

Financial development and public debt. Estimating the role of institutional quality

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Abstract. *Maintaining a sustainable debt level has emerged as a critical issue, particularly when public debt exceeds a certain threshold level. This paper examines the impact of public debt on financial development as mediated by institutional quality. For this purpose, we use FE (LSDV) and system GMM estimators. Our empirical findings demonstrate that public debt has negative impact on financial development, but this negative impact turns positive when it interacts with institutional quality. This implies that public debt is a function of institutional quality, and policymakers must maintain the threshold level of institutional quality in order to make better use of the debt.*

Keywords: financial development, public debt, institutional quality, FE (LSDV), system GMM.

JEL Classification: E44, H63, O43, C23, C32.

1. Introduction

Since at least Adam Smith, if not before, the creation and increase of governmental debt has been a major topic in political economics. Since Domar (1944), the academic study of public debt has concentrated on concepts such as the stock of outstanding public debt's sustainability and optimality, as well as the corresponding sustainable or optimal path of the public sector budget balance. Following the current financial crisis, public debt has been a hot subject among policymakers, media, and academic researchers. A huge number of fiscal packages have ignited and raised interest in fiscal policy problems especially after the recent financial crisis of 2008. The current debt crisis affects not just a number of industrialized and developing countries, including the Eurozone (Ismihan and Ozkan, 2012), but also, low-income nations are harmed badly because of this financial crisis (Bua et al., 2014). Now, countries are more aware of the long-term repercussions of fiscal policy decisions. According to a large body of research, budget deficits and the consequences of public debt are critical components of fiscal policy, particularly during substantial fiscal expansions. Although government spending is an important component of economic growth, a large amount of debt results in a budget deficit, and governments frequently borrow from domestic and foreign sources to lower the size of the deficit (Adam and Bevan, 2005, Loganathan et al., 2010). As a result, whenever borrowing remains only option for financing, the budget deficit is always associated with a significant financial burden.

The financial system is critical for effectively and efficiently allocating financial resources in order to effectively transform a country into a higher-income and higher-value-added country (Kablan, 2010). Financial development becomes more essential than ever in supporting the realization of economic change in a highly challenging environment. However, as the government increasingly obtains funding from domestic banks to support its budget, the space available to finance private investments has been constrained by the growing demand for public-sector credit. This will cause interest rates to rise for private-sector borrowers seeking bank loans (Mun and Ismail, 2015) or the prospect of a tax hike to cover the repayments (Bahal et al., 2018). Both of these factors have a detrimental impact on financial development by raising investment costs and so crowding out private sector investments, affecting financial stability.

This study investigates how public debt impacts financial development. Most people conceive of public debt in terms of the role it can play in expanding financial sectors by offering a relatively safe asset; this is what we refer to as the "safe asset" viewpoint (Hauner, 2009). However, heuristic prudential rules, such as the 60 percent debt/GDP ratio instead by Maastricht Treaty's, attempt to advice policymakers in keeping debt level within a sustainable range (Besancenot et al., 2004). By definition, the public debt that remains below than present value of projected primary surpluses is considered to be the sustainable public debt. From the theoretical point of view, there should not any difficulties for public borrower to finance such debt (Bartolini and Cottarelli, 1994, Hamilton and Flavin, 1985). Although prior research demonstrates that a debt/GDP ratio of 60% is acceptable, several economies, such as Japan, Italy, and Spain, have debt-to-GDP ratios that are higher than 100%. In order to limit debt growth in high indebted economies, sound policies and budget limits are necessary. However, history has shown that ostensibly good fiscal measures may

not always sufficient to prevent debt crises. This would be a strong message to policymakers to be serious about limiting long-term public debt increase. For example, the current chief of the International Monetary Fund remarked of Argentina, “It faces serious problems since its public debt is unsustainable, in a situation where this Latin-American country is deferring debt restructuring” (Briceño and Perote, 2020).

By checking the long-running relationship between the government and private capitalists, Besancenot et al. (2004) underpin that the political cost of a debt refutation is supposed to be quite high. Thus, the government is always forced to default due to a lack of resources. A Ponzi scheme, on the other hand, would not be acceptable to rational investors. Investors would refuse to finance any debt which is less than the sustainable level if future primary surpluses were guaranteed, if the government merely inadequate control over the flow of future primary surpluses, investors may perceive a positive risk of default as the debt approaches the sustainability barrier and refuse to accept the debt. Moreover, after solving the model for the rational expectations equilibrium, they established an illiquidity threshold over which investors will refuse to maintain additional debt. Because a lack of liquidity is sufficient to trigger a default, this degree of illiquidity should be regarded a new default threshold. This creates a succession of lowering default thresholds over repeated iterations. It ultimately reaches a saturation point, which is the deferred value of a share of future primary surpluses. Any debt in excess of this amount would be rejected by rational investors. This risk-free debt level may be far lower than the amount that can be sustained. The policy consequences are significant, since they need a more stringent definition of what constitutes a sound fiscal posture.

