Financial Reforms and Corruption: Evidence using GMM Estimation*

Chandan Kumar Jha

Madden School of Business, Le Moyne College
1419 Salt Spring Road, Syracuse, NY 13214. USA.
E-mail: jhack@lemoyne.edu

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Abstract

This paper assesses the impact of financial reforms on corruption using a panel of 87 countries for 1984-2005. To account for the dynamic nature and high persistence of corruption, the paper employs the difference and system generalized method of moments (GMM) estimators. It finds that policy reforms targeted towards financial liberalization reduce corruption. This result is robust to the inclusion of a number of control variables and the choice of the GMM estimator. Interestingly, the financial liberalization index is found to be positively correlated with corruption though this relationship is not robust. The findings also indicate that legal origins do not impose a binding constraint on the effectiveness of financial reforms in reducing corruption.

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1 Introduction

The positive effects of financial liberalization and development on economic outcomes are well-explored in the empirical literature.[1] For instance, the positive effects of financial liberalization have been recognized for financial sector development (Ang and McKibbin, 2007), and financial development is shown to be positively related to economic growth (Calderón and Liu, 2003) as well as investment and total factor productivity growth (Benhabib and Spiegel, 2000). More recently, studies have focused on the reforms towards financial liberalization and have found that financial reforms are negatively associated with income inequality (Agnello et al., 2012) and positively associated with financial development (Tressel and Detragiache, 2008). On the other hand, studies have found that corruption negatively impacts economic growth (Evrensel, 2010; Mauro, 1995), and is positively associated with poverty and income inequality (Gupta et al., 2002).[2] Some studies have also underscored the importance of the interaction between financial development and corruption for economic growth (Blackburn and Forgues-Puccio, 2010; Ahlin and Pang, 2008), suggesting that looking at the relationship between financial sector liberalization and corruption may provide valuable insights. Yet, there are no studies investigating the link between the two. The present paper fills this gap and contributes to these two strands of literature by investigating (1) the impact of financial sector liberalization on corruption, and (2) the impact of policy reforms towards financial sector liberalization on corruption.

There is a large body of literature studying the causes and consequences of corruption both across and within countries. In one of the early studies investigating the causes of corruption, Treisman (2000) empirically examines the predictive powers of various theories

[1] For instance, financial sector liberalization has also been found to have an effect on economic growth in emerging East Asian economies (Gamra, 2009). Blackburn and Forgues-Puccio (2010) find that financial liberalization has a positive impact on economic development, but only in the presence of good governance.

[2] Some recent studies, *e.g.*, Zeaiter and El-Khalil (2016) have also suggested that fighting corruption can reduce the likelihood of sovereign defaults (for counties in Middle East and North Africa (MENA) region).

of the determinants of corruption across countries. His findings suggest that "countries with Protestant traditions, histories of British rule, and more developed economies" are less corrupt, while Federal states are more corrupt. Furthermore, he finds that while a long exposure to democracy is associated with lower corruption, the current degree of democracy does not predict corruption across countries. His findings thus indicate that cultural norms, political institutions, historical factors, government regulation, and the level of economic development are all important determinants of corruption, which makes it very difficult to disentangle the effects of individual factors on corruption. Since then, there has been a plethora of studies investigating the causal link between the above-mentioned (and various other) factors and corruption.

Only recently, however, some of the studies have focused on the link between financial sector and corruption. However, the majority of these studies look into the implications of the interaction between corruption and financial development for economic growth and development.[3] For instance, Ahlin and Pang (2008) find financial development and corruption to be substitutes for growth. The authors argue that the substitutability between the two exists because the need for liquidity is greater when the level of corruption is high, making financial development more important for growth. On the other hand, corruption is more harmful for growth in the presence of financial underdevelopment and, hence, the gains from reducing corruption is greater. In a general-equilibrium endogenous growth model, Rivera-Batiz (2001) show that international liberalization has a negative impact on long-run growth due to capital outflow when the level of corruption is high. On the other hand, capital account liberalization positively impacts technical change and growth when corruption is low. In another paper, Blackburn and Forgues-Puccio (2010) argue that the effects of financial liberalization on economic development is contingent on the quality of the gov-

[3]An exception seems to be Altunbaş and Thornton (2012), who investigate the effects of bank credit to the private sector and corruption, and find a negative relationship between the two.

ernance. Financial liberalization easing the barriers to cross-country financial transaction, will positively impact development in the presence of good governance by attracting foreign capital. In the presence of bad governance, however, financial liberalization will make it easier for corrupt officials to launder money and hide it outside the country. Consequently, financial liberalization, in the absence of good institutions, will result in higher corruption and may negatively impact growth. Consistent with this argument, their theoretical model predicts that financially open countries are likely to have greater levels of corruption than financially closed countries. There are no studies, however, to the best of my knowledge, that empirically investigate the effects of financial sector liberalization and policy reforms towards financial sector liberalization on corruption across countries.

In this paper, I look at the relationship between financial sector policy reforms and corruption more broadly by using recently published data on financial liberalization across countries. Using Abiad et al. (2010) financial liberalization index data, I define financial reforms (towards liberalization) as the change in the financial liberalization index from the previous year.[4] Previous studies have adopted the similar strategy to define financial reforms (*e.g.*, Agnello et al., 2012). Sine corruption can be persistent and immune to anti-corruption measure and interventions (Mishra, 2006), the paper employs the difference and system generalized method of moments (GMM) estimators to capture the dynamic nature of corruption and to address endogeneity concerns.

Financial liberalization and reforms towards financial liberalization can impact corruption in various ways. First of all, corruption in the banking sector itself is an issue that poses a significant obstacle for firms seeking finance and it has been suggested that the magnitude of this problem can be extenuated by mandating banks to reveal precise information (Beck et al., 2006).[5] Financial sector policies dictating an appropriate degree of banking supervision

[4] For instance, suppose country A's financial liberalization index was 10 in 1999 and 12 in 2000, then the financial reform between 1999 and 2000 is coded as 2 $(12 - 10)$.

