071) |
| RGDP per Capita | | 0.0122 | 0.0048 | 0.0661 |
| | | (0.0644) | (0.0621) | (0.0684) |
| Govt. Expenditures | | | 0.0750*** | 0.0772*** |
| | | | (0.0211) | (0.0208) |
| Imports Openness | | | | 0.0084** |
| | | | | (0.0042) |
| South Asia | -1.853*** | -1.835*** | -1.333** | -1.195** |
| | (0.600) | (0.612) | (0.603) | (0.599) |
| Europe & Central Asia | -0.569 | -0.533 | -0.636 | -0.631 |
| | (0.495) | (0.533) | (0.512) | (0.506) |
| Middle East & North Africa | -1.411** | -1.374** | -1.437** | -1.393** |
| | (0.553) | (0.596) | (0.572) | (0.565) |
| East Asia & Pacific | -1.236** | -1.215** | -0.892* | -1.016** |
| | (0.514) | (0.530) | (0.515) | (0.513) |
| Sub Saharan Africa | -1.501*** | -1.454** | -1.540** | -1.345** |
| | (0.559) | (0.614) | (0.596) | (0.596) |
| Latin American Countries | -0.964* | -0.930 | -0.687 | -0.519 |
| | (0.538) | (0.570) | (0.550) | (0.550) |
| Constant | 4.620*** | 4.455*** | 3.131** | 2.262 |
| | (1.203) | (1.490) | (1.470) | (1.515) |
| *Link Test* (*hatsq*) | 0.1825 | 0.1881 | 0.0759 | 0.0486 |
| | (0.05) | (0.05) | (0.332) | (0.514) |
| *Shapiro-Wilk W test* | 0.9869 (0.2023) | 0.9864 (0.1815) | 0.9892 (0.3592) | 0.9877 (0.2573) |
| R-squared | 0.442 | 0.436 | 0.492 | 0.508 |

Note: Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

Regarding control variables the study finds that all control variables have expected effect on corruption. The column 2 shows the relationship between corruption and trust after controlling for GDP per capita. Our findings indicate that the coefficient of trust remains consistent which implies that trust reduces corruption significantly besides increase in GDP per capita. Similarly, the column 3 shows that the coefficient of government expenditure has significant negative impact on corruption.

Hence, it implies that government can more effectively control corruption with a given increase in its expenditures (Saha & Ben-Ali, 2017).

The column 4 shows that import openness has expected and significant influence on corruption just like trust and government expenditures. Treisman (2000) finds that import openness is one of the most robustly significant variables in his study of corruption. The study concludes that higher exposure to imports generates competition and thus reduces the level of corruption in the country.

The Table 1 clearly shows that the relationship between corruption and trust remains consistent and significant in spite of the fact that we have controlled for GDP per capita, government expenditures and import openness. Moreover, Table 1 reports estimation results after controlling for the regional heterogeneity. The regional effects are computed for the whole sample to know about the regional sensitivity, where North America is taken as a base category.

Finally, the study applies *Linktest test* and *Shapiro-Wilk W test* and the results of these tests are reported in the bottom rows of Table 1. The study applies *Linktest* to assess the functional form of the corruption model. The P-values for the test clearly indicate that our corruption model is correctly specified. Moreover, we apply *Shapiro-Wilk W test* to assess the normality of residuals and the result of *Shapiro-Wilk W test* also indicate that residuals of the models are normally distributed with zero mean and constant variance implying that our results are not suffering from the problem of omitted variables bias. Therefore, we can conclude that our corruption model is not suffering from the problem of specification error.[6]

Table 2 presents the estimation results with random effects regression method. The Hausman test is used to decide which model is preferable and the test statistics suggests that random effects model is preferred over fixed effects model.[7]

The Table 2 (column 1) shows that the coefficient of trust is positively significant at 1% level of significance and yet again confirming the relationship between trust and corruption with random effects estimations. The former communist countries, which are characterized with low levels of trust, are strongly correlated with high levels of corruption. It suggests that low trust levels show lack of legitimacy and therefore, stimulate corruption (Bjornskov, 2003).