Recently, Because of the structure of financial contracts, scholars have expressed a growing concern in linking institutions and financial markets. As a result of their inability to enforce loan agreements, people are more prone to fail on their debts. Large and impersonal financial markets need not only a suitable legal structure, but also adequate enforcement of the rights and restrictions of each contract's parties. Otherwise, financial contracts may become unsustainable owing to well-known issues like adverse selection and moral hazards caused by knowledge asymmetry. In resource allocation, Capasso (2004) emphasizes the relevance of knowledge asymmetry and the structure of information dissemination among players. The economies with informational asymmetries, both the structure of financial contracts and the institutional environment are critical for investment and capital accumulation. If institutions are weak, the rewards of violating a financial contract, for example, may be so tempting that the agreement cannot be completed. Furthermore, good institutions are required to keep the financial markets' ability to channel resources in order to finance economic activity in excellent working condition (Law and Azman-Saini, 2012).

Despite the significance of institutional quality, however, empirical research on this topic is limited. Although, the legal system and political institutions are linked to the quality of institutions and governance, there is not much research on this topic. De Soto (2000) investigates related problems, focusing on the function of property rights as a form of institution, and claiming that a lack of property rights is a substantial impediment to financial progress. Other empirical studies have found that better property rights and legal frameworks tend to enhance financial development (Mishkin, 2009). While much of the

available work focuses on the roles of financial liberalization, legal systems, government ownership of banks, and political institutions as sources of financial development. In sum, better institutional quality is required for the progress of financial system.

This study investigates the relationship between financial development and public debt as it is mediated by institutional quality. The major contribution is the investigation of institutional quality's role as an intermediary, the identification of the threshold value of institutional quality in this relationship, and the computation of marginal values. This study is essential for understanding the importance of institutional quality in the link between financial development and public debt, the significance of sustainable public debt, and its application in policy making.

Our primary limitation is that both institutional quality and public debt are related to financial development. Estimate errors may occur as a result of simultaneity or reverse causality. Many solutions to this problem have been discovered in previous research, and there is still debate on which technique is best suited. To ensure the consistency of our results, we employed three distinct proxies of financial development.

The remainder of the paper is as follows: The following part gives a brief review of the literature, and the third section contains the model, estimating technique, and data utilized in this study. Section 4 contains the results and discussion, while Section 5 has the conclusion.

2. Brief review of literature

The recent financial crisis has brought the financial sector to the forefront of policy discussions. A vast body of research indicates that the financial sector is playing an important role in economic growth and income distribution. When financial system collapses, as the globe is currently witnessing, it may have a terrible impact on the lives of many individuals (Beck et al., 2007). Indicators assessing the size, activity, efficiency, and stability of the financial system are crucial for analysts, academics, and policymakers alike, since correct measurement is critical for understanding causes and devising remedies (Beck et al., 2010). The relevance of financial development in growth of an economy has been demonstrated in the wide body of previous work, and this relationship has a positive correlation (Arestis and Demetriades, 1997, Law and Azman-Saini, 2012).

Bulk of previous research has indicated that public debt has crowding out effect on financial development, such as (Ismihan and Ozkan, 2012, Altaylıgil and Akkay, 2013, Emran and Farazi, 2009), but also some authors argue that public debt is positively connected to financial development (Ondo, 2017, Montes, 2013, Kumhof and Tanner, 2005, Kutivadze, 2011). They believe that the public debt enhances the financial sector's stability by providing security, strong liquidity, and a consistent flow of profits. Furthermore, according to Hauner (2009), Whether or not public debt has a negative impact on financial growth is determined by whether or not the financial sector liberalizes or remains restrictive. Whereas, according to the view point of Bordo and Meissner (2006), when it comes to the impact of foreign debt on financial sector, debt denominated in foreign currencies appears

to be risky when mishandled. However, debt denominated in the single currency does not always lead to a financial disaster.

Moreover, Janda and Kravtsov (2017) look at how national public debt affects financial development, bank performance, and private lending in Central European, Eastern European, Balkan, and Baltic nations. They illustrate that growing public debt has a short-term detrimental impact on private borrowing in the Balkans and Baltic countries. Hauner (2009) argues that public debt boosts the banking sector's profits while reducing its efficacy in the short run. Debt sustainability refers to a government's ability to service its debt at a pace that does not exceed its ability to service it (without implausibly significant policy changes, renegotiating, or defaulting). As a result, governments must be both solvent and liquid at all times in order to service their accumulated government debt. Higher bond rates will gradually increase the cost of repaying debt, thus a government that is having difficulties accessing financial markets may face debt sustainability concerns in the long run (Ostry et al., 2010).

Given the continuing discussion over optimum debt arrangements, the repercussions of substantial public sector borrowing from domestic banks are obviously a topical policy problem (Borensztein et al., 2004, Eichengreen and Hausmann, 2010). Taking this into account, Buiter and Patel (1992) explain that the unsustainable public debt has a crowding out effect, which is illustrated by the IS-LM curve. The IS curve moves to the right as government expenditure rises. The rising curve decreases private borrowing even more while crowding out private investment (Bal and Rath, 2014).

