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Can financial development enhance transparency?

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Abstract A substantial strand of literature unambiguously established the importance of financial development for economic growth. Relatively less attention has been paid to the impact that financial development of a country can have on important development outcomes like transparency. As established by existing research, strong financial institutions in a country would imply an improved and transparent banking system, better corporate governance, ease of accessing credit, greater availability of information and best practices in investment protection. All these should theoretically promise a more transparent economic system. Our empirical findings confirm this. Using several estimation strategies, our results confirm that greater financial development enhances transparency.

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1 Introduction

The latter part of the 20th century saw a proliferation of the ideas of privatization and liberalization with emerging countries moving into an open economic system. The Soviet downfall did also act as a catalyst in changing the economic outlook from a more centralized command system. The rules and regulations that came in place with the process of liberalization helped the developing countries create a strong financial structure. An extensive literature has focused on how financial development affects economic development especially economic growth (e.g. Gaffeo and Garalova 2013; Beck and Levine 2002; Levine et al. 2000; Allen and Gale 2000; Levine and Zervos 1998; King and Levine 1993, to mention a few). Yet, the impact of financial development on different development outcomes has not been researched adequately. One such critical development outcome is the topic of transparency. The concept of transparency becomes crucial in the context of developing countries as it is essential, for aid effectiveness, to avoid corruption, to stop environmental degradation, and to enhance the functionality of financial markets and capital allocation, and in making investment decisions efficient (Durnev et al. 2009; Drabek and Payne 2001). Transparency, therefore, is an essential criterion for the developing countries to stay in the path of growth and development. This paper fills this missing gap in the literature by empirically analyzing how better financial development can lead to a more transparent economic system.

How can greater financial development improve transparency, especially in the context of emerging countries? In the past two decades, emerging economies have become increasingly integrated into the global well-developed financial markets. For instance, if we look at the US portfolio holdings of long-term securities (equities and long-term bonds) between 1994 and 2012, we find the securities issued by entities from the emerging market economies roughly tripled as a share of each country's GDP between 1994 and 2012. This global integration of the financial marker should bring concrete benefits. The global integration leads to a reduction in the cost of capital, increases investment opportunities and improves risk sharing and portfolio diversification. Further, it speeds up the process of technological amalgamation, and contribute to the spread of best practices in investor protection and governance of the financial market. Collectively, these benefits of the financial integration should promote a transparent economic system.

We provide anecdotal evidence to make our case. With the liberalization of the Indian economy in 1991, the financial structure grew and that got reflected in the continuous improvement of information transparencies. Transparency International recently released the list of top ten emerging market firms, nine out of ten firms in the top ten list are from India. The robust and steady development in the financial structure in India is accompanied by a more transparent corporate structure that allowed the respective stakeholders to make informed decisions. The right to information act ensures that corporate decisions are transmitted to all the hierarchies of the stakeholders and improves corporate governance. Our paper shed light to this anecdotal evidence. After controlling for several macroeconomic and institutional

factors this paper analyzes whether financial development and transparency are correlated.

As is the case with the Indian companies, a strong financial system reduces the cost of acquiring information ex-ante, and different checks and balances ensured that the firm managers' interest and firm owners (the stockholders) interest are well aligned. Also, "outside" creditors like banks, equity, and bond holders creates the financial arrangements that compel inside owners and managers to run firms in accordance with the interests of outside creditors. This rationale leads us to our following hypothesis: *Strong financial intermediaries lead to a more transparent economic system.*

As mentioned before, an extensive literature has focused on how financial development[1] affects economic development especially economic growth. Yet, the impact on critical development outcomes has not been researched before to the best of our knowledge. Transparency has a far-reaching significance because of its potential to positively impact the economic development. It helps in promoting access to information about the current economic situation, as well as the about the nuances related to the host economy which is crucial to foreign investors. Hence, a more transparent economic system attracts higher foreign direct investment (FDI), an essential source of capital, especially for the developing countries. Oxelheim (2010) describes transparency as the buzz word of modern economics and politics, Drabek and Payne (2001) see it as a novel topic in finance and economics, Both, Lindstedt and Naurin (2010) and Florini (2008) see it as the solution to corruption and money laundering. Brito and Perraut (2010) see it as a remedy for the immediate crisis. Parry (2008) has noted that transparency permits a clearer assessment of the past fiscal performance, current fiscal position, fiscal risks, and the future direction of fiscal policy.

Contemporary anecdotal evidence strongly indicates the importance of transparency (orthe lack of it). BBC had reported back in 2004 about Greece's fiscal accounts that appear to have been manipulated in order to gain entry into the Eurozone. Eurostat announced in October 2004 that the Greek budget deficit was 4·1% of output in 2000, 3.7% in 2001 and 2002, and 4·6% in 2003. These figures are starkly different with the figures reported by Greece and Eurostat in March 2004 which were 2·0% for 2000, 1·4% in 2001 and 2002, and 1·7% in 2003 (http://news.bbc.co.uk/2/hi/business/4058327.stm). It is this lack of transparency that most likely has fueled and instigated a full-blown crisis in Greece. The ripple effect of such lack of transparency is quite eminent in the recent discourse of events in the Eurozone,

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[1] Efficient financial intermediation is conducive to the investment process in a country. Effective mobilization of household and foreign savings ensures that the funds are being productively used. Financial development thus involves the establishment and expansion of institutions, instruments, and markets that support this investment and growth process. Historically the role of banks and non-bank financial intermediaries ranging from retirement funds to stock markets has been to translate household savings into investment, to monitor investments, and to price and spread risk. As summarized by Levine (2005), and Beck et al. (2009), the following five functions are listed as the overall function of a financial system and those are (1) to produce ex ante information about possible investments and allocate capital; (2) monitor investments and provide corporate governance after providing finance; (3) facilitate the trading, diversification and management of risk; (4) mobilize and pool savings; and (5) ease the exchange of goods and services.

which further necessitates the importance of transparency in the field of economic policies.