Table 2 finds insignificant influence of GDP per capita on corruption. Gokcekus and Suzuki (2013) also conclude that economic development has an insignificant effect on corruption in their random effects model for a panel of 34 countries. It is typically argued that GDP affects corruption significantly when it is complemented with property rights and strong institution where illegal activities are strictly handled (Dimant and Tosato, 2018).

The column 3 shows consistent results for trust, GDP per capita and government expenditures. Similarly, the data from column 4 shows that all terms are significant and have the expected influence on corruption. It is argued that a high import share implies less import restrictions and thereby less corruption. Therefore, import facilitation may be helpful in reducing corruption

[6] Figure 1 in Appendix displays the box plots of residuals of models 1, 2, 3, and 4 respectively. Normality of the residuals indicates the correct specification of the model.

[7] Hausman test P-Value is greater than 0.05 for our sample.

when trade restrictions are supportive for corrupt deals (Seldadyo & De-Haan, 2006). Likewise, Dimant and Tosato (2018) argue that import openness improves economic structure as well as social norms of the country and therefore, countries with more trade openness are subject to low levels of corruption.

**Table 2**

*Random Effects Panel Analysis for the Impact of Trust on Corruption*

| Variables | Corruption (1) | Corruption (2) | Corruption (3) | Corruption (4) |
|---|---|---|---|---|
| Trust | 0.0302*** | 0.0271*** | 0.0238*** | 0.0222*** |
| | (0.0075) | (0.0079) | (0.0078) | (0.0076) |
| RGDP per Capita | | 0.0881 | 0.0962 | 0.147* |
| | | (0.0786) | (0.0763) | (0.0763) |
| Govt. Expenditures | | | 0.0653*** | 0.0718*** |
| | | | (0.0218) | (0.0212) |
| Import Openness | | | | 0.0099** |
| | | | | (0.0040) |
| Constant | 2.728*** | 1.790 | 0.720 | -0.208 |
| | (0.816) | (1.180) | (1.212) | (1.243) |
| Wald Chi2 | 71.45 | 70.77 | 82.97 | 92.75 |
| Prob> Chi2 | 0.000 | 0.000 | 0.000 | 0.000 |
| R-squared | 0.39 | 0.39 | 0.41 | 0.44 |
| Number of Id | 73 | 70 | 68 | 68 |
| Rho | 0.67 | 0.67 | 0.65 | 0.61 |

Note: Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

The results reported in Table 2 show that trust has an important role in determining corruption level and all control variables have expected and significant impact on corruption except for GDP per capita that is insignificant.

As discussed earlier, some studies argue about the possibility of reverse causation between trust and corruption, therefore, our study employs 2SLS technique to deal with the issue of reverse causation. However, before 2SLS panel estimations, our study conducts two-stage cross-sectional analysis with trust variable only to determine the possibility of reverse causation between trust and corruption. The results are reported in Table 3.

**Table 3**

*First Stage Results for the Impact of Trust on Corruption*

| Trust | Coefficient | Std. Err. | t- Statistic | p-Value |
|---|---|---|---|---|
| Initial value of trust | 0.7894*** | 0.0804 | 9.81 | 0.000 |
| Elevation | -0.0049** | 0.0022 | -2.17 | 0.035 |
| Population density | 0.0051 | 0.0072 | 0.72 | 0.477 |
| British legal origin | -6.389** | 2.9936 | -2.13 | 0.038 |
| Socialist legal origin | 0.4222 | 2.5563 | 0.17 | 0.869 |
| Muslim | 0.0770** | 0.0389 | 1.98 | 0.053 |
| Protestant | 0.1185* | 0.0626 | 1.89 | 0.064 |
| Catholic | 0.0046 | 0.0391 | 0.12 | 0.907 |
| Constant | 3.4975 | 4.0443 | 0.86 | 0.391 |
| R-squared | 0.6919 | | F( 8, 52) | 14.60 |
| Adj R-squared | 0.6445 | | Prob > F | 0.0000 |
| Root MSE | 7.9921 | | | |

The statistics significant at 1%, 5% and 10% are shown by***,**,* respectively.

For the first-stage cross-sectional analysis, we have used the concept of initial values (initial conditions) and exogenous instruments. The Table 3 clearly shows that much of the trust is explained by its own initial values and it is highly significant as well. Likewise, most of the instruments are significantly explaining current trust levels. Together these all instruments are explaining 70 percent variation in the trust. In this first step, we have determined trust using initial values and other instruments while in the next step of analysis, predicted values of trust are used to see its effect on corruption and results are reported in Table 4.