The previous ideas dispute the influence of public debt on crowding in and crowding out. On the one hand, Keynesian theory implies that government spending raises aggregate demand through the multiplier effect, for example, when the government injects money into the economy to encourage spending, private consumer demand rises. As a result, companies that wish to generate more money should boost private investment in order to promote crowding in effect (Cwik and Wieland, 2011, Baldacci et al., 2004). The neoclassical view, on the other hand, disagrees and critiques the fact that excessive government spending raises interest rates and reduces private investment due to increased borrowing costs (Wang, 2005).

Furthermore, the debt overhang theory states that debt should be kept under control since there are concerns about the accumulation of debt and the possibility of debt overhang, and it poses a significant threat to governments (López and Nahón, 2017). In the scenario of a debt overhang, the expected debt payment costs will deter local and international investment (Bal and Rath, 2014). To put it another way, governments must maintain a sustainable level of public debt, which implies that they should not have any issues financing it in the future (Bartolini and Cottarelli, 1994). More recently, sovereign debt problems in developed and developing economies, mainly after the global financial crisis, have re-emphasized the need of keeping public debt at a manageable level. According to current literature, indeed, as it has become clear, unsustainable public debt has ramifications that go beyond economic and fiscal stability, and is intimately connected to financial sector instability (Awadzi, 2015), banking crises frequently precede or follow sovereign debt crises. Furthermore, public debt levels grow sharply and this increase results

into a sovereign debt crisis, with previously hidden debt emerging as crises unfold (Reinhart and Rogoff, 2011).

Some international institutions, such as the IMF and the World Bank, give advice on how to effectively use public debt and manage it at a sustainable level in order to manage public debt and control the debt level. The combination of political and economic factors impact debt management and policy such as a good legal framework encourages discipline, openness, and responsibility, all of which are important for ensuring long-term debt sustainability. The significance of institutions and governance cannot be overstated, since strong governance is essential for reducing the negative effects of public debt and make the most of public debt for a country's growth. Due to the low quality of state governance in emerging and underdeveloped nations, they are suffering greatly from greater levels of public debt. The negative effects of debt are exacerbated by poor quality of institutions. As a result, governments attempting to mitigate the adverse effects of public debt must enhance institutional quality. Countries suffering from the negative effects of public debt must improve the quality of institutions to promote investment, eliminate corruption, make better use of government expenditure, increase market competition and revenue and tax collection, and implement effective rules to boost competitiveness. The country's competitiveness may be improved as a result of this strategy, which would improve people's quality of life.

Overall, good institutional quality has a positive relationship with financial development (Huang, 2010, Law et al., 2013, Khan et al., 2020). Clague et al. (1996) discuss that, in compared to autocracy, a democratic country better facilitates protection of property rights and contracts' execution, therefore directly promoting investment, has implied the relevance of institutional reform for financial development. The importance of political intervention and institutions in financial growth has been highlighted in some studies on the political economics of financial development such as (Pagano and Volpin, 2001, Rajan and Zingales, 2003). Huang et al. (2009) show that the amount of democracy is one of the key causes that encourage government to pursue changes to improve financial growth. However, there has been very little study that explicitly examines the influence of democratic processes on financial progress.

Since the late 1990s, governance has been a critical component of international organizations. The World Governance Indicators (WGIs) are a commonly used instrument for assessing institutional quality. Policy makers believe that good governance is an important component in analyzing country performance as described by WGIs (Khan, 2007). As defined by WGI, institutional quality is comprised of six components: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption, all of which are used as benchmarks for measuring institutional quality (Kaufmann et al., 2005).

Authors have used these indicators of institutional quality to measure its impact on financial development such as (Law and Habibullah, 2006), who stated that strengthening the rule of law, protecting property rights, eliminating corruption, decreasing uncertainty, and boosting investor trust are essential not just in fostering economic growth but also in providing the advantages of financial development. The government's crucial role as a political institution in establishing huge trade monopolies that allowed global financial

institutions to be established (Andrianova et al., 2011). Market capitalization and traded goods are influenced favorably and dramatically by a low level of corruption (Bolgorian, 2011). Bribery has a huge and detrimental impact on the financial system of a country; for example, highly transparent countries have lower transaction costs than corrupt ones due to reduced information asymmetry (Jain et al., 2017).

The preceding literature provides us with a sound theoretical framework for measuring the relationship of public debt and financial development. Furthermore, the literature on institutional quality provides us with a theoretical framework for measuring the influence of institutional quality on financial development. Furthermore, the function of institutional quality as a mediating variable is seen to be highly significant; several prior research employed institutional quality as a mediating variable, for example (Kutan et al., 2017, Yahyaoui and Rahmani, 2009), they established the significance of institutional quality in the relationship between financial development and growth. Khan et al. (2019) examined the association between natural resource rent and financial development using institutional quality as a moderating variable. Whereas, Nguyen et al. (2018) evaluate the role of institutional quality in mediating the relationship between domestic credit, trade, and FDI. Improved institutional quality reduces the booming effect of FDI and the crowding out effect of trade. In most cases, institutional quality influences the link between financial development and other factors, and if there is a crowding out effect, institutional quality mitigates it.

