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Corruption's impact on foreign portfolio investment

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ABSTRACT

Corruption has significant effects on a nation's financial markets through its adverse impact on foreign portfolio investment (FPI). Yet, the effects of corruption on FPI are nonlinear and reverse J-shaped, with intermediate levels of corruption yielding the most negative effects. Highly transparent nations, where a "level playing field" exists between foreign and local investors due to lack of information asymmetries related to corruption, attract the most foreign investment. However, at the margin, very corrupt countries attract more investment than moderately corrupt countries because a "perverse level playing field" in the former countries may put foreigners and locals on an even footing in terms of resolving asymmetric information problems. This nonlinear pattern is consistent with foreign investors' desire to trade in markets where they are not at an informational disadvantage.

1. Introduction

The Department of Justice (DOJ) and the SEC's anti-bribery enforcement initiatives and penalties under the U.S. Foreign Corrupt Practices Act (FCPA) have made front page headlines in the popular press almost on a weekly basis in recent years.[1] Many other countries around the world are also following suit. For example, the U.K. passed a major compliance regulation act (the Bribery Act) in April 2011. The prevalence of corruption cases and recent regulatory and enforcement actions are due to several factors including the increased pressure on firms to compete for lucrative international business opportunities.

As Cheung, Rau, and Stouraitis (2011) show, the payoff to corrupt behavior can be quite tempting since they estimate that the average return is 10–11 times the original bribe amount for 166 high profile cases in 20 countries. In addition, Cuervo-Cazurra (2006, 2008) examines the impact of the OECD "Anti-Bribery Convention" of 1997 and finds that corruption has significant negative effects on foreign direct investment (FDI) but this effect can be ameliorated when anti-bribery laws are implemented and coordinated across many nations (rather than just the U.S.). The coordination of such laws effectively reduces the supply of bribes from OECD countries and therefore can reduce corruption around the world. In contrast to Cheung et al's focus on the profitability of bribery and Cuervo-Cazurra's analysis of changes in the supply of bribes, we provide the first country level empirical analysis of the effects of corruption on foreign portfolio investment (rather than FDI) in 49 countries.[2] FPI is distinct from FDI in many respects such as investment tenure, taxation, and information asymmetries all of which can be directly affected by corruption.

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[1] According to the Department of Justice, Congress enacted the FCPA in 1977 to bring a halt the bribery of foreign officials and to restore public confidence in the integrity of the American business system (e.g., see www.justice.gov/criminal/fraud/fcpa/docs/lay-persons-guide.pdf for more details). In particular, the FCPA was enacted for the purpose of making it unlawful for certain classes of persons and entities to make payments to foreign government officials to assist in obtaining or retaining business. Since its enactment, the FCPA has applied to all U.S. persons and certain foreign issuers of securities. With the addition of certain amendments in 1998, the FCPA now also applies to foreign firms and persons who cause, directly or through agents, an act in furtherance of such a corrupt payment to take place within the territory of the United States.

[2] Our focus is on the impact of corruption on financial investment and therefore differs from much of the literature which mainly examines FDI or firms' entry strategies via acquisitions, joint ventures, or other investment vehicles (e.g., see Wei, 2000; Habib & Zurawicki, 2002; Uhlenbruck, Rodriguez, Doh, & Eden, 2006; Cuervo-Cazurra, 2006, 2008; Malhotra, Zhu, & Locander, 2010). Also, we concentrate on corruption rather than the broader issue of political risk in prior literature.

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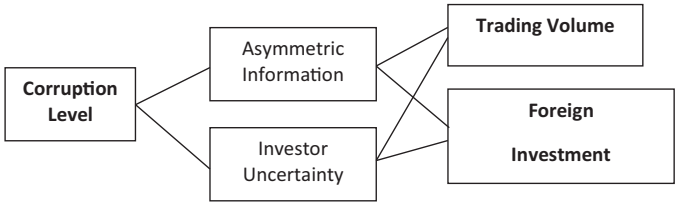

Fig. 1. Relations between Corruption and its Impact on Trading Volume and Foreign Investment. In this graph, we show the conceptual relations between corruption and its impact on asymmetric information and investor uncertainty which, in turn, can affect a financial market's trading activity and foreign investment. The text in bold face represents the variables directly measured and used in our empirical tests with the Corruption Level serving as an independent variable and the other variables serving as dependent variables (Trading Volume and Foreign Investment).

Our main research question pertains to the investment activity of foreigners: are foreign equity and total portfolio investment adversely affected by the level of corruption?

The economic effect of corruption has as its theoretical underpinning recent research in asset pricing that focuses on the effects of market imperfections such as asymmetric information and investor uncertainty about a firm's business fundamentals. Corruption's effect works indirectly through its impact on asymmetric information and investor uncertainty which, in turn, lead to greater adverse selection costs that can affect FPI as well as trading activity related to FPI (see Fig. 1 for a graphical depiction of these relations). Both asymmetric information and investor uncertainty are likely to be influenced by the level of corruption in an economy because increased information about gains from corruption is typically not disclosed in the public markets and, similarly, losses from prosecutions and settlements are difficult to estimate before the enforcement cases are made public. Therefore, corruption deters investors from participating in a market, which would negatively affect foreign investment.

Asymmetric information is a well-known problem where some market participants have superior knowledge over other market participants in terms of the expected returns and riskiness of an asset. Easley and O'Hara (2004) show how public and private information affect asset returns and demonstrate that investors demand a higher return to hold stocks with greater private information (i.e., more severe information asymmetry). More recently, Brandao-Marques, Gelos, & Melgar (2013) show that a nation's greater degree of "opacity" towards investors (including levels of financial and accounting disclosure) makes the country more susceptible to changes in global market conditions, which we infer can also affect foreign portfolio investment. In a theoretical model, Stenzel and Wagner (2014) demonstrate that opacity (possibly caused by corruption) in a financial market can impose significant adverse selection costs on investors which ultimately leads to higher trading costs and decreased portfolio investment (both domestically and internationally).

Shleifer and Vishny (1994) and La Porta, Lopez-de-Silanes, and Shleifer (2002) also suggest that higher levels of corruption lead to larger information asymmetries between investors and issuers, thus creating the classic Stiglitz and Weiss (1981) adverse selection, or "lemons," problem associated with investing in risky firms. In addition, several macro-level studies have documented linear adverse effects of corruption on financing, valuation, and growth. For example, Lee and Ng (2009) show that firms from more corrupt countries trade at significantly lower market multiples by using firm level data from 44 countries. Using estimated bribe payments of Ugandan firms, Fisman and Svensson (2007) find that both the rate of taxation and bribery payments are negatively correlated with firm growth. Other studies with similar implications include Mauro (1997), Wei (2000), Kaufmann and Wei (1999), Ciocchini, Durbin, and Ng (2003), Cuervo-Cazurra (2006), Butler, Fauver, and Mortal, 2009, Fisman (2001), and Johnson and Mitton (2003).

An important feature of the Stenzel and Wagner (2014) model is the possibility of non-linearity in the effects of opacity. We conjecture that the differential abilities of domestic and foreign institutional investors to deal with corruption and related opacity, can also create nonlinear relationships. Thus, as Coppier and Michetti (2006), Pagano (2002, 2008), Barreto (2000), Mauro (2004), Aidt, Dutta, and Sena (2008), Dutt and Traca (2010), and Ratbek (2010) suggest, corruption can also have a nonlinear effect on an economy. Related to these issues of corruption and nonlinearity, Shleifer and Vishny (1993) show that the illegality of corruption and the need for secrecy makes it much more distortionary and costly than even taxation. They suggest that the demands of secrecy can shift a country's investments away from more transparent high value projects into high risk opaque projects if the latter offer better opportunities for "secret" corruption. Naturally, these distortions from corruption serve to increase information asymmetries and hurt foreign investment. In our context, the focus on secrecy instead of shareholder wealth maximization also discourages equity investment into the corrupt country. In this regard, "pervasive and open" corruption without a need for secrecy is actually somewhat better than medium levels of "secret" corruption. This peculiarity further justifies the potential nonlinearity in our empirical models.

