Corruption and Stock Market Development: Developing vs. Developed Economies

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Abstract

This paper looks at the impact of corruption on stock market development, emphasizing the difference between developing and developed economies and the role corruption may play in preventing firms from listing. After setting up a theoretical model that explains why corruption's impact on stock market development may differ, we use a sample of 87 economies worldwide over the period 1995–2017 to test its hypotheses. For the full sample we find no evidence that corruption has a significant effect on stock market development, but this changes when we split the sample into two groups: high-income and low-income countries. For the subsample of poorer (developing) countries, the corruption-stock market development relationship remains insignificant or weak. For the subsample of high-income (developed) countries, however, we find a significant relationship between lower levels of corruption and stock market capitalization as a share of gross domestic product. Our results further indicate that higher levels of income and investment reduce the impact of that aforementioned relationship, suggesting a form of diminishing returns, but this is in line with our theoretical model's results. Our results are robust to alternative estimation specifications and confirm the importance of macroeconomic fundamentals (i.e., income, investment, domestic credit, and macroeconomic stability) for the development of stock markets. In particular, those fundamentals seem more important for developing economies before reduced corruption will have as much (if any) of an impact.

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1 Introduction

This paper looks at the impact of corruption on stock market development in developing versus developed economies. While it is fairly well-known that corruption in general has economic effects, we provide evidence that when it comes to stock market development, corruption may only impact economies beyond a certain development threshold.

Given the importance of financial markets in spurring economic growth, many researchers have investigated their influences.[1] Yartey (2010) shows that institutional quality in general, and corruption in particular, affect stock market development as measured by stock market capitalization, a proxy for size. We build on this work by highlighting an important dichotomy, that this relationship only seems to hold for developed (high-income) economies. First, we show that developed economies exhibit a significant negative relationship between corruption and stock market capitalization. The magnitude of corruption's impact decreases, however, as the economy's stock market becomes more developed, ceteris paribus. Secondly, we show that the relationship between corruption and stock market capitalization for developing economies is far less important, often showing as insignificant. Third, we also show that corruption's negative effect on stock market size (market capitalization) comes at least in part from the fact that it reduces the number of listed firms. This makes intuitive sense since corruption increases transaction costs for firms and, in turn, raises the costs firms must cover to expand, invest, and list on stock markets. Therefore, our work also contributes to the literature by providing evidence of a mechanism through which corruption hinders stock market development: by keeping firms from listing on stock markets.

To arrive at our results, we first set up, calibrate, and numerically solve a simple model that formalizes the impact of reducing corruption on stock market size for developed and developing countries. In our model, corruption forces firms to incur an additional cost before they can operate and list on the stock market, a cost that could be thought of as necessary to pay bribes or overcome excessive red-tape. In developed economies, where such costs are lower to begin with and firms are more productive (and therefore more profitable), a reduction in the cost of corruption can increase stock market size by enabling more firms (even those with lower productivity) to afford

[1] For more on the economic effects of corruption, see Fisman and Miguel (2007), Mauro (1995), Murphy et al. (1993), Shleifer and Vishny (1993).

to list on the stock market. In developing economies, on the other hand, where firm productivity is lower and corruption is higher to begin with, reducing corruption marginally may have no effect on firms' ability to enter the stock market. The difference is that in these economies, the cost of corruption remains prohibitive enough for additional firms to list, even with a small decrease. Therefore, reducing corruption in developing economies may have no impact on stock market size even though it increases it in developed economies.

We then use a panel data set of 87 countries over the period of 1995 to 2017 to test our model's predictions. Employing a static fixed effects model, we find that reduced corruption does increase an economy's stock market development, but that this effect is only statistically significant for developed economies, and that the marginal effect decreases with income, confirming our model's predictions. We then verify the robustness of our results by estimating our panel data set in a dynamic setting using system GMM, which can control for endogeneity concerns, and by testing our results with alternate proxies for stock market size and the measurement of corruption.

Corruption can, of course, affect other aspects of the stock market, as we detail further in the next section. For example, Lakshmi et al. (2021) finds that corruption reduces stock market returns for Brazil, Russia, India, and China (the BRIC economies) and Jamaani and Ahmed (2021) find empirical evidence that control of corruption reduced IPO underpricing in the G20 countries. Corruption can also affect financial development in general as measured by the depth of private credit (Kunieda et al., 2016, Ahlin and Pang, 2008, Altunbas and Thornton, 2012), as measured by broad money (Batabyal and Chowdhury 2015, Song el al, 2021), as measured by loan quality (Park, 2012), and as measured by bank's capital structure (Elshandidy and Acheampong, 2021). And corruption has been shown to directly affect investment as shown by the seminal work of Mauro (1995). Our goal is to build on this literature by focusing not only on corruption's effect on stock market size, but the difference of that relationship between developing and developed economies. We do so both theoretically, in sections 3 and 4, and empirically, in sections 5 and 6, then conclude in section 7.

2 Literature Review

This study closely relates to the theoretical and empirical literature that investigates the impact of institutional factors on stock market development.[2] Ahlin and Pang (2008) distinguish two strands of literature that examine corruption and finance together. The first strand includes seminal papers like La Porta et al. (1997) and La Porta et al. (1998) which focus on factors such as an economy's legal origins, and legal and corruption variables more generally as determinants of financial development. The second strand considers finance and corruption together in the context of growth (Claessens and Laeven, 2003; Beck et al., 2005; Johnson et al., 2002). These papers find that both financial development and reductions in corruption promote growth and that there is some degree of substitutability between the two.

In line with the first strand distinguished by Ahlin and Pang (2008) but more broadly, a number of papers show that legal systems, transparency, property rights, contract enforcement, and low levels of corruption are critical for the development of stock markets (Billmeier and Massa, 2009; Jayasuriya, 2005; Lombardo and Pagano, 2000; La Porta et al., 1997, 1998; Buchanan and English, 2007; Pistor et al., 2000; Mayer and Sussman, 2001; Levine and Zervos, 1998; and Creane et al., 2004). Pagano (1993) discusses the channels through which improvements in financial development can benefit a country's economic growth.

Using a panel of 17 emerging economies, Billmeier and Massa (2009) found that institutional factors have a positive impact on stock market development. They used the 2007 edition of Heritage Foundation's Index of Economic Freedom to measure institutional quality. This index is the weighted average of eleven components: trade policy, fiscal burden, government intervention, monetary policy, capital flows, foreign investment, banking and finance, property rights, wages and prices, regulation, and black marketing. Furthermore, stock market performance is measured as stock market capitalization as a share of GDP, the same variable used as the primary dependent variable in this study.

Using data from 18 emerging economies, Jayasuriya (2005) examined the link between stock market liberalization and stock return volatility and showed that stock return volatility may in-

[2] Table 1 summarizes the major papers in this section.

crease, decrease, or remain unchanged in the post-liberalization period. However, he also explored the link between post-liberalization volatility and favorable market characteristics such as greater transparency, protection of investor rights, and institutional quality including respect for the rule of law and lower levels of corruption. Jayasuriya (2005) found that improved stock market characteristics and institutional quality reduced stock return volatility in the 18 emerging economies he studied. Our study also considers developing economies, but with a distinct comparison to developed economies, with corruption used as our primary regressor, and stock market development as our dependent variable (measured by stock market capitalization as a share of GDP and number of listed domestic companies).

Lombardo and Pagano (2000) studied both developed and emerging markets, using stock market indices to analyze the link between institutional quality and return on equity. They used lack of corruption, judicial efficiency, rule of law, quality of accounting standards, low risk of repudiation of contracts, and nationalization as measures of institutional quality, and total return on national equity markets, dividend yield, and the earnings-price ratio to measure return on equity (ROE). All forms of institutional quality were positively correlated with the authors' measures of ROE for both developed and emerging markets, differing somewhat from our results that show a distinction between the effects of corruption on developing and developed economies. This is likely due to the fact that we look at its impact on stock market capitalization as a share of GDP and the number of domestic companies than ROE, as our theory section emphasizes.

Pagano (1993) used a theoretical model to show that regulatory and institutional factors can influence the functioning of stock markets and make them more–or less–efficient. That is, transparency and less preventive regulations may increase investor participation and enhance investor confidence, and this can have a positive effect on stock market development. La Porta et al. (1997) used a panel of 49 economies to show that protecting investor rights and improving law enforcement promotes corporate governance and eventually leads to the development of financial and capital markets. Similarly, Mao et al. (2019) described that corruption makes the financial market inefficient, and tighter regulations might enhance investor confidence in financial markets. La Porta et al. (1998) also investigated the impact of legal rights, the extent of corporate shareholder and creditor protection, and the quality of law enforcement on capital markets. Based on their sample, they showed that that a weak legal system relates negatively to investor confidence because weak laws fail to protect investors' rights. Thus, a weak judicial system can affect stock markets adversely. In general, countries with poor investor protection tend to have smaller capital markets, and these countries also suffer from having less-developed capital markets.

Buchanan and English (2007) compared the impact of an economy's legal foundation (French civil law vs. English common law) on the market capitalization-to-GDP ratio and other stock market variables. Using a sample of 24 emerging economies, they found that those from the English common law tradition have a higher average market capitalization-to-GDP ratio compared with their French civil law counterparts. Further, returns in emerging markets have higher correlations with the development of market portfolios under the English common law system. Therefore, investors have greater diversification benefits in countries with an English common law tradition. Note that common law countries have stronger legal protection systems for investors compared to their French civil law counterparts (La Porta et al., 1998). Scandinavian civil law countries are positioned in the middle.

Thus, prior studies show that a weak judicial system relates negatively to stock market development. To supplement this analysis, Pistor et al. (1998) focused on the effectiveness of legal institutions. Using a panel of transition economies (i.e., countries of Central and Eastern Europe, sub-Saharan African region), they found that efficient legal institutions have a strong impact on equity and credit market development. Previous studies also reveal that enforcement of laws cannot be a substitute for the quality of laws. Further, good law structure does not substitute for weak institutions. Thus, both strong laws and robust institutions are key drivers of stock market development.

Mayer and Sussman (2001) discussed the role of accounting disclosures in a firm's ability to raise external capital, suggesting that countries should enhance information disclosure to promote financial development. Levine and Zervos (1998) investigated the empirical relationship between stock market development and institutional regulatory factors in 16 emerging economies. They measured stock market development based on size, liquidity, volatility, and international integration, with institutional regulatory factors measured according to investor protection, accounting standards, and information disclosure. They argued that countries with robust institutional quality have well-developed stock markets compared to other countries. Creane et al. (2004) found that stock markets in both the Middle East and North Africa (MENA) region are weak and need further development. These economies can improve their markets by upgrading institutional quality, such as stable legal frameworks, property rights, and investor confidence.