[5] In the similar vein, Chen et al. (2013) find that bribery can explain a large part of bank lending to

are, therefore, likely to reduce corruption in the banking sector. Further, the entry of private and foreign banks, permitted by financial reforms, will stimulate competition among banks, pressurizing them to be more efficient and to be able to offer low-cost, corruption-free loans. Consequently, banks will be compelled to eliminate any sources of inefficiencies, including corruption. In addition to that, public sector banks may face a higher level of corruption since the wage structure and job protection in the public sector is different compared to the private sector (Bender, 1998; Lucifora and Meurs, 2006), and there is an evidence of a negative relationship between public sector wages and corruption (Svensson, 2005). Moreover, financial deepening is likely to influence corporate governance and provide the creditors with an opportunity to monitor firms.[6]

Enhancing market competition is another important way through which policy reforms towards financial liberalization may reduce corruption. In fact, McKinnon (2010) posits that concluding that "corruption is endemic in underdeveloped environment" would be a mistake and, in an appropriately liberalized economy, corruption will be no more prevalent than elsewhere. The absence of an easy credit access stifles entrepreneurial activity creating more room for rent-seeking activities. It has been shown that financial sector reforms lead to financial development and well-developed credit markets (Tressel and Detragiache, 2008),[7] which are likely to promote investment and businesses, and therefore, enhance market competition. Guiso et al. (2004) confirm this hypothesis by showing that financial development leads to an increase in competition by promoting entrepreneurial activity. They find that financial development is positively associated with the probability an individual starts his own business and the entry of new firms.[8] Since efficiency concerns become crucial with

private firms in China.

[6] The idea that financial deepening can affect economic growth through their effects on corporate governance is not new (see Levine (2005) for a detailed discussion).

[7] This effect (not surprisingly) depends on the quality of institutions though.

[8] Several other studies that have shown that financial development reduces financing constraints by mitigating information asymmetries (Love, 2003) and promotes investment (Benhabib and Spiegel, 2000).

increases in both, the number of firms and an increase in market competition, financial development is likely to reduce the scope of paying bribes for the latter translates into a higher cost of production. Indeed, it has been shown that corruption is lower in countries where firms operate in highly competitive markets (Ades and Di Tella, 1999).

Moreover, reforms towards liberalizing several dimensions of financial sector may lead to an increase in market competition and, hence, lower corruption. For instance, in many countries, banks are subject to excessive reserve requirements and are mandated to provide subsidized credits to specific sectors limiting the amount of resources available for productive entrepreneurial projects. Financial reforms that are targeted to diminish or abolish such requirements would free-up resources for entrepreneurial activities, leading to an increase in the number of firms and market competition. The privatization of banks has been found to increase lending (Berkowitz et al., 2014), which may further promote the entry of new firms and enhance market competition. Furthermore, the government ownership of banks and the rate of financial development are found to be negatively correlated (La Porta et al., 2002). Therefore, policy reforms that alleviate the restrictions on the operations of private and foreign banks are likely to induce the rate of financial development, resulting in increases in investment and market competition and, hence, lower corruption. Finally, policy reforms towards developing the securities market are also likely to increase market competition by promoting savings and investment (Henry, 2000). Thus, reforms towards financial liberalization will not only affect corruption in the financial sector, but the general level of corruption in the country will also be negatively impacted.

The main results of the paper can be summarized as follows. Consistent with the hypothesis, using an unbalanced panel of 87 underdeveloped, developing, and developed countries for 1984-2005, I find that reforms targeted towards financial liberalization reduce corruption, regardless of a country's legal origin The results of this paper thus provide yet another argument in favor of financial sector reforms. Interestingly, I find that there is a positive

relationship between financial liberalization index and corruption. However, this relationship is not robust and is sensitive to the choice of control variables and the GMM estimator and, therefore, needs further investigation. As discussed above, at least one previous study (Blackburn and Forgues-Puccio, 2010) has predicted that a positive relationship between financial liberalization and corruption may exist (in the absence of good quality institutions). I also find that GDP per capita is negatively associated with corruption, which is consistent with the findings of the previous studies. Moreover, while there is an inconclusive evidence of a positive relationship between openness to trade and corruption, there is no significant association between government size and corruption.

The rest of the paper proceeds as follows. In the next section, I describe the data sources and explain the variables used in this study. The empirical specification section discusses the model and the estimation procedure. Section 3 presents the results, and section 4 concludes by summarizing the findings and discussing the policy relevance.

2 Data and Empirical Specification

2.1 Data

The measure of corruption used in this paper is the International Country Risk Guide's (ICRG) corruption index. The index captures the extent of corruption and takes values in the range of 0 (high corruption) to 6 (low corruption). To simplify the interpretation of results, I transform the index such that a higher value implies higher corruption. The ICRG corruption index is one of the most commonly used measure of corruption in the empirical corruption literature. An important advantage of using the ICRG corruption index over other measures of corruption is that it is available since 1984 as opposed to other corruption measures. For example, the Control of Corruption Index (CCI) published by the World Bank and Corruption Perception Index (CPI) published by Transparency International are only

available after 1996 and 1995 respectively. Moreover, while CPI scores were not comparable over time until 2012 (footnote 1, page 1, Transparency International, 2012) and hence unfit for a panel analysis, the CCI is only available for alternate years until 2002 limiting the number of observations drastically following the fact that the financial liberalization data is available only until 2005. The use of ICRG corruption index thus allows for the investigation of this relationship with a much greater sample size.