**Table 4**

*Second Stage Results for the Impact of Trust on Corruption*

| Corruption | Coefficient | Std. Err. | z- Statistic | P>z |
|---|---|---|---|---|
| Trust | 0.0316*** | 0.0111 | 2.87 | 0.004 |
| Constant | 2.2966*** | 0.2909 | 7.89 | 0.000 |
| Wald chi2(1) | 8.22 | | Prob > chi2 | 0.0041 |
| R-squared | 0.2378 | | Root MSE | 0.9517 |

The statistics significant at 1% are shown by***.

Table 4 shows highly significant impact of trust on corruption and this effect is also consistent with social capital theory. Moreover, the results reported in Table 3 and Table 4 provide us rationale for two-stage least squares panel estimation and the results are reported in the Table 5.

The Table 5 (column1) also shows significant negative impact of trust on corruption. Uslaner (2002, p.8) finds that the least corrupt countries are also the most trusting nations. While the most corrupt countries are among the least trusting countries. Furthermore, the countries with high levels of trust are less likely to justify crimes including corruption (Kubbe, 2014). These results confirm that more trusting societies are least corrupt as the cost of corruption is probably higher than the benefits of corruption in these societies.

**Table 5**

*Two-Stage Least Squares Results for the Impact of Trust on Corruption*

| Variables | Corruption (1) | Corruption (2) | Corruption (3) | Corruption (4) |
|---|---|---|---|---|
| Trust | 0.0373*** | 0.0337*** | 0.0239** | 0.0194** |
| | (0.0097) | (0.0106) | (0.0095) | (0.0098) |
| RGDP per Capita | | 0.0180 | 0.0342 | 0.107 |
| | | (0.0708) | (0.0624) | (0.0718) |
| Govt. Expenditures | | | 0.109*** | 0.111*** |
| | | | (0.0203) | (0.0199) |
| Import Openness | | | | 0.0141** |
| | | | | (0.0068) |
| Constant | 3.638*** | 3.498*** | 1.450 | -0.0058 |
| | (1.072) | (1.256) | (1.179) | (1.369) |
| R-squared | 0.35 | 0.35 | 0.49 | 0.51 |
| Sargan test | (p = 0.26) | (p = 0.23) | (p = 0.74) | (p = 0.92) |
| Basmana Test | (p = 0.28) | (p = 0.26) | (p = 0.79) | (p = 0.94) |

Note: Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

When real GDP per capita is included in the analysis, the results show that the coefficient of trust remains consistent while GDP per capita shows insignificant negative impact on corruption. The results continue to hold in column 3. The coefficient of government expenditures shows that larger government size control corruption more effectively (La Porta *et al*., 1999; Billger and Goel, 2009; Dimant & Tosato, 2018). Shabbir and Butt (2014) also discuss that Scandinavian countries have larger government size yet are the least corrupt countries.

When import openness is used as a control variable in column 4, parallel results are obtained for all the variables including trust. According to Ades and Di-Tella (1999) import openness brings transparency of transactions and produces competition which requires more efficient outcome, so resources are utilized in productive activities instead of rent seeking activities.

The study employs Sargan's test and tests the hypothesis that the instrumental variables are uncorrelated with error term. Since the p-values are greater than 0.1, we cannot reject the null hypothesis and thus conclude that all the instruments are acceptable in our 2SLS analysis. The earlier results of pooled OLS and REM are confirmed with 2SLS estimations and all these findings identify trust as a key determinant of corruption.

Finally, the study uses GMM estimation technique to address the issue of endogeneity between trust and corruption. The GMM estimation results are reported in the Table 6.