The above results provide robust empirical evidence that corruption control (meaning reduced corruption) can lead to the growth and development of an efficient stock market for a variety of reasons. First, stock market development depends on investors' rights and confidence levels; corruption control makes investors more confident because their rights are more protected, and consequently corruption control has a positive effect on stock market development. Second, low levels of corruption may reduce return volatility, and potential investors are willing to invest in a market with low volatility if it comes along with protection against corruption. Third, evidence shows that multinational companies are more interested in investing in markets with low levels of corruption. Finally, firms consider stock markets as a source of finance as they have confidence in the market.

The mechanism we stress in this paper is simply the cost of listing and therefore gaining access to capital, as our next section describes.

3 Model

To model the effects of the cost of corruption on stock market size, we assume that to list on the stock market firms must be able to pay bribes (alongside other costs) to overcome red tape and excessive bureaucracy.[3] But firms are heterogeneous in terms of their productivity; therefore not all of them can afford to pay the fixed cost to list on the stock exchange and still maintain a positive level of profit. Only a fraction of firms–those who are most productive–will be able to bear the additional cost of corruption and list on the stock exchange in order to produce their goods.

[3]Aside from red tape, other drivers of corruption include asymmetric information between the tax authority and firms since their profitability cannot be always verified (Aidt, 2003). Note that these issues are typically worse in developing economies. See Goel and Nelson (2010) for further drivers of corruption.

To introduce heterogeneity, we build a model with firms who produce differentiated goods and therefore operate in a monopolistically competitive market. Consumers demand goods produced by each firm depending on the price charged by that firm relative to prices set by other firms and depending on the elasticity of substitution between firms. This type of model is simply an application of Melitz (2003).

3.1 Demand side

We assume that consumers in each of two countries indexed by $i = l, h$ derive utility from a continuum of goods produced. Therefore, their utility for consumer in each country i is given by,

$$U_i = \left(\int_{\omega_i \in \Omega_i} q_{\omega_i}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

where Ω_i is the set of active and listed firms in country i who are indexed by ω_i. Also, q_{ω_i} is the demand for product ω_i by consumers in country i, and σ governs the elasticity of substitution across goods. In each country, consumers' labor income is given by W_i, where W_i is hourly wage and L_i is the total quantity of effective labor that is inelastically supplied. Assuming that $W_i = 1$, then aggregate expenditures by consumers by consumers on all goods are given by the following expression,

$$R_i = \int_{\omega_i \in \Omega_i} p_{\omega_i} q_{\omega_i} = L_i, \tag{2}$$

where p_{ω_i} is the price of goods produced by firm ω_i.

If consumers maximize utility subject to the budget constraint, then the quantity demanded by consumers for each firm's output is given by,

$$q_{\omega_i} = \left(\frac{p_{\omega_i}}{P_i} \right)^{-\sigma} \frac{R_i}{P_i}, \tag{3}$$

where P_i is the aggregate price index in country i and is therefore given by,

$$P_i = \left(\int_{\omega_i \in \Omega_i} p_{\omega_i}^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{4}$$

3.2 Supply Side and Equilibrium

For simplicity and to focus on the decision of whether or not to pay the fixed cost associated with corruption in order to list, we assume that once firms list they are able to produce goods and sell them to consumers; otherwise, they produce zero output. Therefore, if firm profits are below zero after paying corruption costs, they do not produce or list.[4]

In any country i, listing on the stock market means a firm incurs a fixed fee of F in bribes and other obstacles but also raises capital of k_{ω_i} in the process. Firms are heterogeneous in their total factor productivity z_{ω_i}. Assuming a linear production function, then each active firm ω_i has a demand for labor l_{ω_i} given by,

$$l_{\omega_i} = F - k_{\omega_i} + \frac{q_{\omega_i}}{A_i z_{\omega_i}}, \tag{5}$$

where A_i is aggregate productivity in country i where the firm is going to list. A_i is constant across firms but can be country specific. Firms maximizing profits choose prices for their goods given by,

$$p_{\omega_i} = \frac{\sigma}{A_i z_{\omega_i}(\sigma - 1)}, \tag{6}$$

where $\frac{1}{z_{\omega_i}}$ represents the marginal cost for each firm and $\frac{\sigma}{(\sigma-1)}$ represents the markup.

When supply equals demand, the profit function of each firm ω_i in country i is given by,

$$\Pi_{\omega_i} = \left(\frac{\sigma - 1}{\sigma} A_i z_{\omega_i} P_i \right)^{\sigma-1} \frac{R_i}{\sigma} + k_{\omega_i} - F \tag{7}$$

[4] The major conclusions of the model would not change if the economy had another sector where firms who do not list could operate and make a profit level that was lower than that of comparable listed firms. This is because firms would still only list if their profit was above zero.

3.3 Model Solution and Calibration

Depending on k_{ω_i}, F and z_{ω_i}, Π_{ω_i} can be zero, negative, or positive. In particular, there exists a threshold level of z_{ω_i}, which we call $\overline{z}_i$, above which firms earn a positive level of profit and therefore are able to list on the stock exchange and produce. Therefore, the solution to the model is a continuum of firms who are active given the fixed costs and individual and aggregate productivity that they face.

3.3.1 Solution

To find the threshold level in each country above which firms will be able to afford the costs of listing, we set $\Pi_{\omega_i} = 0$ and solve for $\overline{z}_i$ to find the following,

$$\overline{z}_i = \frac{(F - k_{\omega_i})^{\frac{1}{\sigma-1}}}{A_i} \frac{\sigma}{P_i(\sigma - 1)} \left(\frac{\sigma}{R_i}\right)^{\frac{1}{\sigma-1}}. \tag{8}$$

The expression for the threshold of productivity above given by 8 along with the equations 4 and 6 for aggregate price and firm level price characterize the solution for the model (ie the equilibrium level of productivity firms must reach in order to list).

3.3.2 Calibration

We assume that country h is a developed economy while country l is a developing one. Therefore, A_h is double the level of A_l, meaning that country h has double the productivity level of country l. Increasing the productivity gaps between the two countries does not alter our results. The elasticity of substitution σ is set to 2 and L_i and R_i correspond to aggregate productivity[5]. We also assume that firm productivity is uniformly distributed over the interval of $[0, 1]$ and that the level of capital each firms gets when it lists (k_{ω_i}) corresponds to its productivity level ($A_i z_{\omega_i}$). With these assumptions and settings, we can solve for the fraction of firms who will list on the

[5]For methods to estimate the elasticity of substitution see Broda and Weinstein (2006), Soderbery (2015), and Hertel et al. (2007)

stock exchange in each country as,

$$N_i = 1 - \overline{z_i}. \tag{9}$$

Using equations 4, 6, 8, and 9, we can study the effect of changes in the costs associated with corruption on the fraction of firms listed.

3.4 Numerical Results and Discussion

To examine the marginal effect of corruption costs on the fraction of firms listed, we must first derive the fraction of firms listed as a function of corruption costs, then calculate how it varies as F varies. We can then examine how that effect itself changes with a country's development status and its initial (or preexisting) level of corruption.

To that end, we use equations 4, 6, 8, and 9 alongside the parameters defined in subsection 3.3.2 to solve for the equilibrium fraction of firms who list over a range of values for $F \in [0, \overline{F}_i]$, $i = l, h$. We assume that at $F = 0$, all firms list such that $N_i = 1$. On the other hand, a value of $F = \overline{F}_i$ prevents any firm from listing so $N_i = 0$. In other words, $\overline{F}_i$ is the value of F where the most productive firm in the distribution would make zero profit. The solution, illustrated in Figure 1, is two functions: one describing the change in the fraction of listed firms as F changes for country h, and another function describing the change in the fraction of listed firms as F changes for country l. We then calculate the marginal effect of changes in corruption costs for both countries over the intervals of $F \in [0, \overline{F}_i]$, $i = l, h$, and illustrate the behavior of the marginal effects of changes in corruption levels and costs in Figure 2.

The solution to our model as depicted in Figures 1 and 2 reveals four facts. First, for F below $\overline{F}_l$, both functions in Figure 1 are downward sloping, so the marginal effect of corruption on the fraction of firms listed is negative. If the fraction of firms listed describes the size of the stock market, then, lowering the cost of corruption increases the size of the stock market[6].

Secondly, for F above $\overline{F}_l$, there exists a discontinuity in the marginal effects curve of country l (the solid line in Figure 2). The discontinuity results from the fact that between $\overline{F}_l$ and $\overline{F}_h$,

[6]We can also assume that size of the stock market reflects its development level.

no firms list in country l at all, while some firms do still list in country h. Over that interval of F, the marginal effect of corruption on stock market size in country l jumps to zero because the combination of high corruption costs and low aggregate productivity—developing economy conditions—mean that no firms can profitably list even if corruption is marginally reduced. For developed economies, on the other hand, with higher aggregate productivity, reducing corruption marginally continues to lead to more firms listing over the interval $(\overline{F}_l, \overline{F}_h)$, as listing remains profitable for some firms. Thus, developed economies may experience an increase in stock market size from marginally reducing corruption costs while developing countries do not.

Thirdly, Figure 1 shows that for both countries, the curves flattens as corruption costs rise; the impact of corruption on stock market size weakens at higher levels of corruption. This means for countries with higher preexisting levels of corruption (ie developing economies), changes in its associated costs generate smaller gains in stock market size as compared to countries with lower levels of corruption. If corruption is already high, most firms are already excluded from listing, so changing the cost of corruption by 1 unit will not affect those firms. At such high levels of corruption, changes in its costs affect a smaller group of firms and in turn have less of an effect on stock market size. Again, when the cost of corruption (F) is high enough that $\overline{F_l} < F < \overline{F_h}$, the marginal effect of reducing corruption costs on the fraction of firms listed is zero for country l.

Lastly, Figure 1 shows that the slope of the solution function for country l is steeper than that for country h at low levels of corruption; the marginal effect of lowering corruption on stock market size is larger for countries with lower productivity (holding everything else constant), when corruption is low. Intuitively, in countries where productivity is low (developing economies), fewer firms are likely to generate a profit high enough to overcome the cost of corruption and list. A reduction in corruption therefore generates a larger increase in firms listing relative to a more productive, developed economy, where firms are more profitable (and therefore already listed).

To further illustrate how corruption's effects can vary depending on an economy's stage of development and preexisting corruption level, we compute the marginal effect of corruption on the fraction of firms listed under different scenarios (using the equations from our model as depicted in Figures 1 and 2), and summarize the scenarios in Table 2. Examining scenario 1 in Table 2, we find that when corruption costs are too high, the effect of corruption on stock market size is zero for developing economies. Examining scenarios 2 and 3 in the developing country column, we find the lower corruption is, the stronger its effect on stock market size. A similar trend appears by examining scenarios 2 and 3 in the developed country column. When comparing scenarios 2 and 3 between the developed and developing country columns, we also see that the effect of corruption on the stock market size is weaker in the higher productivity economy (the case for the developed country).