More importantly, the use of ICRG corruption index is also appropriate in the context of this paper as it takes into account the financial corruption – the most common form of corruption encountered by business "in the form of demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans." In addition to that, the ICRG corruption index also captures the actual and potential corruption reflected by a variety of factors including excessive patronage, nepotism, hidden party funding, and the *quid-pro-quo* between business and politics.[9]

Abiad et al. (2010) have complied the data for financial liberalization that cover 91 countries over 1973-2005. The financial liberalization index takes values in the range of 0 (fully repressed) to 21 (fully liberalized). It is constructed based on the state of repression/liberalization of several dimensions of the financial sector in a country. These dimensions are further divided into multiple sub-dimensions. For example, the credit control dimension is considered to be fully liberalized if the reserve requirements are minimally restrictive, and there are no restrictions on banks' credit allocation decision. A country receives 0 (fully repressed) in the interest rate liberalization dimension if the deposit and lending rates are mandated by the government. Banking sector entry component is considered to be liberalized if there are no restrictions on the entry of domestic and foreign banks and on opening new branches. A minimal restriction on capital inflow and outflow along with the unified

[9] The details of the ICRG methodology is provided in the following document: http://www.prsgroup.com/wp-content/uploads/2012/11/icrgmethodology.pdf.

exchange rate system is required to get a perfect score in the capital account transactions dimension.

The privatization dimension is fully repressed if all major banks are state-owned or the proportion of public bank assets is greater than 50 percent. The securities markets component is considered to be fully repressed when it is altogether absent. It is considered to be fully liberalized if the equity market is open to foreign investors and portfolio investments, pension funds, and stock exchanges are fully deregulated. Finally, the banking supervision dimension takes into account factors like whether a country has adopted capital adequacy ratio based on the Basel standard, independence of banking supervisory agency from executives' influence, whether a banking supervisory agency covers all financial institutions without exception, and whether a banking supervisory agency conducts supervisions through on-site and off-site examinations. Thus, the index is a very comprehensive measure of liberalization in the financial sector. For the detailed methodology of how it was constructed, refer to Abiad et al. (2010).

As can be seen in the summary statistics reported in Table 1, several countries have been financially fully repressed at some point during the time period covered in this study. Many countries such as Egypt, Ethiopia, and Tanzania were fully financially repressed until 1990, and others such as Ghana, India, and Pakistan remained fully repressed until 1986, 1987, and 1988 respectively. Reforms have not been unidirectional either as indicated by the minimum value (-4) reported for financial reforms. Many countries such as Venezuela, Ecuador, and even Austria took steps backward repressing the financial system. This variation allows for the identification of the effect of financial reforms on corruption.

The data source for all the control variables is the World Development Indicators from the World Bank. Purchasing power adjusted Gross Domestic Product (GDP) per capita measured in international dollars is used as a measure of income. I use the general government final consumption expenditure (% of GDP) as the government size and the share of imports

of goods and service in total GDP as the measure of openness to trade.

2.2 Empirical Model

Consider the following baseline dynamic panel econometric model

$$c_{i,t} = \alpha_1 c_{i,t-1} + \alpha_2 c_{i,t-2} + \beta \Delta f_{i,t} + \gamma f_{i,t-1} + \mathbf{x'}_{i,t}\delta + \mu_t + \phi_i + \varepsilon_{i,t} \tag{1}$$

where $c_{i,t}$ is the ICRG corruption index of country i in year t. The lagged values of this variable are included as regressors to capture the persistence of corruption. Mishra (2006) shows that corruption can be highly persistent, even when anti-corruption measures and incentives are in place. Given the highly persistent nature of corruption, I add the second lag of corruption as a regressor, which, along with the first lag, is found to be highly significant in all the specifications regardless of which estimator is employed. I also experimented with higher-order lags, but third and higher-order lags were found to be statistically insignificant suggesting that the correct empirical specification should include two lags of the dependent variable.

The primary variable of interest, $\Delta f_{i,t} = f_{i,t} - f_{i,t-1}$, is the change in financial liberalization index between year t and year $t-1$ and, therefore, measures the financial sector reforms (or the change in policy) between the two periods. $f_{i,t-1}$ is previous year's financial liberalization index of country i. Thus, while β measures the effect of financial sector reforms on corruption, γ reflects the impact of the level of financial liberalization on corruption. Because I have adjusted the corruption index such that a higher score implies a greater corruption, β is expected to be negative. $\mathbf{x'}_{i,t}$ is the vector of control variables. μ_t denotes the time fixed effects, δ_i denotes sets of country dummies, and $\varepsilon_{i,t}$ is the error term. The inclusion of time dummies captures the effect of any event that affects the variables of interest globally and ensures that the estimates are not biased because of the occurrence of any such

events. In addition to controlling for the unobserved time-invariant country-specific factors that could affect financial reforms, the country dummies also capture systematic differences in the measurement of the variables of interest. Various estimation techniques are used to estimate the coefficients β and γ in order to identify the causal impact of financial reforms and financial liberalization on corruption. Note that even though the pooled ordinary least squares (POLS) and fixed effects (FE) estimations produce biased estimates in the presence of lagged dependent variables as regressors, they provide useful checks since the autoregressive coefficient is biased upwards in the POLS estimation, while being biased downwards in the FE estimation (Bond, 2002). Hence, I begin with providing the POLS and FE estimates before moving on to the difference– and system– generalized methods of moments (GMM) estimation techniques to address endogeneity concerns. Additionally, a number of robustness checks are performed to ensure that the GMM specifications are properly specified.

The choice of control variables comes from the existing literature that identifies various economic, political, colonial, and cultural factors that influence corruption. Since political and cultural factors are fixed, to a first approximation, the inclusion of country dummies removes them ensuring that the estimates are not biased due to the omission of these factors. Hence, the main control variables used in this paper are income per capita, openness, and the government size. I control for per capita income as rich countries have a greater amount of resources to constrain corruption. Furthermore, wages usually rise with the economic development that makes corrupt practices more costly leading to a decrease in corruption (Dzhumashev, 2014). Theoretically, it is possible that a greater government size may lead to an increase in corruption with more resources available for bureaucrats to embezzle. Consistently, Goel and Nelson (1998) find that government spending is positively correlated with corruption across US states. Although a negative correlation has been reported between openness to trade and corruption, the causality is not clear (Treisman, 2000). Nevertheless, openness is almost always included as a control variable in the standard corruption literature.

Moreover, Abiad and Mody (2005) show that openness is one of the factors that affect the rate of financial liberalization in a country. Hence, I include openness to trade as a control variable.