**Table 6**

*GMM Estimation Results for the Impact of Trust on Corruption*

| Variables | Corruption (1) | Corruption (2) | Corruption (3) | Corruption (4) |
|---|---|---|---|---|
| Trust | 0.0412** | 0.0705* | 0.0327* | 0.0279* |
| | (0.0182) | (0.0362) | (0.0192) | (0.0172) |
| RGDP per Capita | | -0.244 | -0.0260 | 0.0591 |
| | | (0.241) | (0.127) | (0.0876) |
| Govt. Expenditures | | | 0.104*** | 0.110*** |
| | | | (0.0317) | (0.0229) |
| Import Openness | | | | 0.0126* |
| | | | | (0.0066) |
| Constant | 8.229 | 10.41 | 2.506 | -0.0930 |
| | (5.571) | (7.658) | (3.485) | (3.493) |
| Hansen's J chi2(6) Test | 4.18593 (p = 0.6515) | 5.67191 (p = 0.4609) | 3.59925 (p = 0.7307) | 2.04205 (p = 0.9158) |
| R-squared | 0.225 | 0.033 | 0.481 | 0.504 |

Note: Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

The GMM estimation results reported in Table 6 confirm our earlier findings. It means trust may foster pro-social behaviors and discourage corruption by raising the confidence among citizens that the incidents of corruption will be discovered and punished. The table also shows the results of Hansen'J test which confirms that the instruments are valid and our findings are not suffering from the endogeneity problem. It is important to mention that GMM approach addresses endogeneity and allow us to rule out reverse causality and it identifies the direct effects of trust on corruption. Moreover, we have already reported the results of the residual and our residuals are not indicating the presence of endogeneity.

The results of sensitivity analysis also validate that besides other determinants of corruption, trust (social capital) plays an essential role in the determination of corruption. Table 7 reports the results for sensitivity analysis.

Table 7 shows that higher level of democracy is linked with lower level of corruption. It means provision of more opportunities for people to participate in the selection of their government leads to a low level of corruption indicating that more democratic government and people are less tolerant for corruption (Treisman, 2000). The table also reveals that it is more likely that a country having more education (gross enrollment ratio) will experience a low level of corruption because higher education reduces a person's acceptance for corruption and increases the probability of detection (Shabbir & Butt, 2014; Dimant & Tosato, 2018).

**Table 7**

*Sensitivity Analysis for the Impact of Trust on Corruption*

| Variables | Corruption | Corruption | Corruption | Corruption | Corruption | Corruption |
|---|---|---|---|---|---|---|
| Trust | 0.0324*** | 0.0245*** | 0.0158* | 0.0149* | 0.0177** | 0.0247*** |
| | (0.0059) | (0.0087) | (0.0079) | (0.0078) | (0.0076) | (0.0059) |
| RGDP per Capita | 0.0588 | 0.126 | 0.101 | 0.0728 | 0.083 | 0.0599 |
| | (0.0545) | (0.0774) | (0.0657) | (0.0635) | (0.0639) | (0.0538) |
| Govt. expenditures | 0.0637*** | 0.0911*** | 0.0801*** | 0.0963*** | 0.0960*** | 0.0700*** |
| | (0.0163) | (0.0223) | (0.0201) | (0.0197) | (0.0201) | (0.016) |
| Import Openness | 0.0115*** | 0.0052 | 0.0063* | 0.0079** | 0.0087** | 0.0031 |
| | (0.0041) | (0.0051) | (0.0037) | (0.0036) | (0.0037) | (0.0033) |
| Democracy | 0.0913*** | | | | | |
| | (0.0142) | | | | | |
| Gross Enroll. Ratio | | 0.0069* | | | | |
| | | (0.0041) | | | | |
| Rule of Law | | | 0.324*** | | | |
| | | | (0.104) | | | |
| Govt. Effectiveness | | | | 0.329*** | | |
| | | | | (0.0989) | | |
| Regulatory Quality | | | | | 0.294*** | |
| | | | | | (0.098) | |
| Economic Freedom | | | | | | 0.0555*** |
| | | | | | | (0.0082) |
| Constant | 0.502 | -0.404 | 0.761 | 0.664 | 0.423 | -3.571*** |
| | (1.145) | (1.133) | (1.27) | (1.213) | (1.221) | (0.797) |
| Observations | 136 | 93 | 100 | 97 | 97 | 121 |
| R-squared | 0.59 | 0.473 | 0.515 | 0.559 | 0.55 | 0.615 |

Note: Robust standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1.

The government effectiveness, regulatory quality and rule of law have significant negative impact on corruption and it is more likely that a country having more effective government with higher quality officials will experience low level of corruption (Billger and Goel, 2009). Similar results are also reported for the economic freedom, showing that higher freedom is related with lower levels of corruption (Dimant & Tosato, 2018).