In the following section we empirically estimate the marginal effect of reducing corruption on stock market size as measured by stock market capitalization and number of firms listed (and other measures). For developed economies, reducing corruption increases stock market size, suggesting that corruption costs must be below their threshold $\overline{F}_h$. For developing economies, reducing such costs has little to no effect on stock market size implying that corruption costs must be too high (above $\overline{F_l}$). Therefore, our empirical results verify the relevance of scenario 1 in Table 2.

4 Data, Variables, and Preliminary Analysis

4.1 Data and Variables

The data we use on stock market variables and macroeconomic fundamentals is sourced from the World Bank's World Development Indicators (WDI) database, with the definitions of variables reported in Table 3. Stock market capitalization as a share of GDP is used to capture stock market development. This variable is defined using the share prices of listed domestic companies (in USD) times the number of shares outstanding divided by a country's GDP (also in USD) so that it is in percentage terms rather than currency units, and we use yearly stock market capitalization data for 87 economies over the period 1995 to 2017.

There are two advantages to using stock market capitalization as a proxy for stock market development. First, Demirguc-Kunt and Levine (1996) found that different individual indices or measures of stock market development are highly correlated with stock market capitalization, and second, it is a better and less arbitrary proxy than a composite financial index that includes different measures of financial deepening, such as the banking and nonbanking sectors (Billmeier and Massa, 2009). Moreover, Garcia and Liu (2016) have argued that market capitalization refers to the general development of the stock market and is thus a better index. As a robustness check, in keeping with previous studies (Yartey, 2010), we also use listed domestic companies as a secondary proxy for stock market development. In section 6.5, we also discuss other measures of stock market development.

Following prior studies (Elshandidya and Acheampong, 2021; Park, 2012; Uddin et al., 2020), to measure corruption in an economy, we use the corruption perceptions index (CPI) from Transparency International (TI). The CPI captures corruption control, therefore, higher values of the CPI imply lower corruption level. Yearly CPI data is available from 1995 to 2017. TI first published CPI data for 41 countries in 1995. After that, TI gradually increased the sample number of countries, but it published CPI scores on a scale of 0–10 from 1995 to 2011 and on a scale of 0–100 from 2012 to 2017. In this study, the CPI score is multiplied by 10 to convert the scores from 1995 to 2011. Therefore, all the CPI scores range from 0 to 100, with 0 indicating "highly corrupt" and 100 suggesting "very clean"–a higher CPI refers to lower levels of corruption.[7] The CPI is a comprehensive and widely used proxy of cross-country variation in corruption (Papyrakis et al., 2017), and covers more countries over our sample period compared to other corruption indexes. According to TI, the CPI index presents the daily reality for people in these countries and captures the informed views of analysts, entrepreneurs, and experts worldwide (for seminal studies using the CPI see Aidt, 2011; Andres Dobson, 2011; Dobson Dobson, 2012; Elbahnasawy, 2014; Hanf et al., 2014; Krause Méndez, 2009; Swaleheen, 2008; Wu, 2006).

Next, based on the World Bank's country classifications by income level for 2020-2021, we separate our sample into two groups: developed countries (income $>$ 12,535, the high-income Group) and developing countries (income $\leq$ 12,535, the low-income Group). Figure 3 exhibits the evolution of stock market development in developed and developing economies, demonstrating the differences between the two (Sharma and Paramati, 2021). Figure 4 illustrates the CPI for developing versus developed economies, showing that the corruption control level in developed economies is approximately double that of the developing group. Also of note is that the CPI

[7] Appendix Tables A1 and A2 describe the CPI on a year by year and country by country basis.

in developing economies exhibits a fairly stable trend over the sample, but there is a modest downward trend for the developed group for the years 2000-2014.

4.2 Channels and Control variables

Two factors affect stock market development: institutional and macroeconomic determinants (Garcia and Liu, 1999). Corruption is an institutional factor; therefore, to control for the macroeconomic determinants of stock market development, we use yearly data on income, investment, banking sector development, and macroeconomic stability collected from the WDI data bank. GDP per capita (in constant 2010 US$) is used to measure income levels; likewise, gross fixed capital formation as a percentage of GDP is used to measure investment. Banking sector development is proxied by domestic credit to the private sector by banks as a share of GDP. We also control for inflation as measured by the consumer price index, and at times interpret this as a proxy for macroeconomic stability.

Our final sample of all the variables discussed in section 4 is a panel of country-year observations for the period 1995–2017. All the variables at the 1% and 99% levels are winsorized to eliminate the effect of outliers.

4.3 Preliminary analysis

Based on the country classification discussed in section 4, the descriptive statistics for all the variables for the sample period are reported in Table 4. Mean stock market capitalization as a share of GDP in developed economies is approximately twice that of developing economies. Similarly, developed economies have a higher average corruption control score (70) that is almost double that of the developing group (35). The differences in mean income per capita (38170 vs. 5521) are of course even more pronounced, while that of domestic credit as share of GDP (93 % vs 47%) is slightly less than double. Mean investment is almost equal (approximately 23) for both groups of economies, though with a higher standard deviation for the developing group, and inflation in developing economies is nearly four times higher than that of developed economies, again with a much higher standard deviation for the developing group.

Next, we perform correlation analysis for all variables, with the results reported in Table 5. The correlation of corruption control with stock market development (0.33 vs 0.53) is lower in developing economies than the developed group, which may be due to the fact that developing economies have less variability in terms of CPI overall. Domestic credit and inflation correlate more strongly with market capitalization for the developing group, again likely reflecting the lower overall variability of those variables for the developed group. Interestingly, the investment-stock market relationship is stronger for the developing group of countries, though this is likely due to diminishing returns for the developed group (hinting at a catch-up effect).

5 Empirical strategy

5.1 Static panel estimation of corruption on stock market development

We begin by using a static model to investigate the impact of corruption on stock market development. The framework follows Garcia and Liu (1999) and Billmeir and Massa (2009), employing a fixed effects model. Stock market development is used as the dependent variable and corruption as the primary regressor. The macroeconomic determinants of stock market development are controlled.

The static panel regression model can be written as

$$y_{i,t} = \phi_0 + \phi_1 C_{i,t} + \phi_2 X_{i,t} + \lambda_i + \varepsilon_{i,t}, \tag{10}$$

where $y_{i,t}$ is stock market development, proxied by stock market capitalization (normalized by GDP), and ϕ_1 and ϕ_2 are the coefficients that must be calculated. All variables are log transformed, and we use the formula $ln(\text{Inflation} + \sqrt{(}1 + \text{Inflation}^2))$ for inflation's log transformation since inflation contains negative values. $C_{i,t}$ is the primary regressor for corruption, proxied by CPI. Here, we assume that corruption is not endogenous to stock market development in the short run (approximately 23 years). The control variables, $X_{i,t}$, are those used in previous research works and listed in section 4. Control variables, such as income, investment, and domestic credit, are normalized by GDP. Inflation, which we take as a modest proxy for macroeconomic stability, is also included in the set of controls. The country-specific time-invariant effect is captured by λ_i, and the stochastic term is captured by $\varepsilon_{i,t}$.

5.2 Dynamic Panel Estimation of Corruption Effects on Stock Market Development

In this section, we consider a dynamic model in which corruption may be endogenous to stock market development. Therefore, the dynamics (and potential endogeneity) of corruption are taken into account. Like the static model in Equation 10, the dependent variable is stock market development and the primary regressor is corruption. The dynamic panel regression estimation is given by:

$$y_{i,t} = \kappa y_{i,t-1} + \phi C_{i,t} + \lambda_i + \varepsilon_{i,t}, \tag{11}$$

where $y_{i,t}$ is stock market development in country i at time t, $C_{i,t}$ is corruption in country i at time t, λ_i captures the time-invariant country-specific characteristics, and $\varepsilon_{i,t}$ captures the remainder stochastic term. Note that this study is not directly interested in the coefficient κ on the lagged dependent variable $y_{i,t-1}$. However, including this variable takes into account the dynamics of the process and may recover consistent estimates for the impact of corruption on stock market development (ϕ).

In Equation 11, we assume that the stochastic term $\varepsilon_{i,t}$ is serially uncorrelated. We also assume that the primary variable of interest, $C_{i,t}$, does not correlate with future realizations of the error term (for example $\varepsilon_{i,t+1}$). However, $C_{i,t}$ could be endogenous because it may be correlated with the present stochastic term ($\varepsilon_{i,t}$) and earlier shocks. Therefore, $\forall i$

$$E\left(C_{i,t}\varepsilon_{i,s}\right) \neq 0, s \leq t, \tag{12}$$

$$E\left(C_{i,t}\varepsilon_{i,s}\right) = 0, s > t. \tag{13}$$

To estimate ϕ in equation 11, we use the difference generalized method of moments (GMM) model developed by Holtz-Eakin et al. (1988) and Arellano and Bond (1991). This model can obtain consistent estimates of the coefficients κ and ϕ by dealing with the endogeneity of the regressors (such as that detailed by equations 12 and 13). To implement difference GMM, we eliminate the country-specific unobserved time-invariant effect, namely λ_i, by taking the first difference of $y_{i,t}$. The following equation is derived after taking the first difference of equation 11:

$$\Delta y_{i,t} = \kappa \Delta y_{i,t-1} + \phi \Delta \mathrm{C}_{i,t} + \Delta \varepsilon_{i,t} \tag{14}$$

The difference GMM method of estimation employs a vector of instruments W maintaining that the moments $E\left(\Delta\varepsilon_{i,t}W\right) = 0$. If the error term, $\varepsilon_{i,t,}$ is not serially correlated (as we assumed), then the lagged values of $y_{i,t-1}$ and $C_{i,t}$, provide valid instruments. Note that validity tests help us to verify that these two assumptions hold.

However, Blundell and Bond (1998) identified a potential shortcoming with the difference GMM model. Based on their arguments, if stock market development and corruption remain persistent over a long period, the lagged levels of these variables become rather weak instruments in the difference GMM regression equation. Therefore, Equations (11) and (14) are combined to use the system GMM model proposed by Blundell and Bond (1998). Note that the system GMM estimation requires additional moments from the equation (14) in levels which is $E\left[\left(\lambda_i + \varepsilon_{i,t}\right)W\right] = 0$. The additional instruments for the regression are the lags of the first difference of stock market development, $\Delta y_{i,t-1}$, and corruption, $\Delta \mathrm{C}_{i,t}$, respectively. System GMM estimation therefore helps to obtain consistent and efficient estimates of κ and ϕ.

To verify the validity of our estimation methods, we perform a serial correlation test to check the hypothesis that the errors in the first-difference regression exhibit no second-order serial correlation, and the Hansen test to check the validity of the instruments in terms of over-identification restrictions. For System GMM estimation, the difference-in-Hansen test is performed to evaluate the hypothesis that the additional instruments used in the levels of all the equations remain uncorrelated with the residuals.

