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Corruption and reforms: Are liberal democracies different?☆

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ABSTRACT

In this study we examine the impact on corruption of economic reforms, international linkages, and the interaction of past reforms with current international flows for a large group of countries over a period of more than three decades within a dynamic panel data framework. We consider two economic reforms (greater trade and financial openness) and their corresponding international linkages (international trade and foreign direct investment intensities). Among the reform and intensity measures, only the FDI inflow intensity indicator appears to have a direct, negative effect on corruption. However, past trade and financial reforms interacted with subsequent levels of foreign investment and trade reduce corruption, particularly in liberal democracies.

1. Introduction

In the 1960s, prominent scholars posited that corruption in developing countries played a positive role in economic development by cutting red tape. The "functional" role of corruption in by-passing inefficient government institutions came to be known as the "grease the wheel" hypothesis (Leff, 1964; Huntington, 1968). However, over time, as more data became available, a new generation of scholars rejected this "functional" thesis. In their study on growth and investments in a large cross-national sample, Meon and Sekkat (2005) found evidence that corruption actually "sands the wheels" by making things worse, particularly in countries where governance institutions are already of poor quality.

By 1996, the World Bank had created the Corruption Action Plan Working Group, which stated that reform policies such as privatization, business deregulation, trade liberalization, financial and capital account liberalization, and tax restructuring, were essential means to reduce government discretion, which historically had created opportunities for corruption and rent-seeking practices (World Bank, 1997).

Since the 1990s, a larger number of empirical studies utilizing newly created indices of (perceived) corruption have documented the stupendous role of corruption in undermining economic development. In this paper, we re-examine the determinants of corruption for a panel of 129 countries over the period from 1984 to 2018 (using 5-year averages to minimize the impact of business cycle

fluctuations), with a special focus on the impact of economic reforms and international economic ties to which they are linked. Economic openness reforms are important tools in the hands of policy makers that can expand a country's place in the global economy and the benefits that come with it.

Our approach has several novel features that distinguish it from the existing literature on the determinants of corruption. First and foremost, we are interested in the anti-corruption effects of the interactions between lagged reforms and current international linkages. Since reforms take time to change global ties, it is important to incorporate the timing of adjustments into the empirical model. If reforms are successful in triggering growth in international economic flows in subsequent years, it is precisely the joint effect of past reforms with current linkages that should matter the most for changing corruption. In this regard, we are looking at two policy reforms - reduction in trade barriers and lowering of capital market restrictions, and the two corresponding international linkages - trade and foreign direct investment intensities.

Second, while we are focused on identifying the impact of the reforms-linkages nexus on corruption for all types of countries, we are particularly interested in the question of whether the impact matters more for liberal democracies compared to other political systems such as illiberal democracies, autocratic systems, and totalitarian regimes. There is evidence that the political system might matter (Sequeira, 2016). When countries introduce foreign trade and investment barriers, companies often seek ways to circumvent those barriers, often by bribing local officials. This tax evasion strategy is less likely to work in liberal democracies due to the higher quality of public institutions. Hence, when barriers are removed through economic reforms, the impact on trade and investment and subsequently corruption will be stronger in liberal democracies compared to other forms of political regimes which, at the extreme, may not see any impact on corruption.

Finally, we embedded the above analysis within a dynamic panel framework, that is, we control for the past level of corruption.[1] This approach is partially driven by the persistence of corruption over time (hysteresis), a fact that has not been adequately accounted for in the empirical literature on corruption. In addition, the inclusion of a lagged dependent variable term functions as a way to reduce omitted variable bias (Eichengreen and Irwin, 1996) and mitigate the autocorrelation of the residuals in time series data. Throughout the analysis, we use the system GMM estimator which is designed to yield consistent estimates in lagged dependent variable models with country-specific fixed effects as well as address the bias from the potential endogeneity of some (or all) of the covariates.

The main findings of the paper are as follows. First, we find that economic reforms geared toward greater openness and stronger economic ties (more trade and FDI inflows) appear to have a limited impact on corruption. Second, we find that past financial market reforms interacted with higher levels of current foreign investment reduce corruption. Finally, we find that the corruption reducing interaction of past capital market reforms with greater current international linkages is particularly strong in liberal democracies.

The paper is structured in the following way. We review the literature and provide a theoretical discussion on the causal impact of reforms on corruption in chapter 2. In chapter 3, we discuss the various empirical models, the identification assumptions of the system GMM estimator, as well as the specification tests. Data issues and variable definitions are covered in Chapter 4. Chapter 5 contains the discussion of the main results including robustness checks. Chapter 6 summarizes and concludes.

2. Literature review and theory

2.1. Literature review

Since the late 1990s, the empirical investigation of the determinants of ctorruption has attracted a fair amount of scholarly attention.[2] Here, we review the two streams of research most relevant for this investigation. The first focuses on the impact of trade intensity, trade policy reforms, FDI inflow intensity and capital market reforms. The second one examines the impact of broadly defined institutional variables of legal and political nature, such as colonial and legal heritage, religion, democratic rule, political instability, federal vs. centralized government, etc.

The empirical literature of trade intensity and corruption is by far the most investigated among the intensity and policy reform measures.[3] Trade intensity is frequently measured as imports relative to GDP or the ratio of total trade (exports plus imports) to GDP. Ades and Di Tella (1999) claim to be the first to examine the impact of the import share on corruption. Using both cross-section and panel fixed effect estimations, they find import shares to have a negative, statistically significant impact on corruption. Sandholtz and Koetzle (2000) find that trade intensity, measured by exports plus imports as a share of GDP, is correlated with lower levels of corruption, measured by Transparency International's Corruption Perception Index (CPI). Treisman (2000) shows that trade intensity as measured by the share of imports in GDP is associated negatively with corruption. A similar result is reported by Larrain and Tavares (2007) who use panel IV estimators to account for the potential endogeneity of their trade intensity measure.[4] Similarly, Gatti (1999)

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documents that more open countries tend to have a lower level of corruption. Using a fixed effects IV panel estimator, Frechette (2006) shows that the import-to-GDP ratio has a statistically significant, negative effect on corruption.[5] On the other hand, Knack and Azfar (2003) and Gerlagh and Pellegrini (2008) report that trade intensity has no significant impact on corruption, while Majeed (2011, 2014) finds a significant, non-linear relationship between the two variables. Using Leamer's Extreme-Bounds analysis, Serra (2006) concludes that there is no robust correlation between trade intensity and corruption. Finally, Gurgur and Shah (2005) as well as You and Khagram (2005) show that an increase in the trade intensity has a significant, positive effect on corruption.

The empirical literature investigating the link between corruption and trade policies such as import duties and international taxes paints a mixed picture. While the legal profession sees high tariffs as a catalyst for customs fraud and hence a rise in corruption (Rosen, 2025), the empirical literature on the impact of tariffs on corruption is less supportive of such a view. Chaudhry and Shabbir (2007) and Anwaz (2007) who employ the KOF Globalization Index which aggregates FDI inflows, trade flows, trade policy measures and capital market openness indices into a single index of globalization report a negative impact on corruption. In contrast, Lee and Azfar (2000) find in a panel estimation approach that tariff levels have no effect on corruption. To investigate the link between economic reforms and corruption using panel estimators, several studies have utilized the Sachs-Warner openness dummy variable which labels a country as closed if one of the following conditions apply: high tariffs or non-tariff barriers, strong black market premium exchange rate depreciation, state monopoly on exports and socialist economic system (Giavazzi and Tabellini, 2005; Tavares, 2007; Olofsgard and Zahran, 2008).[6] While Giavazzi and Tabellini as well as Tavares report a negative impact of trade reforms on corruption, Olofsgard and Zahran find no evidence for a robust impact of trade policy reform.[7] Sequeira (2016) argues that when countries introduce foreign trade barriers, companies often seek ways to circumvent those barriers by bribing local officials. When the trade barriers are eventually removed through a trade policy reform, the volume of trade is unaffected since it never declined in the first place due to the tax evasion scheme. Specifically, she finds that in the years after a free trade agreement between Mozambique and South Africa came into effect, imports by Mozambique from South Africa did not rise but bribe transfers from importers to local officials declined significantly.