Because of the many benefits of transparency, Brito and Perraut (2010) describe transparency as a hallmark of democratic government. In recent times, one of the most common policy prescriptions for overcoming the so-called "resource curse," particularly, for extractive industries, has been the call for greater transparency and accountability from governments (Williams 2011). This is consistent with the findings of Korhonen (2004) that greater levels of democracy of a country's political institution can alleviate the resource curse. It is not surprising therefore that Coyne (2009) describes transparency as an important characteristic of effective political institutions and Toader et al. (2010) argue that transparency is at the very foundation of good governance. This is because of transparency, in the end, is about empowerment and trust between and among stakeholders (Global Environmental Management Initiative (GEMI) Report 2004).

Re-iterating the theoretical arguments, a healthy financial system should imply greater release of financial and economic information, better corporate governance, more alignment in the interests of firm managers and stockholders and overall greater accountability. Thus, with a healthy financial system, comes a society that scores better both in terms of information transparency and accountability transparency. Information transparency captures the idea that information is critical for market-related economic content and in reducing information asymmetries and that the government plays a key role on the extent and nature of the information that is released. Information transparency is essential for accountability transparency. Masses want better access to information as a check on government actions. Information transparency enacts through the freedom of the press and independent media, through the release of fiscal information, and through the informal or formal constraints that are placed on the action of the government, and thus creates government accountability as masses become aware of the government actions. The reduction of the information asymmetries in the corporate sector and the enhancement of the accountabilities by the public officials paves the path for a better overall transparency.

We hypothesize that better financial development should enhance transparency of countries. We employ fixed effect (FE) estimates and System GMM estimates to provide empirical support to our hypothesis. Both estimates and several alternative empirical specifications confirm our hypothesis that a better financial development does improve transparency. We are aware of the possible endogeneity in the model. Our main variable of interest, financial development, can suffer from endogeneity arising out of reverse causality or omitted variable bias or both. As explained later, our identification strategy now relies on several techniques that help mitigate endogeneity concerns. First, we mitigate endogeneity concerns via the construction of the cross-country panel that essentially lags all independent variables by one period or 5 years. We then run different specifications using different lag structures of the independent variables. Second, we resort to employing System GMM estimates. For System GMM estimates, instruments are generated via moment generating conditions and the use of additional moments lead to greater precision. We treat financial development and our income measure to be endogenous in all

specifications. Finally, as part of robustness analysis, we run System GMM estimates by incorporating lagged variables. For all empirical strategies, our results confirm that higher financial development indeed leads to greater information transparency. Further, we also show that overall transparency score, comprising of both information and accountability transparency, is enhanced with greater financial development. A standard deviation rise in private credit, our benchmark measure of financial development, raises transparency by about 1.9% points or by almost 2.5%.

Yet, we do acknowledge that in spite of our attempts to correct for endogeneity, the results should be interpreted with caution. The endogeneity arising out of strong simultaneity in the determination of information transparency and financial development might not be totally negated with our estimation strategies. But, we still believe that our robust estimation strategies provide meaningful direction in terms of causality and add to the literature in a meaningful way. The paper is organized as follows. Section 2 describes the data and its sources. Section 3 describes the empirical methodology, and Sect. 4 presents the benchmark results. In Sect. 5, we present our robustness findings, and we summarize in Sect. 6.

2 Data description

Our main dependent variable of interest is Information Transparency. The variable is considered from Williams' Database of Transparency (2015). The literature lacked a comprehensive measure of transparency before this dataset. As mentioned by Coronel (2012), a measure of transparency that encompasses all different dimensions and spans over an extensive set of countries and time does not exist. Existing indices have covered specific aspects of transparency whether it be free speech (see, for example, Press Freedom data, Freedom House) or democratic transparency (polity2 from Polity IV project) or freedom of Information Laws (Islam 2006). Williams' (2015) measure of transparency is a comprehensive measure of transparency capturing a wide range of dimensions like the extent of media freedom, the extent of information released by the government, degree, and quality of political constraints or checks and balances and extent of fiscal transparency.

Information transparency captures the extent to which government makes the release of all kinds of information possible. Greater information transparency, as put forward by Williams (2015), should reduce information asymmetries and makes more information available. The information transparency constructed by Williams encompasses several indices that measure different dimensions of information transparency. This ranges from the release of financial, social or economic information, the extent of information flows via internet usage, television usage or trade in newspapers, availability and release of important financial information related to the balance of payments or functioning of the central bank or banking regulation. The index also takes into account a country's telecommunication infrastructure.

The other measure of transparency available in Williams' database is *Accountability Transparency.* This measure of transparency considers the extents of checks

on the behavior of the government and, thus, promoting accountability in the process. The three main sub-components considered in the construction of the index are the existence of a free and independent media, the extent of fiscal or budgetary transparency and degree of political constraints. Accordingly, it incorporates several available databases that capture all these sub-components. Overall, the Information transparency has 13 separate indicators measuring all the separate sub-components while accountability transparency has 16 separate indicators. After re-scaling and standardizing all the separate indices, the information or accountability transparency indices have been constructed by taking averages. Williams applies a similar methodology to that of the Corruption Perceptions Index (CPI) to construct the standard errors. Finally, based on these two indices, he created the overall Transparency index. We start with Information Transparency and subsequently use both the overall Transparency index as well Accountability Transparency as part of our empirical analysis. In "Appendix", we present the subcomponents of information and accountability transparency.