In addition, Meon and Sekkat (2005) propose an interesting test of the "greasing the wheels" versus "sand in the wheels" hypotheses related to corruption. This research suggests a possible nonlinear relation between corruption and the economy because, at some levels, corruption can be beneficial (i.e., it greases the wheels of commerce) and, at other levels, corruption might be harmful (thus, putting sand in the wheels of an economy).[3]

The nonlinear trade-off of the degrees of corruption on the ability of domestic and foreign institutional investors to deal with corruption, have not been previously explored. We investigate equity and total portfolio investments held by foreigners, which is particularly interesting because foreign investors have the choice to invest in many countries whereas domestic investors may not have the option to altogether avoid investment in their home country. Moreover, corruption also gives rise to varying degrees of asymmetric information between foreign and domestic investors that, in turn, affect investment decisions. For example, foreign equity investment is expected to be very high when corruption is

[3] A recent study by Quazi (2014) describes corruption as either a "helping" or "grabbing" hand and shows that the "helping" hand hypothesis dominates for 53 African nations due in part to the relatively weak regulatory/legal environment in this region. In addition, Brockman, Rui, & Zou, 2013 and Chen, Ding, & Kim, 2010 show that higher levels of corruption can help politically connected firms perform in terms of stock returns and earnings predictability. However, as Cuervo-Cazurra (2006, 2008) and others have observed, the negative consequences of corruption can be stronger in nations with somewhat stricter enforcement of regulations/laws.

extremely low. Such a transparent environment can create a "level playing field" where sophisticated foreign investors can thrive with high quality fundamental research.

In contrast, foreign equity investment can decrease sharply as corruption increases. Intermediate levels of corruption provide incentives for locals to acquire a relative informational advantage over foreign competitors, causing uncertainty and adverse selection, similar to the theoretical model of Stenzel and Wagner (2014) on opacity noted earlier. This model shows that both highly transparent and highly opaque markets can have lower adverse selection and trading costs than intermediate levels of opacity because in transparent markets any advantage from private information quickly dissipates while in very opaque markets there is little economic benefit to acquire private information (relative to its cost) and thus adverse selection costs are lower in these two types of markets. The authors show it is only in the intermediate level of opacity that it is economically profitable to become an "informed" trader and thus adverse selection costs (and trading costs) increase in this type of market.

Based on the above insights from Shleifer and Vishny (1994), La Porta et al. (2002), and Stenzel and Wagner (2014), a moderately corrupt environment could therefore give an edge to local investors who may enjoy a closer relationship with corrupt government officials than foreign institutional investors. At medium levels of corruption, local monopolies/cronies can also twist the rules in their favor. Thus, dominance of local monopolies in a moderately corrupt environment can force foreigners out of the market. Lastly, foreign equity investment may stabilize and perhaps increase when the levels of corruption are extremely high. In this environment, all investors (including the foreign institutions) may readily influence the corrupt government officials. Even if investors do not interact with corrupt officials, the knowledge about specific firms that are benefiting from corruption may be pervasive (or even publicly known) and embedded in culture, thus creating a "perverse level playing field" for both domestic and foreign institutional investors. In this case, foreign institutions could competitively venture into these highly corrupt environments.

Our main findings can be summarized as follows. First, we find that corruption can have a negative effect on a country's financial markets. Greater corruption is associated with lower foreign portfolio investment into the country. Second, we find that our main results are not only statistically significant but also economically important. Corruption's adverse impact on foreign equity investment ranges from −49.3% to −93.8% of a nation's nominal GDP, depending on the level of corruption within a country. Third, to see if there are any potential two-way interactions between foreign investment, trading, and corruption, we estimate a system of simultaneous equations and find some evidence that these variables are endogenously determined. Even after controlling for this observed simultaneity, we show that corruption still significantly affects equity investments by foreigners. Fourth, corruption has a nonlinear impact on foreign equity and portfolio investments. That is, our results indicate that foreign institutions invest heavily in economies with transparent environments that are relatively free of corruption and their investments are associated with a sharp fall to a minimal level when there is a moderate amount of corruption. Ultimately, in a reversal of this pattern, foreign investment does not decline further at extremely high levels of corruption and, in some cases, foreign investment actually increases to form a reverse J-shaped pattern. Several theoretical models support this potential nonlinear relation although this current study is the first to empirically test this pattern for FPI and corruption.

Our paper also builds upon the prior literature on foreign direct investments (FDI) into real assets such as plant, property, and equipment. However, foreign portfolio investment (FPI) is distinct from FDI because it represents investment in equity and debt instruments in the secondary markets. FDI may result despite high asymmetric information whenever FDI investors possess informational or technical advantages in particular host country sectors. However, informational or technical advantages may subsequently reduce resale values for direct investors when deciding to divest or exit from host countries. The tax treatments of FDI and FPI are also very different because FDI investors are often able to obtain tax holidays as long as they create employment and continue their presence for many years. Potentially higher exit costs, due to divesting difficulties in FDI, imply that only investors with low probabilities of early required divestitures will engage in longer-term FDI.

In contrast, FPI investors may consider relatively shorter-term equity investments lasting even a few days because of potentially lower costs of divestiture and lower risks of loss in the short run. FPI divestitures require only secondary market trading of stocks or bonds whereas FDI divestures imply dealing with the sale of real and illiquid assets such as plant, property and equipment. In this vein, the intensity of institutional trading volume can also nicely proxy for FPI. Nonetheless, corruption and information asymmetry represents a risk to FPI investors (unlike being potentially advantageous to FDI investors or local institutional portfolio investors).

2. Data sources and variable definitions

We build a panel data set based on corruption scores, secondary market institutional trading costs and foreign portfolio investment variables for 49 countries from 2004 to 2008 to study the effects of country level corruption. We intentionally stop before the 2008 crisis because the U.S. and European financial crises after that period would make it hard to isolate the pure effects of corruption.[4] Although we provide a brief summary of all the variables and their data sources in the Appendix, we describe the motivation for the use of these variables here.

2.1. Our measure of corruption

Our corruption measure is based on the reciprocal of Transparency International's Corruption Perceptions Index (CPI), which is a composite index, or poll of polls, that ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. It is also used extensively by other researchers such as Treisman (2000), Svensson (2005), Pagano (2002, 2008), Ciocchini et al. (2003), and many others.[5]

The original CPI variable is constructed to represent transparency[6] but, for ease of understanding, our *Corruption* variable is the

[4] In addition, we analyze foreign firms listed in their home markets rather than rely on U.S. American Depositary Receipts (ADR) data which other studies have typically employed. The use of ADRs can be problematic because the firms that issue U.S.-traded ADRs could mitigate the effects of corrupt practices in their home countries. In contrast, the Ancerno dataset that we use provides detailed country level and firm level transaction cost information for actual foreign stocks traded by over 700 institutions directly in the home markets of 49 countries.

[5] Details about the index's construction are available in the historical data section of the organization's website at www.tranparency.org. The definition relates closely to corruption defined as the misuse of public office for private gain (Klitgaard (1991 page 221) and Shleifer and Vishny (1993 page 599)). Corruption defined this way would capture, for example, the sale of government property by government officials at unreasonable prices, kickbacks in government contracts and tenders, kickbacks in public procurement decisions, bribery and theft of government funds, among other things (Svensson (2005; page 2)).

[6] The original CPI is reported on a scale of 1 (least transparent or most corrupt) to 10 (most transparent or least corrupt).

reciprocal of the yearly value of the CPI for each country. The corruption variable can range between 0.10 for minimum corruption and 1.00 for maximum corruption, where higher numbers within this range imply greater corruption. For example, several countries including Australia tie as the least corrupt countries with a corruption score of 0.11 while Venezuela ranks as the most corrupt country with a score of 0.44. To conserve space and for simplicity of exposition, we report our results based on the reciprocal of transparency index as our measure of corruption. Our conclusions are the same in robustness tests with alternative transformations of corruption variable that preserve the sign and monotonic ordering of the original Transparency International metric, as discussed later in Section 3.

2.2. Foreign equity and total portfolio investment

To measure the attractiveness of a nation's equity markets to foreign investors, we analyze the net capital investment in a country's equity markets using two alternative data sources, one from the IMF and another from Ancerno. First, we use the Coordinated Portfolio Investment Survey (CPIS) from IMF (http://www.imf.org/external/np/sta/pi/cpis.htm). This survey of central banks measures *Equity Held by Foreigners* for each country from 2001 to 2009 at market prices.[7] We then define *Equity Held by Foreigners* as our first measure. Note that this variable can be higher than 100% for countries that have high foreign equity investment relative to their *nominal* GDP. We also measure the attractiveness of a nation's combined equity and debt markets by using the *Total Portfolio Investment by Foreigners* variable.