Another strand of the literature examines the impact of foreign direct investment (FDI) inflows on corruption. Larrain and Tavares (2007), using a cross section of countries between 1981 and 2000, uncover that FDI inflows (as a share of GDP) significantly decrease corruption in the host country. Regressing current corruption levels on past (average) FDI inflow shares for a large set of countries, Kwok and Tadesse (2006) find that foreign direct investment generates positive spillovers on the institutional environment thereby lowering the host country's level of corruption.

The second economic policy reform concerns the lifting of capital controls. Olofsgard and Zahran (2008), using panel estimators based on annual data, find that an equity market liberalization dummy significantly lowers corruption levels. Dreher and Siemers (2009) panel data analysis surveying 80 countries over the period 1984–2002 finds that stricter capital account restrictions went together with higher levels of corruption.[8]

Table A1 in Appendix A summarizes the findings of the empirical literature investigating the impact of economic openness reforms and international economic linkages on corruption perception.

Following Treisman (2000), Serra (2006) conducted a comprehensive study testing the robustness of most determinants of corruption that had been identified in the literature. She did so by applying a variant of Leamer's Extreme-Bounds Analysis (EBA) method to 16 determinants of corruption. Her results confirm many of Treisman's (2000) findings. More specifically, she found that several determinants passed the EBA litmus test: a country's level of development, a democratic political system, countries with a larger percentage of people leaning toward Protestantism, colonial heritage and political instability.

2.2. Causes of corruption - reforms, intensities, and their interactions: theory

The theoretical impact of economic reforms, the volume of international linkages and the reform-linkages interaction on the level of corruption is complex and multi-layered. In what follows, we discuss some of the potential avenues of policy reform successes and failures as well as their expected impact on corruption.

2.2.1. Reforms and international linkages

A trade policy reform in the form of lower tariffs on imports, lower taxes on exports, and/or reductions of non-tariff barriers should, ceteris paribus, increase trade flows (imports and exports) over time as both sides engage more fully in the international specialization of factor usage leading to a mutually beneficial outcome. However, if the importing country has low governance, tariff evasion may be

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[5] Country studies have also explored this issue, although their generalization is limited. In their analysis of Vietnam, Malesky and Guerguiev (2013) noted that economic openness was the most important factor in reducing corruption.

[6] The Sachs-Warner openness dummy is a controversial measure of openness. Rodrik and Rodriguez (2000) argue that due to its design it is essentially a Sub-Saharan Africa dummy.

[7] Olofsgard and Zahran (2008) is the only paper surveyed in Section 2.1 that uses the Arrelano-Bond difference GMM estimator to estimate a lagged dependent variable model (Table 2, columns 7 and 8). While inferior to the two-step system GMM estimator with robust finite sample bias corrected standard errors used in this study, their analysis also lacks the battery of specification tests that are necessary to ensure the appropriateness of the GMM model specification.

[8] To our knowledge, no empirical study has investigated the corruption effects of the interaction between (lagged) economic policy reforms and international linkages. The closest study in spirit is Majeed (2014) who examines the corruption impact of the contemporaneous interaction of trade intensity with Bureaucratic Quality.

rampant, especially since bribes are often just a small fraction of import values (Sequeira, 2016). In those cases, lowering trade barriers may not produce significant changes in imports. Also, if imports are highly price inelastic, a reduction in trade cost though lower trade barriers will not lead to large changes in imports.

A capital market reform that lessens restrictions on capital in- and outflows should make the local economy a more attractive place for foreign investment since the reforms lower the country-specific risks and increase profits for foreign investors, all else equal (Dreher and Siemers, 2009). However, other factors such as local labor shortages, excessive red tape, language barriers, a low import elasticity, or high labor and environmental standards can deter foreign direct investment even if capital markets are fully liberalized.

Despite the possible breakdowns mentioned above, we expect past trade and capital market reforms to stimulate current trade and FDI inflow intensities, respectively (*Hypothesis 1*).

2.2.2. FDI inflows and corruption

If FDI comes from a less corrupt source country, corruption may decline as foreign investors will try to push the destination country to adopt the same standards as in the source country. Foreign investors may also make current and/or future investments contingent on improvements in the destination country's level of corruption. Investors from less corrupt countries may in general be less willing to pay bribes since they are not used to such payments from their home market experience (Kwok and Tadesse, 2006)

On the other hand, if FDI comes from more corrupt countries, corruption in the destination country may increase as foreign investors could undermine local business standards and introduce local officials to the lure of bribes. Finally, if FDI comes from an equally corrupt country and/or is concentrated in special economic areas such as free trade zones that have little interaction with the economy of the destination country a change in corruption is unlikely.

Since most of the world's foreign direct investment emanates from high-income, low corruption countries, we expect the impact of FDI inflows to decrease the level of corruption (*Hypothesis 2*).

2.2.3. Trade inflows and corruption

An increase in trade openness may make local markets more competitive. The rise in competition lowers the monopolistic rents of local firms, thereby reducing their ability to pay bribes and thus lowering corruption.

Conversely, a rise in imports generates more means for customs officials to collect bribes from exporting firms and/or embezzle a fraction of the larger amount of import duties collected. This would increase the country's level of corruption (Majeed, 2014).

We expect a rise in trade intensity to reduce the level of corruption, in particular in countries with good public governance such as liberal democracies (*Hypothesis 3*).

2.2.4. Interaction of reforms and linkages on corruption

Meaningful economic reforms will take time to affect a country's economy, even under the best of circumstances. Of course, reforms without changes in economic behavior cannot affect corruption. To capture the potential changes in trade and FDI inflows in response to policy reforms, it is important for empirical studies to model the time lag of reforms. In other words, an interaction term between lagged economic reforms and current international flows has the *best potential* to capture the corruption-reducing impact of economic reforms, in particular in liberal democracies (*Hypothesis 4*, derived from combining H1, H2, and H3).

2.2.5. Covariates

The expected impact on corruption of the control variables used in this study (democracy ($-$), economic development ($-$), Hispanic colonial heritage ($+$), Protestant religious beliefs ($-$)) follows the reasoning and findings in Treisman (2000).

3. Empirical model

3.1. Estimation equations

We report results similar to Treisman's specification, but our baseline regression model merges the determinants of corruption established in the empirical corruption literature with two sets of covariates: the economic reform Economic linkage variables (trade and FDI shares in GDP) and the interaction of economic linkage variables with lagged economic reform variables (trade and investment reforms). In addition, we include a lagged dependent variable to account for the persistence of corruption over time.

$$Corr_{it} = \beta_0 + \beta_1 Corr_{i,t-1} + \beta_2 Democracy_{it} + \beta_3 Reforms_{it-1} + \beta_4 Links_{it} + \beta_4 X_{it} + \beta_5 Z_i + \nu_i + \gamma_t + \mu_{i,t} \qquad \text{Eq (1)}$$

where $Corr_{it}$ is a measure of the perceived level of corruption in a country, $Democracy_{it}$ captures political reforms, $Reforms_{it-1}$ is vector of lagged economic reform variables, $Links_{it}$ is a vector of economic linkages between countries, X_{it} is vector of time-varying control variables, Z_i is vector of time-invariant control variables, ν_i denotes unobserved country-specific effects, γ_t denotes unobserved, year-specific time effects, and μ_{it} denotes the idiosyncratic error term, i denotes country and t time.

We then extend this model to include interactions of past economic reforms with international linkages:

$$Corr_{it} = \beta_0 + \beta_1 Corr_{i,t-1} + \beta_2 Democracy_{it} + \beta_3 Links_{it} + \beta_4 Reform_{it-1}*Links_{it} + \beta_5 X_{it} + \beta_6 Z_i + \nu_i + \gamma_t + \mu_{i,t} \qquad \text{Eq (2)}$$

We expect both economic ties between countries as well as the interaction of past reforms with linkages to dampen a country's level of corruption. First, economic reforms in the form of greater openness to foreign trade and investment are a strong signal that policy

makers are serious about exposing domestic firms to the rules (and competition) of the international market, a move that is incompatible with the status quo of maintaining (or even increasing) levels of corruption. Second, as economic ties with less corrupt countries grow over time, the expectations of foreign businesses vis-à-vis the rule of law and the quality of the home country's governance institutions are likely to have a (positive) contagion effect thereby lowering the country's level of corruption. Thus, the expectation is that the interaction coefficient estimates (β_4) are negative as they capture the amplification effect of increased economic ties in the current period in response to economic reforms in the prior period.