Based on our hypothesis, our main independent variable of interest is financial development. Our benchmark measure of financial development is 'Private Credit to Deposit Money Banks as a percentage of Gross Domestic Product (GDP)' taken from the Global Financial Development Database (GFDD), World Bank 2016 online database. The variable is a measure of the depth of the financial system and captures financial resources provided to the private sector by domestic money banks as a share of GDP. According to the database, commercial banks as well as other financial institutions that accept transferable deposits, such as demand deposits, are categorized as domestic money banks.

Additional measures of financial development are considered part of robustness analyses. The other measure similar to private credit that is considered is private credit by deposit money banks and other financial institutions as a percentage of GDP. Whereas private credit captures claim on the private sector by deposit money banks, the latter includes deposit money banks as well as other financial institutions (Beck et al. 2009). Both these measures capture the activity of financial intermediaries and also they capture credit issued by intermediaries other than a central bank. Additionally, we consider liquid liabilities as a percentage of GDP. Liquid liabilities is also a measure of the depth of the financial system. As another measure of the depth or size, we consider bank deposits as a percentage of GDP. Based on the definition of Global Financial Database, this consist of 'total value of demand, time and saving deposits at domestic deposit money banks as a share of GDP' (Global Financial Development, World Bank 2016).

While all these measures capture the size or depth of financial institutions, as a measure of the depth of the financial market, we consider stock market capitalization over GDP as our final measure. This captures the total value of listed shares in a stock market as a percentage of GDP and, as expected, is an indicator of the size of the stock market. Thus, through our measures, we capture the depth or size of both financial markets and institutions. The size or depth of financial institutions and markets are most appropriate for our analysis. Further, these measures are most popular in the existing literature (Fischer and Valenzuela 2013; Andreasen and Valenzuela 2016). Measures of financial access can also be

suitable for our empirical analysis, but due to data availability issues, we are unable to use such measures. Those measures are only available for more recent periods. The construction of the 5-year interval panel along with the lag structure of the explanatory variable can only be meaningful if we have a continuous time series of more than 20 years which is not available for the financial access measures.

Since this a very new database, to our knowledge, we are the first to explore what affects the transparency of nations. Thus, we do not have any extant literature that can guide us in our selection of controls. We select controls that have been shown to affect overall development outcomes of nations, transparency being one such development outcome. We control for democracy in our specifications. For instance, democracy has been found to be an important determinant of press freedom (Dutta and Roy 2009; Djankov et al. 2003; Egorov et al. 2007). Polity2 from Polity IV is used as a proxy of democracy. The variable ranges from 0 to 10 with higher values representing more democratic institutions.

Further, we also control for durability of a political system. The durability of regimes, especially, democratic regimes, has been shown to be important for development outcomes. Montinola and Jackman (2002) show that corruption is actually lower in authoritarian regime than in nascent democracies, although once democratization reaches a certain threshold, this relationship changes and democratic regimes fare better. Similar to their study, Sung (2004) stresses on the non-linear association between democracy and corruption. His study shows that starting from an authoritarian regime, democratization initially results in greater corruption before it eventually leads to a decline in corruption. Similar findings have been established by Mohtadi and Roe (2003) and Rock (2009). 'Durability' is also considered from Polity IV. Based on the definition provided by Polity IV, regime durability is "the number of years since the most recent regime change (defined by a three-point change in the POLITY score over a period of three years or less) or the end of transition period defined by the lack of stable political institutions (denoted by a standardized authority score)". The variable is constructed by coding the year when a new government (post-change) is established, as zero and then adding 1 for each subsequent year until a new regime change or transition period occurs. A democratic nation with durable political institutions should lead to greater transparency.

We also control for GDP per capita growth. Studies like Bartik (1994) has shown that economic growth leads to lower income inequality. But other studies (see, Partridge et al. 1996; Cutler and Katz 1991; Blank and Card 1991) have less faith in the ability of economic growth to reduce income inequality. Other studies have shown that the sectoral pattern of growth might affect poverty reduction (Raddatz 2006; Satchi and Temple 2006). Instead of GDP per capita growth, we could have used GDP per capita. Yet, since GDP per capita level varies primarily between countries, the effect can be taken out for our fixed effect estimates or System GMM estimates that takes into account fixed country effects. GDP per capita growth more considers within-country variation and, thus, we control for GDP per capita growth.

As a proxy for communication infrastructure, we consider mobile users per 100 people. Studies have shown that greater access or reach of media enhances governance outcomes like lower corruption (Dutta and Roy 2016; Bailard 2009).

While for many developing countries, mobile phones only became popular in the early nineties, this is our best possible measure for communication infrastructure based on data availability. We have sufficient data points over our sample period of 1975–2005 for explanatory variables. We have around 4.6 observations per country. Further, the construction of the 5-year interval panel along with the lag structure of the explanatory variable can only be meaningful if we have a continuous time series of more than 20 years which is not possible for other measures of communication infrastructure due to data constraints. Finally, we also control for natural resource rents as a percentage of GDP. Studies like Svensson (2000), Lane and Tornell (1995, 1996) have pointed out that windfalls like natural resource rent can lead to higher rent seeking in the presence of competing social groups. Higher rent seeking implies less accountability and, thus, transparency should be affected.

Thus, our benchmark controls consist of GDP per capita growth, mobile users per 100 people, polity2, durability and natural resource rents as a percentage of GDP. As part of robustness analysis, we test our benchmark findings to the inclusion of other controls. We talk about this in detail in our robustness section.

3 Empirical methodology

Our empirical analysis is aimed at explaining the simple question—does financial development improve information transparency? The empirical specification we estimate is given below

$$\text{Trans}_{it} = \beta_0 + \beta_1 \text{Trans}_{it-1} + \beta_2 \text{FD}_{it} + \sum_{j=1}^{J} \alpha_j X_{jit} + \beta_2 \gamma_i + \beta_3 \theta_t + \varepsilon_{it}. \qquad (1)$$

where Trans_{it} is the measure of transparency for country i in time t. As a starting point of our empirical analysis, we consider information transparency and subsequently use the overall transparency index and accountability transparency. Trans_{it-1} is transparency lagged by one period. The financial development measure is captured in the term FD_{it}. X_{jit} represents our matrix of control variables. γ_i represents the country fixed effect and θ_t denotes time fixed effect.