These findings suggest that illegal behavior has direct relation with the potential gains from illegal activity and inverse relation with the probability of detection. The results show that most trusting societies have low levels of corruption. It implies that chances of detection and punishment are perhaps high for trusting societies because of strong institutions and respect for law. Therefore, this high cost of corruption reduces the likelihood of corruption for the trusting societies.

As discussed earlier, previous empirical studies have produced mixed and conflicting results on the direction of the causal relationship between trust and corruption and no agreement is reached about the main direction of causality between these variables. Therefore, it is imperative to check for the robustness of our results. Granger (1969) procedure suggests causation of variables in a given model. The study has conducted Granger causality tests to make sure about the causation of variables and Granger causality tests results are reported in Table 8.

**Table 8**

*Panel Granger Causality Tests Results*

| Null hypothesis | Observations | F- Statistic | Prob. |
|---|---|---|---|
| Trust does not Granger causes Corruption | 1256 | 4.07877 | 0.0172* |
| Corruption does not Granger causes Trust | | 1.12675 | 0.3244 |

The Granger causality test results reported in Table 8 confirm that there is unidirectional causality between trust and corruption and this unidirectional Granger causality runs from trust to corruption. It implies that trust causes corruption but there is no evidence of reverse causality of corruption on trust (Graeff & Svendsen, 2013). This fact is also a confirmation of our earlier assumption that the causality runs from trust to corruption.

## Conclusion

In this study we attempt to extend the existing literature on determinants of corruption by empirically investigating the impact of social capital (trust) on corruption using suitable estimation techniques to deal with the endogenous nature of trust. The study focuses on the model given by Becker (1968) and the data is taken for a sample of 72 countries over the time period 1984-2016. In this study, corruption perception index is used as dependent variables while trust as well as traditional economic variables are used as explanatory variables.

Our study finds that trust has a significant negative impact on corruption level. It means development of cooperative ethos, norms and trust may reduce a person's acceptance for illegal behavior and creates incentives to follow the written rules. Trusting societies have higher respect for law so the risk of detection of corrupt activities is perhaps higher in these societies. Therefore, it can be concluded that corruption can be controlled with the augmentation of social capital.

Our study finds that control variables have expected negative impact on corruption indicating that GDP per capita, government expenditures and import openness can be helpful in controlling corruption. Generally, regardless of the treatment we employ, we find that the patterns established by the pooled OLS regression results largely remain the same and trust sands the wheels of corruption.

Although, the determinants of corruption have been addressed in corruption literature through different channels however, our study suggests that social capital is yet, another channel through which corruption can be controlled. Moreover, our study contributes to a longstanding debate of direction of causality between trust and corruption and provides a clear identification of the causal link from trust to corruption.

There are few limitations of this study. The first limitation of our study is that we have used trust as a proxy for social capital however, social capital consists of “trust, norm and network”. Another limitation is data constraint for social capital as “World Value Survey” includes limited number of countries. Future research can use different measures of social capital for a larger set of countries.

The study recommends that education programs should focus on polices that improve trust in the society. In addition, efforts should be made for the encouragement of social capital as it has been identified as a key determinant of corruption, which can sands the wheels of corruption.

## References

Ades, A., & Di-Tella, R. (1999). Rents, competition and corruption. *American Economic Review*, *89*(4), 982-993.

Arrow, K. (1972). Gift and exchanges. *Philosophy and Public Affairs*, *1*(4), 343-362.

Bardhan, P. (1997). Corruption and development: A review of issues. *Journal of Economic Literature*, *35*(3), 1320-1346.

Becker, G. (1968). Crime and punishment: An economic approach. *The Journal of Political Economy*, *76*(2), 169-217.

Billger, S., & Goel, R. (2009). Do existing corruption levels matter in controlling corruption? Cross-country quantile regression estimates. *Journal of Development Economics*, *90*(2), 299-305.

Bjornskov, C. (2003). *Corruption and social capital*. Working paper No. 03-13. Aarhus University, Denmark.

Bjornskov, C. (2012). How does social trust affect economic growth? *Southern Economic Journal*, *78*, 1346-1368.