In our extended model, we evaluate the role of liberal democracies in controlling levels of corruption. We do this by interacting our key time-varying variables with a dummy for liberal democracies, LD_i. The estimation equation is:

$$Corr_{it} = \beta_0 + \beta_1 Corr_{i,t-1} + \beta_2 Democracy_{it} + \beta_3 Reforms_{it-1}*Links_{it} + \beta_4 Reforms_{it-1}*Links_{it}*LD_i + \beta_5 Links_{it} + \beta_6 Links_{it}*LD_i + \beta_8 X_{it}$$
$$+ \beta_9 Z_i + \nu_i + \gamma_t + \mu_{i,t}$$

$$\text{Eq (3)}$$

3.2. GMM dynamic panel data estimation

The standard approach is to estimate the model in equations (1)–(3) in first differences thus eliminating the individual fixed effects. Specifically, the estimating model thus becomes:

$$y_{i,t} - y_{i,t-1} = \widetilde{\beta}_1 \left(y_{i,t-1} - y_{i,t-2} \right) + \beta_2 (X_{it} - X_{i,t-1}) + \widetilde{\gamma}_t + (\mu_{i,t} - \mu_{i,t-1}) \qquad \text{Eq (4)}$$

The problem in estimating Eq. (4) is the endogeneity introduced by the lag dependent variable since $E\left[\left(y_{i,t-1} - y_{i,t-2} \right) \left(\mu_{i,t} - \mu_{i,t-1} \right) \right] \neq 0$. The dynamic panel data estimator developed by Holtz-Eakin, Newey and Rosen (1988) and Arellano and Bond (1991) and applied to the growth literature by Caselli et al. (1996) and Dollar and Kraay (2003) [9] among others, addresses this issue by using two periods or more lags of the dependent variable as instruments for the differenced lagged dependent variable since

$E\left[y_{i,t-s} \left(\mu_{i,t} - \mu_{i,t-1} \right) \right] = 0$, for $t = 3, 4...T$ and $s \geq 2$, under the assumption that μ_{it} is not serially correlated.

Blundell and Bond (1998) show that this difference estimator may not perform well when there is high persistence in the dependent variable and demonstrate that the system GMM estimator, initially proposed by Arellano and Bover (1995), may be better suited in terms of asymptotic efficiency [10]. The system GMM estimator is based on the idea that additional moment conditions can be introduced by adding a level equation to the differenced equation and using lagged differences of the explanatory variables as instruments for the level equation since $\left[\mu_{it} \left(y_{i,t-1} - y_{i,t-2} \right) \right] = 0$, for $t = 3, 4...T$.

Since the dependent variable (corruption) is likely to display a high level of persistence, the system GMM estimator is a more suitable choice in our context. Another advantage of the system estimator is the identification of the impact of the time-invariant variables.

Finally, the potential endogeneity of the time-varying explanatory variables, $Reforms_{it}$, $Links_{it}$ and X_{it}, can be addressed within the GMM approach by using appropriate lags of these variables as instruments. For example, if $E\left[(x_{i,t} - x_{i,t-1})(\mu_{i,t} - \mu_{i,t-1}) \right] \neq 0$ but $E\left[x_{i,t-s}(\mu_{i,t} - \mu_{i,t-1}) \right] = 0$ for $s \geq 2$, two or more lags of x_{it} could be used as instruments. Furthermore, in the level equation of the system GMM estimator, lagged differences of x_{it} are used as instruments for x_{it}.

3.3. Specification tests for the dynamic panel data model

To test the validity of our system GMM estimates, we perform a battery of tests. First, since lagged values are used as instruments, consistent estimation requires the absence of second-order serial correlation in the error term (see Arellano and Bond, 1991). To test this requirement, we perform the Arellano-Bond AR(2) test. A sufficiently high p-value (e.g., values > 0.05) implies the absence of second-order autocorrelation. In that case, the system GMM can be applied without any adjustments to the instrument set. A low p-value indicates the presence of an MA error term of order two or higher. In this case, the model needs to be re-estimated with the instrument set lagged by an additional period (Cameron and Trivedi, 2005). To test whether the modified system GMM estimator has the correct error structure, we test for the absence of third-order autocorrelation using the Arellano-Bond AR(3) test. Failure to reject the null (p-value of greater than 0.05) indicates the absence of higher order serial correlation.

Second, to test the validity of the exclusion restrictions, we perform the Hansen *J*-test. Under the null hypothesis, the instruments are correctly excluded from the model. Since we use system GMM, we report two additional tests of the exclusion restrictions known as the difference-in-Hansen tests. These tests separate checks of the validity of the exclusions restrictions, one for the level and one for the difference equations (see Roodman, 2009b).

Our next test is motivated by the issues of instrument proliferation. Roodman (2009) shows that having numerous instruments, which usually is the case in GMM estimation, can result in an over-fitting of the model. This can fail to rid the explanatory variables of their endogenous components, potentially leading to inconsistent estimates. In this case both Hansen tests may produce very high p-

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[9] For a more recent application of the dynamic panel data method in the context of corruption and growth, see Swaleheen (2011).
[10] As Hayakawa (2007) has shown, the system GMM estimator also performs better in terms of small sample bias.

values, often close to 1. To avoid instrument proliferation, the instrument set should be reduced by either restricting the number of lags (Beck, Demirguc-Kunt and Levine, 2000) or by "collapsing" the instrument set into a smaller dimension matrix (Roodman, 2009a; Vieira, MacDonald and Damasceno, 2012). Finally, we report two-step robust standard errors corrected for finite sample bias (Windmeijer, 2005).

4. Data

The data set covers the five decades from 1984 to 2018, a time frame driven by the availability of corruption data for a large cross-section of countries. Following Islam (1995) and Caselli et al. (1996), we use five-year averages of all time varying variables which yields a maximum of 7 time periods. Taking averages ensures that, to a large extent, short-term fluctuations resulting from changes in business cycles are smoothed out. In addition, by using the time-averages, we capture the longer-term impact of reforms, linkages and other explanatory variables on corruption. The cross-section dimension varies by model specification, ranging from N = 62 to N = 129.

The dependent variable is an index of corruption taken from the ICRG (international country risk guide) data set. The index is actually a corruption control index (higher values represent less corruption) which we convert to a corruption index with higher values measuring higher levels of corruption.

Due to the inability to capture democracy by use of a single variable, we employ three different democracy measures, explained in detail in Table A1 below. Our first democracy measure, *FH_score* (Freedom House), is constructed as the average of political rights and civil liberties scores, both from the Freedom House dataset. Our second measure is the *Polity2* score from the Polity-IV dataset (Marshall et al., 2019). This measure ranges from −10 to +10 with the latter capturing the highest score given to democracies. Our final measure of democracy is called *democratic capital* and is based on Persson and Tabellini (2009). According to these authors, this measure captures the stock of civic values that impact how much a country's residents are willing to cherish and stand up for democracy. The longer a country is democratic, the stronger is the development of formal and informal institutions and norms that make the country more resilient to coups as well as enable the country to switch back to democracy, should it fall into an autocratic regime. Following Persson and Tabellini (2009), the stock of democratic capital grows in the years a country is democratic and does not grow otherwise. We define a country to be democratic if *Polity2* score is positive. This capital starts accumulating from the first year in the data, 1800, if a country was democratic before then or from the first year of a country's independence. Democratic capital also depreciates at a constant rate, δ. Persson and Tabellini (2009) use 6 % and 1 % as the depreciation rates and we use the latter in our dataset. Democratic capital is constructed as follows (similar to Fredriksson and Neumayer, 2013): Let $z_{i,t}$ be the stock of democratic capital for country i in year t and let $a_{i,t}$ be an indicator variable which takes the value of 1 if a country is democratic and 0 otherwise. Then, $z_{i,t} = a_{i,t} + \delta * z_{i,t-1}$. The measure is then multiplied by 1- δ to normalize it to lie between 0 and 1.