One of our alternative measures of equity investments in a country is the cumulative *Institutional Trading Volume* (in U.S. dollars) from the Ancerno dataset for all stocks in a given country executed in the given calendar year by all the institutions in our sample (and normalized by the country's nominal GDP).[8] In addition, we use the Treasury International Capital (TIC) database to measure U.S. investors' investment in our sample of countries (rather than all foreign investors'). The TIC data set enables us to formulate complementary measures of equity and debt investment by U.S. investors that are similar to the ones calculated by the IMF. IMF survey and TIC data are correlated but not strictly comparable. We refer to these alternative measures as *Equity Held by U.S. Investors* and *Total Portfolio Investment by U.S. Investors*.

2.3. Macro institutional features and control variables

Prior research identifies macro-level institutional features other than corruption that may have important effects on stock market performance. For example, Eleswarapu and Venkataraman (2006) examine 412 NYSE-listed ADRs from 44 countries and find that, after controlling for firm level determinants of trading costs, the effective bid-ask spread and price impact of trades are significantly lower for ADRs from countries with better ratings for judicial efficiency, accounting standards, and political stability. Daouk, Lee, and Ng (2006) show that earnings opacity, enforcement of insider trading laws, and short-selling restrictions affect trading volume and U.S. foreign stockholdings. Therefore, we include some of these institutional details as control variables and also perform an orthogonalized analysis of the effects of corruption.[9]

As additional control variables in our regressions, we follow Chuhan, Claessens, and Mamingi, (1998) and employ four U.S. and emerging market factors that may affect investment risks and returns. Thus, we include the 10-year U.S. Treasury yield, as well as the annual changes in U.S. industrial production, the Russell 3000 stock index, and the Bank of America – Merrill Lynch Emerging Markets Corporate Plus Index.

2.4. Modeling the effect of corruption on foreign portfolio investment and trading volume

We combine the variables described above into a set of regression models and estimate them via OLS and two-stage least squares (2SLS) in order to determine the effect of corruption, as described below:

$$Equity\ Held\ by\ Foreigners_{i,t} = f_1(Corruption, Corruption^2, Controls) + \varepsilon_{s,t} \quad (1)$$

$$Total\ Portfolio\ Investment\ by\ Foreigners_{i,t} = f_2(Corruption, Corruption^2, Controls) + \varepsilon_{s,t} \quad (2)$$

$$Institutional\ Trading\ Volume_{i,t} = f_3(Corruption, Corruption^2, Controls) + \varepsilon_{s,t} \quad (3)$$

where,

$\varepsilon_{s,t}$ signifies the residual terms for each regression.

In the above equations, *Equity Held by Foreigners* and *Total Portfolio Investment by Foreigners* are alternative proxies for FPI and in later analyses we focus on *Equity Held by Foreigners* in particular. As a robustness check, we also re-estimate Eqs. (1) and (2) with the U.S.-specific investment variables from the U.S. TIC database described earlier in this section.

As noted above Eqs. (1)–(3) can be estimated separately via OLS or jointly as a system of simultaneous equations via 2SLS. We can then compare the results across the two sets of estimates to see if corruption exhibits a similar pattern across both methods. The approach also enables us to explicitly control for any possible simultaneity between the two main types of dependent variables (foreign investment and trading volume). Given that foreign portfolio investment in a country's financial market can affect the level of trading volume (and vice versa), it is important to allow for this possible endogenous relationship.

To estimate the 2SLS model, we include one of the two dependent variables in each of the regression models. For example, the foreign equity investment regression has institutional trading volume as an additional control variable, and vice versa. In order to estimate such a system, we need two instruments to "identify" the models. Accordingly, we choose two instruments that are exogenous to the system (and not correlated with the models' error terms) but can be related to the three endogenous variables,

[7] Equity investment is shown in Table 3.1 of CPIS data at http://www.imf.org/external/np/sta/pi/topic.htm and include ordinary shares, stocks, participating preferences shares, depository receipts denoting ownership of equity securities issued by non-residents. Market values of unlisted firms are calculated by using one of the following methods: (1) a recent transaction price, (2) directors' valuation, or (3) net asset value.

[8] This service provides trading cost analysis to over 700 institutional investors, advisors, hedge funds, consultants and brokers with over $7.5 trillion in annual trading of about 13,000 stocks domiciled in 60 countries that trade on nearly 100 exchanges and venues. Countries in our sample represent more than 86% of the world's equity market capitalization of listed companies as of 2008 (based on the 2009 World Development Indicators available from the World Bank). This and other similar datasets are used widely in academic papers focusing on institutional trading costs, such as those by Chiyachantana, Jain, Jiang, and Wood, (2004), and Keim and Madhavan (1996).

[9] Our orthogonalized effects analysis closely follows the methodology in Daniel and Titman (2006).

namely, anti-manipulation rules associated with price and volume manipulation in a nation's financial markets (i.e., the Price manipulation rules index and Volume manipulation rules index defined in the Appendix). As we will report later in Tables 3 and 4 of the following section, the nonlinear effect of corruption on FPI is consistent regardless of whether we use OLS or 2SLS methods even though we do find some mixed evidence that foreign investment and trading volume are endogenously determined.

3. Empirical methodology and results

3.1. Summary statistics

Panel A of Table 1 shows country level data for the key variables in our analysis. The descriptive statistics of the Average Corruption Score, our key explanatory variable, which has a mean of 0.20 in Panel B for the overall sample and ranges from a minimum of 0.11 to a maximum of 0.44. The mean value of our first dependent variable, Equity Investment Held by Foreigners, is 78.41% of GDP. Average Institutional Trading Volume is 24.48% of GDP while the mean value of Total Portfolio Investment by Foreigners is 183.90% of GDP, respectively.

Panel C of Table 1 shows the correlation coefficients between our main variables. Corruption is negatively correlated with some of our measures of FPI. The correlation coefficients of Corruption with Equity Held by Foreigners, Institutional Trading Volume, and Total Portfolio Investment by Foreigners are −0.17, −0.39, and −0.18, respectively, and these coefficients are statistically significant at the 1% level. Thus, on a simple univariate basis, corruption is associated with decreases in several measures of foreign portfolio investment. Most of these results also remain intact after orthogonalizing corruption according to Eqs. (4)–(8), which are described later in this section.[10] For example, the correlation coefficients between our orthogonalized Corruption Residual and Equity Held by Foreigners and Total Portfolio Investment by Foreigners are-0.22, and -0.21 respectively, and are all significant at the 1% level. As expected, various measures of FPI are positively correlated with each other because foreign investors prefer more liquid, lower-cost financial markets, holding all else constant. These correlations are also consistent with our research questions and motivate our univariate and multivariate empirical tests presented below.

In Table 2, we divide our sample into two subgroups based on the level of Corruption, using the median value of corruption as the cut-off point. In panel A, and the average difference in Institutional Trading Volume between high and low corruption groups is −30.85% while the difference based on the median values in Panel B are similar in magnitude (−21.94%) to those found for the average values. Both of these differences are statistically significant at the 1% level. Countries in the high corruption group also have less Foreign Equity and Total Portfolio Investment, as can be seen by the statistically significant differences in the mean and median values of these variables.

Fig. 2 shows the nonlinear relationships between Corruption and Equity Held by Foreigners and Institutional Trading Volume. Equity Held by Foreigners is very high with extremely low levels of corruption. As noted earlier, a transparent environment may create a level playing field where sophisticated foreign investors can thrive with high quality fundamental research. Equity Held by Foreigners decreases sharply as corruption increases. At moderate level of corruptions, locals may obtain significant informational advantage over foreigners. This asymmetry appears to discourage foreign investment. The portfolio investment then stabilizes and even increases slightly for extremely high levels of corruption. In this latter environment, anybody, including foreign institutional investors, might readily understand the effects of corruption on each firm and may influence the corrupt government officials. In sum, our summary statistics Fig. 2 reveal statistically significant relationships in the hypothesized directions on a univariate basis between Corruption and key measures of the quality of a nation's financial markets.