Our overall goal is to gain an understanding of financial development's impact, if any, on transparency. One of the major challenges we face in this context is identification with respect to financial development. While financial development can improve information transparency, better levels of information transparency can also lead to a stronger financial sector. As more information becomes available, greater mobilization of savings into investment can be made possible with related stakeholders being able to make use of the efficient information. Additionally, better checks and balances and, thus, higher accountability transparency has been shown to improve financial development in existing studies. Thus, financial development, in all likelihood, is endogenous. Further, GDP per capita can potentially be endogenous as well since higher transparency in the form of greater information availability or better checks and balances can improve development outcomes and, thus, boost GDP per capita.

We handle endogeneity concerns by three methods. The first method is based on the construction of the panel. We construct a panel of around 158 countries over a period of 30 years considering a data point every 5 years. This is done following Acemoglu, Naidu, Restrepo and Robinson (2014). According to the authors, interval panels are better than panels based on averages since the latter creates a complex pattern of serial correlation and, thus, generating consistent estimators becomes more challenging. The dependent variable runs from 1980 to 2010 while all independent variables run from 1975 to 2005. The entire panel is in the form of a 5-year interval panel and all independent variables lag the dependent variable by 5 years. We start our analysis with fixed effect specifications. We lag all independent variables by one period (implying lagged by 5 years). Thus, since by the construction of the panel, independent variables are lagged by 5 years, lagging them further by one period implies independent variables are lagged by 10 years. While lagged independent variables do not completely eliminate endogeneity issues, we believe such an extensive lag mitigates the problem to a great extent.

The second method by which we handle is by employing System GMM estimators. Instrumental Variable (IV) estimators are, yet, another method by which endogeneity can be handled. Persson and Tabellini (2006) have stressed in this context that it is extremely challenging to find efficient, time varying instruments that are strictly exogenous for multiple endogenous variables in panels with fixed effects. Additionally, as stressed by Clemens et al. (2012), IV estimators may not be an improvement over OLS estimators since the instruments could be weak. Murray (2006) and Baum (2008) have pointed out that the finite-sample properties of IV estimators can be problematic.

System GMM estimators as part of Dynamic Panel Estimators allow us to address the endogeneity issues by not having to find strictly exogenous instruments and, thus, have become popular for recent empirical panel studies (see for instance, Dutta and Sobel 2016; Asiedu and Lien 2011; Asiedu et al. 2009, to mention a few). A linear dynamic panel data (DPD) model estimated to capture the effect of lagged dependent variable on a current dependent variable is prone to generate inconsistent standard errors due to the correlation of the unobserved panel-effects with the lagged dependent variable. The GMM estimator, Difference GMM, proposed by Arellano and Bond (1991) improves on this by using lagged values of the endogenous variables as instruments after considering first differences of the data. In the process, they generate consistent estimates. The estimator is specified as a system of equations with an equation in each time period and the instrument applicable to each equation differ. Additional orthogonality conditions become available for later time periods and these additional conditions improve the efficiency of the Arellano-Bond estimator.

Arellano and Bover (1995) pointed out a potential weakness in the Difference GMM estimator in the context of weak instruments. The lagged levels are often rather poor instruments for first differenced variables, especially if the variables are close to a random walk. The System GMM estimator proposed by Blundell and Bond (1998) solves the problem of poor or weak instruments by using moment conditions based on the level equations together with the usual Arellano and Bond type orthogonality conditions (Han and Phillips 2010). Thus, Blundell–Bond

instruments levels with differences. As Roodman (2009a) points out, 'for random walk–like variables, past changes may indeed be more predictive of current levels than past levels are of current changes so that the new instruments are more relevant'. The use of the extra moment conditions that 'rely on certain stationarity conditions of the initial observation' result in reduced and greater precision over Difference GMM estimates. Thus, we use System GMM estimator as our benchmark estimator. Both Difference GMM and System GMM are best suited to handle large 'N' (number of countries), small 'T' (number of time periods) panels with country fixed effects and subjected to the presence of autocorrelation and heteroskedasticity within countries in the panel.

We treat financial development as well as GDP per capita to be endogenous to all our specifications. System GMM estimates are valid only when there is no second order correlation in the idiosyncratic errors. We report the p values showing the absence of such correlation. Further, we report the p values for the overidentification restrictions satisfying the validity of the instruments. Additionally, these tests lose power when the number of instruments is large relative to the number of countries. As suggested by Stata (2009) and Roodman (2009b), if the ratio, r = n/i, n being the number of countries and i being the number of instruments, is less than one, then estimates are susceptible to a Type 1 error and autocorrelation and over-identification tests are likely to be not valid. Thus, we report the 'r's for all the specifications as well. Time dummies are included in all specifications so that correlation of idiosyncratic disturbances across countries is minimized making the assumption of no correlation valid (Roodman 2009b). A two-step GMM estimator is employed that generate asymptotically efficient estimates.

One quick thing to mention here is that there is some potential concern with regard to our instruments being weak since polity2 is relatively sticky for developed countries. But the 5-year interval panel makes polity2 relatively more fluctuating over time since a data point is considered every 5 years and thus, there is more potential for the variable to change. Also for our sample of countries, we have more developing countries compared to developed countries for which polity fluctuate over the 5-year interval. Thus, even though there might be some potential for the weak instruments problem due to polity being sticky for some countries, overall we think it is not something serious enough to bias our results since, for a greater part of the sample, the variable does change over time.