The two economic reform variables are (1) trade policy reform measured as the average tariff rate, the ratio of import tariff revenues to the value of imports; and (2) international finance reform as defined by the Chinn-Ito index of financial openness. This measure attempts to capture a country's capital account openness by assessing how freely capital flows across its borders based on regulatory environment (Chinn and Ito, 2008) and international linkages between countries are captured through a trade link defined as the ratio of total trade to GDP and an international investment link measured by the share of FDI inflows in GDP.

The remaining explanatory variables (see Table A in the Appendix for details) fall into three categories: a measure of economic development (real GDP per capita), measures of colonial history (colonizing country, origin of legal system), and a measure of religious orientation (dominant religion) Tables B contains the summary statistics for all variables where the mean is calculated as the grand mean (average across countries and time).

5. Empirical results

Our study builds on the work of Treisman (2000, 2007) in understanding the determinants of corruption. As a baseline model, we incorporate the main variables from Treisman, 2007, Table 1). These results are reported in Appendix Tables A4 and A5. Our findings confirm the cross-section estimates in Treisman (2000, 2015) and the extreme bound analysis in Serra (2006). Political reforms creating more democratic societies, captured by three measures of democracies, the FH index, the Polity 2 index and the democratic capital stock variable, matter for corruption. All coefficient estimates are negative, and all but one are statistically significant. Similarly, a higher living standard (GDPpc), a legal system that originates in Scandinavia or Germany (legorg_Scan, legorg_German), and a higher percentage of people with protestant beliefs have negative coefficient estimates that are statistically significant. In contrast to some findings in the literature, British or French legal origin has no statistically significant impact on corruption in our model estimates. The same holds for predominantly Catholic or Islamic countries. On the other hand, countries with colonial ties to Spain and Portugal experience higher corruption levels compared to countries with other colonial powers. The dynamic panel estimates also reveal that past levels of corruption imply more current corruption, with all coefficient estimates being statistically significant. When we account for economic ties between countries, we find that international linkages lower corruption but the precision of the estimated coefficients is weak. The FDI share is statistically significant in two of the four models, while the trade share variables (total trade share and import share) are insignificant throughout.

Our main contribution is to incorporate the role of past reforms and their interaction with economic integration in reducing corruption. Our hypothesis is that past economic reforms interacted with international linkages will result in lowering corruption levels. We start by estimating various specifications of Equation (1), where past reforms are included with other contemporaneous time varying measures. In Table 1, we use the Freedom House Index as the measure of democracy. We alternate between lagged values of the Share of Import Duties and Chinn-Ito Financial Openness Index as measure of economic reform. Our findings are in general

Table 1

Determinants of corruption: Economic linkages and lagged reform measures.

Dep. Var: Corruption	(1)	(2)	(3)	(4)	(5)	(6)
Corruption $_{t-1}$	0.556***	0.642***	0.528***	0.618***	0.493***	0.636***
	(0.069)	(0.079)	(0.069)	(0.086)	(0.068)	(0.079)
Freedom House Score	−0.064***	−0.020	−0.061***	−0.032	−0.071***	−0.032*
	(0.023)	(0.020)	(0.023)	(0.021)	(0.022)	(0.020)
Ln FDI Share	−0.055	−0.159**				
	(0.079)	(0.072)				
Ln Trade Share			0.180	0.094		
			(0.174)	(0.114)		
Ln Import Share					0.148	0.096
					(0.172)	(0.131)
Chinn Ito Index(t-1)	0.117		−0.036		−0.020	
	(0.165)		(0.158)		(0.154)	
Import Duties Share (t-1)		−0.050		−0.075		−0.069
		(0.093)		(0.117)		(0.101)
Ln GDPpc	−0.095*	−0.174	−0.095	−0.206	−0.096	−0.199*
	(0.054)	(0.109)	(0.073)	(0.133)	(0.061)	(0.107)
Spanish/Portuguese Colonial Origin	0.223**	0.107*	0.266***	0.168**	0.287***	0.156*
	(0.087)	(0.061)	(0.095)	(0.083)	(0.092)	(0.083)
Ln. Protestant Share	−0.042*	−0.044	−0.053**	−0.047	−0.063**	−0.045
	(0.025)	(0.028)	(0.026)	(0.036)	(0.028)	(0.035)
Observations	661	404	653	401	644	400
Countries	129	104	128	103	127	103
# of instruments	74.0000	74.0000	74.0000	74.0000	74.0000	74.0000
AR(4) pval	0.1335	0.7892	0.2552	0.8346	0.2873	0.7967
Hansen Overid Test pval	0.1091	0.3144	0.0925	0.1260	0.1139	0.1113
Diff Hansen test for levels eq. pval	0.3996	0.3286	0.4737	0.2124	0.3869	0.1986
Diff Hansen test for diff eq. pval	0.2824	0.6955	0.7292	0.7596	0.5732	0.5651

All models estimated using Blundell-Bond two step system GMM estimator with robust finite sample bias corrected standard errors (Windmeijer, 2005).

AR(q): p-value of Arellano and Bond test for autocorrelation of order q of the error term.

Hansen Overid Test pval: Hansen test of the overidentification restrictions, p-values reported.

Diff in Hansen test for level eq: tests the validity of the mean stationarity assumption in the levels equation, p-values reported.

Diff in Hansen test for diff eq: tests the validity of the mean stationarity assumption in the difference equation, p-values reported.

*/**/***: Significant at 10 %, 5 % and 1 %, respectively. Standard errors in parenthesis.

All regressions include time dummies.

All time varying variables enter as five-year averages.

agreement with the previous literature. Democracy lowers corruption and so do economic linkages, as captured by the FDI share.[11] Past economic reforms are not statistically significant by themselves in lower corruption. In Table 2, we use the Democratic Capital as the measure of democracy. The results are qualitatively similar. This measure of democracy, which captures the democratic momentum being built from previous years, has a negative and statistically significant impact on corruption. FDI share has a negative sign though is significant in only one of the two specifications. The other two measures of international linkages are not significant. Here again, the lagged economic reform measures are not statistically significant.[12]

The AR(3) tests in both Tables A4 and A5 had low p-values that imply the absence of higher-order autocorrelation of the error term. Thus, fourth period lags of the lagged dependent variable were used as instruments. Other time varying variables were considered to be predetermined and appropriately instrumented by their lag values as well. The high p-values of the Hansen J-test show the validity of the exclusion restriction. Furthermore, since the p-values of the Hansen J-test statistic are bound away from unity, instrument proliferation is a non-issue. Finally, the p-values of the difference-in-Hansen test for both the difference and the level equation imply that we cannot reject the null of correctly excluded instruments for either equation.

In Table 3, we estimate our main specification, Equation (2), where we introduce the interaction between lagged economic policies and current international linkages. While the main findings with regard to the standard determinants of corruption continue to hold, the interaction of prior financial openness and with greater current FDI flows lowers corruption (with two of the three estimates (columns 5–7) showing statistical significance). The cross effect of past protectionism with current trade and FDI shares appears to be unrelated with corruption, as all coefficient estimates are statistically insignificant, though most of the estimates have the expected signs. This is a novel finding. Our results suggest that undertaking financial sector reforms in the past amplify the effect of FDI in lowering corruption. While there have not been many previous studies examining the effect of FDI on corruption, the association between these variables has been found to be ambiguous. Most of these studies have also been in a cross-section setting or have not

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[11] As other studies have pointed out, the size of the impact of international flows on corruption is small. A 50 % increase in FDI inflows lowers the mean value of corruption by 2.6 % [(-0.159/100)x50/3.04].

[12] We had also included contemporaneous values of the economic reform variables, and they were not significant as well.

Table 2
Determinants of corruption: Economic Linkages and Lagged Reform measures- Alternative Democracy Measure.