Table 2 presents the cross-correlation table. The significance level of the correlation is reported in parentheses. Both the level and the change in the financial liberalization index are negatively correlated with corruption. Other variables–per capita income, openness, and government size– are also negatively correlated with corruption. Next, I present the results of the formal regression analysis to identify which of these variables have a causal effect on corruption.

3 Results

3.1 Pooled OLS and Fixed Effects Estimation

I start by presenting estimation results from the pooled ordinary least squares (POLS) and the fixed effects (FE) regressions. Standard errors are clustered at the country-level to account for potential correlation between countries' errors over time in both types of regression. Note that while these estimates are inconsistent due to the presence of a lagged dependent variable as an explanatory variable, they are informative since the coefficients of the lagged dependent variables from the POLS and the FE estimations are biased in opposite directions. The autoregressive coefficient is biased upwards in the POLS estimation, while being biased downwards in the FE estimation (see Bond (2002) for a detailed discussion). Thus the consistent estimates of the autoregressive coefficient should lie between the FE and the POLS estimates of the autoregressive coefficient, which is a useful check.

The POLS estimates are presented in the first two columns of Table 3. These estimates indicate a persistence of corruption. While the coefficients of both the lags of corruption are significant, only the first lag has a positive sign. The second lag has a negative coefficient

suggesting that actions are taken (by the relevant authorities) to curb corruption (to some extent) whenever the corruption is perceived to be very high in a country. However, the coefficient of the first lag is about five times greater in absolute value than that of the second lag indicating that corruption tends to be highly persistent. The coefficient of the financial liberalization index is negative and statistically significant in both the baseline and the extended specifications indicating that a greater financial liberalization is associated with lower corruption. The coefficients of financial reforms are, however, statistically insignificant at the conventional levels. Columns 3 and 4 report the results of the FE estimation given by equation (1). Both the lags of the dependent variable are significantly associated with corruption. According to the FE estimates, neither the financial liberalization index nor reforms towards financial liberalization is significantly associated with corruption.

As discussed earlier, concerning the coefficients on the lagged dependent variables, the FE estimates are likely to be biased downwards and the POLS estimates upwards, and hence, the consistent estimates of the coefficient on the first lag should lie between 0.96 to 1.06, and those of the second lag should lie between -0.22 and -0.17. Having useful ranges for the autoregressive coefficients in Table 3, next I discuss GMM estimators that have been shown to be consistent in the presence of the lagged dependent variables.

3.2 Generalized Method of Moments Estimation

In the presence of the lagged dependent variables, Arellano and Bond (1991) proposed using the difference GMM estimation. The difference GMM estimator removes the fixed effects by transforming the data and addresses the endogeneity issue by using lagged values as instruments. In a later study, Blundell and Bond (1998) show that the difference GMM performs poorly, especially when the variables are close to a random walk – the lagged levels are not strong instruments for first-differenced variables. Moreover, when the number of time periods is small and the dependent variable is highly persistent, the difference GMM

may be subject to huge sample bias (Alonso-Borrego and Arellano, 1999). Hence, following Arellano and Bover (1995) and Blundell and Bond (1998), I also present the results using the system GMM estimator. The system GMM estimator improves efficiency by using both lagged levels as well as lagged differences.[10] I report results employing both the difference and system GMM estimators to ascertain the robustness of results.[11]

Since the reported two-step standard errors can be severely downward biased (see Roodman (2009b) for details), I use Windmeijer (2005) finite sample corrected standard errors for both the difference GMM and the system GMM that makes two-step estimation more efficient than one-step estimation (especially for system GMM). As noted by Roodman (2009a), the implementation of the difference and system GMM in popular software (including the user written command *"xtabond2"*) generates a large number of instruments, which weakens the Hansen test of the validity of the instruments. There is also a danger of false-positive results in such cases (see Roodman (2009a) for a detailed discussion). Hence, following Roodman (2009a), I collapse the instrument matrix to limit the number of instruments preventing the model from being over-fitted .[12] Additionally, I use only two lags as instruments. In all the specifications, the lagged dependent variable is treated as predetermined, and all the control variables are assumed to be endogenous, except, of course, year dummies that instrument themselves.

Table 4 presents the results of the two-step difference GMM estimation. The first column presents the results of the rudimentary specification. Consistently, the coefficients of the lagged dependent variable lie in between the FE coefficient and the POLS coefficient. The estimates indicate a negative relationship between financial reforms and corruption and

[10] The STATA package *"xtabond2"* developed by Roodman (2009b) is employed to implement all the GMM regressions. In a recent study, Bazzi and Clemens (2013) warn that the mere use of system GMM does not necessarily guarantee the absence of weak-instruments problem. However, they admit that weak instrument diagnostics are not yet available for dynamic panel estimation.

[11] This is particularly important since the system GMM requires additional moment restrictions (see Roodman (2009b) for details).

[12] I use "collapse" option in *xtabond2* in order to do the same.

a positive relationship between financial liberalization index and corruption. In the next column, I control for per capita income. This specification does not seem to be a reliable one as the coefficients of the lagged dependent variables lie outside the lower and the upper bounds indicated by FE and POLS estimates of the autoregressive terms. However, when I include government size and openness in the next two columns, coefficients of the lagged dependent variables lie within the range given by FE and POLS estimates. According to the estimates reported in the next three columns, financial reforms are significantly and negatively related to corruption. On the other hand, the relationship between financial liberalization index and corruption is statistically not significant at the conventional levels. Moreover, while openness is positively associated with corruption, income and government size do not seem to be significantly associated with corruption.

The results of the system GMM estimation can be found in Table 5. Consistently, in all the system GMM specifications, the estimated autoregressive coefficients lie between the FE coefficient and the POLS coefficient reported in Table 3. Moreover, these coefficients lie within the range for dynamic stability, which enhances the credibility of estimation results. Note that the Hansen J-statistic reports p-values for the null hypothesis that the overidentifying restrictions are valid. In all the specifications reported in Tables 4 and 5, the Hansen J-statistics fail to reject the validity of overidentifying restriction. Finally, the p-values reported for AR(1) indicate that there is a high first order correlation in each specification, but the p-values for AR(2) show no evidence of a second order correlation. For system GMM, Difference-in-Hansen test reports p-values for the validity of additional moment restrictions. The test does not reject the null hypothesis that the additional moment restrictions are valid in any of the specifications. In sum, these test statistics indicate a proper specification in each column for both the difference and system GMM reported in Tables 4 and 5.