Finally, as part of robustness analysis, we resort to our last method. To mitigate endogeneity concerns arising out of possible co-determination between general economic development (income level) and financial development, we re-run our fixed effect specifications with different lag structures as part of robustness analysis. We re-run our fixed effect specifications by lagging all explanatory variables by one period (5 years) except financial development. As stated before, due to the construction of our panel, all explanatory variables are lagged by one period (5 years) and, thus, lagging them by yet another period essentially implies all variables are being lagged by two periods or 10 years. As another robustness check, financial development measures are lagged by one period (5 years) but all other variables are now lagged by two periods (10 years).

4 Results

4.1 Baseline results

Table 1 presents the summary statistics. We can see that information transparency ranges from 17 to 86 in our sample while accountability transparency ranges from 21 to 83. Finally, overall transparency score ranges from 17 to 83 for our sample of countries. The mean for private credit is approximately 32 which is lower than the mean of the other measures of financial development. Liquid liability and stock market measures have the highest mean, approximately 42, among all the measures.

In Table 2, we report the correlation statistics among our main variables of interest. As evident from the table, all the different measures of financial development are correlated positively with information transparency, accountability transparency, and overall transparency index. The correlation is significant at the 5% level of significance. In terms of the measures of financial development, we find that while the two measures of private credit, as expected, are highly correlated to the extent of more than 0.90%, the correlation magnitude for the other measures like liquid liabilities, deposits, and stock market are correlated with private credit is around 0.75–0.77%. Thus, other than the two measures of private credit, the other measures are not hugely overlapping and measure different aspects of depth of the financial institutions and markets. Other than financial development, GDP per capita, Mobile users, Polity, and Durability are positively correlated with all measures of transparency as well. Natural resource rent, as expected, is correlated negatively with all transparency measures.

Table 3 presents our baseline results or results that form the starting point of our empirical analysis. Unobserved heterogeneity is dealt with, in the context of panel data, by demeaning the data or first differencing it. DPD incorporates lagged dependent variables allowing for a partial adjustment mechanism. In our context,

Table 1 Summary statistics

Variable	Obs	Mean	SD	Min	Max
Inf. Trans.	1020	50.4	16.8	7.0	86.0
Acct. Trans.	986	45.4	21.3	5.0	83.0
Trans. Index	984	48.5	17.0	8.0	83.0
Prvt. Credit	883	32.2	30.6	0.0	192.7
Prvt. Credit (fin. Inst.)	884	34.8	33.2	0.0	192.7
Stock mkt. cap.	386	42.5	61.9	0.1	857.3
Liq. Liab.	876	42.6	35.7	0.0	328.9
Bank dep.	871	34.5	35.0	0.0	372.5
GDP per cap grw.	913	1.92	5.92	−50.2	53.9
Polity2	1011	0.8	7.5	−10.0	10.0
Durable	1024	22.6	28.6	0.0	196.0
Mobile users	1009	9.2	22.5	0.0	132.5
Natural resource	910	11.2	15.4	0.0	85.8

Table 2 Correlation matrix

	Inf. Trans.	Acct. Trans.	Trans. Index	Prvt. Credit	Prvt. Cred. (fin. Inst.)	Stock mkt. cap.	Liq. Liab.	Bank dep.	GDP per cap.	Polity2	Durable	Mobile users	Natural resource
Inf. Trans.	1												
Acct. Trans.	0.71*	1											
Trans. Index	0.92*	0.92*	1										
Prvt. Credit	0.56*	0.44*	0.55*	1									
Prvt. Cred. (fin. Inst.)	0.58*	0.44*	0.56*	0.95*	1								
Stock mkt. cap.	0.23*	0.10*	0.17*	0.35*	0.40*	1							
Liq. Liab.	0.40*	0.32*	0.40*	0.77*	0.75*	0.30*	1						
Bank dep.	0.45*	0.39*	0.46*	0.77*	0.75*	0.31*	0.97*	1					
GDP per cap grw.	0.13*	0.01*	0.09*	0.07*	0.05*	0.05*	0.06	0.05*	1				
Polity2	0.68*	0.78*	0.79*	0.41*	0.41*	0.0866	0.30*	0.36*	0.35*	1			
Durable	0.30*	0.26*	0.30*	0.44*	0.53*	0.27*	0.31*	0.32*	0.52*	0.20*	1		
Mobile users	0.50*	0.25*	0.39*	0.43*	0.43*	0.28*	0.33*	0.35*	0.47*	0.30*	0.24*	1	
Natural resource	−0.28*	−0.41*	−0.39*	−0.29*	−0.27*	−0.04	−0.22*	−0.23*	−0.028	−0.40*	−0.07*	−0.06	1

* Significance at the 5% level

Table 3 Fixed effect—information transparency and financial development

	(1)	(2)	(3)	(4)	(5)
Private credit$_{t-5}$	0.0582***	0.0640***	0.0612***	0.0407**	0.0473**
	(0.0178)	(0.0186)	(0.0183)	(0.0193)	(0.0204)
GDP per cap growth$_{t-5}$		0.00703	0.0173	−0.0108	−0.0307
		(0.0501)	(0.0483)	(0.0487)	(0.0516)
Polity$_{t-5}$			0.524***	0.501***	0.503***
			(0.0664)	(0.0674)	(0.0694)
Durable$_{t-5}$			0.0514*	0.0240	0.0165
			(0.0300)	(0.0317)	(0.0326)
Mobile users$_{t-5}$				0.0706***	0.0641***
				(0.0229)	(0.0243)
Natural resource rent$_{t-5}$					0.0239
					(0.0498)
Constant	55.79***	55.76***	53.48***	54.37***	54.21***
	(0.716)	(0.871)	(0.952)	(0.990)	(1.156)
Observations	732	689	685	673	648
R^2	0.52	0.521	0.574	0.581	0.574
Number of countries	154	149	147	147	146