3.2. Regression results including non-linear effects

Next, we test our main research questions in a multivariate panel regression setting. In Models [1] to [3] of Table 3, we examine the impact of corruption on foreign equity, total portfolio investments, and trading volume by using Equity Held by Foreigners, Total Portfolio Investment (both scaled by nominal GDP), and Institutional Trading Volume, as our dependent variables. All of the models in Table 3 contain the two key explanatory variables, namely, the linear and squared forms of corruption. These variables try to capture any possible linear and nonlinear relationships between corruption and foreign equity investment. The linear corruption variable in all of these specifications is negative and statistically significant at 1% while a positive and significant squared form of corruption captures the nonlinear relationship between corruption and foreign equity, and portfolio investment, as well as trading volume. These results are consistent with the notion that there is a nonlinear relation between corruption and foreign investment activity. Specifically, Table 3Table 3's results demonstrate that equity and total portfolio investment are very high with extremely low levels of corruption, decrease sharply as corruption increases, and then stabilize and even increase slightly for very high levels of corruption. We find a similar reverse J-shaped pattern when we use the alternative foreign equity investment measures based on Ancerno's Institutional Trading Volume.[11, 12]

As a robustness check, in models [4] and [5] of Table 3 we re-estimate our models using U.S. Treasury International Capital data (TIC) that focuses solely on U.S. investors' investments in the foreign equity and debt of our sample of countries (rather than all foreign investment in these nations). As we report in Table 3Table 3's results for models [4] and [5], corruption's nonlinear pattern remains intact even when we consider only foreign portfolio investment activity by U.S. investors.[13]

[10] The orthogonalization procedure and relevant equations are described in more detail when we discuss the multivariate regressions later in Section 3. In essence, we capture the residuals from a regression equation where corruption is the dependent variable and various macro-institutional factors are on the right hand side. The idea is to assess the pure effects of corruption from these residuals that are free of the inter-related effects of other macro-institutional factors.

[11] We also replicate the results in Table 3 by using only countries with high levels of corruption (above the median). The nonlinear results remain statistically significant for Equity Held by Foreigners, Total Portfolio Investment by Foreigners, and Institutional Trading Volume. Our results in Table 3 also remain significant when we use corruption variable as the only explanatory variable. Further, our results remain robust when we include country fixed effects in Table 3.

[12] In addition to the above robustness checks, we used a nation's nominal GDP (in U.S. dollars) as a control variable for the size of a country's financial market, as there is a generally positive relationship between economic activity and market size. In this alternative setting, the un-scaled levels of portfolio investment and trading activity are used as the dependent variables and Domestic Nominal GDP is then used as a control variable for market size. In this alternative specification, the nonlinear patterns observed for *Corruption* and $Corruption^2$ remain significant and possess the correct sign. This confirms that our main findings of a reverse J-shaped pattern between foreign portfolio investment and corruption are robust to this alternative control variable.

[13] Compared to the first 3 columns, the magnitude of coefficients on corruption in columns 4 and 5 is different because the former include investments by all foreigners whereas the later focus on foreign investments only by U.S. investors.

Table 1
Descriptive statistics of Corruption, Equity Held by Foreigners, Institutional Trading Volume, and control variables.

Country	Number of trades	Corruption	Equity Held by Foreigners (CPIS)	Institutional Trading Volume –Ancerno	Total Port-folio Investment by Foreigners	Equity Held by US Investors (TIC)	Total Port-folio Investment by US Investors
Argentina	19,602	0.35	4.78	0.35	8.08	8.83	31.80
Australia	1,488,978	0.11	22.81	25.95	34.51	89.69	184.27
Austria	256,262	0.12	21.74	14.2	96.69	21.00	34.23
Belgium	412,599	0.14	56.08	17.66	158.10	47.27	60.97
Brazil	552,841	0.28	0.37	45.5	0.96	61.28	78.66
Canada	2,028,362	0.12	34.71	27.08	43.53	165.69	314.93
Chile	37,168	0.14	26.04	2.01	34.25	37.89	85.17
Colombia	2650	0.26	0.84	0.16	4.70	8.360	33.63
Cyprus	401	0.17	13.65	0.27	133.18	29.84	40.49
Denmark	320,693	0.11	37.95	20.05	82.29	69.09	97.48
Egypt	37,955	0.32	0.83	3.84	2.03	16.90	25.95
Finland	661,838	0.11	36.79	59.75	86.91	129.35	149.82
France	3,588,508	0.14	26.06	32.53	98.26	72.12	98.95
Germany	2,813,287	0.13	23.21	21.74	66.47	45.91	67.15
Greece	344,910	0.22	4.63	19.61	32.98	19.71	23.40
Hong Kong	1,841,308	0.12	164.83	125.62	290.38	354.64	366.51
Iceland	2807	0.11	66.41	0.56	91.88	3.10	128.66
India	422,560	0.31	0.04	6.91	0.05	36.05	37.80
Indonesia	185,532	0.43	0.07	6.46	0.56	25.06	35.20
Ireland	448,774	0.13	208.92	32.39	659.04	242.62	372.91
Israel	175,862	0.16	7.50	14.99	21.21	138.97	207.29
Italy	1,572,258	0.20	23.03	15.12	54.04	23.65	33.66
Japan	9,636,759	0.14	10.17	31.28	50.67	74.90	86.91
Jordan	263	0.20	.	0.04	.	3.11	8.27
Korea	844,890	0.20	4.76	20.54	9.02	89.82	105.97
Luxembourg	48,842	0.12	2,228.00	21.28	5,051.00	387.20	1,206.32
Malaysia	236,979	0.20	3.16	14.83	5.08	56.78	89.25
Mexico	302,013	0.29	0.36	4.56	1.15	51.55	83.54
Morocco	301	0.29	.	0.04	.	2.95	5.36
Netherlands	1,576,435	0.11	71.13	44.2	180.21	143.32	237.17
New Zealand	58,272	0.11	18.98	3.99	25.00	29.41	96.84
Norway	625,563	0.12	49.22	33.07	116.79	45.16	94.26
Pakistan	1608	0.41	0.13	0.22	0.19	3.94	5.05
Panama	5481	0.31	3.81	3.36	25.98	687.25	854.67
Peru	12,422	0.29	.	2.65	.	13.45	40.27
Philippines	65,875	0.41	0.11	3.97	4.91	36.85	65.30
Portugal	105,578	0.16	16.42	8.57	77.23	19.94	24.62
Singapore	602,599	0.11	75.68	40.91	179.90	199.55	242.00
South Africa	453,771	0.21	23.77	28.6	25.61	134.73	153.51
Spain	978,304	0.15	11.03	17.8	48.56	38.30	51.08
Sweden	1,096,396	0.11	56.70	47.99	87.82	95.94	173.85
Switzerland	2,796,389	0.11	96.96	149.87	216.90	430.0	441.10
Taiwan	736,988	0.17	.	.	.	140.21	141.11
Thailand	85,665	0.28	0.84	4.32	3.48	47.21	53.70
Turkey	198,986	0.26	0.02	7.54	0.32	18.79	27.58
United Kingdom	12,181,113	0.12	46.51	73.52	109.51	197.62	304.04
Uruguay	387	0.16	0.59	0.04	11.13	0.19	48.04
USA	175,976,578	0.14	28.56	119.31	40.33	.	.
Venezuela	98	0.44	0.23	0.00	4.14	1.51	22.29

Panel B: Overall summary statistics for 49 countries

Statistics	Number of trades	Corruption	Equity Held by Foreigners	Institutional Trading Volume	Total Portfolio Investment by Foreigners	Equity Held by US Investors	Total Portfolio Investment by US Investors
N	49	49	45	48	45	48	48
MEAN	4,609,055	0.20	78.41	24.48	183.90	95.54	147.95
STD	25,090,507	0.10	330.44	32.96	750.33	157.21	250.34
MIN	98	0.11	0.02	0.00	0.05	0	0
MAX	175,976,578	0.44	2228.14	149.87	5051.43	687.25	1206.32

Panel C: Pearson Correlation Coefficients

	Corruption	Corruption Residual	Equity Held by Foreigners	Institutional Trading Volume	Total Portfolio Investment
Corruption	1				
Corruption Residual	0.59***	1			
Equity Held by Foreigners	−0.17***	−0.22***	1		
Institutional Trading Volume	−0.39***	−0.09	0.03	1	
Total Portfolio Investment by Foreigners	−0.18***	−0.21***	0.99***	0.03	1