Bozovic, I. (2017). Social capital and corruption in post-communist countries. In: *International Studies Association Annual Meeting*, Baltimore.

Breuer, J. B., & McDermott, J. (2013). Respect, responsibility, and development. *Journal of Development Economics*, *105*, 36-47.

Coleman, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, 95-121.

Corbacho, A., Philipp, J., & Ruiz-Vega, M. (2015). Crime and erosion of trust: Evidence for Latin America. *World Development*, *70*, 400-415.

Dimant, E., & Tosato, G. (2018). Causes and effects of corruption: What has past decade's empirical research taught us? A survey. *Journal of Economic Surveys*, *32*(2), 335-356.

Gokcekus, O., & Suzuki, Y. (2013). Intensity of trade with the EU and corruption in Africa. *Journal of Economic Integration*, *28*(4), 610-630.

Graeff, P., & Svendsen, G. (2013). Trust and corruption: The influence of positive and negative social capital on the economic development in the European Union. *Quality and Quantity*, *47*(5), 2829-2846.

Granger, C.W. J. (1969). Investing causal relations by econometric methods and spectral methods. *Econometrica*, *34*, 424-438.

Huntington, S. P. (1968). *Political order in changing societies*. New Haven: Yale University Press.

Kalenborn, C., & Lessmann, C. (2013). The impact of democracy and press freedom on corruption: Conditionality matters. *Journal of Policy Modeling*, *35*(6), 857-886.

Khalifa, S. (2016). Trust, landscape, and economic development. *Journal of Economic Development*, *41*(1), 19-32.

Khan, F. N., & Majeed, M. T. (2018). Education levels and Life Expectancy of Males and Females: Empirical Evidence from Pakistan. *Journal of Arts and Social Sciences*, *5* (1), 96-114.

Kubbe, I. (2014). Corruption and trust: A model design. In T. Debiel & A. Gawrich (Eds.), *Functionalities of Corruption* (pp. 117-135). NewYork, NY: Springer.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1999). The quality of government. *The Journal of Law, Economics, and Organization*, *15*(1), 222-279.

Majeed, M. T. (2014). Corruption and trade. *Journal of Economic Integration*, *29*(4), 759-782.

Majeed, M. T., & Ajaz, T. (2018). Social capital as a determinant of population health outcomes: A global perspective. *Pakistan Journal of Commerce & Social Sciences*, *12*(1), 52-77.

Morris, S., & Klesner, J. (2010). Corruption and trust: Theoretical considerations and evidence from Mexico. *Comparative Political Studies*, *43*(10), 1258-1285.

Putnam, R. (1993). *Making democracy work, civic traditions in modern Italy*. Princeton: Princeton University Press.

Rose-Ackerman, S. (1999). *Corruption and government: Causes, consequences and reform*. Cambridge: Cambridge University Press.

Rose-Ackerman, S., & Palifka, B. (2016). *Corruption and government: Causes, consequences and reform*. Cambridge: Cambridge University Press.

Saha, S., & Ben-Ali, S. (2017). Corruption and economic Development: New evidence from the Middle Eastern and North African countries. *Economic Analysis and Policy*, *54*, 83-95.

Seldadyo, H., & De-Haan, J. (2006). The determinants of corruption: A literature survey and new evidence. In Paper presented at the *European Public Choice Society Conference* (pp.1-60). Turku, Finland.

Seligson, M. (2002). The impact of corruption on regime legitimacy: A comparative study of four Latin American countries. *The Journal of Politics*, *64*(2), 408-433.

Shabbir, G., & Butt, A. R. (2014). Socioeconomic determinants of corruption: A cross country evidence and analysis. *Forman Journal of Economic Studies*, *10*, 79-104.

Sobel, J. (2002). Can we trust social capital?. *Journal of Economic literature*, *40*(1), 139-154.

Treisman, D. (2000). The causes of corruption: A cross-national study. *Journal of Public Economics*, *76*(3), 399-457.

Uslaner, E. M. (2002). *The moral foundations of trust*. Cambridge: Cambridge University Press.

Uslaner, E. M. (2009). Corruption. In G. T. Svendsen & G. L. H. Svendsen (Eds.), *The Hand Book on Social Capital* (pp. 127-142). London, Edward Elgar.

