# Financial Reforms and Corruption: Evidence using GMM Estimation*

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September 2015

**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.

*JEL classification codes:* D73; G28; O16

*Keywords:* Corruption; Financial Reforms; Government Size; Legal Origins; Liberalization; Openness

*I would like to thank Louis-Philippe Beland, Trina Biswas, Satadru Das, Nasr Elbahnasawy, Sukriye Filiz, Anna Kochanova, Sushanta Mallick, Maxwell Means, Bibhudutta Panda, Luiza Pogorelova, Sudipta Sarangi, Ishita Tripathi, and Gregory Upton for their helpful comments. Any errors are my own.

# 1 Introduction

The positive effects of financial reforms and development on economic outcomes are well-reported in the empirical literature. For instance, financial reforms have been found to be negatively associated with income inequality (Agnello et al., 2012) and positively associated with financial development (Tressel and Detragiache, 2008). 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). On the other hand, studies have found that corruption negatively impacts economic growth (Mauro, 1995), and is positively associated with poverty and income inequality (Gupta et al., 2002).[1] Some studies have also underscored the importance of the interaction between financial development and corruption for economic growth (Ahlin and Pang, 2008), suggesting that looking at the relationship between financial sector liberalization and corruption may provide important 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 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

[1] In a recent study, Justesen and Bjørnskov (2014) argue that corruption is likely to hurt the poor more than the rich since the former are more dependent on public services than the latter. Using survey data, they find that poor people in Africa are much more likely to be victims of bribe-seeking government officials.

predict corruption across countries. His findings thus indicate that cultural norms, political institutions, historical factors, government regulation, and 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. More recently, Dzhumashev (2014) also finds that corruption decreases with economic development. And, Jetter et al. (2015) find that the relationship between democracy and corruption depends on the level of economic development, and democratization may even lead to an increase in corruption in poor countries. Regarding cultural norms and legal enforcement, Fisman and Miguel (2007) show that both are important determinants of corruption suggesting that legal enforcement alone may not be sufficient to eradicate corruption.

Only recently, 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 (see for instance, Ahlin and Pang (2008) and Blackburn and Forgues-Puccio (2010)). An exception seems to be Altunbaş and Thornton (2012), who investigate the effect of bank credit to the private sector and corruption, and find a negative relationship between the two. There are no studies, however, to the best of my knowledge, that 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.[2] Sine corruption has been shown to be persistent (Elbahnasawy, 2014), 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.

There could be several channels through which financial reforms can reduce corruption. First, corruption in the banking sector is an important obstacle to firms seeking financing and Beck et al. (2006) find that mandating banks to disclose accurate information can be an important tool to mitigate the severity of this problem.[3] An appropriate degree of banking supervision (an important dimension of financial reforms), thus, may lower corruption in the banking sector. Second, since there is a negative association between the government ownership of banks and the rate of financial development (La Porta et al., 2002), easing the entry of private and foreign banks may also reduce corruption by increasing competition among banks and forcing them to offer cheap (corruption-free) loans making financial markets more efficient. Moreover, corruption in public sector banks may be greater because of differences in the wage structure and a greater job protection compared to the private sector.[4] Third, financial deepening is likely to influence corporate governance and provide the creditors with an opportunity to monitor firms.[5]

Another important channel through which policies towards financial liberalization can impact corruption is by making markets more competitive. Financial sector reforms lead to financial development and well-developed credit markets (Tressel and Detragiache, 2008),[6] which are likely to promote investment and business, and therefore, boost market compe-

[2] 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 $(12 - 10)$. Agnello et al. (2012) adopt similar strategy to investigate the impact of financial reforms on income inequality.

[3] Fungáčová et al. (2015) find a positive relationship between firms' total bank debit ratios and bribery indicating that in order secure finance from banks, firms often need to pay bribes.

[4] The public sector wages are greater than the private sector wages in both developing (Bender, 1998) and developed countries (Lucifora and Meurs, 2006), and the existing evidence suggests that public sector wages are negatively related to corruption (Svensson, 2005).

[5] 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).

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

tition. Guiso et al. (2004) confirm this hypothesis by showing that financial development (1) increases the probability an individual starts his own business, (2) promotes the entry of new firms, and (3) boosts competition. Together an increase in the number of firms and a competitive market are likely to reduce the scope of paying bribes since bribing would shrink profit margins. Along these lines, Ades and Di Tella (1999) have shown that corruption is lower in countries where firms face greater competition. More recently, using enterprise-level data on bribes, Berg et al. (2012) find that competition and privatization negatively impact corruption.