Panel A reports our key variables by country. All variables are defined in the Appendix. The main variables of interest are those reported in the last five columns and represent our key dependent variables. All five variables are scaled and expressed as percent of GDP. *Equity Held by Foreigners,* and *Total Portfolio Investment by Foreigners* are from Coordinated Portfolio Investment Survey (IMF). An alternative measure of equity investments in a country is the institutional trading activity from the Ancerno dataset, *Institutional Trading Volume*. *Institutional Trading Volume* in a country's stocks for each calendar year is defined as the total institutional buy plus sells volume, which is the sum of all buy and sell orders for all stocks in a given country, executed in the given calendar year by the institutions in our sample. Another set of variables, *Equity Held by US Investors,* and *Total Portfolio Investment by US Investors* are from the U.S. Treasury International Capital system's dataset (TIC). Note that the IMF survey and TIC data are correlated but not strictly comparable because they rely on different data collection methods and sources. Both data sets are cross-sectionally consistent and thus confirm a similar pattern of foreign portfolio investment across countries and over time. Panel B shows the summary statistics for the overall sample and Panel C shows Pearson Correlation Coefficients. All variables retain their definitions from Table 1. ***, **, and * represent 1, 5, and 10% significance level.

Table 2
Effects of country level corruption.

Mean Values Corruption level	Average Corruption Value	Equity Held by Foreigners	Total Portfolio Investment by Foreigners	Institutional Trading Volume
Low Corruption (N = 25)	0.12	48.37	115.94	42.34
High Corruption (N = 24)	0.26	4.35	13.50	11.49
High minus Low		−44.02***	−102.44***	−30.85***
Median Values **Corruption level**	**Median Corruption Value**	**Equity Held by Foreigners**	**Total Portfolio Investment by Foreigners**	**Institutional Trading Volume**
Low Corruption (N = 25)	0.12	32.02	68.14	29.32
High Corruption (N = 24)	0.26	1.12	5.39	7.38
High minus Low		−30.90***	−62.75***	−21.94***

The sample is divided into two subgroups of countries with low versus high corruption using median value as the cut-off point. *Equity Held by Foreigners, Total Portfolio Investment by Foreigners, Institutional Trading Volume,* and *Corruption* are defined in the Appendix. Each country has one observation based on the average value for the entire sample period in this table. Means of the respective conditioning variable in high and low subgroups are shown in the first column. ***, **, and * represent 1, 5, and 10% significance level respectively.

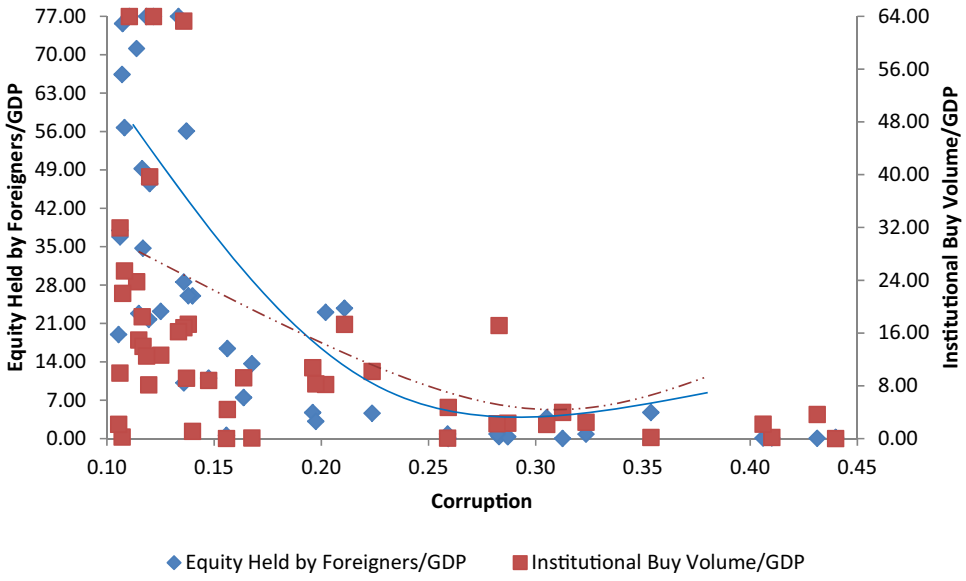

Fig. 2. Corruption, Equity Held by Foreigners, and Institutional Buy Volume. *Corruption* is the 2004–2008 average of the inverse of Transparency International's Corruption Perception Index for each country. *Equity Held by Foreigners* is the average equity ownership of foreigners divided by GDP as a percentage. *Institutional Buy Volume* is the average of the cumulative value of shares traded that were designated as buy orders, expressed as a percentage of GDP.

One potential concern with any empirical analysis is the endogeneity of one or more of the dependent variables. For example, the country's level of foreign investment can be determined simultaneously with the nation's trading volume. In turn, this potential endogeneity could affect our estimates of the impact of corruption on these key variables. Thus, to control for possible confounding effects between dependent variables, Table 4 reports the results of a system of two simultaneous equations using two-stage least squares regression based on Equity Held by Foreigners and Institutional Trading Volume (as well as a robustness test using trading volume and Foreign Equity Held by U.S. Investors). This system of equations takes as its basis the models previously discussed and presented in Table 3 but allows these dependent variables to influence each other. Thus, we can explicitly test whether foreign investment affects institutional trading volume. In addition, the validity of the two instruments used in the model reported in Table 4 (Price and Volume manipulation rules indexes from Cumming, Johan, & Li, 2011) is confirmed via the diagnostic tests suggested by Staiger and Stock (1997).[14] This finding provides support that the simultaneous model is properly identified and uses strong, reliable instruments for the endogenous variables.

Table 4 confirms that there is a simultaneous relationship between Institutional Trading Volume and Equity Held by U.S. Investors but not between trading volume and Equity Held by Foreign Investors. For example, models 2 and 3 of Table 4 show that foreign equity investment by U.S. investors and trading volume both affect each other in a statistically significant manner at the 1% level. In contrast, this pattern does not hold for models 1–2 and thus, in sum, we find mixed evidence of endogeneity between these variables. Interestingly, the nonlinear impact of corruption

[14] For example, the Staiger and Stock (1997) F-statistics for Equity Held by Foreigners, Institutional Trading Volume, and the TIC's Equity Held by U.S. Investors are 3.44, 9.75, and 12.86, respectively, which correspond to p-values of 0.0347, 0.0001, and 0.0001.

Table 3
Change in equity, total portfolio investment by Foreigners, and Institutional Trading Volume due to corruption at the country level.

Dependent variable	Equity Held by Foreigners (CPIS) [1]	Total Portfolio Investment by Foreigners (CPIS) [2]	Institutional Trading Volume (Ancerno) [3]	Equity Held by US Investors (TIC) [4]	Total Portfolio Investment by US Investors [5]
Intercept	0.09 (1.20)	243.65 (1.10)	−2.44 (−0.04)	0.14 (0.73)	0.24 (1.14)
Corruption	−555.71[b] (−8.56)	−1278.78[c] (−6.87)	−272.2[c] (−2.87)	−1.36[c] (−5.52)	−2.07[c] (−6.82)
Corruption^2		1730.61[c](6.40)	394.25[b] (2.17)	2.04[c] (4.74)	3.12[c] (6.04)
POLCON-III	−0.02[a] (−1.80)	−54.33 (−1.56)	−35.87[c] (−3.33)	−0.16[c] (−4.48)	−0.11[c] (−2.91)
Efficiency of judicial system	0.001 (0.62)	1.67 (0.54)	3.26[b] (2.61)	0.01[c] (2.94)	0.01[c] (3.16)
Insider Trading Rules	−0.003[a] (−1.84)	−10.60[a] (−1.82)	1.72[a] (1.94)	0.00 (0.60)	−0.01 (−1.41)
French legal origin	−0.01 (−1.45)	−25.84 (−1.02)	6.87 (1.54)	−0.03[b] (−2.32)	−0.07[c] (−4.37)
German legal origin	−0.01 (−1.11)	−13.74 (−0.51)	23.6[b] (2.11)	0.03 (1.01)	−0.05 (−1.35)
Scandinavian legal origin	−0.01 (−1.24)	−18.64 (−1.02)	0.33 (0.04)	−0.02 (−0.71)	−0.08[c] (−2.71)
US 10-Yr. Treasury Yield	0.68 (0.37)	781.16 (0.15)	1182.71 (0.76)	3.27 (0.71)	4.26 (0.82)
U.S. Industrial Production	0.05 (0.22)	250.53 (0.34)	404.78 (1.05)	0.04 (0.06)	−0.03 (−0.04)
Russell 3000 Stock Return	−0.05 (−1.58)	−118.21 (−1.39)	18.46 (0.2)	−0.13 (−1.26)	−0.14 (−1.29)
Emerging Markets Debt Index Return	0.04 (1.48)	95.66 (1.28)	−380.01[a] (−1.69)	0.13 (1.18)	0.15 (1.32)
R^2	0.31	0.24	0.31	0.37	0.46
N	195	195	143	197	197