According to the system GMM estimates, financial reforms are negatively related to corruption regardless of which specification is used. Although the financial liberalization index

is positively associated with corruption, this relationship is sensitive to the choice of control variables. These results indicate that it is *reform* rather than the current state (liberalization or repression) of financial system that matters for corruption. This, however, does not necessarily mean that financial reforms have a short-lived effect on corruption. A potential explanation is that financial reforms reduce corruption permanently to a certain level and, since corruption tends to be highly persistent, it stays at the new lower level.[13] However, if the level of financial liberalization is positively associated with corruption as indicated by the estimates reported in Tables 5 (columns 1, 4, and 5) and 7, its explanation may lie in a paper by Blackburn and Forgues-Puccio (2010). The authors argue that financial liberalization may increase corruption because the former results in fewer controls on international financial transactions, and the ease of moving money across borders facilitates the laundering of unlawfully earned money. A lower probability of the detection of embezzled funds makes the corrupt transactions less costly and, hence, more attractive. Thus, corruption may be higher in countries with highly liberalized financial system if it is not accompanied by good governance.

The system GMM estimates also indicate that income is negatively related to corruption – a result that is consistent with findings of the previous studies (for instance, Dzhumashev, 2014). The results of this paper also indicate that there is no association between the size of the government and corruption, which is in contrast with the findings of Goel and Nelson (1998), who find that government size, particularly, state government spending, is positively associated with corruption across U.S. states. The results of this paper, however, does not necessarily contradict their findings because in a recent paper Kotera et al. (2012) find that

[13] This is a plausible conjecture since the overall corruption in a country also reflects the occurrences of bribes that citizens are often forced to pay in order to obtain government services such as driver's license (see Bertrand et al. (2007) on the prevalence of corruption in the provision of public services). Financial sector liberalization is more likely to affect corrupt transactions between firms and government officials (*i.e.*, collusive corruption) and, as motivated in the Introduction section, banking sector corruption. It is unlikely to affect extortionary bribes – the form of corruption in which citizens are forced to bribe in order to obtain government services they are entitled to, except the occurrences of such bribes in the banking sector.

the relationship between government spending and corruption depends on the democracy level. Another possibility could be that the dynamics of relationship between government size and corruption is different at the state-level compared to the country-level.

Finally, a greater degree of openness is found to be positively associated with corruption, though its magnitude is very small. This result is not surprising as theoretically openness can affect corruption in both directions. On the one hand, openness may reduce corruption by increasing competition, it may lead to a rise in corruption since custom officials have a greater opportunity to engage in bribe-taking activities due a larger volume of international trade. Nevertheless this is an interesting finding since the previous studies have usually reported a negative correlation between openness and corruption. There are, however, some studies, that fail to find an association between openness and corruption. For example, Gatti (2004) does not find the evidence of a clear association between openness (measured by variables that proxy for the presence and intensity of controls on capital flows) and corruption.

3.3 Robustness checks

Excluding Emerging Asia and Transition Economies

Corruption emerged as the second biggest problem after crime in a survey conducted by the Pew Research Center in 34 emerging and developing economies with 76% respondents saying that "corruption is a "very big problem".[14] Several Asian economies (such as China, India, Indonesia, Japan, and Korea) have experienced very high growth rates during the last 4 decades, and financial liberalization has been found to have played a role in their growth (Gamra, 2009). Emerging economies and economies in transition are prone to greater corruption for a number of reasons including the large scale privatization (see Kaufmann and Siegelbaum (1997) for a detailed discussion).[15] To rule out the possibility

[14] Visit www.pewglobal.org/2014/11/06/crime-and-corruption-top-problems-in-emerging-and-developing-countries/country-issues-report-08/ (Accessed February 20, 2018).

[15] Over 50,000 medium- and large-scale enterprises are estimated to have been privatized during only the

that the relationship between financial reforms and corruption are driven by the unique circumstances in these economies, I examine this relationship excluding Emerging Asia and Transition economies from the sample. Results reported in Table 6 demonstrate that this is not the case since the coefficient on the financial reforms remains negative and statistically significant when emerging Asian economies and transition economies are excluded from the model in columns 1 and 2 respectively. The relationship between reforms towards financial liberalization and corruption remains robust in column 3, when both Emerging Asian as well as transition economies are dropped from the sample. Also note that all the test statistics reported at the bottom of the Table point to a proper specification in each column.

Using deeper lags as instruments

As a further robustness check, I also experiment by using deeper lags as instruments in the system GMM estimation. These results are reported in Table 7. The results using up to 3 and 4 lags as instruments are similar to those reported in Table 5 in which only 2 lags have been used as instruments. Overall, the difference and system GMM estimators provide robust evidence of a causal and negative impact of financial reforms on corruption, while the relationship between the level of financial liberalization and corruption is not robust and depends on the choice of control variables as well as the estimation method.

4 Legal origins, financial reforms, and corruption

In an influential paper, La Porta et al. (1998) document that common law countries have the most favorable environment for investment, while French civil law countries tend to have the weakest legal protection of investors. Countries with German and Scandinavian civil laws are located in the middle. Compared to French civil law, British common law has also been found to have a better developed financial system, more independent judiciary, better

first half of the 1990s as opposed to only about 6,000 during 1980s in the transition economies of the former Soviet Union and Central and Eastern Europe (Kaufmann and Siegelbaum (1997)).

property rights, less stringent government regulation and hence lower corruption (see for Porta et al. (2008) for a detailed discussion). Although the omission of legal origins is not a concern for the results reported in this paper because they are fixed, I explore whether the effect of financial reforms on corruption is driven by a sub-sample of countries with a particular legal origin or whether legal origins may enhance the effectiveness of financial reforms on corruption.[16] These results are reported in Table 8.