World Bank (2004). *The costs of corruption*. Washington, DC: World Bank.

World Bank (2017). *World Development Indicators*. Washington, DC: World Bank.

Received: Feb 20th, 2018
Revisions Received: Nov 15th, 2018

**Appendix**

**Table A 1: List of countries**

| | | | | |
|---|---|---|---|---|
| Albania | Colombia | Iraq | New Zealand | Switzerland |
| Algeria | Cyprus | Israel | Nigeria | Thailand |
| Argentina | Czech Republic | Italy | Norway | Tunisia |
| Armenia | El Salvador | Japan | Pakistan | Turkey |
| Australia | Estonia | Jordan | Poland | Ukraine |
| Azerbaijan | Finland | Kuwait | Qatar | United Kingdom |
| Bahrain | Ethiopia | Lebanon | Romania | United States |
| Bangladesh | France | Libya | Russian Federation | Uruguay |
| Belarus | Germany | Lithuania | Saudi Arabia | Venezuela, RB |
| Brazil | Ghana | Malaysia | Singapore | Vietnam |
| Bulgaria | Hong Kong | Mali | Slovak Republic | Yemen, Rep. |
| Burkina Faso | Hungary | Mexico | Slovenia | Zimbabwe |
| Canada | India | Moldova | South Africa | |
| Chile | Indonesia | Morocco | Spain | |
| China | Iran, Islamic Rep. | Netherlands | Sweden | |

**Table A2**

*Descriptive Statistics*

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Corruption Index | 3727 | 3.0084 | 1.3456 | 0 | 6 |
| Trust Score | 236 | 25.9186 | 14.5750 | 3.2 | 73.7 |
| RGDP per capita | 6496 | 10.2385 | 2.2043 | 4.6294 | 16.4514 |
| Govt. expenditures | 6738 | 16.5927 | 7.9893 | 0 | 156.5315 |
| Imports openness | 7023 | 44.2388 | 29.3678 | 0 | 424.8172 |
| Democracy | 6446 | 1.3099 | 7.4068 | -10 | 10 |
| Gross enrl. ratio | 5756 | 62.0851 | 33.9882 | 0 | 166.1359 |
| Rule of law | 3312 | -0.0138 | 0.9961 | -2.6688 | 2.1205 |
| Govt. effectiveness | 3247 | -0.0108 | 1.0003 | -2.4796 | 2.4296 |
| Reg. quality | 3247 | -0.0106 | 0.9991 | -2.6754 | 2.2473 |
| Eco. Freedom | 3170 | 59.1713 | 11.8355 | 1 | 90.50 |

**Table A3**

*Correlation Matrix*

| Variables | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Corruption Index | 1 | 1 | | | | | | | | | | |
| Trust Score | 2 | 0.48 | 1.00 | | | | | | | | | |
| RGDP per capita | 3 | 0.22 | 0.44 | 1.00 | | | | | | | | |
| Govt. exp. | 4 | 0.63 | 0.35 | -0.07 | 1.00 | | | | | | | |
| Import openness | 5 | 0.12 | -0.03 | -0.37 | 0.32 | 1.00 | | | | | | |
| Democracy | 6 | 0.53 | 0.17 | 0.20 | 0.24 | 0.13 | 1.00 | | | | | |
| Gross enrl. ratio | 7 | 0.25 | -0.11 | -0.11 | 0.14 | 0.16 | 0.32 | 1.00 | | | | |
| Rule of law | 8 | 0.65 | 0.46 | 0.16 | 0.52 | 0.22 | 0.38 | 0.10 | 1.00 | | | |
| Govt. effect. | 9 | 0.62 | 0.47 | 0.16 | 0.48 | 0.22 | 0.36 | 0.09 | 0.93 | 1.00 | | |
| Reg. Quality | 10 | 0.61 | 0.43 | 0.07 | 0.50 | 0.27 | 0.29 | 0.17 | 0.91 | 0.93 | 1.00 | |
| Eco. Freedom | 11 | 0.57 | 0.20 | 0.18 | 0.32 | 0.09 | 0.48 | 0.33 | 0.51 | 0.46 | 0.54 | 1.00 |

Figure 1: Box plots of residuals of Models 1, 2, 3, 4