6 Empirical Results

6.1 Static Panel Results: Explanation of Primary Regressor

Table 6 reports the results of the static panel data model. The first specification, column 1, presents the estimation results of the full sample using the static panel Equation 10. Next, as can be seen in Table 6, we split our sample into two income groups, developing (low-income) and developed (high-income). Column 2 presents the results of the estimation of the model with low-income group, whereas column 3 presents the results of the estimation of the model for the high-income group. For each treatment, the estimation results for country fixed effects are reported while controlling for income, investment, domestic credit, and inflation. Year fixed effects are also controlled for in all three.

For the full sample the coefficient on corruption is statistically insignificant, suggesting that corruption control has no impact on stock market capitalization. Based on the split-sample results, however, we see that this is not true for all economies. Column 2 shows that below the threshold income level (Income $\leq$ 12,535), the coefficient on corruption control is insignificant, but column 3 reports that above the threshold (Income $>$ 12,535) the coefficient is significant and positive in terms of influencing stock market development.

These results provide evidence in favor of our theoretical model's predictions that corruption should impact stock market development differently in different economies (scenario 1 in Table 2). Our model shows that for developing economies (where firms have lower productivity), reducing corruption marginally is not sufficient to help firms become profitable and list, particularly when corruption is high (above $\overline{F}_l$). Therefore, we would see no effect of reducing corruption on stock market development. On the other hand, higher productivity in developed economies implies that marginal reduction in corruption can help firms overcome costs of corruption and stay profitable when they list, increasing stock market development.

We also control for the macroeconomic determinants of stock market development in all three treatments presented in Table 6. The coefficients on income and investment are positive at the 1% level for full sample, low- and high-income groups, as expected. Higher income levels, which lead to increased disposable income that in turn leads to growth-oriented investment, create greater demand for the stock market and increase stock market capitalization as a share of GDP.

The domestic credit variable, however, is positive and significant only for the full sample and the developing economies. These results imply that a higher level of banking sector development is associated with a high evolution of stock market capitalization at lower income levels, again as expected. For the developed economies group, however, domestic credit shows an insignificant coefficient in column 3. This can be attributed to companies issuing debt for equity swaps, or simply to diminishing marginal returns. The coefficient on inflation is negative and insignificant for all three treatments, and if one interprets inflation as a proxy for macroeconomic stability–as we do–this means macro stability does not significantly impact stock market capitalization, consistent with Garcia and Liu (1999).

6.2 The Moderating Effect of Income and Investment level

To further study how developed economies' income and investment levels affect the corruption-stock market relationships found above, we incorporate two interaction terms, $(Corruption\ \ control) \times Income$ and $(Corruption\ \ control) \times Investment$, into Equation 10. Table 7 reports the results of the inclusion of those interaction terms for the sample of developed countries on stock market development. Column 2 shows that the coefficient on $(Corruption\ \ control) \times Income$ is negative and significant, implying that an increase in income reduces the marginal impact of corruption on stock market development. Similarly, Column 3 shows that the coefficient on $(Corruption\ \ control) \times Investment$ is also negative and significant, indicating that an increase in investment also reduces the marginal impact corruption on stock market development.

Note that the sign of the interaction term further support the results of our theoretical model. In particular, our theoretical model shows that the marginal effect of lowering corruption on stock market size is lower for countries with higher productivity (ie developed economies with higher income) particularly at low levels of corruption[8]. Intuitively, at higher productivity and low corruption levels (as is the case in developed economies), most firms already participate in the

[8]This is seen in the fact that the slope of the solution function for country l is steeper than that for country h in Figure 1 when F is small. Also, this can be seen when comparing scenarios 2 and 3 across columns.

stock market, therefore, lowering corruption would not lead to a large increase in the number of firms who enter the market as corruption cost decreases (compared to when productivity is low and corruption is high).

6.3 Robustness Check: Alternative Measure of Stock Market development

As a first robustness check, we use the number of listed domestic companies in an economy as an alternative proxy for stock market development to test the impact of corruption. As previously mentioned, this is an instrument that has been used in previous studies (Yartey, 2010).[9]

Table 8 presents estimation results using the static panel equation (10) with all of the same macroeconomic controls as previously specified, but now using the log of number of listed domestic companies as the dependent variable. The results are similar to those of the original model presented in Table 6, particularly in terms of the magnitude of each corruption coefficient. The coefficient on corruption for the developing economies is now weakly significant (at the 10% level), but for the developed economies it remains significant at the 1% level, again suggesting a larger impact for that group.

Overall, these results continue to support our theoretical model, providing evidence that corruption is a constraint that negatively affects the growth of the number of listed companies for developed economies. Perhaps most importantly, however, this alternative measure may suggest a mechanism by which corruption impacts stock market development–that is, via the number of firms able to list, as in our model.

6.4 Robustness Check: Dynamic Panel Results

For our second robustness check, the dynamic panel model's results are presented in Table 9, with stock market capitalization as a share of GDP as our dependent variable. Again our initial results are confirmed, as the coefficient on corruption is insignificant for the developing economies (column

[9] It is worth noting that an issue with this measure is that some firms may delist for various reasons. Using only the number of newly listed firms would therefore be preferable, but data for such a measure was not available.

1) but positive and significant at the 1% level for the developed economies (column 2). Table 9 also presents the relevant tests to authenticate the validity of the specifications for system GMM. First, high p-values (> 0.10) for the serial correlation test strongly support that there is no second-order serial correlation. Second, high p-values associated with the Hansen test of over-identifying restrictions providing evidence that the instruments are not correlated with the residuals. Finally, the high p-values for the difference-in-Hansen test reported in columns 1 and 2 corroborate that the additional instruments used in the level equations do not correlate with the residuals.

To summarize, comparing Tables 6, 7, 8, and 9, across all model specifications, corruption control has a significant, positive impact on both measures of stock market development–stock market capitalization and the number of listed companies–for developed economies. That effect is mitigated, for stock market capitalization, at least, as an economy's income and/or domestic credit levels increase. Corruption has no effect on stock market capitalization for developing economies, however, and only a small and weakly significant positive effect on the number of domestic companies listed, consistent with the predictions of our theoretical model.

6.5 Additional Robustness Checks[10]

Though the CPI is a comprehensive measure of cross-country variation in corruption that is widely-used in the literature (Papyrakis et al., 2017), we acknowledge that it is not the only possible measurement of corruption. In this subsection, we therefore use an alternative measurement, the Control of Corruption index from the World Bank's Worldwide Governance Indicators (WGI) database[11] to test the sensitivity of our theoretical predictions and compare our baseline results from Table 6. Similarly, to be sure our results are not sensitive to the specific method of grouping of countries within our sample period, we also employ an alternative classification of countries (developed vs. developing) based on 1995-2017 income, where income is measured using GNI per

[10]Special thanks to two anonymous referees for suggesting the robustness checks in this subsection.

[11]Control of Corruption is defined by the WGI as perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Data is reported in percentile rank terms, ranging from 0 (lowest rank; most corrupt/least effective at control of corruption) to 100 (highest rank; least corrupt/most effective at control of corruption). Data was collected from `http://info.worldbank.org/governance/wgi`. Details on the methodology can be found in Kaufmann et al. (2011).

capita, calculated using the World Bank Atlas method. Therefore, this historical classification by income helps us divide the countries into developed vs developing in the different years.[12]

In addition to the aforementioned alternative measure of corruption and country classification method, we test our baseline treatment by including two additional control variable. First, we add stock market liquidity, with stock traded as a share of GDP acting as a proxy.[13] These results are presented in Table 10. As can be seen in Column (3), the coefficient of corruption control on stock market development is positive and highly significant for developed economies, supporting our results as compared with Table 6. It is also interesting to see that stock market liquidity has a significant impact for all economies. Although stock market liquidity creates some multicollinearity issues, we feel it is worthwhile to consider as an additional control variable in this section. Secondly, we include an institutional quality variable to account for the impact of institutions on stock market development.[14] These results are reported in Table 11, where Columns 1–3 show that our baseline results continue to hold with this additional control. As expected, institutions have a positive and significant impact for the whole sample and for developing countries. However, institutional quality does not appear to have a significant impact on stock market development for developed countries. This is perhaps not surprising, since institutions may be of greater importance in developing economies. Furthermore, Billmeier and Massa (2009) found that although institutional quality has a positive significant impact on the stock market development of the whole sample and non-hydrocarbon countries, the coefficient becomes insignificant for oil-exporting countries.

To further check the robustness of our results using the Control of Corruption index and alternate classification of countries, we employ two alternate proxy variables for stock market

[12]Data was collected from https://databank.worldbank.org/source/world-development-indicators and more details on the World Bank Atlas can be found at https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method. Further, data on historical classification by income was collected from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

[13]Billmeier and Massa (2009) also use stock traded as a share of GDP as a proxy for stock market liquidity.

[14]Institutional Quality Index data is collected from the Heritage Foundation's Index of Economic Freedom, 2022 edition (Heritage Foundation, 2022). This index aggregates the following 10 components with equal weight: trade policy, fiscal burden, government intervention, monetary policy, capital flows and foreign investment, banking and finance, property rights, wages and prices, regulation, and the black market. The index assigns a score (0–100) to each country's performance, with higher scores corresponding to higher levels of institutional quality. This index has been used repeatedly as a proxy for institutional quality. See, for example, Billmeier and Massa (2009), Creane et al. (2004), Sahay and Goyal (2006), Lejour et al. (2006), and Boatman (2007). Institutional quality index data came from https://www.heritage.org/index/explore?view=by-region-country-year&u=637889449815731423.

development: stock market capitalization per capita[15] and stock market volatility[16]. Those results are reported in Table 12, where Columns (1) and (4) show that the coefficient on corruption for the full sample is not statistically significant, and Columns (2) and (5) similarly show that the coefficient on corruption is insignificant or only weakly significant for developing economies. However, the coefficient on corruption is significant and positive in Column (3) and significant and negative in Column (6), meaning our theoretical predictions and baseline empirical results continue to be supported. Moreover, these results provide further evidence that corruption control impacts stock market development differently in developing vs. developed countries.

Finally, as an additional attempt to address sample selection issues we run a quantile regression using our original dependent variable of stock market capitalization as a share of GDP, and report the results in Table 13. Columns 1–3 show the impact of corruption on stock market development at the 25th, 50th, and 75th percentiles for lower-income (developing) countries, with the same results shown for higher-income (developed) countries in Columns 4-6. Despite the analysis, which uses far more constrained methods, the coefficient on corruption remains significant only for higher-income countries, again supporting our previous results.

7 Conclusion and Policy Implications

This study contributes to the literature on corruption and stock market development using country-level data from 87 economies worldwide over the period 1995-2017. In accordance with our theoretical model's predictions, our empirical findings show that corruption has a significant impact on stock market development for higher income economies, but not for lower income economies, and those results are robust to various specifications, including an alternative proxy for stock market development and controlling for the potential endogeneity of corruption. The fact that our results remain consistent with our alternative measurement of market development, the number of domestic firms listed, may be evidence of a mechanism by which corruption impacts overall stock

[15] In line with Mhadhbi et al. (2021), stock market capitalization per capita is defined as total market capitalization of listed domestic companies in current USD divided by the total population of the country.