3. Model, estimation strategy and data

3.1. Model

In this study, following (Chung-Yee et al., 2020, Hauner, 2009, Benayed and Gabsi, 2020, Mun and Ismail, 2015), we use following regression model to measure the impact of public debt on financial development.

$$FD_{it} = \beta_0 + \beta_1 FD_{it-1} + \beta_2 Debt_{it} + \gamma X_{it} + \rho_{it} + \varepsilon_{it} \quad (1)$$

where FD is the financial development and Debt is the public debt level. X denotes the set of control variables used in this analysis. While β and γ are the parameters requires to be estimated; ρ denotes the country specific effects and ε is the error term. Here, i and t represent the number of countries and time span respectively.

In our analysis, for FD we use three different proxies: domestic credit to private sector (% of GDP) and domestic credit to private sector by banks (% of GDP) and Broad money (% of GDP). Debt is the general government gross debt to GDP ratio.

Furthermore, we use number of control variables such as: GDP per capita which is having positive relationship with the FD and economy grows with the growth of financial sector (Igan and Tan, 2017, Kiss et al., 2006); GDP growth is also a control variable in our analysis as some of previous literature use it and most of them show that GDP growth has positive relationship with FD such as (Igan and Tan, 2017) and prior study reveal a negative relationship between GDP growth and FD, because rapid economic expansion increases

retained earnings in firms' balance sheets, suggesting that the private sector in EMEs relies more on internal finances to expand operations. Additionally, economic growth promotes the development of stock markets, allowing firms to access money at a lower cost of capital (Nguyen et al., 2018). Inward foreign direct investment (FDI) is also a control variable in this analysis. FDI has positive relationship with FD as many empirical research on growing inward FDIs and their impacts have been conducted, with the majority of them focusing on spillover effects in technology transfer from industrialized to developing nations (Fernandes and Paunov, 2015, Fujimori and Sato, 2015). While some authors, for example Furceri et al. (2012) state that inward FDI has a beneficial influence on domestic credit levels, but when it creates an inflationary environment, it reduces domestic credit levels. As a result, the impact of inbound FDI on domestic credit levels is influenced by macroeconomic conditions in the host country such as institutional quality.

The real deposit interest rate is a rate paid by commercial banks to people or companies on deposits, is used to calculate interest rates. Higher the deposit interest rate, more the investors get attracted and as a result it fosters the FD (Ismihan and Ozkan, 2012). We have also selected inflation as a control variable, since it is predicted to have a negative association with FD because large government borrowing from banks, is only likely to have a gradual negative impact on financial deepening (Boyd et al., 2001). Trade openness is also included and expected to have positive relationship with FD (Chinn and Ito, 2006, Benayed and Gabsi, 2020, Law and Azman-Saini, 2012, Rajan and Zingales, 2003). Trade openness, if positively influence the FD, it means there will be higher demands of credit and credit level will increase (Nguyen et al., 2018).

The most significant factors of FD are institutional variables. Due to data restrictions, the institutional variables are time-invariant, but we do not consider this to be a big issue, first because these features change relatively slowly (Claessens and Laeven, 2003). The incentives for banks and other financial organizations to increase their credit activities by boosting credit availability are influenced by institutional quality. Consumption and investment can be influenced by the institutional environment, imitating credit activity. Poor institutions, such as a poor rule of law, may generate issues with contractibility and information un-verifiability, resulting in knowledge asymmetry. This is one of the most important considerations in loan decisions. It has been demonstrated that since institutions alleviate asymmetric information issues, they mimic banks and other financial organizations in boosting credit availability (Fosu, 2014, Doblaz-Madrid and Minetti, 2013). Similarly, higher level of institutional quality lowers transaction costs (Hoffman et al., 2016), reduces risk, improves the efficiency of market. On the other hand, higher transparency, a stronger legal system, and better regulation all lead to improved transactional confidence between contractual parties, which in turn stimulate economic activity. In the financial industry, improved institutional quality can help improve competition policy (Delis, 2012), As a result, banks and other financial institutions are compelled to grow their loan portfolios in order to keep up with the market trend. Taking this into account, we added the institutional quality variable in equation (1), also added the interaction term between public debt and institutional quality, we got:

$$FD_{it} = \beta_0 + \beta_1 FD_{it-1} + \beta_2 Debt_{it} + \beta_3 IQ_{it} + \beta_4 (Debt_{it} \times IQ_{it}) + \gamma X_{it} + \rho_{it} + \varepsilon_{it} \quad (2)$$

From the above equation (2), we can calculate the marginal effect of public debt on FD as the aim in this paper is to measure the mediating role of institutional quality between FD and public debt.

$$\frac{\partial FD_{it}}{\partial Debt_{it}} = \beta_2 + \beta_4 IQ_{it} \quad (3)$$

Equation (3) demonstrates the marginal effect of public debt on financial development depends on institutional quality. Moreover, this indicates that different countries institutional quality it is not homogenous. Each country in our analysis, depending on institutional quality, countries where the level of institutions quality is higher, the negative effect of public debt is lower and this negative effect becomes worse when country is at lower level of institutional quality.