The relationship between financial reforms and corruption remains robust when countries with British, German, or Scandinavian legal origin are dropped from the sample. While the coefficient of financial reforms is not significant when countries with French legal origin are dropped from the analysis, the estimates of this specification are not reliable because the Hansen J-test rejects the validity of the overidentifying restrictions. Furthermore, the p-value reported for the Difference-in-Hansen test indicates that the validity of additional moment restrictions required for the system GMM is questionable. Also note that when countries with French legal origin are dropped from the analysis (column 2), the number of countries reduces to 46, which is relatively small compared to the number of time periods. In all other columns (except column 2), the test statistics reported at the bottom of Table 8 indicate a proper specification.

Although the effect of financial reforms on corruption seems to be the largest in countries with British legal origins – the coefficient of financial reforms is lowest when countries with British legal origin are dropped from the sample, unfortunately, this result cannot be ascertained with the present data.

Also note that the relationship between the level of financial liberalization and corruption is sensitive to the exclusion of countries with different legal origins and becomes insignificant when countries with legal origins other than German are dropped from the sample. Further-

[16] Although the latter can be better studied with the sub-samples of countries according to legal origins, it is not feasible with the present data since in such cases the number of countries will be too small relative to the number of time periods.

more, neither the government size nor openness is significantly associated with corruption in any of the columns. On the other hand, income is negatively related to corruption in all the specifications and is statistically insignificant only when countries with British legal origin are dropped from the sample.

5 Discussion and Conclusion

In this paper, I employ the difference and system GMM estimators to investigate the causal impact of financial reforms on corruption. Using data for 87 underdeveloped, developing, and developed economies over 1984-2005, I find that financial sector reforms towards liberalization negatively impact corruption. The results also suggest that legal origins do not impose a binding constraint on the effectiveness of financial reforms in reducing corruption.

Interestingly, I find a positive relationship between financial liberalization and corruption, though this relationship is not robust and is sensitive to the inclusion of additional control variables and the choice of the GMM estimator. However, as argued earlier, this does not necessarily mean that financial reforms have a short-lived effect on corruption. Furthermore, in a dynamic general equilibrium model, Blackburn and Forgues-Puccio (2010) find that financial liberalization may lead to an increase in corruption in the absence of good governance. Since the present data does not allow for the investigation of this conjecture, I leave this question open for future research. Another related avenue for research would be to empirically examine whether the effectiveness of financial reforms and liberalization on corruption depends upon the institutional context of the economy in question. A complementarity between financial reforms and institutional quality has been reported by several studies investigating the effects of financial liberalization and reforms on factors such as financial depth (Tressel and Detragiache, 2008) and economic development (Blackburn and Forgues-Puccio, 2010), and hence, it may be insightful to explore whether such complemen-

tarity exists in the context of corruption. Finally, the analysis of this study is limited to the period of 1984–2005 due to the data unavailability. It would be an useful exercise to re-investigate the relationship between financial reforms and corruption using an updated dataset for the financial reforms that covers recent years (if and when it becomes available) to see whether this relationship persists till date.

Consistent with the findings of the previous studies, I find a negative relationship between GDP per capita and corruption. The paper does not find the evidence of a significant association between the size of government and corruption. Moreover, the paper also finds an (inconclusive) evidence of a positive association between openness to trade and corruption – a result that is in contrast to the findings of previous studies. Since there are plausible reasons to believe that openness may lead to an increase in corruption and the causality between the two is not well-established, this finding indicates that a more careful investigation of the causal link between openness and corruption may be useful.

To conclude, this study provides yet another reason in favor of financial reforms by suggesting that policy reforms targeted towards financial liberalization reduce corruption, while there is no conclusive evidence of a positive association between the level of financial liberalization and corruption. Many countries in the world remain considerably financially repressed even today, and several of those are deeply mired in corruption. Since financial repression and corruption both obstruct economic growth and development, the importance of this issue cannot be overstated.

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Tables

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
ICRG corruption index	-3.418	1.371	-6	0	1570
Financial Liberalization Index	13.24	5.445	0	21	1570
Δ Financial Liberalization Index	0.491	1.032	-4	8	1570
GDP Per Capita	9920.484	9784.418	224.397	47626.28	1509
Openness	35.936	24.832	4.631	200.273	1537
Government Size	14.862	5.629	2.976	43.479	1539

A higher value of corruption index implies greater corruption. GDP per capita is measured in international dollars and is adjusted for purchasing power. Openness is measured as the share of imports of goods and services in total GDP. The government size is measured as the share of general government final consumption expenditure in total GDP.

Table 2: Cross-correlation table

Variables	ICRG Corruption Index	Financial Liberalization Index	Δ Financial Liberalization Index	GDP per capita	Openness	Govt. Size
ICRG	1.000					
Financial Liberalization	-0.324 (0.000)	1.000				
Δ Financial Liberalization	-0.019 (0.455)	-0.078 (0.002)	1.000			
GDP per capita	-0.582 (0.000)	0.674 (0.000)	-0.148 (0.000)	1.000		
Openness	-0.108 (0.000)	0.272 (0.000)	-0.061 (0.016)	0.263 (0.000)	1.000	
Govt. Size	-0.487 (0.000)	0.313 (0.000)	-0.059 (0.020)	0.457 (0.000)	0.005 (0.840)	1.000

$p-$values in parentheses.

Table 3: The Effect of Financial Reforms on Corruption: Pooled OLS and FE Estimates

	Pooled OLS		Fixed Effects OLS	
	(1)	(2)	(3)	(4)
C_{t-1}	1.077***	1.057***	0.973***	0.960***
	(0.0294)	(0.0309)	(0.0322)	(0.0337)
C_{t-2}	-0.158***	-0.169***	-0.221***	-0.221***
	(0.0274)	(0.0282)	(0.0273)	(0.0279)
f_{t-1}	-0.0133***	-0.00727***	0.00554	0.00450
	(0.00192)	(0.00272)	(0.00548)	(0.00584)
Δf_t	-0.00622	-0.00552	-0.000115	-0.00350
	(0.00812)	(0.00810)	(0.00820)	(0.00845)
$\log(GDPPC)$		-0.0493***		-0.0382
		(0.0142)		(0.115)
Government Size		-0.00383**		-0.00204
		(0.00178)		(0.00424)
Openness		0.000201		0.000416
		(0.000252)		(0.00164)
Year dummies	Yes	Yes	Yes	Yes
Observations	1570	1501	1570	1501
Countries	87	85	87	85

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is ICRG corruption index – a higher value of the index implies greater corruption. Standard errors clustered at the country-level in parentheses. Constant not repoted.