This table reports the estimates from ordinary least squares regressions to assess the impact of corruption ($Corruption_{i,t}$) as the key explanatory variable on the level of five dependent variables in separate regressions: *Equity Held by Foreigners, Total Portfolio Investments by all Foreigners, Institutional Trading Volume*, *Equity Held and Total Portfolio Investment by U.S. Investors,* controlling for other factors. The test is performed from 2001 to 2009 for *Equity Held by Foreigners*, as well as *Equity Held by U.S. Investors*, and from 2004 to 2008 for *Institutional Trading Volume*. Statistical significance is based on heteroscedasticity-consistent standard errors. See Appendix for definitions of all variables used in this table and subsequent tables.

[a] Represent 10% significance level respectively.
[b] Represent 5% significance level respectively.
[c] Represent 1% significance level respectively.

on these variables still persists even after controlling for this potential endogeneity. Similar to what is reported in Table 3, all three models in Table 4 show a negative parameter estimate for the Corruption variable and a positive parameter for the nonlinear form of Corruption. Overall, the relationship between corruption and our dependent variables indicates that endogeneity is not a significant problem in our sample.

3.3. Alternative approach to identify the effects of corruption on foreign portfolio investment

At the country level, corruption can be highly correlated with other macro-institutional variables such as the efficiency of judicial system and legal origins. To mitigate potential simultaneity and multi-collinearity problems, we conduct an additional set of tests based on a two-step regression in order to orthogonalize the key variables of interest. In the first step, we regress Corruption

Table 4
Simultaneity Tests for Trading Costs and Foreign Investment.

Dependent variable	Equity Held by Foreigners $_{i,t}$ [1]	Institutional Trading Volume $_{i,t}$ [2]	Equity Held by US Investors $_{i,t}$ [3]
Intercept	0.19[a] (1.91)	−95.24[a] (−1.69)	0.03 (0.18)
Corruption $_{i,t}$	−629.40[c] (−3.36)	−223.06[b] (−2.09)	−1.10[c] (−3.22)
Corruption^2 $_{i,t}$	898.32[c] (2.67)	391.47[b] (2.03)	1.92[c] (3.10)
POLCON-III	−0.02 (−0.88)	−29.84[b] (−2.28)	−0.13[c] (−3.22)
Efficiency of judicial system	0.00 (0.07)	5.57[c] (3.54)	0.02[c] (3.34)
Insider trading rules	−0.01[b] (−2.45)	1.39 (1.14)	0.00 (−0.48)
French legal origin	−0.02[a] (−1.87)	18.68[c] (3.24)	0.00 (−0.10)
German legal origin	−0.02[a] (−1.77)	26.43[c] (5.05)	0.04[b] (2.59)
Scandinavian legal origin	−0.01 (−0.62)	−0.90 (−0.11)	−0.01 (−0.31)
U.S. Ten-Year Treasury Yield	−1.13 (−0.54)	2027.04[a] (1.71)	1.79 (0.47)
U.S. Industrial Production	0.73 (1.5)	124.99 (0.45)	1.08 (1.21)
Russell 3000 Stock Return	0.14 (1.28)	−8.04 (−0.12)	0.29 (1.42)
Emerging Markets Debt Index Return	−0.56[a] (−1.83)	−221.30 (−1.27)	−1.07[a] (−1.90)
Equity Held by US Investors		216.93[c] (4.46)	
Institutional Trading Volume	0.00 (0.06)		0.00[c] (4.67)
R^2	0.33	0.27	0.61
N	140	140	142
F Statistic	4.88[c]	9.78[c]	15.25[c]

This table reports simultaneity tests between yearly levels of corruption ($Corruption_{i,t}$), the level of *Equity Held by Foreigners, Institutional Trading Volume*, and *Equity Held by U.S. Investors*. The test is performed from 2001 to 2009 for *Equity Held by Foreigners*, as well as *Equity Held by U.S. Investors*, and from 2004 to 2008 for *Institutional Trading Volume*. We test the null hypothesis that the three dependent variables are not determined simultaneously. Statistical significance is based on heteroscedasticity-consistent standard errors.

[a] Represent 10% significance level respectively.
[b] Represent 5% significance level respectively.
[c] Represent 1% significance level respectively.

Table 5
Simultaneous Equations Approach to Assess Country Level Corruption.

Dependent variable	Corruption [1]
Intercept	0.48[c] (23.95)
Efficiency of judicial system	−0.03[c] (−15.84)
French legal origin	0.01 (0.77)
German legal origin	−0.01 (−1.39)
Scandinavian legal origin	−0.01 (−0.72)
POLCON-III	−0.05[b] (−2.15)
R^2	0.70
N	260

Dependent variable	Equity Held by Foreigners [1]	Total Portfolio Investment by Foreigners [2]	Institutional Trading Volume [3]	Equity Held by US Investors [4]
Intercept	−0.02 (−0.26)	−14.53 (−0.07)	−57.07 (−0.86)	−0.10 (−0.5)
Corruption residual	−131.75[c] (−4.89)	−340.05[c] (−4.54)	−64.38[c] (−3.69)	−0.25[c] (−4.33)
POLCON-III	−0.02 (−1.39)	−44.91 (−1.15)	−36.55[c] (−3.01)	−0.16[c] (−3.91)
Efficiency of judicial system	0.01[c] (6.60)	16.06[c] (6.71)	6.00[c] (4.75)	0.02[c] (6.15)
Insider trading rules index	0.00[a] (−1.92)	−11.11[a] (−1.88)	1.66[a] (1.73)	0.00 (0.37)
French legal origin	−0.01[a] (−1.73)	−32.87 (−1.24)	5.56 (1.27)	−0.04[c] (−2.87)
German legal origin	−0.01 (−0.76)	−5.86 (−0.22)	25.38[b] (2.21)	0.04 (1.20)
Scandinavian legal origin	0.00 (0.13)	0.97 (0.06)	4.81 (0.63)	0.00 (0.00)
US Ten-Year Treasury Yield	0.40 (0.22)	170.96 (0.03)	1152.84 (0.73)	2.59 (0.55)
U.S. Industrial Production	0.08 (0.34)	316.48 (0.42)	410.19 (1.05)	0.11 (0.18)
Russell 3000 Stock Return	−0.04 (−1.23)	−99.78 (−1.14)	14.87 (0.16)	−0.10 (−1.00)
Emerging Markets Debt Index Return	0.03 (1.08)	75.79 (0.98)	−373.3 (−1.64)	0.10 (0.94)
R^2	0.27	0.21	0.29	0.34
N	195	195	141	194