3.2. Estimation strategy

The main goal in this paper is to analyze the mediating role of institutional quality in the relationship between FD and public debt. Our estimation strategy mainly adopted the methods to treat the problem of potential endogeneity. In addition, considering the potential endogeneity problem in the model, it is probable that institutional quality and public debt are endogenous with FD, which may lead to estimation biases due to simultaneity, reverse causality, and measurement mistakes that require specialized estimating approaches to address. To deal with this problem, several estimation techniques have been used and social scientists are still debating which method is the most suited (Dollar and Kraay, 2004). Variables on the right are likely endogenous with FD. In the presence of simultaneity, employing ordinary least square (OLS) estimation technique for the estimation of this model can produce biased results and. In addition, OLS is efficient estimator if no simultaneity is present. Two stage least squares (2SLS) instrumental variables techniques and generalized method of moments (GMM) produce efficient results in the presence of simultaneity. This implies that we perform a Hausman specification error test to rule out the simultaneity problem before dismissing OLS in favor of the alternatives.

The simultaneity problem occurs because some of the explanatory variables are endogenous and hence likely to be linked with the error term. As a result, the simultaneity problem occurs, and we must employ a fixed effect/Least-Squares Dummy Variable (LSDV) and generalized method of moments (GMM). The lags on the right hand side of the equation are applied first, after that we apply the fixed effect and the instrument variable approach. Instrument variable (IV) is considered to be a useful approach dealing endogeneity. Although the IV technique is beneficial for resolving endogeneity, the primary issue with it is finding suitable instruments that are connected with exogenous variables but not with error terms. Finally, we apply system GMM estimation technique. Different lags can be applied to the system GMM estimator to evaluate causality. Different lags produce different results (Kolstad and Villanger, 2008). The problem of simultaneity can be corrected by using the Hausman test (Hausman, 1978). Instead of OLS, we repeat

this test using various estimating methods. To begin, we apply Hausman test to evaluate which of the fixed and random effects is most appropriate. FE (Fixed effect) seems to be a better match than RE (Random effect). Furthermore, past research indicates that because of endogeneity, we cannot depend only on the FE, such as the connection of public debt to residuals and unobserved country-specific factors, may remain. As a consequence, previous researches suggest that GMM estimate is more appropriate.

As a result, we employ both Arellano and Bond's (Arellano and Bond, 1991) GMM in first difference and Blundell and Bond's (Blundell and Bond, 1998) GMM in system. In dynamic panel data estimation, GMM in first difference has been frequently utilized. The initial difference and an acceptable level of their lagged value are used in this estimate approach. In this manner, the particular consequences are eliminated. However, when there are a limited number of observations in a time series, the GMM in first difference becomes unsuitable, and the process may be enhanced by using system GMM. The system GMM is thought to be more efficient than the GMM in first difference. Furthermore, we also use the Sargan test (Sargan, 1958) to check the validity of instrument over-identification, as well as to test the null hypothesis of whether the error term is correlated.

3.3. Data

In our analysis, we use World Bank, IMF and World Bank (Worldwide Governance indicators) datasets to draw our data. The public debt data on IMF database is available till 2015 and worldwide Governance Indicators database starts from 1996. We can consider it as one of the limitations in our analysis is availability of dataset. So, our data comprise the period of 1996-2015 and 79 countries are included in this analysis according to the availability of data (for list of countries see Appendix A1). The variables used in this analysis are presented in Table with their description, sources and descriptive statistics. The dependent variable is financial development (FD). For FD, we used three different proxies such as: Domestic credit to private sector (% of GDP); Domestic credit to private sector by banks (% of GDP) and Broad money (% of GDP). The independent variable in our analysis is public debt. Institutional quality is the intermediating variable.

Table 1. *Description of variables*

Variable	Description	Source	Mean	SD	Min	Max
Crepri	Domestic credit to private sector (% of GDP)	WDI	45.246	40.117	1.604	233.211
Crebank	Domestic credit to private sector by banks (% of GDP)	WDI	43.016	38.221	1.3839	214.128
BM	Broad Money (% of GDP)	WDI	59.978	49.261	5.143	365.588
Debt	Public debt, debt to GDP ratio (general government gross debt: 90% of the total debt)	IMF	56.199	37.090	0.063	249.114
IQ	Institutional Quality	WGI	4.854	1.576	1.786	8.676
FDI	Foreign Direct Investment, Net inflows (% of GDP)	WDI	4.422	5.656	-15.745	58.519
GDPG	GDP growth (annual %)	WDI	3.952	4.0003	-20.599	26.417
GDPC	GDP per capita (current USD)	WDI	7839.60	12535.58	138.699	91254
IR	Deposit interest rate (%)	WDI	8.032	9.958	-0.1425	203.375
Inf	Inflation (GDP deflator (annual %))	WDI	8.688	27.357	-27.048	914.126
Topen	Trade openness (Imports (% of GDP) + exports (% of GDP))	WDI	84.799	57.347	15.636	442.62

Here, the institutional quality data comes from the WGI and the ICRG dataset. WGI consists of six measures of governance: voice and accountability, political stability and violence, government effectiveness, rule of law, regulatory quality and control of corruption. Each measure consists of index from -2.5 to 2.5 . A higher value means better the quality of institutions. In this paper, we have modified this index. First of all we have taken the average of all six measures and then created an index from 0-10 such as Abbas et al. (2021) did. Greater values means better is the quality of institutions.