[16] Following Levine and Zervos (1998), stock market volatility was proxied by stock return volatility. Data is collected from `https://databank.worldbank.org/source/world-development-indicators`.

market capitalization: the ability of firms to list.

More generally our results may be interpreted as evidence that corruption is a major factor that contributes toward stock market development, but that other factors such as income and investment (overall productivity) may be more important before corruption is as much of a concern. These results seem to confirm the importance of macroeconomic fundamentals for stock market development, indicating that policies to curb corruption will enhance efficiency and functioning, but that macroeconomic fundamentals may be a key precursor. They also complement those of Sharma and Paramati (2021), who find evidence that per capita income has a positive, significant effect in controlling corruption for upper-middle and high-income countries, while it seems to promote corruption in lower-income countries.

There are several directions for potential future work. Alternative measures of market capitalization and corruption would be natural extensions of this study, further testing our theoretical model. It would be interesting to see if the difference between developed and developing economies remains with alternative measures. Alternative groupings of economies would also be interesting to consider, though we could not do so due to sample size restrictions. Finally, there is always, of course, the need for a better understanding of how corruption affects state-owned enterprises, private entities, and multinational corporations, ideally using micro-level datasets. Such studies could perhaps shed more light on the dichotomy between corruption's effects on developing versus developed economies highlighted by our results.

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Figure 1: Stock market size as a function of corruption for countries l and h

Graph represents fraction of firms listed in each country (N_h and N_l given by equation 9). N_h and N_l are derived numerically by varying F over $F \in [0, \overline{F}_i]$, $i = l, h$, while calibrating values for σ and A_i. Slope of each curve is the marginal effect of corruption costs on stock market size.

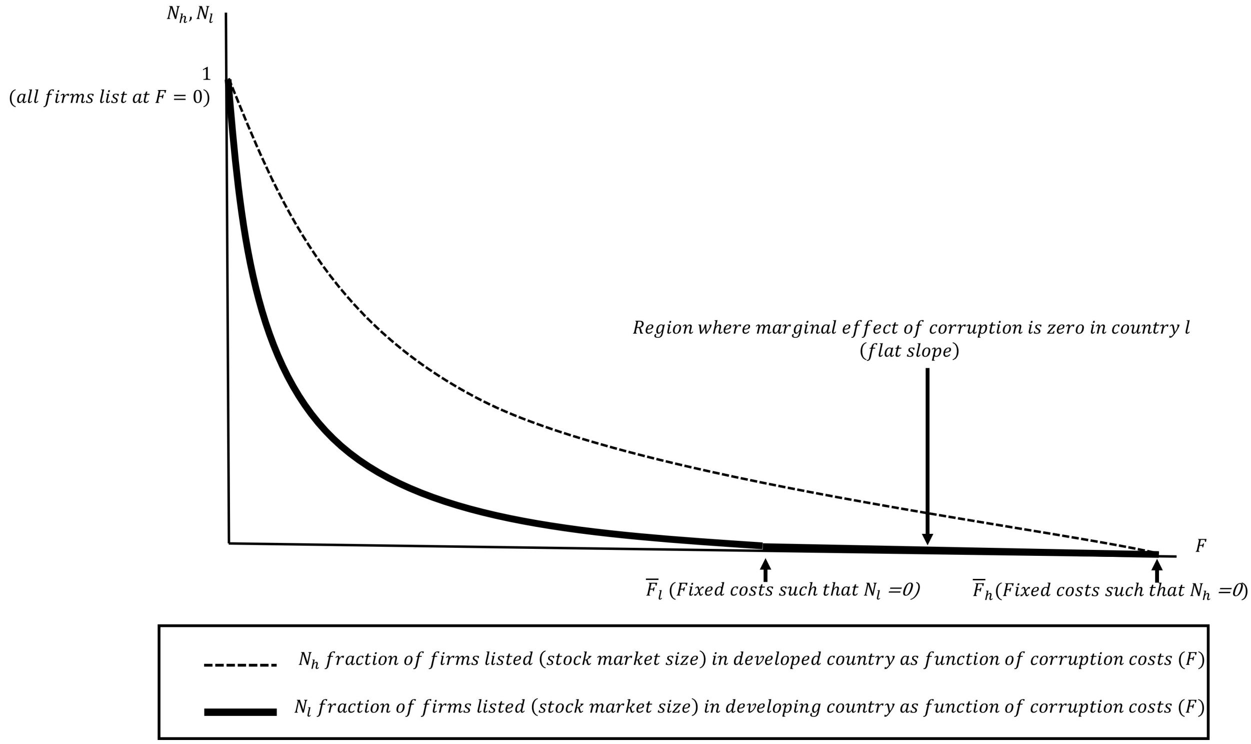

Figure 2: The marginal effect of changes in corruption costs on stock market size

Graph represents the numerical derivative of functions N_h and N_l over $F \in [0, \overline{F}_i]$, $i = l, h$.

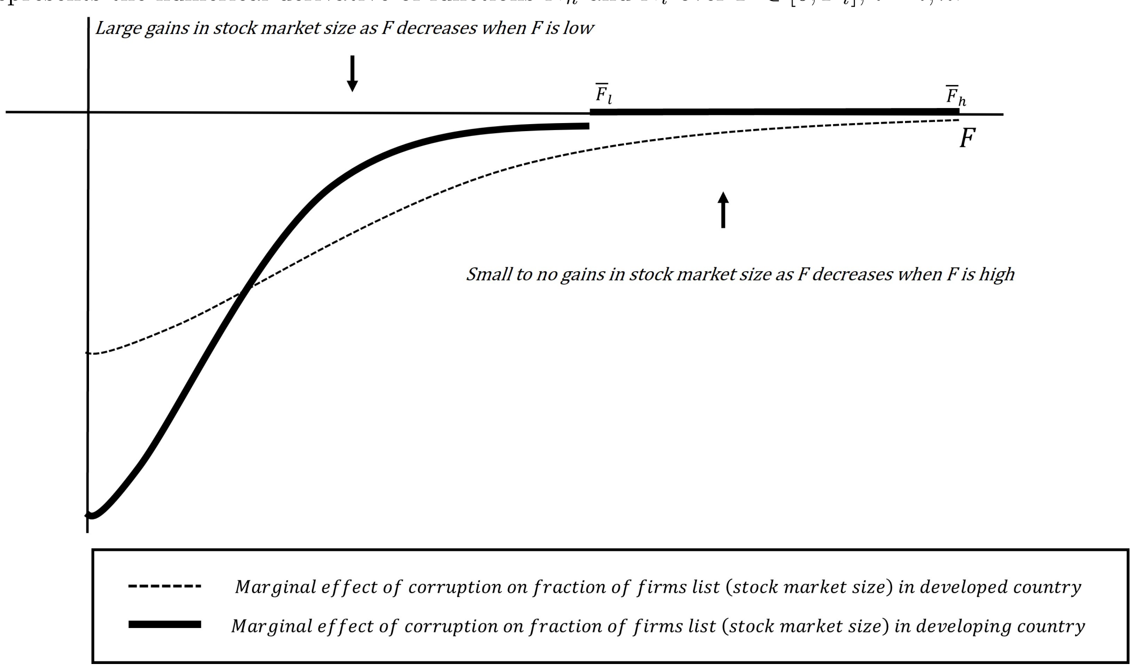

Table 1: Summary of relevant literature

Author(s)	Variable(s)	Period	Sample	Methodology	Findings
Ahlin and Pang (2008)	TI, ICRG, and credit to private sectors	1960–2000	71 economies	OLS	Corruption inc. financial development.
Billmeier and Massa (2009)	institutions, remittances, natural resources, stock market development	1995-2005	17 economies	OLS/Fixed effect regression	Institutions and remittances inc. stock market development (whole sample and countries without significant hydrocarbon sectors) . oil price inc. stock market development (in resource dec. rich countries)
Buchanan and English (2007)	legal foundation, the ratio of market capitalization to gross domestic product (GDP)	1976-1999	24 emerging economies		English common law countries inc. stock market capitalization to GDP. French civil law countries inc. stock return
Creane et al. (2004)	institutional quality, regulation and financial development	2000- 2002	20 Middle East and North Africa (MENA) countries	Principal Components Analysis	Upgrading institutional quality inc. financial development.
Jamaani and Ahmed (2021)	institutional quality, IPO underpricing	1995-2016	G20 economies	Hierarchical linear estimation technique (HLM)	Voice & accountability dec. IPO Underpricing (Developing G dec. 20 economies).
Jayasuriya (2005)	stock market liberalization, institutional quality, stock return volatility	N/A	18 emerging economies	GARCH method	Improved stock market characteristics and institutional quality dec. stock return volatility.
La Porta et al. (1997)	legal rules, law enforcement, capital markets	N/A	49 economies	OLS/Cross section regression	Protecting investor rights and improving law inc. capital market (including both equity and debt markets).
La Porta et al. (1998)	Legal rules, origin of rules (Common-law vs. French-civil law vs Scandinavian-civil-law countries), legal protection of investors	N/A	49 economies	OLS/Cross section regression	Weak judicial system dec. stock market development.
La Rosa et al. 2021)	corporate and country corruption risk, performance of CEO	2013 - 2017	100 best-performing CEOs, 249 listed companies in both developed and emerging economies	Hierarchical linear models (HLM)	Corporate corruption risk dec. CEO performance.
Lakshmi et al. (2021)	corruption, stock returns	1995–2014	4 emerging economies	Fixed-effect model/instrumental variable 2SLS/system GMM	Higher corruption dec. stock returns.
Levine and Zervos (1998)	capital control liberalization, stock market size, liquidity, volatility, international integration	N/A	16 emerging economies	Dickey-Fuller unit root	Liberalization inc. size, liquidity, and volatility of stock market.
Mayer and Sussman (2001)	accounting disclosures, financial development	N/A	N/A	Theoretical paper	Accounting disclosures inc. financial development.
Mhadhbi et al. (2021)	carbon emission, stock market, capitalization per capita, stock traded per capita	1994-2014	19 economies	Panel linear and nonlinear ARDL	Stock market development dec. environmental quality.
Pagano (1993)	regulatory, institutional factors, stock market development	N/A	N/A	Theoretical model	Regulatory and institutional factors inc. stock market development.
Pistor et al. (2000)	legal change in the protection of shareholder and creditor rights, external finance	1994-1998	22 transition economies	OLS and IV specifications	Efficient legal institutions inc. equity and credit market development.
Yartey (2010)	macroeconomic factors, institutional quality, stock market development	1990 -2004	42 emerging economies	GMM estimation	Higher income level and investment inc. stock market development institutional quality inc. stock market development.