Additionally, reforms towards liberalizing several dimensions of financial sector may boost market competition and, hence, help reduce corruption. For instance, the privatization of banks is likely to enhance market competition since it increases lending (Berkowitz et al., 2014). Also, an imposition of excessive reserve requirements and mandating banks to extend subsidized credits to certain sectors adversely impact the amount of resources available for entrepreneurial activities, which will limit the number of firms and discourage competition. Consequently, financial reforms towards the abolition of excessive reserve requirements and providing greater autonomy to banks regarding credit supply are likely to increase competition. Finally, policy reforms towards developing the securities market promote savings and investment (Henry, 2000), which may further increase market competition. Thus, the effect of financial sector reforms is likely to affect corruption in other sectors as well rather than to be limited to the financial sector.

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. Financial reforms reduce corruption regardless of a country's legal origin. The results of this paper thus provide yet another reason 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. 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 paper utilizes the International Country Risk Guide's (ICRG) corruption index that captures the extent of political corruption. It takes values in the range of 0 to 6 with a greater value implying lower corruption. To simplify the interpretation of results, I use the negative of 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 published by the World Bank and Corruption Perception Index published by Transparency International are only available after 1996 and 1995 respectively. 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.[7]

Abiad et al. (2010) have complied the data for financial liberalization that covers 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 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

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

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).

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[8]

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

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. $f_{i,t-1}$ is previous year's financial liberalization index of country $i$. 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. Thus, $\beta$ and $\gamma$ measure the effects of the level of financial liberalization and reforms

[8] Corruption has been shown to have inertia (Elbahnasawy, 2014) and, hence, a dynamic panel model is an appropriate one for panel studies involving corruption. 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 the third lag, but it was found to be statistically insignificant suggesting that the correct model should include two lags of the dependent variable.

in the financial sector on corruption. Because I have adjusted the corruption index such that a higher score implies a greater corruption, the expected sign of $\gamma$ is negative. $\mathbf{x}'_{i,t}$ is the vector of control variables. $\mu_t$ denotes the time fixed effects, $\delta_i$ 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 $\beta$ and $\gamma$ in order to identify the causal impact of financial reforms and financial liberalization on corruption.

The choice of control variables comes from the existing literature that identifies various economic, political, colonial, and cultural factors that impact 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 and, hence, I include openness to trade as a

control variable.

As can be seen in the summary statistics reported in Table 1, there are several countries that were financially fully repressed, at least one year 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.

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.[9] I report results employing both the difference and system GMM estimators to ascertain the robustness of results.[10]

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 .[11] Additionally, I use only two lags as instruments. In all the

[9] The STATA package *"xtabond2"* developed by Roodman (2009b) is employed to implement all the GMM regressions.

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

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

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 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.[12] 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 6, 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.

[12] 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 system GMM estimates also indicate that income is negatively related to corruption – a results 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 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.

As a robustness check, I also experiment by using deeper lags as instruments in the system GMM estimation. These results are reported in Table 6. 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.

### 3.3 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 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.[13] These results are reported in Table 7.

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 7 indicate a

[13] 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.

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. Furthermore, 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.

# 4 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 complementarity exists in the context of corruption.

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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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 |
| $\Delta$ 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 | $\Delta$ Financial Liberalization Index | GDP per capita | Openness | Govt. Size |
|---|---|---|---|---|---|---|
| ICRG | 1.000 | | | | | |
| Financial Liberalization | -0.324 (0.000) | 1.000 | | | | |
| $\Delta$ 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 |

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) |
| $\Delta f_t$ | -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 |
| Constant | -0.177*** | 0.112 | -0.896*** | -0.629 |
| | (0.0499) | (0.0978) | (0.0873) | (0.949) |
| 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.

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) |
| $\Delta f_t$ | -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) |
| $\Delta f_t$ | -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) |
| Constant | -1.240*** | 0.579 | 0.505 | 1.017* | 0.772 |
| | (0.447) | (0.675) | (0.603) | (0.539) | (0.542) |
| 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.

Table 6: 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) |
| $\Delta f_t$ | -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) |
| Constant | -1.334*** | 0.768 | -1.331*** | 0.788 |
| | (0.394) | (0.544) | (0.391) | (0.559) |
| 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.

Table 7: 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) |
| $\Delta f_t$ | -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) |
| Constant | -0.176 | 1.527** | 1.030* | 0.625 |
| | (1.232) | (0.677) | (0.603) | (0.577) |
| 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.

Appendix

Table A.1: The 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 | |