Table 4: The Effect of Financial Reforms on Corruption: Difference GMM Estimates

	(1)	(2)	(3)	(4)	(5)
C_{t-1}	1.020***	1.131***	0.966***	0.944***	0.935***
	(0.0603)	(0.0997)	(0.0804)	(0.0612)	(0.0616)
C_{t-2}	-0.218***	-0.252***	-0.205***	-0.194***	-0.190***
	(0.0372)	(0.0450)	(0.0405)	(0.0411)	(0.0402)
f_{t-1}	0.0287*	0.0341	0.0250	0.0399	0.0401
	(0.0147)	(0.0307)	(0.0290)	(0.0258)	(0.0277)
Δf_t	-0.248**	-0.0932	-0.269**	-0.297**	-0.317**
	(0.106)	(0.169)	(0.117)	(0.132)	(0.132)
$\log(GDPPC)$		3.617	-1.919	-1.354	-1.407
		(2.717)	(1.465)	(0.901)	(0.872)
Government Size			0.0219		-0.000681
			(0.0278)		(0.0229)
Openness				0.0383*	0.0398**
				(0.0204)	(0.0185)
Year dummies	Yes	Yes	Yes	Yes	Yes
Instruments	26	28	30	30	32
Hansen J-test	[0.258]	[0.397]	[0.353]	[0.743]	[0.847]
AR(1)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
AR(2)	[0.703]	[0.722]	[0.579]	[0.587]	[0.599]
Observations	1483	1424	1416	1417	1416
Countries	87	84	84	84	84

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is ICRG corruption index – a higher value of the index implies greater corruption. Windmeijer (2005) finite sample corrected standard errors in parentheses. p-values are in brackets. To avoid instrument proliferation, the instrument matrix has been collapsed and only two lags have been used as instruments. Hansen J-test reports the p-values for the null that instruments are valid. The p-values reported for AR(1) and AR(2) are for first and second order autocorrelated disturbances in the first differences equations.

Table 5: The Effect of Financial Reforms on Corruption: System GMM Estimates

	(1)	(2)	(3)	(4)	(5)
C_{t-1}	0.992***	1.012***	0.997***	0.985***	0.986***
	(0.0511)	(0.0450)	(0.0524)	(0.0486)	(0.0533)
C_{t-2}	-0.189***	-0.211***	-0.205***	-0.210***	-0.203***
	(0.0312)	(0.0358)	(0.0340)	(0.0327)	(0.0344)
f_{t-1}	0.0415**	0.0195	0.0220	0.0310*	0.0374**
	(0.0211)	(0.0154)	(0.0174)	(0.0180)	(0.0180)
Δf_t	-0.223**	-0.188**	-0.193**	-0.202**	-0.268***
	(0.104)	(0.0801)	(0.0756)	(0.0874)	(0.0887)
$\log(GDPPC)$		-0.165	-0.166*	-0.258***	-0.263***
		(0.101)	(0.0916)	(0.0862)	(0.0911)
Government			0.000142		0.00822
Size			(0.0137)		(0.0150)
Openness				0.00484**	0.00499*
				(0.00246)	(0.00281)
Year dummies	Yes	Yes	Yes	Yes	Yes
Instruments	31	34	37	37	40
Hansen J-test	[0.272]	[0.232]	[0.417]	[0.646]	[0.620]
Diff-in-Hansen test	[0.328]	[0.551]	[0.873]	[0.906]	[0.916]
AR(1)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
AR(2)	[0.510]	[0.775]	[0.773]	[0.656]	[0.695]
Observations	1570	1509	1501	1502	1501
Countries	87	85	85	85	85

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is ICRG corruption index – a higher value of the index implies greater corruption. Windmeijer (2005) finite sample corrected standard errors in parentheses. p-values are in brackets. To avoid instrument proliferation, the instrument matrix has been collapsed and only two lags have been used as instruments. Hansen J-test reports the p-values for the null that instruments are valid. Diff-in-Hansen test reports the p-values for the validity of the additional moment restrictions that are necessary for system GMM. The p-values reported for AR(1) and AR(2) are for first and second order autocorrelated disturbances in the first differences equations. Constant not reported.

Table 6: The Effect of Financial Reforms on Corruption Excluding Emerging Asia and Transition Economies

Excluding →	(1) Emerging Asia	(2) Transition Economies	(3) Emerging Asia & Transition Economies
C_{t-1}	0.978***	1.008***	1.007***
	(0.0566)	(0.0597)	(0.0535)
C_{t-2}	-0.189***	-0.215***	-0.208***
	(0.0415)	(0.0381)	(0.0464)
f_{t-1}	0.0384*	0.0189	0.0213
	(0.0202)	(0.0156)	(0.0147)
Δf_t	-0.179**	-0.204**	-0.152*
	(0.0879)	(0.101)	(0.0789)
$\log(GDPPC)$	-0.304***	-0.148*	-0.201**
	(0.107)	(0.0833)	(0.0948)
Government Size	0.00182	0.000163	-0.00115
	(0.0178)	(0.0163)	(0.0167)
Openness	0.00739*	0.00130	0.00110
	(0.00438)	(0.00284)	(0.00514)
Year dummies	Yes	Yes	Yes
Instruments	40	40	40
Hansen J-test	[0.345]	[0.166]	[0.430]
Diff-in-Hansen test	[0.533]	[0.436]	[0.449]
AR(1)	[0.000]	[0.000]	[0.000]
AR(2)	[0.460]	[0.460]	[0.432]
Observations	1281	1360	1140
Countries	74	70	59

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is ICRG corruption index – a higher value of the index implies greater corruption. Windmeijer (2005) finite sample corrected standard errors in parentheses. p-values are in brackets. To avoid instrument proliferation, the instrument matrix has been collapsed and only two lags have been used as instruments. Hansen J-test reports the p-values for the null that instruments are valid. Diff-in-Hansen test reports the p-values for the validity of the additional moment restrictions that are necessary for system GMM. The p-values reported for AR(1) and AR(2) are for first and second order autocorrelated disturbances in the first differences equations. Constant not reported.