Dep. Var: Corruption	(1)	(2)	(3)	(4)	(5)	(6)
Corruption $_{t-1}$	0.576***	0.643***	0.523***	0.512***	0.514***	0.484***
	(0.070)	(0.098)	(0.081)	(0.082)	(0.081)	(0.082)
Democratic Capital	−1.433***	−0.565	−1.335***	−1.180**	−1.310**	−1.464**
	(0.362)	(0.570)	(0.516)	(0.550)	(0.518)	(0.641)
Ln FDI Share	−0.109	−0.277***				
	(0.079)	(0.078)				
Ln Trade Share			0.082	0.044		
			(0.240)	(0.141)		
Ln Import Share					0.004	0.048
					(0.167)	(0.139)
Chinn Ito Index(t-1)	0.252		0.095		0.121	
	(0.165)		(0.195)		(0.222)	
Import Duties Share (t-1)		−0.009		−0.024		−0.040
		(0.092)		(0.103)		(0.104)
Ln GDPpc	−0.047	−0.105	−0.073	−0.108	−0.074	−0.101
	(0.059)	(0.077)	(0.075)	(0.099)	(0.075)	(0.102)
Spanish/Portuguese Colonial Origin	0.226***	0.143	0.295***	0.309**	0.294***	0.365**
	(0.084)	(0.090)	(0.109)	(0.128)	(0.112)	(0.145)
Ln. Protestant Share	−0.019	−0.036	−0.042	−0.048	−0.046	−0.048
	(0.036)	(0.029)	(0.036)	(0.043)	(0.040)	(0.044)
Observations	624	374	616	371	607	370
Countries	120	95	119	94	118	94
# of instruments	74.0000	74.0000	74.0000	74.0000	74.0000	74.0000
AR(4) pval	0.1158	0.9241	0.2933	0.8608	0.3241	0.8730
Hansen Overid Test pval	0.1548	0.6396	0.0388	0.3122	0.0202	0.2218
Diff Hansen test for levels eq. pval	0.4622	0.5816	0.0986	0.4933	0.0404	0.1249
Diff Hansen test for diff eq. pval	0.0314	0.5568	0.1258	0.2548	0.0454	0.0767

Notes: Same as Table 1.

Table 3
Determinants of corruption: Interactions of past economic reforms with economic linkages.

Dep. Var: Corruption	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corruption $_{t-1}$	0.606***	0.610***	0.473***	0.492***	0.605***	0.604***	0.504***
	(0.068)	(0.070)	(0.089)	(0.077)	(0.089)	(0.087)	(0.091)
Freedom House Score	−0.018	−0.041*			−0.082***		
	(0.024)	(0.022)			(0.019)		
Democratic Capital			−1.533***	−1.159***			−1.316**
			(0.463)	(0.449)			(0.531)
Polity 2 Democ						−0.031***	
						(0.012)	
Ln Trade Sh		0.105		−0.030			
		(0.096)		(0.140)			
Imp Dut Sh(t-1) X Ln Trade Sh		−0.016		0.004			
		(0.017)		(0.014)			
Ln FDI Share	0.008		−0.015		0.011	0.064	−0.004
	(0.094)		(0.109)		(0.059)	(0.072)	(0.079)
Imp Dut Sh(t-1) X Ln FDI Sh	−0.060		−0.050				
	(0.042)		(0.050)				
Chinn Ito Ind(t-1) X Ln FDI Sh					−0.053	−0.156**	−0.127*
					(0.063)	(0.069)	(0.069)
Ln GDPpc	−0.223**	−0.196**	−0.131	−0.124	−0.052	−0.100*	−0.095
	(0.106)	(0.082)	(0.082)	(0.086)	(0.052)	(0.052)	(0.064)
Spanish-Portuguese Colonial Origin	0.042	0.121	0.342***	0.276**	0.206***	0.191**	0.226*
	(0.079)	(0.082)	(0.131)	(0.119)	(0.070)	(0.090)	(0.117)
Ln. Protestant Share	−0.003*	−0.002	−0.000	−0.001	−0.001	−0.001	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	404	401	374	371	661	640	624
Countries	104	103	95	94	129	125	120
# of instruments	81.0000	81.0000	81.0000	81.0000	76.0000	76.0000	76.0000
AR(3) pval	0.0675	0.0457	0.1063	0.0737	0.0350	0.0328	0.0508
AR(4) pval					0.146	0.145	0.135
Hansen Overid Test pval	0.1313	0.1024	0.1655	0.1479	0.0703	0.0338	0.0582
Diff Hansen test for levels eq. pval	0.1804	0.3293	0.1622	0.2210	0.4314	0.4113	0.1839
Diff Hansen test for diff eq. pval	0.9328	0.3781	0.2413	0.3040	0.5509	0.8057	0.9354

Notes: See Table 1.

controlled for endogeneity of the variables. None of the previous studies has also examined the issue of timing of the reforms.

Next, we extend this specification to examine the effect of liberal democracies[13] by interacting the linkage variables, as well as the interaction of lagged reform and linkages with a dummy variable for liberal democracies (Equation (3)). The results are presented in Table 4. A key finding here is that magnitude of the interaction of past reforms with FDI in lowering corruption is much greater in liberal democracies than other countries. This may be because liberal democracies may have political and economic systems that more attuned to the will and needs of the people and are more responsive to the market conditions. Economic reforms in this environment may better enable FDI to produce welfare and growth enhancing effects, including lowering corruption. Another interesting result in this table is that the interaction of past economic reform with trade share also lowers corruption in liberal democracies. This may point to the complementarity of trade and FDI in combating corruption in an environment preceded by financial sector reforms, in the case of liberal democracies. As noted in Sequeira (2016), in the presence of corruption, trade reforms may not result in an increase in imports if the firms are already circumventing tariffs through bribes. Our results in columns 4–6 suggest that in the case of liberal democracies, previous economic reforms may produce an environment which is more conducive to the realization of grain from trade, including a reduction in corruption.

As a robustness check, we report four additional estimation approaches, two each for Equations (2) and (3) (results are in Tables 5 and 6, respectively). For Eq. (2), we first restrict the sample to that of developing countries but again use systems-GMM estimator (Table 5, Columns 1–3). As a result, the sample size drops by about 1/3 from 600+ observations to 400+ obs. The standard corruption determinants have similar coefficient signs as in previous tables, but the level of significance is much reduced. More importantly, the main finding from Table 3 - that the interaction of past capital reforms (financial openness) with higher current FDI flows lowers corruption – continues to hold, with statistically significant coefficient estimates in two of three specifications. In columns 4–6, we return to the full sample but estimate the model using fixed-effect instrumental variable regressions. For instruments, instead of using external instruments, we use second and third order centered moments for all time varying variables, based on the approach suggested in Lewbel (1997). All the three measures of democracy have a negative and statistically significant impact on corruption. More importantly, the negative effect on corruption of the interaction of past economic reforms with FDI share persists and is significant in two of the three specifications.

In the final robustness test, we estimate Eq. (3), using two alternative estimation methods. In Table 6, columns 1–3, we use a quasi-maximum likelihood dynamic panel data estimator (Kripfganz, 2016). Unlike the GMM based methods, this estimator is more restrictive in its assumptions of initial conditions and also does not perform as well when there is persistence in the dependent variable. We again see that in the case of liberal democracies, the interaction of past economic reforms and FDI lowers corruption.[14] In columns 4–6, we again estimate the model using an instrumental variable approach with Lewbel (1997) type instruments for all the time varying variables. Here, two of three measures of democracy have a negative and statistically impact on corruption. In two of the three regressions, the interaction of past economic reforms with FDI share has a negative effect on corruption for liberal democracies (columns 5 and 6).

Thus, the variety of our robustness checks support our main finding that the interaction of past economic reforms with linkage (especially past financial openness with FDI share) has a statistically significant effect in lowering corruption and this effect is even sharper in the case of liberal democracies.