Panel A: Stage I
Corruption is first orthogonalized and cleaned of any multi-collinearity with macro-institutional variables in the regression below:
$Corruption_{it} = f_4(Efficiency\ of\ Judicial\ system, French\ legal\ origin, German\ legal\ origin, Scandinavian\ legal\ origin, POLCON\text{-}III) + v_{i,t}$
Variable definitions are the same as those in earlier tables and defined in the Appendix. Statistical significance is based on White's heteroscedasticity-consistent standard errors.
Panel B: Stage II. Orthogonalized Nonlinear Corruption ($v_{i,t}$) from Panel A is used in Panel B as explanatory variable. After estimating Eq. (4), the system of equations for *Equity Held by Foreigners, Total Portfolio Investment by Foreigners, Institutional Trading Volume, and Equity Held by US Investors* can be estimated via a panel data set as follows:
$Equity\ Held\ by\ Foreigners_{i,t} = f_3(Corruption\ \ Residual, Control\ variables) + \varepsilon_{s,t}$
$Total\ Portfolio\ Investment\ by\ \ Foreigners_{i,t} = f_6(Corruption\ \ Residual, Control\ \ variables) + \varepsilon_{s,t}$
$Institutional\ Trading\ Volume_{i,t} = f_7(Corruption\ Residual, Control\ variables) + \varepsilon_{s,t}$
$Equity\ Held\ \ by\ US\ Investors_{i,t} = f_8(Corruption\ Residual, Control\ variables) + \varepsilon_{s,t}$
Variable definitions are the same as those on earlier tables and defined in the Appendix. Standard errors are clustered by country and year following Petersen (2009). Models [3] is from Ancerno while Models [1] and [2] are from the CPIS dataset, and Model [4] is from the U.S. Treasury (TIC) dataset.
[a] Represent 10% significance level respectively.
[b] Represent 5% significance level respectively.
[c] Represent 1% significance level respectively.

on the Efficiency of judicial system, country level political constraints (POLCON-III), as well as French legal origin, German legal origin, and Scandinavian legal origin, with English common law as the base case, and store the residuals from this regression, $v_{i,t}$. The model's structure and variable choice are based on La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999), Shleifer and Vishny (1994), Tanzi (1995), Johnson, Kaufmann, and Zoido-Lobaton (1998) and La Porta et al. (2002):

$$Corruption_{it} = f_4(Efficiency\ of\ judicial\ system, French\ legal\ origin, German\ legal\ origin, Scandinavian\ legal\ origin, POLCON\text{-}III) + v_{i,t} \quad (4)$$

Then, in the second step, we use $v_{i,t}$ as an alternative proxy for Corruption's incremental effect. In this way, Corruption is orthogonalized and thus free of any collinearity between other macro-institutional variables. The incremental effect of residual, or orthogonalized, corruption on Equity Held by Foreigners, Total Portfolio Investment by Foreigners, Institutional Trading Volume, and Equity Held by U.S. Investors is estimated via a panel data set as follows:

$$Equity\ Held\ by\ Foreigners_{i,t} = f_5(Corruption\ residual, Controls) + \varepsilon_{s,t} \quad (5)$$

$$Total\ Portfolio\ Investment\ by\ Foreigners_{i,t} = f_6(Corruption\ residual, Controls) + \varepsilon_{s,t} \quad (6)$$

$$Institutional\ Trading\ Volume_{i,t} = f_7(Corruption\ residual, Controls) + \varepsilon_{s,t} \quad (7)$$

$$Equity\ Held\ by\ U.S.\ Investors_{i,t} = f_8(Corruption\ residual, Control\ variables) + \varepsilon_{s,t} \quad (8)$$

where,
Corruption Residual = $v_{i,t}$ from Eq. (4).
All of the above regression specifications include dummy variables to control for unobserved regional differences and we cluster standard errors by country and year, as recommended in Petersen (2009).[15] In Regression [1] of Panel A in Table 5, the

[15] When we cluster by quarter-years (or month-years) rather than by year, the statistical significance of our results remains robust.

Table 6
Robustness Check using Transformed Variables based on *ln*(1 + x).

Dependent variable	Equity Held by Foreigners	Total Portfolio Investment by Foreigners	Institutional Trading Volume	Equity Held by US Investors
Natural Logs of:	[1]	[2]	[3]	[4]
Intercept	4.50[c] (2.63)	5.33[b] (2.46)	2.82 (1.14)	0.21 (1.23)
Corruption	−40.10[c] (−13.73)	−41.48[c] (−11.19)	−13.18[b] (−2.55)	−2.13[c] (−7.18)
Corruption^2	43.83[c] (9.07)	44.33[c] (7.26)	8.69 (1.08)	2.72[c] (6.20)
POLCON-III	−0.36 (−0.83)	−0.96[b] (−2.10)	−1.58[b] (−2.02)	−0.11[c] (−2.96)
Efficiency of judicial system	0.71[c] (2.70)	0.96[b] (2.37)	−0.30 (−0.93)	0.05[c] (3.39)
Insider Trading Rules	0.13 (0.98)	0.11 (0.7)	0.42[c] (3.21)	0.00 (−0.5)
French legal origin	0.44[b] (2.48)	0.86[c] (3.55)	−0.06 (−0.34)	−0.06[c] (−4.83)
German legal origin	−0.04 (−0.27)	0.49[c] (2.72)	0.56[c] (2.80)	−0.04[a] (−1.65)
Scandinavian legal origin	−0.31[b] (−1.98)	−0.07 (−0.42)	0.08 (0.30)	−0.08[c] (−2.94)
US Ten-Year Treasury Yield	27.87 (0.76)	18.25 (0.42)	68.46 (1.27)	3.50 (0.86)
U.S. Industrial Production	−0.15 (−0.03)	0.07 (0.01)	15.70 (1.44)	−0.01 (−0.03)
Russell 3000 Stock Return	−1.47 (−1.65)	−1.17 (−1.11)	0.87 (0.29)	−0.11 (−1.25)
Emerging Markets Debt Index Return	1.63[a] (1.92)	1.38 (1.34)	−17.18[b] (−2.37)	0.12 (1.29)
R^2	0.78	0.74	0.49	0.49
N	195	195	143	197

This table re-estimates the Models [1]–[4] from Table 3 but all variables are transformed via *ln*(1 + x) to account for possible outliers.
[a] Represent 10% significance level respectively.
[b] Represent 5% significance level respectively.
[c] Represent 1% significance level respectively.

dependent variable is Corruption and the R^2 of the regression is 0.70. The residuals from the first-stage regressions reported in Panel A are then used along with Eqs. (5)–(8) to generate the second-stage parameter estimates found in Panel B of Table 5. To verify the validity of using this residual as an instrument for corruption in the second-stage models, we compute test statistics based on Anderson and Hsiao (1981) and strongly confirm that this residual is a valid instrument with F-statistics close to zero for all models, 0.54, 1.01, 1.05, and 1.88 for models [1]–[4] (i.e., the residual term is correlated with corruption but not the residuals from the second-stage regressions of foreign investment and institutional trading volume).

In Panel B of Table 5, the dependent variable in the first regression is Equity Held by Foreigners and the corruption residual has a statistically significant coefficient of −131.75. Since we use orthogonalized residuals as proxies for corruption, we do not include a squared form of these residuals in our regressions because squaring the residual values removes an important attribute of these variables: their potential to have either a negative or positive sign. In models [2]–[4], we find similar patterns between corruption, total foreign investment, institutional trading volume, and equity investment by U.S. investors. Thus, increased corruption confirms our earlier results which indicate that these variables are typically associated with lower levels of foreign investment activity.

Overall, the above results provide additional support for our research questions related to corruption's impact on foreign investment activity. For example, the evidence related to Corruption is consistent with how greater amounts of asymmetric information and investor uncertainty can create a negative relationship between corruption and our investment and trading volume variables.

3.4. Tests of robustness and economic significance

In this section, we report the main findings of various robustness tests by: (a) transforming all variables in Table 3 into logarithmic form (e.g., *ln*(1 + X)) and re-estimating these models in order to minimize the effect of outliers, (b) re-running the foreign investments regressions of Table 3 by excluding data from countries that are tax-havens, and (c) re-estimating our country level trading volume models of Table 3 after omitting some observations that might be skewing the results (e.g., some nations may have many more observations than the rest of our sample).[16]

Table 6 re-runs the four models described earlier in Table 3 but replaces all variables (both dependent and independent) with their log-transformed counterparts.[17] For example, for Equity Held by Foreigners, we take the natural logarithms of 1 plus these values. By performing this transformation on all variables, we can minimize the impact of outliers in a different way than simply winsorizing the data set. As one can see from the results reported in Table 6, our main findings are robust to this alternative method of accounting for outliers. Corruption retains its significant nonlinear effect on foreign investment and institutional trading volume.