Fixed Effect Specifications are considered. The dependent variable is Information Transparency. Private credit to deposit money banks as a percentage of GDP is the measure of financial development. Dependent variable runs from 1980 to 2010 with a 5-year interval. All independent variables run from 1975 to 2005 with a 5-year interval. Further, we consider a one period lag (lagged by 5 years since we consider a 5-year interval data) for all the independent variables. Period dummies are included in all specifications. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1, 5, and 10%, respectively

the lagged dependent variable captures the persistence of the dependent variable arising due to country heterogeneity. DPD models suffer from Nickell bias as pointed out by Nickell (1981). Such bias arises in panels with large N and small T because of the demeaning process. The correlation arising out of such demeaning process creates a bias in the estimate of the coefficient of the lagged dependent variable (Baum and Schaffer 2013). Thus, for our fixed effect estimates, we do not control for a lagged dependent variable. We do control for lagged independent variable in the context of System GMM estimators as they general consistent estimators by getting rid of Nickell bias (see, Baum and Schaffer 2013).

As mentioned before, all independent variables are lagged by one period or 5 years which essentially implies they are lagged by 10 years due to the construction of the panel. While this does not completely take care of endogeneity arising out of reverse causality, it does mitigate the situation to a great extent. Our dependent variable is information transparency and the benchmark measure for financial development is 'private credit to deposit money banks as a percentage of GDP'. Factors like legal origin or social capital can affect the extent of information transparency of a country or for that matter any development outcome (see, for example, Dutta and Roy 2016; Bhattacharyya and Hodler 2014). We include private

credit only in column (1) and then add controls in subsequent columns. The coefficient of private credit is positive and significant for all the specifications. In terms of economic significance, a standard deviation rise in private credit will raise information transparency score by about 1.9% points. Since information transparency varies between 7 and 86 for our sample, this implies a 2.5 percent rise in transparency score. 'Polity' or greater democracy, as expected, has a boosting impact on information transparency. Greater communication infrastructure in the form of higher mobile users improves information transparency as well. GDP per capita growth is not significant for any of the specifications.

4.2 Benchmark results

We present our benchmark results, the System GMM estimates, in Table 4. Private credit is still considered as the measure of financial development and information transparency is the dependent variable. As stated earlier, private credit and GDP per capita, are treated endogenously in all specifications. From the results, we find that private credit is positive and significant for all the specifications. The magnitude of the impact is comparable to the fixed effect estimates. Greater financial development leads to a more competitive environment and enables greater monitoring on managers and all other stakeholders. Acting under greater constraints, it is in the best interest of the managers to release the needed financial information and be transparency about the whole process. Further, the financial development also minimizes the cost of acquiring information. Thus, all of these imply greater information transparency.

In terms of controls, GDP per capita growth is positive but not significant in any of the specifications. The coefficient of 'Polity' is positive and significant. Thus, as a country gets richer and has more democratic constraints, it benefits by a gain in information transparency score. The same is true for mobile users. With higher mobile users, a country's information transparency score is booted. Durability and natural resource rent are not significant for any of the specifications. We report the p values, as mentioned before, for both Sargan test and second order autocorrelation test. The insignificance of both sets of p values shows that overidentification restrictions are met and that there is no second order autocorrelation. $r = n/i$ is also greater than one for all the specifications suggesting that our estimates are not susceptible to Type I error.

5 Robustness analysis

As part of our robustness analysis, we first test our results to alternative measures of financial development. The results are presented in Table 5. The alternate measures considered are liquid liabilities as a percentage of GDP, private credit to deposit money banks and other financial institutions as a percentage of GDP, bank credits as a percentage of GDP and stock market capitalization as a percentage of GDP. We consider information transparency as the dependent variable and the same set of controls as before. The coefficients of all the different measure of financial

Table 4 System GMM—information transparency and financial development

	(1)	(2)	(3)	(4)	(5)
Inf. Trans$_{t-5}$	0.657***	0.643***	0.593***	0.562***	0.588***
	(0.0335)	(0.0287)	(0.0299)	(0.0344)	(0.0316)
Private credit	0.0761***	0.0721***	0.0701***	0.0757***	0.0587***
	(0.0106)	(0.0102)	(0.0125)	(0.0123)	(0.0122)
GDP per cap.		0.0834	0.103	0.0732	0.0113
		(0.0701)	(0.0759)	(0.0753)	(0.0805)
Polity			0.177***	0.176***	0.204***
			(0.0592)	(0.0596)	(0.0608)
Durable			0.00719	−0.00177	0.00657
			(0.0150)	(0.0152)	(0.0138)
Mobile users				0.0149*	0.0146*
				(0.00871)	(0.00828)
Natural resource rent					−0.0251
					(0.0284)
Constant	18.45***	19.16***	21.31***	22.80***	22.11***
	(1.722)	(1.390)	(1.417)	(1.640)	(1.555)
Observations	755	733	722	719	696
Number of countries	154	153	152	152	150
Number of Instruments	45	65	67	68	69
r = n/i	3.4	2.35	2.26	2.23	2.17
Sargan test (*p* val.)	0.15	0.18	0.19	0.13	0.15
Second order Autocorr. (*p* val.)	0.40	0.39	0.82	0.77	0.98

System GMM Specifications are considered. The dependent variable is Information Transparency. Private credit to deposit money banks as a percentage of GDP is the measure of financial development. Dependent variable runs from 1980 to 2010 with a 5-year interval. All independent variables run from 1975 to 2005 with a 5-year interval. Period dummies are included in all specifications. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1, 5, and 10%, respectively

development are positive and significant for all the alternate specifications. Thus, our results support our hypothesis. Higher levels of financial development enhance information transparency. In terms of economic impact, bank deposits over GDP have the strongest impact on information transparency. A standard deviation rise in bank deposits raises information transparency by almost 2.1% points which translate to almost a 3 percent change. In the case of stock market measure, the magnitude is 1.2% points that translate to a 1.5% change. GDP per capita growth is positive and significant in specifications in column (1) and (4). 'Polity' continues to have a positive and significant impact on information transparency for all the specifications. The coefficient of natural resource rent is, as expected, negative but only significant in specifications in column (1) and (4).