6. Summary and conclusions

In this paper we examine the impact of economic reforms, international linkages, and their interactions on corruption for a panel of countries over a period of more than three decades. We use a dynamic panel data framework to account for a country's past level of corruption. We also control for established determinants of corruption such as a country's development status, colonial history, religious beliefs, and level of democracy. We consider two economic reforms (greater trade and financial openness) and their corresponding international linkages (international trade and foreign direct investment intensities).

Our main results are as follows. Among the reform and intensity measures, we find the FDI inflow intensity indicator to have a direct, negative effect on corruption, while greater trade intensity as well as the economic reform measures by themselves appear to matter little for corruption. However, when interacted with past economic reforms, stronger international economic linkages do matter in reducing corruption, especially through the FDI channel. These results hold for a subsample of developing countries as well, though with diminished precision of the estimates. Finally, we find that the corruption-reducing interaction of past economic reforms with greater current international linkages is particularly strong in liberal democracies. In addition, past capital market reforms in liberal democracies lower corruption not only through the FDI channel, but through trade as well, most likely a reflection of the complementarity between trade and foreign investment.

In terms of future research, the role of different political systems for corruption can be further investigated. For example, one may wonder if the subgroup of illiberal democracies still experiences a reduction in corruption from economic reforms. Also, given the importance of authoritarian regimes such as China, Vietnam and Saudi-Arabia for world trade, investment and production, economic reforms in these countries may not only reduce corruption at home but produce corruption-reducing spillover effects for their many trading partners.

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[13] For a list of liberal democracies at the end of our sample period (2018), see Table A3.

[14] In Tables 5 and 6, we also tried the interaction of past financial reforms with trade share but the coefficient estimates on this variable were not statistically significant.

Table 4

Determinants of corruption: Impact of liberal democracies.

Dep. Var: Corruption	(1)	(2)	(3)		(4)	(5)	(6)
Corruption $_{t-1}$	0.686***	0.735***	0.682***	Corruption $_{t-1}$	0.738***	0.766***	0.742***
	(0.049)	(0.051)	(0.062)		(0.058)	(0.053)	(0.069)
Freedom House Score	−0.058***			Freedom House Score	−0.069**		
	(0.017)				(0.029)		
Polity IV Democracy		−0.018*		Polity IV Democracy		−0.024*	
		(0.011)				(0.014)	
Democratic Capital			−0.752**	Democratic Capital			−0.239
			(0.325)				(0.370)
Ln FDI Share	−0.072	−0.093	−0.141	Ln Trade Share	0.085	0.078	0.190
	(0.093)	(0.103)	(0.089)		(0.113)	(0.099)	(0.132)
Ln FDI Sh. X Liberal Democracies	0.364	0.561	0.283	Ln Trade Sh X Liberal Democracies	0.195**	0.183	0.030
	(0.263)	(0.396)	(0.259)		(0.085)	(0.123)	(0.086)
Chinn Ito Ind(t-1) X Ln FDI Sh	0.239**	0.164	0.137	Chinn Ito Ind(t-1) X Ln Trade Sh	0.102**	0.088*	0.057
	(0.112)	(0.108)	(0.098)		(0.049)	(0.051)	(0.041)
Chinn Ito Ind(t-1) X Ln FDI Sh X Liberal Democracies	−0.630**	−0.845**	−0.510**	Chinn Ito Ind(t-1) X Ln Trade Sh X Liberal Democracies	−0.272**	−0.347**	−0.208**
	(0.306)	(0.406)	(0.242)		(0.109)	(0.138)	(0.092)
Ln GDPpc	−0.091*	−0.110**	−0.069	Ln GDPpc	−0.085	−0.048	−0.009
	(0.049)	(0.049)	(0.057)		(0.071)	(0.075)	(0.059)
Observations	788	762	741		779	751	732
Countries	129	125	120		128	124	119
Instruments	86.0000	86.0000	86.0000		93.0000	93.0000	93.0000
AR(4) pval	0.2698	0.1896	0.2173				
AR(3) pval					0.1811	0.1249	0.1450
Hansen Overid Test pval	0.3047	0.3854	0.4060		0.0959	0.2052	0.2078
Diff Hansen test for levels eq. pval	0.6541	0.9297	0.7823		0.0759	0.3411	0.0758
Diff Hansen test for diff eq. pval	0.2013	0.4477	0.3102		0.0617	0.2639	0.3266

Notes: See Table 1.

Table 5

Robustness checks: Political reforms and interactions of past economic reforms with linkages- alternative sample and estimation method.

Dep. Var: Corruption	Sample of Developing Countries			Instrumental Variable Estimation Using Lewbel (1997) Style Instruments		
	(1)	(2)	(3)	(4)	(5)	(6)
Corruption $_{t-1}$	0.423***	0.417***	0.437***	0.72***	0.75***	0.70***
	−0.069	−0.081	−0.08	(0.045)	(0.053)	(0.059)
FH Score	−0.03			−0.04***		
	−0.021			(0.011)		
Polity 2 Democ		−0.005			−0.01*	
		−0.011			(0.006)	
Democ. Capital			−0.741**			−0.55*
			−0.372			(0.304)
Ln FDI Sh.	−0.03	−0.032	−0.036	0.13	0.09	0.05
	−0.057	−0.067	−0.07	(0.158)	(0.078)	(0.071)
Chin Ito Ind(t-1) X Ln FDI Sh	−0.084*	−0.116**	−0.089	−0.16	−0.15**	−0.13**
	−0.05	−0.053	−0.058	(0.148)	(0.076)	(0.064)
Ln GDPpc	−0.011	−0.031	0.003	−0.07**	−0.08***	−0.07**
	−0.041	−0.046	−0.066	(0.031)	(0.028)	(0.027)
Col_Spa-Port	0.02	−0.015	0.054	0.10*	0.08	0.12
	−0.12	−0.11	−0.117	(0.059)	(0.070)	(0.074)
Ln. Protest. Share	0.001	0.001	0.001	−0.00	−0.00	−0.00
	−0.002	−0.002	−0.002	(0.001)	(0.001)	(0.002)
Observations	422	415	408	661	640	624
Countries	82	81	79	129	125	120
# of instruments	81	81	81			
AR(3) pval	0.0727	0.0871	0.0772			
Hansen Overid Test pval	0.2684	0.1891	0.3153			
Diff Hansen test for levels eq. pval	0.5597	0.6411	0.6562			
Diff Hansen test for diff eq. pval	0.0809	0.4648	0.6867			

Notes: Columns (1)–(3) are estimated using systems-GMM but the sample is restricted to developing countries.

Columns (4)–(6) are estimated for the full sample using Instrumental Variable Estimation where the instruments are constructed as the second and third order centered moments based on the approach in Lewbel (1997).

All regressions report robust standard errors and include time and country fixed effects.

*/**/***: Significant at 10 %, 5 % and 1 %, respectively.

Table 6

Robustness check: Impact of liberal democracies - alternative estimation methods.

Dep. Var: Corruption	Quasi Maximum Likelihood Dynamic Panel Estimation (Kripfganz, 2016)			Instrumental Variable Estimation Using Lewbel (1997) Style Instruments		
	(1)	(2)	(3)	(4)	(5)	(6)
Corruption $_{t-1}$	0.72***	0.77***	0.72***	0.75***	0.76***	0.73***
	(0.062)	(0.107)	(0.065)	(0.048)	(0.042)	(0.043)
Freedom House Score	−0.02			−0.02		
	(0.020)			(0.014)		
Polity IV Democracy		−0.00			−0.01*	
		(0.010)			(0.008)	
Democratic Capital			1.23**			−1.06**
			(0.618)			(0.515)
Ln FDI Share	−0.02	0.00	−0.04	0.40**	−0.01	−0.52**
	(0.068)	(0.059)	(0.070)	(0.196)	(0.103)	(0.227)
Ln FDI Sh. X Liberal Democracies	0.28**	0.31**	0.47***	−0.54**	0.63	2.68***
	(0.129)	(0.144)	(0.149)	(0.232)	(0.446)	(1.040)
Chinn Ito Ind(t-1) X Ln FDI Sh	0.12	0.08	0.12	−0.31	0.03	0.43**
	(0.080)	(0.078)	(0.079)	(0.198)	(0.111)	(0.211)
Chinn Ito Ind(t-1) X Ln FDI Sh X Liberal Democracies	−0.24**	−0.25**	−0.41***	0.43*	−0.77*	−2.71***
	(0.122)	(0.124)	(0.134)	(0.256)	(0.449)	(1.025)
Ln GDPpc	0.05	−0.04	−0.13	−0.03	−0.11***	−0.18***
	(0.120)	(0.130)	(0.143)	(0.033)	(0.037)	(0.051)
Observations	670	647	630	788	762	741
Countries	127	123	118	129	125	120

Notes: Columns (1)–(3) are estimated using Quasi Maximum Likelihood Dynamic Panel Estimation (Kripfganz, 2016).
Columns (4)–(6) are estimated for the full sample using Instrumental Variable Estimation where the instruments are constructed as the second and third order centered moments based on the approach in Lewbel (1997).
All regressions report robust standard errors and include time and country fixed effects.
*/**/***: Significant at 10 %, 5 % and 1 %, respectively.