Another concern is that the special tax policies of some nations might be driving our results since tax havens tend to attract large foreign investments. For example, foreign investments of some tax havens such as Luxembourg and Ireland tend to exceed GDP. Thus, we repeat the tests based on Models [1]–[3] of Table 3 and we re-run our models after omitting tax-haven nations such as Luxembourg, Switzerland, and others. The main findings of the country-level foreign investment regressions reported in Table 3 remain the same when we drop those nations with very high foreign equity investment ratios (namely, Hong Kong, Ireland, Luxembourg, Switzerland, Singapore, Belgium, Netherlands, Cyprus, Panama, Thailand, Japan, and Israel). When we replicate Table 3 without those outliers, the coefficient for Corruption is −279.0 and significant at the 1% level and the squared term is positive and significant in the full regression model when Equity Held by Foreigners divided by GDP is used as the dependent variable. Thus, our main results remain intact even after accounting for the possibly confounding factors of tax-related foreign investment incentives.

Yet another way to ensure the robustness of our choice of corruption variable is to re-estimate the model with other transformations of this variable. We find that our corruption

[16] To conserve space, other than the results for the log-transformed variables in Table 6, we do not tabulate robustness tests but the results are available upon request.
[17] We thank an anonymous referee for suggesting this alternative robustness test.

Table 7
Economic Significance of Corruption's Impact on Foreign Investment at the Country Level.

Dependent Variables	Foreign Equity Investment (%)	Total Portfolio Investment by Foreigners (%)	Institutional Trading Volume (%)	Equity Held by U.S. Investors (%)
Minimum Effect	−49.34	−114.28	−24.05	−11.89
Median Effect	−64.12	−148.98	−31.17	−15.36
Average Effect	−77.15	−179.98	−37.38	−18.34
Maximum Effect	−93.84	−228.80	−43.80	−20.34
Indifference Point for Corruption	0.36	0.37	0.35	0.33

We present the effects of corruption for our primary dependent variables based on parameter estimates from Table 3. To compute the first four rows of results in this table, we use the minimum, median, average, and maximum values of corruption and then multiply them by the appropriate parameters (if these parameters are statistically significant at the 10% level or lower). The final row of the table reports the "indifference point" where the net effect of corruption on our key dependent variables is zero. These indifference points represent a specific value of corruption that is derived from the relevant parameter estimates of the linear and nonlinear forms of corruption (i.e., Corruption and Corruption^2) for each dependent variable by setting these competing linear and nonlinear effects equal to zero. These calculations for *Foreign Equity Investments, Total Portfolio Investments, Institutional Trading Volume*, and *Equity Held by U.S. Investors* are based on parameter estimates reported in Table 3 for Models [1]–[4], respectively.

measure is robust to alternative transformations that preserve the sign and monotonic ordering of the original transparency metric and thus our results are not driven by the choice to use the reciprocal of the Transparency International index. For example, following the methods of Kolasinki, Reed, and Ringgenberg (2013) and Greene (1997), we also use a trans-log specification (*ln*(CPI rating) and *ln*(CPI rating)^2), which provides a very flexible form that is commonly used in economics to account for possible nonlinearities. Our results on the reverse J-shape effects of corruption are robust to this specification. We also use an alternative form of the dependent variable by computing the logarithm of foreign investment and regressing it on linear and squared forms of the un-transformed CPI rating, along with our other controls. In this case, we once again find that corruption has a nonlinear effect on investment. Thus, our results are robust to alternative forms of the corruption variable.

Lastly, we focus on the economic significance of our results. We present in Table 7 the effects of corruption for our primary dependent variables based on parameter estimates from Table 3. To compute the first four rows of results in this table, we use the minimum, median, average, and maximum values of corruption and then multiply them by the appropriate parameters (if these parameters are statistically significant at the 10% level or lower). The results reported here show that corruption is associated with a large, negative impact on a nation's equity markets, as shown by corruption's effect on Foreign Equity Investment (e.g., −77.2% on average, computed as follows from Model [1] in Table 3: $-555.71 \times 0.19 + 781.59 \times 0.19^2$). By reporting the effects at corruption's minimum, median, average, and maximum values, one can see the range of corruption's impact on these key dependent variables. For example, for all four variables, the impact of corruption at its maximum level of 0.44 is approximately twice as large as its effect when corruption is at its minimum level of 0.11. Thus, the influence of corruption is not only statistically significant but also economically significant.

The last row of the table reports the "indifference point" where the net effect of corruption on our key dependent variables is zero. These indifference points represent a specific value of corruption that is derived from the relevant parameter estimates of the linear and nonlinear forms of corruption (i.e., Corruption and Corruption^2) for each dependent variable by setting these competing linear and nonlinear effects equal to zero. For example, the level of corruption that has a zero net effect on Foreign Equity Investments is 0.36.[18] Interestingly, the indifference point for our Corruption variable is nearly the same for all four dependent variables, ranging from 0.33 to 0.37, and with an overall mean of 0.36. As a point of reference, Argentina's level of corruption is 0.35 and is closest to this mean value based on our sample of 49 nations. Thus, countries with corruption levels above this range can experience an uptick in foreign investment due to the "perverse playing field" for very high levels of corruption, as we have described in the introduction section.

4. Conclusions

We test the non-linear effects of corruption on foreign portfolio investment and institutional trading volume. The differential abilities of domestic and foreign institutional investors to deal with corruption potentially generate nonlinear effects of corruption that have not been previously explored in the literature. We test the nonlinear effects of corruption by examining a country level panel dataset that has several dependent variables – portfolio investment and foreign institutional trading – and several control variables in addition to the key explanatory variable – the corruption perception index.

We find that increased corruption is normally related to less foreign portfolio investment into a country. However, the effect of corruption on foreign equity investment is nonlinear and reverse J-shaped, with intermediate levels of corruption yielding the most negative effects on foreign portfolio investment in our study of 49 countries. We interpret this finding as evidence consistent with three phases of corruption: (1) a highly transparent level playing field with low levels of corruption, (2) a risky and severely asymmetric information environment with moderate levels of corruption, and (3) a "perverse" level playing field in countries with very high levels of corruption, where the information about the beneficiaries of corruption is common knowledge.

Our findings on corruption's pervasive effects on investors and corporations suggest that further research is warranted in areas of international portfolio analysis and corporate decision making, explicitly focusing on short term and long term consequences of corruption and the regulatory fight against it.

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[18] This result is computed by setting the first order derivative of the parameter estimates from Model [1] in Table 3 equal to zero and then solving for a specific value of corruption: $-555.71 + 2 \times 781.59 \times \text{Corruption} = 0$.

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Appendix. : Data Variable Definitions

Variable	Definition	Source
Equity Held by Foreigners and Total Portfolio Investment by Foreigners	The amount of investments in a nation's equity, as well as total debt plus equity, by foreigners. Scaled and expressed as a percentage of GDP.	IMF's CPIS dataset
Institutional Trading Volume	The total institutional investors' buy plus sell trading volume, which is the sum of all buy and sell orders for all stocks in a given country, executed in the given calendar year by the institutions in our sample. Expressed as a percentage of GDP.	Ancerno dataset
Equity Held by U.S. Investors and Total Portfolio Investment by U.S. Investors	The amount of investments in equity, as well as total debt plus equity, by U.S. investors in a particular country. Scaled and expressed as a percentage of GDP.	U.S. Treasury International Capital (TIC) dataset
Corruption	The reciprocal of Transparency International's Corruption Perceptions Index (CPI), which is a composite index, or poll of polls, that ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians.	Transparency International
Political constraints (POLCON-III)	Measures the feasibility of policy changes within a country. The score ranges from 0 (total political discretion) to 1 (a change in current policies is infeasible).	Henisz (2002)
Efficiency of judicial system	The assessment of the efficiency and integrity of the legal environment as it affects business and is scaled from 0 for lowest to 10 for highest efficiency.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
Legal origins	Dummy variables for French, German, and Scandinavian civil laws as well as English common law.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997)
U.S. Ten-Year Treasury Yield	Yield to Maturity of 10-year constant maturity U.S. Treasury note.	St. Louis FRB's FRED database
U.S. Industrial Production	Annual growth rate of total U. S. industrial production	St. Louis FRB's FRED database
Russell 3000 Stock Return	Annual return on Russell 3000 U.S. stock index	Bloomberg
Emerging Markets Debt Index Return	Annual return on Bank of America – Merrill Lynch Emerging Markets Corporate Plus Index (tracks the performance of U.S. dollar- and Euro-denominated emerging markets non-sovereign debt, publicly issued within the major domestic and Eurobond markets).	Bloomberg

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