Our next set of robustness analysis consists of checking the results with accountability transparency and the overall transparency index. These results are presented in Table 6. Overall results are stronger for the overall transparency index.

Table 5 System GMM—information transparency and financial development

	(1)	(2)	(3)	(4)
Inf. Trans.$_{t-5}$	0.569***	0.478***	0.628***	0.557***
	(0.0293)	(0.0208)	(0.0284)	(0.0341)
Liquid liabilities	0.0421***			
	(0.0106)			
GDP per cap.	0.236***	0.0547	0.0295	0.250***
	(0.0680)	(0.0486)	(0.0806)	(0.0736)
Polity	0.200***	0.473***	0.198***	0.180***
	(0.0529)	(0.0373)	(0.0614)	(0.0546)
Durable	0.0109	0.0339***	0.0127	0.000649
	(0.0183)	(0.00803)	(0.0122)	(0.0194)
Mobile users	0.0228**	0.000413	0.00870	0.0247***
	(0.00965)	(0.00699)	(0.00842)	(0.00904)
Natural resource rent	−0.0790***	0.0514	−0.0213	−0.0607**
	(0.0302)	(0.0315)	(0.0265)	(0.0306)
Stock market cap.		0.0236***		
		(0.00260)		
Pvt. Crt (+ fin. Inst)			0.0477***	
			(0.0106)	
Bank deposit				0.0562***
				(0.0108)
Constant	22.99***	30.65***	19.95***	23.30***
	(1.476)	(1.148)	(1.399)	(1.706)
Observations	692	346	697	685
Number of countries	148	103	150	148
Number of Instruments	69	69	69	69
r = n/i	2.13	1.49	2.17	2.14
Sargan test (p val.)	0.10	0.34	0.13	0.15
Second order Autocorr. (p val.)	0.45	0.32	0.95	0.50

System GMM Specifications are considered. The dependent variable is Information Transparency. Private credit to deposit money banks as a percentage of GDP is the measure of financial development. Dependent variable runs from 1980 to 2010 with a 5-year interval. All independent variables run from 1975 to 2005 with a 5-year interval. Period dummies are included in all specifications. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1, 5, and 10%, respectively

The first five columns present the results with the overall index as a dependent variable while the last two columns present the results with accountability transparency as a dependent variable. In the case of the overall index, results hold for our benchmark measure of financial development, private credit, as well as all the other robustness measures. In the case of private credit (refer to column 1 specification), a standard deviation rise in private credit raises overall transparency score by 1.5% points. The transparency index varies from 17 to 83. Thus, this implies a 2.2 percent rise in transparency score. In the case of bank deposits as the

Table 6 System GMM—overall transparency index, accountability transparency and financial development

	Overall transparency					Accountability transparency	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overall Trans$_{t-5}$	0.658***	0.572***	0.401***	0.666***	0.563***		
	(0.0658)	(0.0594)	(0.0466)	(0.0659)	(0.0625)		
Private credit	0.0326**						
	(0.0153)						
GDP per capita growth	−0.120	−0.0779	−0.136***	−0.114	−0.0794	−0.442***	−0.258*
	(0.0959)	(0.0731)	(0.0317)	(0.0981)	(0.0757)	(0.0616)	(0.136)
Polity	−0.167	−0.134	0.241***	−0.189*	−0.0884	0.134	−0.329**
	(0.102)	(0.0980)	(0.0809)	(0.100)	(0.0997)	(0.0886)	(0.158)
Durable	0.0393**	0.0333*	0.106***	0.0365*	0.0272	0.145***	−0.0387
	(0.0195)	(0.0187)	(0.00550)	(0.0191)	(0.0210)	(0.00845)	(0.0339)
Mobile users	−0.00916	−0.00890	−0.00230	−0.0141*	−0.0102	−0.0296***	−0.00992
	(0.00741)	(0.00831)	(0.00446)	(0.00789)	(0.00741)	(0.00469)	(0.0120)
Natural resource rent	−0.154***	−0.168***	−0.250***	−0.146***	−0.149***	−0.358***	−0.177***
	(0.0429)	(0.0394)	(0.0211)	(0.0426)	(0.0387)	(0.0391)	(0.0628)
Liquid liabilities		−0.03**					
		(0.01)					
Stock market cap.			0.00483			0.0109*	
			(0.00308)			(0.00484)	
Pvt. Crt (+ fin. Inst)				0.0310*			
				(0.0159)			
Bank deposits					0.0530***		0.0694***
					(0.0162)		(0.0260)
AccoutabilityTrans.$_{t-5}$						0.323***	0.404***
						(0.0279)	(0.0665)

Table 6 continued

	Overall transparency					Accountability transparency	
Constant	19.44***	23.74***	33.84***	19.10***	23.62***	37.13***	31.65***
	(2.960)	(2.641)	(2.410)	(2.938)	(2.752)	(1.554)	(3.065)
Observations	682	678	346	683	671	347	671
Number of countries	149	147	103	149	147	104	147

System GMM Specifications are considered. The dependent variable for columns (1) to (5) is *Overall Transparency Score* while that for columns (6) and (7) is *Accountability Transparency*. Private credit to deposit money banks as a percentage of GDP is the measure of financial development. Dependent variable runs from 1980 to 2010 with a 5-year interval. All independent variables run from 1975 to 2005 with a 5-year interval. Period dummies are included in all specifications. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1, 5, and 10%, respectively

measure for financial development, a rise in its standard deviation raises overall transparency score by 2.4% points which translate to a 3.7% rise. In the case of accountability transparency, the coefficients of stock market capitalization and bank deposits are the only ones that are significant.