Equally interesting would be an investigation of other economic policy reforms, both international and purely domestic. On the international side, reforms geared toward a flexible exchange rate regime or a reduction in export restraints come to mind. Among domestic policy initiatives, tax reforms, reducing excessive regulation and reforms of the welfare system may be promising candidates.

Finally, investigating the role played by other international linkages such as portfolio investments, migration, remittances and foreign aid may produce additional insights in how reforms may curb the curse of corruption.

CRediT authorship contribution statement

Jeffry Jacob: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Thomas Osang:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Luigi Manzetti:** Writing – original draft, Funding acquisition.

Declaration of competing interest

The authors declare that there are no ethical issues or conflicts of interest in this research.

Appendix

Table A1

Empirical Studies of the Impact of Economic Openness Reforms and International Economic Linkages on Corruption: Main Findings

Variable	Empirical Studies and their Findings		
Trade Openness	Lowers Corruption	Increases Corruption	No impact/non-linear
	Ades and Tella (1999), Knack and Azfar (2003), Sandholtz and Koetzle (2000), Treisman (2000), Gatti (1999), Larrain and Tavares (2007), Torrez (2002)	Gurgur and Shah (2005), You and Khagram (2005)	Knack and Azfar (2003), Serra (2006), Gerlagh and Pellegrini (2008), Majeed (2011, 2014)
Trade Policy Reform	Lowers Corruption	Increases Corruption	No impact
	Chaudry and Shabbir (2007) [a]		Lee and Azfar (2000), Larrain and Tavares (2007), Olofsgard and Zahran (2008), Sequeira (1016)
FDI inflows	Lowers Corruption	Increases Corruption	No impact

(continued on next page)

Table A1 (*continued*)

Variable	Empirical Studies and their Findings		
Capital Market Reform	Kwok and Tadesse (2006), Larrain and Tavares (2007) Lowers Corruption Dreher and Siemers (2009), Chaudry and Shabbir (2007) [a], Olofsgard and Zahran (2008)	Increases Corruption	No impact

[a] Chaudhry and Shabbir (2007) employ the KOF Globalization Index which aggregates FDI inflows, trade flows, trade policy measures and capital market openness indices into a single index of globalization.

Table A2

List of Countries and Indicator for Liberal Democracies (LD)

Country	LD	Country	LD	Country	LD	Country	LD
Albania	0	France	1	Mexico	0	Switzerland	1
Algeria	0	Gabon	0	Moldova	0	Tanzania	0
Angola	0	Gambia	0	Mongolia	0	Thailand	0
Argentina	1	Germany	1	Morocco	0	Togo	0
Armenia	0	Ghana	0	Mozambique	0	Trinidad and Tobago	0
Australia	1	Greece	1	Myanmar	0	Tunisia	0
Austria	1	Guatemala	0	Namibia	0	Turkey	0
Azerbaijan	0	Guinea	0	Netherlands	1	Uganda	0
Bahamas	0	Guinea-Bissau	0	New Zealand	1	Ukraine	0
Bahrain	0	Guyana	0	Nicaragua	0	United Arab Emirates	0
Bangladesh	0	Haiti	0	Niger	0	United Kingdom	1
Belarus	0	Honduras	0	Nigeria	0	United States	1
Belgium	1	Hungary	1	Norway	1	Uruguay	1
Bolivia	0	Iceland	1	Oman	0	Venezuela	0
Botswana	0	India	0	Pakistan	0	Vietnam	0
Brazil	1	Indonesia	0	Panama	0	Yemen	0
Bulgaria	1	Iran	0	Papua New Guinea	0	Zambia	0
Burkina Faso	0	Iraq	0	Paraguay	0	Zimbabwe	0
Cameroon	0	Ireland	1	Peru	0		
Canada	1	Israel	1	Philippines	0		
Chile	1	Italy	1	Poland	0		
China	0	Jamaica	0	Portugal	1		
Colombia	0	Japan	1	Qatar	0		
Congo	0	Jordan	0	Russia	0		
Costa Rica	1	Kazakhstan	0	Saudi Arabia	0		
Cote d'Ivoire	0	Kenya	0	Senegal	0		
Croatia	1	Kuwait	0	Sierra Leone	0		
Cyprus	1	Latvia	1	Singapore	0		
Czech Republic	1	Lebanon	0	Slovak Republic	1		
Denmark	1	Liberia	0	Slovenia	1		
Dominican Republic	0	Libya	0	South Africa	1		
Ecuador	0	Lithuania	1	South Korea	1		
Egypt	0	Madagascar	0	Spain	1		
El Salvador	0	Malawi	0	Sri Lanka	0		
Estonia	1	Malaysia	0	Sudan	0		
Ethiopia	0	Mali	0	Suriname	0		
Finland	0	Malta	1	Sweden	1		

Table A3

Variable Definitions and Data Sources

Name	Definition and Source(s)
Corruption	Corruption index, from 0 to 6, (Table f) from ICRG (international country risk guide), a proprietary data set. Rescaled so the 6 captures highest level of corruption.
FH_score	Sum of Political Rights and Civil Liberty; both indicators from Freedom House (Freedom House)
Democ. Capital	Measure of the Stock of Democratic Capital of a country. Constructed based on Persson and Tabellini (2009)
Polity 2 Democracy	This democracy measure is derived from the POLITY2 variable in the Polity-IV dataset (Marshall et al., 2019). It is essentially the sum of a country's democracy and autocracy score and ranges from -10 to 10.
GDPpc	GDP per capita: PPP converted gross domestic product per capita. From Penn World Tables v7.1 (Heston et al., 2012)
Imp dut./Tax rev	*Trade reform:* Share of taxes and duties on imports in total tax revenue by the government (WDI, World Bank data bank)
Chinn-Ito index	*International finance reform:* an index measuring the level of a country's financial openness (kaopen series), Chinn and Ito (2008);
Trade Share	*Trade link:* Imports plus exports relative to GDP; From PWT Mark 7.1 (Heston et al., 2012)

Table A3 (*continued*)

Name	Definition and Source(s)
FDI Share	*International investment link*: FDI inflows relative to GDP (both in constant USD). Author calculations from Penn World Table, 7.1 (Heston et al., 2012), following Alcala and Ciccone, 2004))
Imports Share	*Trade link*: Imports relative to GDP; From PWT Mark 7.1 (Heston et al., 2012)
LD (Liberal Democracies)	Dummy variable for liberal democracies
Col_{country}	Name of main colonizing country
Legor_{country}	Name of country of legal origin
{religion} Share	Percent of protestant, catholic and Islam adherents in general population (Zurlo, nd)