4. Results and discussion

This section provides the results and related discussion.

Results using domestic credit to private sector (% of GDP) as a proxy of financial development to measure the impact of public debt on financial development

As discussed earlier, we use three different proxies of financial development to measure its relationship with public debt. Table presents the results of effect of public debt on FD by using credit to private sector (% of GDP) as a proxy for FD. In our Analysis, we also measure the results of basic model without institutional quality. For this purpose, column 1 and column 4 in Table present the results without the influence of institutional quality. It can be seen clearly that public debt has significant negative relationship with credit to private sector in using both methodologies FE (LSDV) and GMM.

Moreover, column 2 and 3 present the results of using FE (LSDV) and column 5 and 6 present the results using system GMM as our estimation techniques. In Table, we can see that there is significant negative relationship of GDP growth with domestic credit to private sector is consistent with the results of (Nguyen et al., 2018, Benayed and Gabsi, 2020). The negative relationship of GDP growth with domestic credit to private sector could be the reason because in our analysis there are some countries which are emerging and some authors think that if the economic growth is faster, it also boosts the retained earnings which indicate that emerging economies are relying more on internal funds to expand its operations. Furthermore, economic growth encourages the development of stock markets, allowing businesses to utilize funds with reduced cost of capital.

Meanwhile, real GDP per capita shows significant and positive relation with domestic credit to private sector, shows consistency with previous literature (Mun and Ismail, 2015, Janda and Kravtsov, 2017, Magud et al., 2014, Yang and Yi, 2008). This positive relationship demonstrate that economic development is linked with financial sectors' development, with financial sector playing a significant part in supplying credit for economic activities, despite the fact that their stock market capitalizations are still small in comparison to capital demand. FDI also has positive relationship with domestic credit to private sector and it also shows consistency with previous literature such as Khan et al. (2020), Furceri et al. (2012) and Li and Liu (2005).

Table 2. Estimated results of FE and two step system GMM: impact of public debt on FD using credit to private sector (% of GDP) as a proxy of FD (1996-2015)

Crepri	FE	FE	FE	GMM	GMM	GMM
	1	2	3	4	5	6
Crepri (-1)				1.2592*** (0.1286)	0.9559*** (0.0122)	0.8790*** (0.0125)
Crepri (-2)				-0.4274*** (0.1130)	-0.0909*** (0.0142)	-0.1564*** (0.0225)
Debt	-0.0705*** (0.0159)	-0.0515*** (0.0164)	-0.2466*** (0.0422)	-0.0451* (0.0257)	-0.0426*** (0.0078)	-0.0749*** (0.0115)
IQ		0.0214 (0.0219)	-0.1309*** (0.0346)		0.0975*** (0.0126)	0.0343* (0.0180)
Debt × IQ			0.0320*** (0.0071)			0.0085*** (0.0018)
GDPG	-0.0133*** (0.0018)	-0.0380*** (0.0099)	-0.0141*** (0.0018)	-0.0033*** (0.0009)	-0.0039*** (0.0004)	-0.0049*** (0.0004)
GDPG	0.3757*** (0.0158)	0.3851*** (0.0166)	0.3573*** (0.0162)	0.0421 (0.0329)	0.0162*** (0.0047)	0.0586*** (0.0067)
FDI	0.0017 (0.0016)	0.0012 (0.0016)	0.0030* (0.0016)	0.0018*** (0.0006)	0.0015*** (0.0002)	0.0120*** (0.0018)
IR	-0.0020** (0.0009)	-0.0022 (0.0017)	-0.0023** (0.0009)	-0.0023** (0.0009)	-0.0022*** (0.0002)	-0.0034*** (0.0002)
Inf	-0.0015*** (0.0003)	-0.0015*** (0.0006)	-0.0015*** (0.0003)	-0.0059*** (0.0010)	-0.0040*** (0.0002)	-0.0039*** (0.0003)
Topen	0.3467*** (0.0401)	0.3912*** (0.0416)	0.3477*** (0.0399)	0.1368*** (0.0363)	0.1200*** (0.0108)	0.1550*** (0.0176)
Constant	-0.7304*** (0.2197)	-1.1655*** (0.2639)	0.1304 (0.3077)	-0.0988 (0.2285)	-0.4101*** (0.0988)	-0.1342 (0.1293)
Observations	1,580	1,580	1,580	1,343	1,343	1,284
R-squared	0.4535	0.4765	0.4608			
No. of countries	79	79	79	79	79	79
Sargan test				13.3884	66.0235	67.0162
p-value				0.5723	0.3397	0.9997
AR(1) test				-3.776	-4.127	-3.9461
p-value				0.0002	0.0000	0.0001
AR(2) test				0.5800	-1.1063	-0.0872
p-value				0.5619	0.2686	0.9305