Table 2: Average marginal effect of reduction in corruption level

Initial corruption level	Average marginal effect of corruption on stock market development (size) as measured by fraction of firms listed[a]	
	Developing Economy ($i = l$)	Developed Economy ($i = h$)
Scenario 1: $F \in [\overline{F}_l, \overline{F}_h]$ High corruption level	0 no effect on stock market size	-0.0026 some effect on stock market size
Scenario 2: $F \in [0, F_m]$ Medium corruption level[b]	-0.0200 small effect on stock market size, bigger than the effect in developed economy	-0.0174 small effect on stock market size, smaller than the effect in developing economy
Scenario 3: $F = \epsilon$, $\epsilon \leq 1$ Low corruption level	-0.0624 large effect on stock market size, bigger than the effect in developed economy	-0.0312 large effect on stock market size, smaller than the effect in developing economy

[a] The marginal effects are calculated as the numerical derivative of N_i with respect to F then averaged over the listed intervals. Note that $\overline{F}_i$ is calculated as the value of F where $N_i = 0$, $i = l, h$.
[b] F_m is the midpoint of $[0, \overline{F}_h]$.

Table 3: Definition of variables

Variables	Definition
Corruption perception Index (CPI)	Score of the Transparency International Index (TI)
Market capitalization	Calculated by dividing the value of listed shares by GDP
Income	GDP per capita in constant 2010 US$
Investment	Gross fixed capital formation as a percentage of GDP
Domestic credit	Domestic credit to private sector by banks is expressed as a share of GDP
Inflation	Consumer Price index in percentage

All variables are log transformed. We use formula $ln(Inflation + sqrt(1 + Inflation^2))$ for inflation log transformation since inflation contains negative value. CPI data are obtained from TI Except CPI, all the data are obtained from the World Bank's compilation of World Development Indicators (WDI).
CPI measures corruption control. Therefore, higher values of CPI imply lower corruption levels.

Table 4: Summary of Descriptive Statistics, 1995–2017

	Developing						**Developed**					
Variable	N	Mean	Std. Dev.	Min.	Median	Max.	N	Mean	Std. Dev.	Min.	Median	Max.
A. Corruption												
Corruption perception index	650	35.96	10.91	4	35	79.4	650	70.22	16.74	23	73	100
B. Dependent Variables												
Market capitalization	650	43.9	49.21	1.51	27.45	352.85	650	84.01	72.96	4.66	62.98	366.87
C. Channels												
Income	650	5521.88	3250.22	456.24	5469.74	12285.05	650	38170.79	19220.5	12491.35	36938.36	91617.28
Investment	650	23.14	6.16	5.89	22.12	45.52	650	22.98	4.17	11.54	22.44	38.47
D. Macro Control Variables												
Domestic credit	650	47.79	32.4	2.97	39.39	166.5	650	93.76	39.03	1.45	91.03	174.88
Inflation	609	8.29	10.69	-2.35	5.79	90.98	616	2.11	1.95	-2.35	2.045772	12.38

Data are based on availability. The yearly sample covers the period from 1995 to 2017.
All variables are defined in 3. CPI measures corruption control. Therefore, higher values of CPI imply lower corruption levels.

Table 5: Pearson Correlation Matrix, 1995–2017

	Developing					Developed				
Variable	1	2	3	4	5	1	2	3	4	5
1.Market capitalization										
2.Corruption perception index	0.33***					0.53***				
3.Income	0.19***	0.49***				0.44***	0.71***			
4.Investment	0.20***	0.05	0.07*			0.13**	-0.06	-0.16***		
5.Domestic credit	0.58***	0.41***	0.26***	0.41***		0.35***	0.40***	0.34***	-0.03	
6.Inflation	-0.22***	-0.16***	-0.07*	-0.08**	-0.37	-0.10***	-0.01**	-0.10**	0.04	-0.26***

Variables are log transformed. CPI measures corruption control. Therefore, higher values of CPI imply lower corruption levels.

Table 6: Fixed effects regression results of stock market development (stock market capitalization) on corruption control

Variables:	(1) Full Sample	(2) Developing	(3) Developed
Corruption control	0.208	0.117	0.601***
	(-0.177)	(-0.214)	(-0.192)
Income	1.062***	0.792***	1.140***
	(-0.134)	(-0.199)	(-0.232)
Investment	0.456***	0.412***	0.416***
	(-0.101)	(-0.139)	(-0.117)
Domestic credit	0.098*	0.252***	-0.023
	(-0.056)	(-0.091)	(-0.051)
Inflation	-0.005	-0.01	-0.005
	(-0.010)	(-0.021)	(-0.011)
Constant	-8.869***	-5.855***	-11.610***
	(-1.076)	(-1.557)	(-2.501)
Observations	1,270	650	620
Adj. R-squared	0.891	0.856	0.919
Year effects	YES	YES	YES
Country effects	YES	YES	YES
F Test	20.030***	12.790***	15.210***

The dependent variable is stock market development defined as stock market capitalization as a share of GDP. The regressor is corruption control as measured by the CPI. Therefore, higher values of the CPI imply lower corruption levels. All variables are log transformed. The sample is from year 1995 to 2017. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Fixed effects regression results of stock market development - interaction terms

Variables:	(1) Developed	(2) Developed	(3) Developed
Corruption control	0.601***	11.250***	2.746**
	(-0.192)	(-3.759)	(-1.226)
Income	1.140***	5.448***	1.099***
	(-0.232)	(-1.621)	(-0.244)
Investment	0.416***	0.422***	3.172**
	(-0.117)	(-0.116)	(-1.586)
Domestic Credit	-0.023	-0.048	-0.005
	(-0.051)	(-0.042)	(-0.053)
Inflation	-0.005	-0.002	-0.004
	(-0.011)	(-0.010)	(-0.011)
Corruption control* Income		-1.063***	
		(-0.373)	
Corruption control* Investment			-0.672*
			(-0.383)
Constant	-11.610***	-54.570***	-20.040***
	(-2.501)	(-16.290)	(-4.371)
Observations	620	620	620
Adj. R-squared	0.919	0.921	0.919
Year effects	YES	YES	YES
Country effects	YES	YES	YES
F test	15.210***	15.300***	16.380***

The dependent variable is stock market development defined as stock market capitalization as a share of GDP. The regressor is corruption control as measured by the CPI. Therefore, higher values of the CPI imply lower corruption levels. All variables are log transformed. The sample is from year 1995 to 2017 Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Fixed effects regression results of stock market development (number of firms listed) on corruption control

	(1) Developing	(2) Developed
Corruption control	0.142*	0.544***
	(-0.085)	(-0.189)
Macro-economic controls	YES	YES
Observations	650	620
Adj. R-squared	0.856	0.919
Year effects	YES	YES
Country effects	YES	YES
F Test	12.790***	15.210***

The dependent variable is stock market development defined as number of listed companies. The regressor is corruption, measured by CPI. The macro-economic controls are income, investment, domestic credit, and inflation. All variables are log transformed. The sample is from year 1995 to 2018. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: System GMM (two step) results of stock market development on corruption control

Variables:	(1) Developing	(2) Developed
Stock Market Capitalization t-1	0.669***	0.385***
	(-0.068)	(-0.119)
Corruption Control	-0.560	1.264**
	(-0.394)	(-0.573)
Macro-economic controls	YES	YES
Observations	612	601
Year effects	YES	YES
Country effects	YES	YES
No of Countries	50	42
Instruments	40	40
Serial correlation	-0.72	-1.39
Serial correlation (p-value)[a]	0.475	0.165
Hansen	41.13	39.89
Hansen (p-value)[b]	0.156	0.191

The dependent variable is stock market development defined as stock market capitalization as a share of GDP. The regressor is corruption control as measured by the CPI. Therefore, higher values of the CPI imply lower corruption levels. The macro-economic controls are income, investment, domestic credit, and inflation. All variables are log transformed. The sample is from year 1995 to 2017. The Windmeijer finite sample corrected standard errors of the two-step GMM estimates are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

[a] The null hypothesis is that the errors in the first-difference regression exhibit no second order serial correlation (valid specification).

[b] The null hypothesis is that the instruments are not correlated with the residuals (valid specification).

Table 10: Robustness check: Fixed effects regression results of stock market development on corruption control - Additional controls (stocks traded)

Variables:	(1) Full Sample	(2) Developing	(3) Developed
Corruption control (WGI)	-0.082	-0.119	0.871***
	(-0.134)	(-0.142)	(-0.238)
Income	0.621***	0.368*	0.591***
	(-0.121)	(-0.190)	(-0.181)
Investment	0.537***	0.624***	0.243**
	(-0.083)	(-0.116)	(-0.096)
Domestic credit	0.001	-0.027	0.036
	(-0.050)	(-0.095)	(-0.051)
Inflation	-0.004	-0.009	0.008
	(-0.009)	(-0.016)	(-0.009)
Stocks traded (share of GDP)	0.226***	0.229***	0.210***
	(-0.028)	(-0.036)	(-0.030)
Constant	-3.908***	-1.417	-7.518***
	(-1.004)	(-1.393)	(-1.909)
Observations	1,121	587	526
Adj. R-squared	0.919	0.89	0.949
Year effects	YES	YES	YES
Country effects	YES	YES	YES
F Test	30.400***	18.450***	22.390***

The dependent variable is stock market development defined as stock market capitalization as a share of GDP.
The regressor is corruption control as measured by the WGI retrieved from the WB. Therefore, higher values of the variable imply lower corruption levels.
The table additionally includes Stocks traded (share of GDP).
All variables are log transformed. The sample is from year 1995 to 2017. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Countries are classified as developing or developed according to the World Bank's criteria.

Table 11: Robustness check: Fixed effects regression results of stock market development on corruption control - Additional controls (institutional quality as measured by Heritage Foundation's Index of Economic Freedom)

Variables:	(1) Full Sample	(2) Developing	(3) Developed
Corruption control (WGI)	0.150	0.106	0.881***
	(-0.139)	(-0.148)	(-0.278)
Income	0.792***	0.461**	0.776***
	(-0.130)	(-0.214)	(-0.238)
Investment	0.557***	0.628***	0.395***
	(-0.098)	(-0.143)	(-0.123)
Domestic credit	-0.021	-0.010	-0.025
	(-0.053)	(-0.101)	(-0.040)
Inflation	0.003	0.005	0.009
	(-0.010)	(-0.019)	(-0.011)
Institutional quality	0.902***	1.175***	-0.551
	(-0.291)	(-0.392)	(-0.429)
Constant	-9.762***	-7.689***	-6.838***
	(-1.439)	(-2.063)	(-2.448)
Observations	1,073	564	501
Adj. R-squared	0.897	0.874	0.928
Year effects	YES	YES	YES
Country effects	YES	YES	YES
F Test	19.690***	11.970***	16.060***

The dependent variable is stock market development defined as stock market capitalization as a share of GDP.
The regressor is corruption control as measured by the WGI retrieved from the WB. Therefore, higher values of the variable imply lower corruption levels.
The table additionally includes Institutional quality as measured by the score of the Heritage Foundation Index.
All variables are log transformed. The sample is from year 1995 to 2017. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Countries are classified as developing or developed according to the World Bank's criteria.