Table A4
Summary Statistics

Time-Varying Variables					
Variable	Obs	Mean	Std. dev.	Min	Max
Corruption	675	3.037	1.253	0	6
FH Score	675	8.371	3.666	1	13
Polity 2 democ	651	3.752	6.396	−10	10
Democ. Capital	635	0.255	0.241	0	0.881
Ln FDI Sh.	675	1.210	0.758	0	5.599
Ln Trade Sh	657	4.207	0.567	0.197	6.012
Ln Imports Sh.	650	3.564	0.549	0.076	5.252
Ln GDPpc	675	8.487	1.552	5.146	11.406
Chinn Ito Ind	674	0.520	0.367	0	1
Ln Imp dut./tax rev	428	1.822	1.237	−0.023	4.318
Ln. Protest. Share	675	2.436	1.396	0	4.579
Ln Catholic Share	675	2.495	1.594	0	4.582
Ln Islam Share	675	1.925	1.741	0	4.615
Time-invariant variables					
Variable	Obs	Mean	Std. dev.	Min	Max
Liberal Democ	129	0.310	0.464	0	1
Col_British	129	0.271	0.446	0	1
Col_Spa-Port	129	0.163	0.371	0	1
Col_French	129	0.132	0.340	0	1
LO_British	110	0.327	0.471	0	1
LO_French	110	0.518	0.502	0	1
LO_German	110	0.036	0.188	0	1
LO_Scandinavian	110	0.045	0.209	0	1

Table A5
Correlations Between the Time-Varying Variables

	Corruption	FH Score	Polity 2 democ	Democ. Capital	Ln FDI Sh.	Ln Trade Sh	Ln Imports Sh.	Ln GDPpc	Chinn Ito Index	Ln Imp dut./ tax rev	Ln. Protest. Share	Ln Catholic Share	Ln Islam Share
Corruption	1												
FH Score	−0.5591	1											
Polity 2 democ	−0.3933	0.8932	1										
Democ. Capital	−0.5584	0.6782	0.6617	1									
Ln FDI Sh.	0.09	0.0615	0.0152	−0.0563	1								
Ln Trade Sh	−0.0209	0.032	−0.0363	−0.186	0.495	1							
Ln Imports Sh.	0.0389	0.0069	−0.0327	−0.2274	0.5124	0.9792	1						
Ln GDPpc	−0.6661	0.6153	0.4193	0.6025	0.0979	0.1848	0.0926	1					
Chinn Ito Index	−0.403	0.4656	0.3726	0.4628	0.2609	0.1921	0.1658	0.6233	1				
Ln Imp dut./tax rev	0.507	−0.5928	−0.4899	−0.5586	−0.1675	−0.0899	−0.0356	−0.7719	−0.59	1			
Ln. Protest. Share	−0.2449	0.2396	0.2461	0.2743	0.1508	0.0837	0.0883	0.1579	0.1562	−0.1807	1		
Ln Catholic Share	−0.0095	0.2935	0.3168	0.1741	0.0815	−0.025	−0.0247	0.0407	0.1462	−0.0953	−0.0339	1	
Ln Islam Share	0.1881	−0.4976	−0.5527	−0.3767	−0.025	0.0797	0.089	−0.2305	−0.2179	0.2515	−0.3574	−0.5726	1

Table A6
Determinants of corruption: Inclusion of Democracy and Long -Term Factors

Dep Var: Corruption	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption $_{t-1}$	0.517***	0.549***	0.551***	0.605***	0.617***	0.605***	0.679***	0.474***
	(0.064)	(0.070)	(0.071)	(0.074)	(0.120)	(0.119)	(0.112)	(0.117)
Freedom House Score	−0.039**		−0.072***		−0.082***			
	(0.019)		(0.018)		(0.025)			
Democratic Capital		−0.381		−1.234***		−0.938**		−0.989**
		(0.355)		(0.330)		(0.465)		(0.504)
Polity 2 Democracy							−0.025	
							(0.017)	
Ln GDPpc	−0.104*	−0.114*	−0.137**	−0.063	−0.049	−0.042	−0.069	−0.090
	(0.061)	(0.065)	(0.066)	(0.069)	(0.063)	(0.081)	(0.066)	(0.095)
LO_British	−0.048	−0.115						0.178
	(0.097)	(0.103)						(0.121)
LO_French	0.061	0.019						
	(0.099)	(0.082)						
LO_German	−0.371	−0.393*						
	(0.243)	(0.232)						
LO_Scandinavian	−0.905***	−0.900***						
	(0.200)	(0.221)						
Col_British			−0.028	0.036				
			(0.123)	(0.113)				
Col_French			−0.060	0.027				
			(0.155)	(0.144)				
Col_Spa-Port			0.208**	0.282***				0.337***
			(0.100)	(0.091)				(0.125)
Ln. Protest. Share					−0.050*	−0.053	−0.058**	−0.092**
					(0.027)	(0.032)	(0.028)	(0.039)
Ln Catholic Share					0.023	−0.003	−0.008	
					(0.028)	(0.033)	(0.029)	
Ln Islam Share					−0.042	−0.021	−0.044	
					(0.032)	(0.036)	(0.046)	
Observations	765	728	856	792	721	670	685	620
Countries	114	108	135	123	135	123	128	108
# of instruments	63	63	62	62	47	47	47	47
AR(3) pval	0.1443	0.1154	0.1199	0.0721				
AR(4) pval					0.0686	0.0727	0.0901	0.0740
Hansen Overid Test pval	0.1405	0.1882	0.0051	0.0548	0.0046	0.0679	0.0023	0.0672
Diff Hansen test for levels eq. pval	0.4262	0.7244	0.0676	0.6248	0.0293	0.7606	0.0341	0.5342
Diff Hansen test for diff eq. pval	0.6179	0.9541	0.1494	0.8227	0.1837	0.9285	0.4611	0.9195

Notes: See Table 1.

Table A7
Determinants of Corruption- Inclusion of Democracy, Long-Term Factors and Economic Linkages

Dep Var: Corrup	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption $_{t-1}$	0.450***	0.448***	0.441***	0.536***	0.451***	0.463***	0.513***	0.436***
	(0.084)	(0.089)	(0.084)	(0.076)	(0.101)	(0.100)	(0.107)	(0.074)
FH Score	−0.064***	−0.045*	−0.038					−0.033
	(0.025)	(0.025)	(0.024)					(0.030)
Democ. Capital				−0.813	−0.831*	−0.816*		
				(0.585)	(0.475)	(0.434)		
Polity 2							−0.011	
							(0.012)	
Ln FDI Sh.	−0.087*			−0.087				−0.089*
	(0.050)			(0.062)				(0.049)
Ln Trade Sh		−0.022			−0.050		0.005	−0.031
		(0.157)			(0.156)		(0.157)	(0.145)
Ln Imports Sh.			−0.034			−0.086		
			(0.158)			(0.162)		
Ln GDPpc	−0.185***	−0.169**	−0.174**	−0.060	−0.108	−0.087	−0.173**	−0.205***
	(0.060)	(0.066)	(0.068)	(0.089)	(0.078)	(0.070)	(0.068)	(0.058)
Col_Spa-Port	0.319***	0.276**	0.275**	0.304**	0.300**	0.300***	0.264**	0.324**
	(0.103)	(0.113)	(0.128)	(0.139)	(0.118)	(0.111)	(0.126)	(0.132)

Table A7 (*continued*)

Dep Var: Corrup	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LO_British	0.105	0.084	0.041	0.167	0.157	0.134	0.082	0.090
	(0.089)	(0.101)	(0.100)	(0.126)	(0.105)	(0.097)	(0.095)	(0.105)
Ln. Protest. Share	−0.071**	−0.087**	−0.093***	−0.072*	−0.099***	−0.103***	−0.096***	−0.088**
	(0.028)	(0.036)	(0.035)	(0.037)	(0.037)	(0.039)	(0.036)	(0.041)
Observations	628	633	624	597	602	594	604	614
Countries	113	113	113	107	107	107	108	112
# of instruments	63	63	63	63	63	63	63	79
AR(4) pval	0.1298	0.1851	0.2063	0.1021	0.2351	0.2451	0.2745	0.3550
Hansen Overid Test pval	0.5187	0.3149	0.4045	0.1762	0.1767	0.2691	0.0856	0.2953
Diff Hansen test for levels eq. pval	0.8322	0.7873	0.7595	0.3693	0.7686	0.8552	0.4523	0.5175
Diff Hansen test for diff eq. pval	0.8781	0.9497	0.9769	0.9431	0.7431	0.8642	0.8606	0.6037

Notes: See Table 1.

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