Though the construction of our panel takes care of endogeneity and the System GMM estimates further adds to the robustness of our findings, we further run our specifications by considering different lag structures to rule out any possible endogeneity arising out of co-determination of financial development and GDP per capita growth measures. Other than GDP per capita growth, political institution measures—'Polity' and 'Durability'- might also be co-determined with financial development. We re-run our fixed effect specifications by lagging all explanatory variables by one period (5 years) except financial development. As stated before, due to the construction of our panel, all explanatory variables are lagged by one period (5 years) and, thus, lagging them by yet another period essentially implies all variables are being lagged by two periods or 10 years. For our newer set of results, financial development measures are lagged by one period (5 years) but all other variables are now lagged by two periods (10 years). Keeping space constraint in mind, we do not report the findings but they are available on request. Our conclusions remain unaffected. We re-run the fixed effect specification with the alternate lag structure for all the different measures of financial development and the sign and significance of all the different measures are retained.

As another robustness test to mitigate endogeneity arising out of potential co-determination of financial development with other explanatory variables, we lag everything by two periods except financial development measures. So now, based on the construction of the panel, all variables are lagged by three periods (or, 15 years) while financial development measures are lagged by one period. Overall, our findings are similar to our benchmark results. Robustness of our finding is retained. Finally, as another robustness check, we re-run our benchmark System GMM specifications by lagging financial development measure by one period. Thus, lagged financial development is now instrumented. The results remain robust. Financial development still has a positive and significant impact on information transparency as well as the overall transparency score.

Finally, we check our results with the inclusion of additional controls. We do this to further mitigate omitted variable bias and thus, mitigate, endogeneity concern to some extent arising out of omitted variable bias. These controls include trade openness, foreign direct inflow (FDI) as a percentage of GDP, urban population as a percentage of total population and secondary enrolment (both male and female enrolment). The data is considered from World Development Indicator online database (2016). Greater trade openness implies a more competitive situation and, thus, the reward from rent-seeking goes down. In this context, Ades and Di Tella (1999) have suggested that in the case of low competition, the margins from rents are high and thus lower trade openness is associated with higher corruption. Along the same line of thought, greater trade openness should lead to greater transparency. The argument is similar in the case of FDI that also makes a country more competitive. Further, studies have shown that greater FDI inflows lead to better development outcomes like enhancing the productivity of domestic firms (Haskel

et al. 2007), leading greater human capital accumulation (Borensztein et al. 1998) and generating efficient local financial markets (Alfaro et al. 2004, 2006). A greater urban populace or more educational attainment in the form of higher secondary enrolment makes a society more cognizant about the need for a transparent society and, thus, the government and associated stakeholders might face the pressure to improve upon the transparency situations (Lowatcharin and Menifield 2015). Our results remain unaffected to the inclusion of additional controls. The coefficient of financial development remains positive and significant for all the specifications. In terms of the controls, the coefficients of male or female secondary enrollment or FDI/GDP are not significant. Both Trade/GDP and Urban population as a percentage of GDP have a positive impact on transparency.

6 Conclusion

In the present paper, we find that nations become more transparent with a well-structured financial market. Our empirical estimates based on several alternative estimation strategies point to the robust conclusion of a higher financial development being able to boost information transparency as well as overall transparency. The findings are timely and particularly important for the developing regions. "Lack of transparency" is the phrase frequently used by researchers who study developing economies. The way the governments of these economies and their central bank function contribute to their woes on several occasions by failing to fully disclose information about financial and economic conditions while also being less than clear about the laws and regulations that govern their markets. For example, governments might be viewed as providing incorrect information about its debt levels, fiscal policies, and regulatory requirements while central Banks may be seen as stingy with financial disclosures. Our results indicate the need by the policymakers to ensure that strong financial intermediaries do exist which in turn should help with improved transparency, a much needed mediating factor needed to attain and to sustain in the path of economic growth. However, the bell-curve shape of the relationship also demonstrates the necessity of institutions, regulatory and supervisory quality.

Appendix: Components of transparency

Components of information transparency

ifs	Release of financial information index
wdi	Release of Economic and Social Information Index
bop	Release of Balance of Payments Information Index
cbt_eft	Central Bank Transparency—Economic Transparency

ifs	Release of financial information index
ipd_info	Institutional Profiles database—Quantity
sci_period	Statistical Capacity Indicator—*Periodicity and timeliness*
bdi	Banking Disclosure index
ipd_process	Institutional Profiles database—Process
sci_meth_source	Statistical Capacity Indicator—*Source data and Statistical Methodology*
cbt_proced	Central Bank Transparency—*Procedural Transparency*
kof	KOF Index of Globalization
radios	Radios (per 1000 population)
e_gov	E-government (UN)—web measure, infrastructure, participation

Components of accountability transparency

fhp	Freedom of the press
ciri	CIRI human rights dataset
ipd_media	Institutional Profiles Database (Media)
rsf	Reporters Sans Frontieres
msi	Media Sustainability Index
gir_media	Global Integrity Report (Media)
rfi	Release of Fiscal Information
ipd_fiscal	Institutional Profiles Database (Fiscal)
obi	Open Budget Index
irai_qbm	IDA Resource Allocation Index (Quality of Budgetary and Financial Management)
xconst	Executive Constraints
wcy	World Competitiveness Yearbook
cbt_pol	Central Bank Transparency (Political)
irai_tac	IDA Resource Allocation Index (Transparency, Accountability and Corruption in the Public Sector)
gir_govt	Global Integrity Report (Political Constraints)
gci	Global Competitiveness Index (Information on government policies)

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