Table 12: Robustness check: Fixed effects regression results of stock market development on corruption control - Alternative measures of stock market development

Variables:	*Stock market capitalization per capita*			*Stock market volatility*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Developing	Developed	Full Sample	Developing	Developed
Corruption control (WGI)	0.074	0.051	0.690**	0.135	0.168*	-0.697**
	(-0.155)	(-0.157)	(-0.269)	(-0.082)	(-0.089)	(-0.276)
Income	2.081***	1.781***	1.962***	-0.682***	-0.068	-0.627***
	(-0.157)	(-0.293)	(-0.193)	(-0.118)	(-0.169)	(-0.225)
Investment	0.591***	0.475	0.605***	-0.043	0.167	-0.312**
	(-0.176)	(-0.295)	(-0.109)	(-0.083)	(-0.108)	(-0.135)
Domestic credit	0.129	0.202	0.049	0.055	-0.066	0.0713*
	(-0.091)	(-0.160)	(-0.069)	(-0.036)	(-0.064)	(-0.037)
Inflation	-0.003	-0.010	0.008	0.018*	0.054***	0.010
	(-0.014)	(-0.027)	(-0.010)	(-0.010)	(-0.017)	(-0.011)
Constant	-14.180***	-10.890***	-16.090***	8.437***	2.587**	12.720***
	(-1.566)	(-2.560)	(-2.067)	(-1.007)	(-1.275)	(-2.094)
Observations	1200	645	547	1290	639	644
Adj. R-squared	0.963	0.912	0.967	0.686	0.732	0.751
Year effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES
F Test	58.310***	35.780***	44.430***	30.350***	12.250***	39.150***

The dependent variable is stock market development defined as stock market capitalization per capita and stock return volatility.
The regressor is corruption control as measured by the WGI retrieved from the WB. Therefore, higher values of the variable imply lower corruption levels.
All variables are log transformed. The sample is from year 1995 to 2017. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Countries are classified as developing or developed according to the World Bank's criteria.

Table 13: Robustness check: Quantile regressions results of stock market development on corruption control.

Variables:	(1) Developing	(2) Developing	(3) Developing	(4) Developed	(5) Developed	(6) Developed
Corruption control (WGI)	0.235	0.116	0.003	0.635*	0.746**	0.874**
	(-0.202)	(-0.269)	(-0.457)	(-0.378)	(-0.292)	(-0.412)
Income	0.658*	0.477	0.306	1.096***	1.101***	1.106***
	(-0.363)	(-0.483)	(-0.821)	(-0.268)	(-0.207)	(-0.292)
Investment	0.658***	0.672**	0.686	0.332**	0.337***	0.342*
	(-0.248)	(-0.330)	(-0.561)	(-0.162)	(-0.125)	(-0.177)
Domestic credit	0.100	0.132	0.162	0.017	-0.006	-0.033
	(-0.153)	(-0.203)	(-0.345)	(-0.081)	(-0.062)	(-0.088)
Inflation	-0.026	-0.01	0.004	0.006	0.001	-0.005
	(-0.035)	(-0.046)	(-0.078)	(-0.014)	(-0.011)	(-0.016)
Regression type	25th %tile	Median	75th %tile	25th %tile	Median	75th %tile
Observations	615	615	615	541	541	541
Year effects	YES	YES	YES	YES	YES	YES
Country effects	YES	YES	YES	YES	YES	YES

The dependent variable is stock market development defined as stock market capitalization as a share of GDP.
The regressor is corruption control as measured by the WGI retrieved from the WB. Therefore, higher values of the variable imply lower corruption levels.
All variables are log transformed. The sample is from year 1995 to 2017. Analytical standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Countries are classified as developing or developed according to the World Bank's criteria.

Figure 3: Average stock market capitalization as a share of GDP (%) in developed and developing countries, 1995-2017

Developing economies have lower levels of stock market capitalization compared to developed economies over the time period.

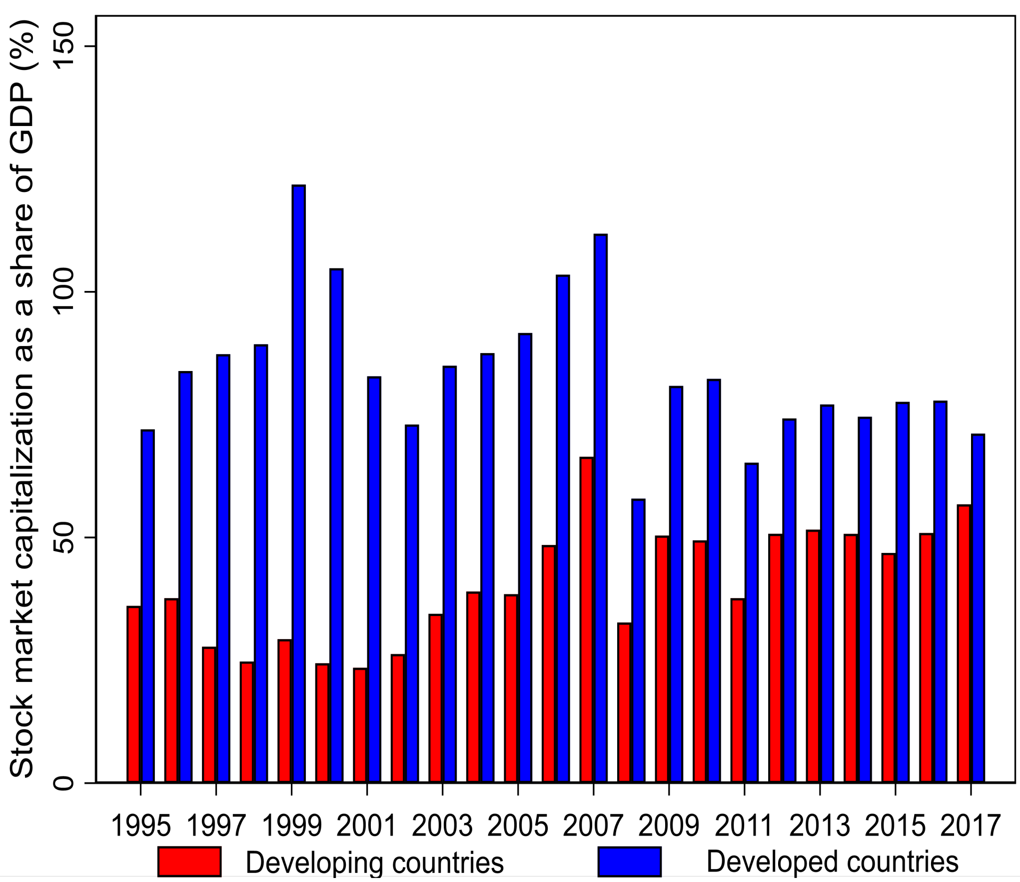

Figure 4: Average corruption perceptions index (CPI) in developed and developing countries, 1995-2017

Developed economies have higher levels of corruption control to developed economies over the time period (implying that developing economies have higher levels of corruption compared to developed economies.)

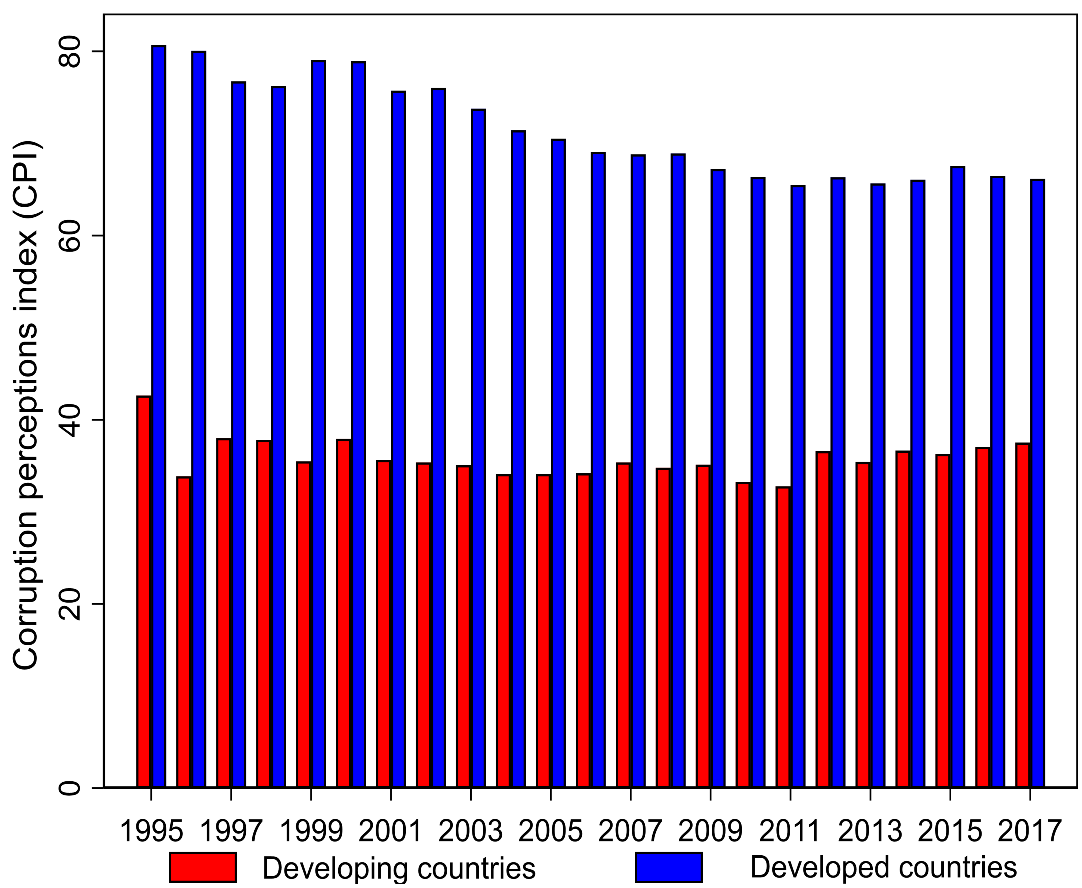

Table - Appendix A1: Corruption Perceptions Index-Transparency International - part 1