Notes. In Table 2, first 3 columns present the results using fixed effect LSDV and last three columns present results using two step system GMM estimation techniques. Column 1 and column 4 present the results without the influence of institutional quality. ***, **, and * are the robust standard errors at the 1%, 5%, and 10% levels, respectively. Inward FDI always boosts the economic growth which results for an economy to have more demand of credit and ultimately give rise to financial sector. Interest rate has significant negative relationship which is also consistent with previous literature as higher interest rates makes less credit available (Shetta and Kamaly, 2014, Codogno et al., 2003, Njuru et al., 2014), as the borrowing cost is higher and the firms will be reluctant to borrow at higher rates. In our analysis, inflation is significant negatively correlated with domestic credit to private sector and these results are consistent with (Chinn and Ito, 2006, Huybens and Smith, 1999). If the rate of inflation rises, the real rate of return on savings decreases. As a result, financial institutions are making fewer loans. According to the estimations, commerce has a beneficial impact on bank credit. In reality, rising imports and exports are usually accompanied by rising demand for financial services. Lastly, Trade openness shows significant positive relation with domestic credit to private sector, these results are

consistent with previous literature such as (Estrada et al., 2015, Law, 2009, Braun and Raddatz, 2008). According to which, countries which are more open to trade, may need more credit as the local firms needs to cope up with the challenge of competition.

Moreover, the results in column 2, 3 using FE estimator and 5, 6 using GMM estimator indicate that public debt has adverse effect and institutional quality is positively correlated with FD. The results of interaction term are presented in columns 3 (FE estimation) and column 6 (GMM estimation). In both cases we can see the negative effect of public debt changes to positive when public debt is interacted with institutional quality. This indicates that public debt is a function of institutional quality. So, we can say as the institutional quality becomes better and better, the adverse effect of public debt become lower and lower. Here, the threshold effect can also be calculated from Equation (3), which is 7.71 in case of using FE estimation and it is 8.81 in case of using GMM estimation. From the results of column 6, we have also calculated the marginal values (Slope= $-0.0749+0.0085 \times IQ$) using mean, minimum and maximum value of institutional quality (for results see Appendix A2).

Furthermore, Sargan-Hansen test validates the instruments and Arellano-Bond test shows that AR(1) is serially correlated and rejected but AR(2) shows no serial correlation.

Results using domestic credit to private sector by banks (% of GDP) as a proxy of financial development to measure the impact of public debt on financial development

Table presents the results of impact of public debt on financial development using domestic credit to private sector by banks (% of GDP). We can see the results in Table are consistent as shown in Table . Similarly as in Table , the first three columns present the results using FE estimation technique, while, last three columns present the results using GMM estimation technique. Column 1 and column 4 present the results without the influence of institutional quality. In both cases public debt is significant and negatively effects the domestic credit to private sector by banks. These results are consistent with previous literature. The results of interaction term between public debt and institutional quality are presented in columns 3 and 6 which show that although public debt has negative relationship with FD but when it is interacted with institutional quality, the impact is positive. These results show that public debt is a function of institutional quality.

Furthermore, the threshold value can be calculated by Equation (3). The threshold value in case of static panel LSDV is 5.92 and in case of system GMM, the threshold is 9.7. These results show that better the quality of institutions, adverse effect of public debt will decrease. As it is stated earlier that the benchmark estimation technique in this paper is two-step system GMM, so by considering the results of GMM, we can calculate the marginal values by (slope= $-0.0593+0.0061 \times IQ$).

Table 3. Estimated results of FE and two step system GMM: impact of public debt on financial development using credit to private sector by banks (% of GDP) as a proxy of financial development (1996-2015)

Crebank	FE	FE	FE	GMM	GMM	GMM
	1	2	3	4	5	6
Crebank (-1)				0.6984*** (0.0160)	0.9572*** (0.0190)	0.9043*** (0.0168)
Crebank (-2)				-0.0859*** (0.0069)	-0.2371*** (0.0209)	-0.2689*** (0.0156)
Debt	-0.0334*	-0.0083	-0.1262***	-0.0261**	-0.0283***	-0.0593***

Crebank	FE	FE	FE	GMM	GMM	GMM
	1	2	3	4	5	6
	(0.0186)	(0.0179)	(0.0473)	(0.0104)	(0.0092)	(0.0167)
IQ		0.2142*** (0.0238)	0.1324*** (0.0386)		0.1371*** (0.0213)	0.0535*** (0.0121)
Debt × IQ			0.0213*** (0.0079)			0.0061** (0.0027)
GDPG	-0.0177*** (0.0022)	-0.0565*** (0.0108)	-0.0591*** (0.0108)	-0.0053*** (0.0004)	-0.0048*** (0.0003)	-0.0056*** (0.0003)
GDPC	0.4852*** (0.0186)	0.4914*** (0.0180)	0.4786*** (0.0186)	0.1269*** (0.0086)	0.0908*** (0.0092)	0.1267*** (0.0060)
FDI	0.0050*** (0.0019)	0.0038** (0.0018)	0.0047*** (0.0018)	0.0014*** (0.0003)	0.0020*** (0.0002)	0.0110*** (0.0018)
IR	-0.0023** (0.0011)	0.0003 (0.0018)	0.0000 (0.0018)	-0.0005 (0.0003)	-0.0016*** (0.0002)	-0.0025*** (0.0002)
Inf	-0.0017*** (0.0003)	-0.0026*** (0.0006)	-0.0025*** (0.0006)	-0.0052*** (0.0002)	-0.0060*** (0.0002)	-0.0062*** (0.0002)
Topen	0.3727*** (0.0471)	0.4303*** (0.0451)	0.4318*** (0.0450)	0.1350*** (0.0279)	0.1816*** (0.0113)	0.1655*** (0.0119)
Constant	-1.9244*** (0.2581)	-3.3443*** (0.2866)	-2.7931*** (0.3519)	-0.0876 (0.1426)	-1.0341*** (0.1293)	-0.5585*** (0.1053)
Observations	1,580	1,396	1,396	1,343	1,343	1,284
R-squared	0.4745	0.5441	0.5466			
No. of countries	79	79	79	79	79	79
Sargan test				49.7859	70.8606	64.4325
p-value				0.4021	0.2061	0.9999
AR(1)				-3.8179	-4.3099	-3.9004
p-value				0.0001	0.0000	0.0001
AR(2) test				-0.5426	0.7223	1.1031
p-value				0.2574	0.4701	0.2700