Table 7: The Effect of Financial Reforms on Corruption: System GMM Estimates Using Alternative Lags as Instruments

	Three lags		**Four lags**	
	(1)	(2)	(3)	(4)
C_{t-1}	0.986***	0.992***	0.976***	1.007***
	(0.0487)	(0.0560)	(0.0470)	(0.0463)
C_{t-2}	-0.191***	-0.211***	-0.185***	-0.215***
	(0.0309)	(0.0374)	(0.0305)	(0.0349)
f_{t-1}	0.0461**	0.0211*	0.0455**	0.0176**
	(0.0183)	(0.0121)	(0.0178)	(0.00833)
Δf_t	-0.249***	-0.210**	-0.235***	-0.192***
	(0.0899)	(0.0934)	(0.0881)	(0.0741)
$\log(GDPPC)$		-0.218***		-0.215***
		(0.0771)		(0.0747)
Government		0.00110		0.00289
Size		(0.0138)		(0.0131)
Openness		0.00419		0.00442*
		(0.00270)		(0.00240)
Year dummies	Yes	Yes	Yes	Yes
Instruments	34	46	37	52
Hansen J-test	[0.562]	[0.363]	[0.751]	[0.644]
Diff-in-Hansen test	[0.370]	[0.740]	[0.340]	[0.681]
AR(1)	[0.000]	[0.000]	[0.000]	[0.000]
AR(2)	[0.569]	[0.679]	[0.536]	[0.704]
Observations	1570	1501	1570	1501
Countries	87	85	87	85

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is ICRG corruption index – a higher value of the index implies greater corruption. Windmeijer (2005) finite sample corrected standard errors in parentheses. p-values are in brackets. To avoid instrument proliferation, the instrument matrix has been collapsed in all the specifications. Hansen J-test reports the p-values for the null that instruments are valid. Diff-in-Hansen test report the p-values for the validity of the additional moment restrictions that are necessary for system GMM. The p-values reported for AR(1) and AR(2) are for first and second order autocorrelated disturbances in the first differences equations. Constant not reported.

Table 8: Lagal Origins, Financial Reforms, and Corruption

Excluded legal origin →	British	French	German	Scandinavian
	(1)	(2)	(3)	(4)
C_{t-1}	1.024***	1.088***	0.963***	0.980***
	(0.0690)	(0.0750)	(0.0663)	(0.0563)
C_{t-2}	-0.166***	-0.279***	-0.197***	-0.198***
	(0.0336)	(0.0709)	(0.0413)	(0.0373)
f_{t-1}	0.0156	0.00497	0.0324*	0.0267
	(0.0139)	(0.0198)	(0.0193)	(0.0187)
Δf_t	-0.147**	-0.146	-0.194**	-0.232**
	(0.0622)	(0.111)	(0.0886)	(0.0973)
$\log(GDPPC)$	-0.0916	-0.292***	-0.256**	-0.191*
	(0.139)	(0.112)	(0.108)	(0.101)
Government Size	0.00586	0.00539	-0.00324	-0.00247
	(0.0160)	(0.0275)	(0.0148)	(0.0146)
Openness	0.00555	0.00319	0.00381	0.00265
	(0.00460)	(0.00434)	(0.00293)	(0.00258)
Year dummies	Yes	Yes	Yes	Yes
Instruments	40	40	40	40
Hansen J-test	[0.338]	[0.016]	[0.225]	[0.287]
Diff-in-Hansen test	[0.702]	[0.036]	[0.564]	[0.803]
AR(1)	[0.000]	[0.000]	[0.000]	[0.000]
AR(2)	[0.460]	[0.530]	[0.611]	[0.759]
Observations	1053	740	1377	1390
Countries	61	46	78	79

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is ICRG corruption index – a higher value of the index implies greater corruption. Windmeijer (2005) finite sample corrected standard errors in parentheses. p-values are in brackets. To avoid instrument proliferation, the instrument matrix has been collapsed and only two lags have been used as instruments. Hansen J-test reports the p-values for the null that instruments are valid. Diff-in-Hansen test reports the p-values for the validity of the additional moment restrictions that are necessary for system GMM. The p-values reported for AR(1) and AR(2) are for first and second order autocorrelated disturbances in the first differences equations. Constant not reported.

Appendix

Table A.1: List of countries used in this paper's analysis

Albania	Algeria	Argentina	Australia	Austria
Azerbaijan	Bangladesh	Belarus	Belgium	Bolivia
Brazil	Britain	Bulgaria	Burkina Faso	Cameroon
Canada	Chile	China	Colombia	Costa Rica
Côte d'Ivoire	Czech Republic	Denmark	Dominican Republic	Ecuador
Egypt	El Salvador	Estonia	Ethiopia	Finland
France	Germany	Ghana	Greece	Guatemala
Hong Kong	Hungary	India	Indonesia	Ireland
Israel	Italy	Jamaica	Japan	Jordan
Kazakhstan	Kenya	South Korea	Latvia	Lithuania
Madagascar	Malaysia	Mexico	Morocco	Mozambique
Netherlands	New Zealand	Nicaragua	Nigeria	Norway
Pakistan	Paraguay	Peru	Philippines	Poland
Portugal	Romania	Russia	Senegal	Singapore
South Africa	Spain	Sri Lanka	Sweden	Switzerland
Taiwan	Tanzania	Thailand	Tunisia	Turkey
Uganda	Ukraine	United States	Uruguay	Venezuela
	Vietnam		Zimbabwe	