	Year																						
Country Name	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Argentina	52	34	28	30	30	35	35	28	25	25	28	29	29	29	29	29	30	35	34	34	32	36	39
Australia	88	86	89	87	87	83	85	86	88	88	88	87	86	87	87	87	88	85	81	80	79	79	77
Austria	71	76	76	75	76	77	78	78	80	84	87	86	81	81	79	79	78	69	69	72	76	75	75
Azerbaijan					17	15	20	20	18	19	22	24	21	19	23	24	24	27	28	29	29	30	31
Bahrain									61	58	58	57	50	54	51	49	51	51	48	49	51	43	36
Bangladesh		23					4	12	13	15	17	20	20	21	24	24	27	26	27	25	25	26	28
Belgium	69	68	53	54	53	61	66	71	76	75	74	73	71	73	71	71	75	75	75	76	77	77	75
Botswana				61	61	60	60	64	57	60	59	56	54	58	56	58	61	65	64	63	63	60	61
Brazil	27	30	36	40	41	39	40	40	39	39	37	33	35	35	37	37	38	43	42	43	38	40	37
Bulgaria				29	33	35	39	40	39	41	40	40	41	36	38	36	33	41	41	43	41	41	43
Canada	89	90	91	92	92	92	89	90	87	85	84	85	87	87	87	89	87	84	81	81	83	82	82
Chile	79	68	61	68	69	74	75	75	74	74	73	73	70	69	67	72	72	72	71	73	70	66	67
China	22	24	29	35	34	31	35	35	34	34	32	33	35	36	36	35	36	39	40	36	37	40	41
Colombia	34	27	22	22	29	32	38	36	37	38	40	39	38	38	37	35	34	36	36	37	37	37	37
CostaRica			65	56	51	54	45	45	43	49	42	41	50	51	53	53	48	54	53	54	55	58	59
Croatia					27	37	39	38	37	35	34	34	41	44	41	41	40	46	48	48	51	49	49
Cyprus									61	54	57	56	53	64	66	63	63	66	63	63	61	55	57
CzechRepublic		54	52	48	46	43	39	37	39	42	43	48	52	52	49	46	44	49	48	51	56	55	57
Denmark	93	93	99	100	100	98	95	95	95	95	95	95	94	93	93	93	94	90	91	92	91	90	88
Ecuador		32		23	24	26	23	22	22	24	25	23	21	20	22	25	27	32	35	33	32	31	32
Egypt,ArabRep.		28		29	33	31	36	34	33	32	34	33	29	28	28	31	29	32	32	37	36	34	32
Finland	91	91	95	96	98	100	99	97	97	97	96	96	94	90	89	92	94	90	89	89	90	89	85
France	70	70	67	67	66	67	67	63	69	71	75	74	73	69	69	68	70	71	71	69	70	69	70
Germany	81	83	82	79	80	76	74	73	77	82	82	80	78	79	80	79	80	79	78	79	81	81	81
Ghana				33	33	35	34	39	33	36	35	33	37	39	39	41	39	45	46	48	47	43	40
Greece	40	50	54	49	49	49	42	42	43	43	43	44	46	47	38	35	34	36	40	43	46	44	48
HongKong	71	70	73	78	77	77	79	82	80	80	83	83	83	81	82	84	84	77	75	74	75	77	77
Hungary	41	49	52	50	52	52	53	49	48	48	50	52	53	51	51	47	46	55	54	54	51	48	45
India	28	26	28	29	29	28	27	27	28	28	29	33	35	34	34	33	31	36	36	38	38	40	40
Indonesia	19	27	27	20	17	17	19	19	19	20	22	24	23	26	28	28	30	32	32	34	36	37	37
Iran,IslamicRep.									30	29	29	27	25	23	18	22	27	28	25	27	27	29	30
Ireland	86	85	83	82	77	72	75	69	75	75	74	74	75	77	80	80	75	69	72	74	75	73	74
Israel		77	80	71	68	66	76	73	70	64	63	59	61	60	61	61	58	60	61	60	61	64	62
Italy	30	34	50	46	47	46	55	52	53	48	50	49	52	48	43	39	39	42	43	43	44	47	50
Jamaica				38	38			40	38	33	36	37	33	31	30	33	33	38	38	38	41	39	44
Japan	67	71	66	58	60	64	71	71	70	69	73	76	75	73	77	78	80	74	74	76	75	72	73
Jordan		49		47	44	46	49	45	46	53	57	53	47	51	50	47	45	48	45	49	53	48	48
Kazakhstan					23	30	27	23	24	22	26	26	21	22	27	29	27	28	26	29	28	29	31
Kenya		22		25	20	21	20	19	19	21	21	22	21	21	22	21	22	27	27	25	25	26	28
Korea,Rep.	43	50	43	42	38	40	42	45	43	45	50	51	51	56	55	54	54	56	55	55	54	53	54
Kuwait									53	46	47	48	43	43	41	45	46	44	43	44	49	41	39
Lebanon									30	27	31	36	30	30	25	25	25	30	28	27	28	28	28
Luxembourg			86	87	88	86	87	90	87	84	85	86	84	83	82	85	85	80	80	82	85	81	82

Yearly CPI data is available from 1995 to 2017. TI first published CPI data for 41 countries in 1995. After that, TI gradually increased the sample number of countries, but it published CPI scores on a scale of 0-10 from 1995 to 2011 and on a scale of 0-100 from 2012 to 2017. In this study, the CPI score is multiplied by 10 to convert the scores from 1995 to 2011. Therefore, all the CPI scores range from 0 to 100, with 0 indicating "highly corrupt" and 100 suggesting "very clean"-a higher CPI refers to lower levels of corruption.

Table - Appendix A2: Corruption Perceptions Index-Transparency International - part 2

	Year																						
Country Name	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Argentina	52	34	28	30	30	35	35	28	25	25	28	29	29	29	29	29	30	35	34	34	32	36	39
Australia	88	86	89	87	87	83	85	86	88	88	88	87	86	87	87	87	88	85	81	80	79	79	77
Austria	71	76	76	75	76	77	78	78	80	84	87	86	81	81	79	79	78	69	69	72	76	75	75
Azerbaijan					17	15	20	20	18	19	22	24	21	19	23	24	24	27	28	29	29	30	31
Bahrain									61	58	58	57	50	54	51	49	51	51	48	49	51	43	36
Bangladesh		23					4	12	13	15	17	20	20	21	24	24	27	26	27	25	25	26	28
Belgium	69	68	53	54	53	61	66	71	76	75	74	73	71	73	71	71	75	75	75	76	77	77	75
Botswana				61	61	60	60	64	57	60	59	56	54	58	56	58	61	65	64	63	63	60	61
Brazil	27	30	36	40	41	39	40	40	39	39	37	33	35	35	37	37	38	43	42	43	38	40	37
Bulgaria				29	33	35	39	40	39	41	40	40	41	36	38	36	33	41	41	43	41	41	43
Canada	89	90	91	92	92	92	89	90	87	85	84	85	87	87	87	89	87	84	81	81	83	82	82
Chile	79	68	61	68	69	74	75	75	74	74	73	73	70	69	67	72	72	72	71	73	70	66	67
China	22	24	29	35	34	31	35	35	34	34	32	33	35	36	36	35	36	39	40	36	37	40	41
Colombia	34	27	22	22	29	32	38	36	37	38	40	39	38	38	37	35	34	36	36	37	37	37	37
CostaRica			65	56	51	54	45	45	43	49	42	41	50	51	53	53	48	54	53	54	55	58	59
Croatia					27	37	39	38	37	35	34	34	41	44	41	41	40	46	48	48	51	49	49
Cyprus									61	54	57	56	53	64	66	63	63	66	63	63	61	55	57
CzechRepublic		54	52	48	46	43	39	37	39	42	43	48	52	52	49	46	44	49	48	51	56	55	57
Denmark	93	93	99	100	100	98	95	95	95	95	95	95	94	93	93	93	94	90	91	92	91	90	88
Ecuador		32		23	24	26	23	22	22	24	25	23	21	20	22	25	27	32	35	33	32	31	32
Egypt,ArabRep.		28		29	33	31	36	34	33	32	34	33	29	28	28	31	29	32	32	37	36	34	32
Finland	91	91	95	96	98	100	99	97	97	97	96	96	94	90	89	92	94	90	89	89	90	89	85
France	70	70	67	67	66	67	67	63	69	71	75	74	73	69	69	68	70	71	71	69	70	69	70
Germany	81	83	82	79	80	76	74	73	77	82	82	80	78	79	80	79	80	79	78	79	81	81	81
Ghana				33	33	35	34	39	33	36	35	33	37	39	39	41	39	45	46	48	47	43	40
Greece	40	50	54	49	49	49	42	42	43	43	43	44	46	47	38	35	34	36	40	43	46	44	48
Hong Kong	71	70	73	78	77	77	79	82	80	80	83	83	83	81	82	84	84	77	75	74	75	77	77
Hungary	41	49	52	50	52	52	53	49	48	48	50	52	53	51	51	47	46	55	54	54	51	48	45
India	28	26	28	29	29	28	27	27	28	28	29	33	35	34	34	33	31	36	36	38	38	40	40
Indonesia	19	27	27	20	17	17	19	19	19	20	22	24	23	26	28	28	30	32	32	34	36	37	37
Iran,IslamicRep.									30	29	29	27	25	23	18	22	27	28	25	27	27	29	30
Ireland	86	85	83	82	77	72	75	69	75	75	74	74	75	77	80	80	75	69	72	74	75	73	74
Israel		77	80	71	68	66	76	73	70	64	63	59	61	60	61	61	58	60	61	60	61	64	62
Italy	30	34	50	46	47	46	55	52	53	48	50	49	52	48	43	39	39	42	43	43	44	47	50
Jamaica				38	38			40	38	33	36	37	33	31	30	33	33	38	38	38	41	39	44
Japan	67	71	66	58	60	64	71	71	70	69	73	76	75	73	77	78	80	74	74	76	75	72	73
Jordan		49		47	44	46	49	45	46	53	57	53	47	51	50	47	45	48	45	49	53	48	48
Kazakhstan					23	30	27	23	24	22	26	26	21	22	27	29	27	28	26	29	28	29	31
Kenya		22		25	20	21	20	19	19	21	21	22	21	21	22	21	22	27	27	25	25	26	28
Korea,Rep.	43	50	43	42	38	40	42	45	43	45	50	51	51	56	55	54	54	56	55	55	54	53	54
Kuwait									53	46	47	48	43	43	41	45	46	44	43	44	49	41	39
Lebanon									30	27	31	36	30	30	25	25	25	30	28	27	28	28	28
Luxembourg			86	87	88	86	87	90	87	84	85	86	84	83	82	85	85	80	80	82	85	81	82

Yearly CPI data is available from 1995 to 2017. TI first published CPI data for 41 countries in 1995. After that, TI gradually increased the sample number of countries, but it published CPI scores on a scale of 0-10 from 1995 to 2011 and on a scale of 0-100 from 2012 to 2017. In this study, the CPI score is multiplied by 10 to convert the scores from 1995 to 2011. Therefore, all the CPI scores range from 0 to 100, with 0 indicating “highly corrupt” and 100 suggesting “very clean”-a higher CPI refers to lower levels of corruption.