Notes. In Table 3, first 3 columns present the results using fixed effect LSDV and last three columns present the results using two step system GMM estimation techniques. Column 1 and column 4 present the results without the influence of institutional quality. ***, **, and * are the robust standard errors at the 1%, 5%, and 10% levels, respectively.

At the end, to check the validity of instrument, we employed the Sargan-Hansen test and the Arellano-Bond test. The Sargan-Hansen test supports instruments' validity and the results of Arellano-Bond test indicates that the first order serial correlation AR (1) is rejected and the second order AR(2) cannot be rejected and it shows the serial correlation. The above results indicate that public debt has negative relationship with domestic credit to private sector by banks (% of GDP), but when it is interacted with institutional quality it become positive and shows that public debt is a function of institutional quality. This dependency of public debt clearly indicates that in countries where the institutional quality is poor, the adverse effect of public debt will be greater and countries need to improve the quality of institutions to decrease the adverse effect of public debt.

Results using broad money (% of GDP) as a proxy of financial development to measure the impact of public debt on financial development

Table 4 presents the results by using the third proxy broad money (% of GDP) of FD. Same as mentioned earlier in the results while using first two proxies of FD, our results show consistency with the results of previous two proxies of FD (see Table and Table).

Table 4. Estimated results of FE and two step system GMM: impact of public debt on financial development using broad money (% of GDP) as a proxy of financial development (1996-2015)

BM	FE 1	FE 2	FE 3	GMM 4	GMM 5	GMM 6
BM(-1)				0.7246*** (0.0343)	0.7646*** (0.0118)	0.7674*** (0.0222)
BM(-2)				0.0333*** (0.0106)	0.0879*** (0.0180)	-0.0064 (0.0171)
Debt	-0.0223* (0.0125)	-0.0084 (0.0126)	-0.0177* (0.0341)	-0.0150* (0.0087)	-0.0107** (0.0052)	-0.0370** (0.0162)
IQ		0.0330** (0.0168)	0.0289** (0.0274)		0.0592*** (0.0145)	0.0738*** (0.0112)
Debt × IQ			0.0025** (0.0057)			0.0049* (0.0026)
GDPG	-0.0121*** (0.0014)	-0.0292*** (0.0076)	-0.0248*** (0.0076)	-0.0233*** (0.0023)	-0.0072*** (0.0002)	-0.0075*** (0.0002)
GDP C	0.2819*** (0.0124)	0.2788*** (0.0127)	0.2823*** (0.0131)	-0.0092 (0.0139)	-0.0254*** (0.0074)	0.0082 (0.0068)
FDI	0.0012 (0.0013)	0.0010 (0.0012)	0.0099 (0.0066)	0.0004 (0.0004)	0.0092*** (0.0014)	0.0004* (0.0002)
IR	-0.0013* (0.0007)	-0.0032** (0.0013)	-0.0184** (0.0092)	-0.0019*** (0.0006)	-0.0047*** (0.0002)	-0.0043*** (0.0002)
Inf	-0.0006*** (0.0002)	-0.0010** (0.0004)	-0.0011*** (0.0004)	-0.0043*** (0.0002)	-0.0048*** (0.0002)	-0.0047*** (0.0001)
Topen	0.3849*** (0.0315)	0.3977*** (0.0319)	0.3714*** (0.0326)	0.0665*** (0.0168)	0.0004*** (0.0001)	0.0833*** (0.0086)
Constant	0.0614 (0.1727)	-0.1655 (0.2028)	-0.0738 (0.2545)	0.8778*** (0.1122)	0.6074*** (0.0647)	1.0338*** (0.0851)
Observations	1,580	1,396	1,396	1,343	1,343	1,343
R-squared	0.4369	0.4726	0.4766			
No. of Countries	79	79	79			
Sargan Test				59.7138	66.6589	74.0669
p-value				0.1196	0.3199	0.6944
AR(1) test				-4.8322	-4.8701	-4.9286
p-value				0.0000	0.0000	0.0000
AR(2) test				0.254	-1.1695	-0.6205
p-value				0.7995	0.2422	0.5349

Notes. In Table 4, first 3 columns present the results of using fixed effect LSDV and last three columns present the results using two step system GMM estimation techniques. Column 1 and column 4 present the results without the influence of institutional quality. ***, **, and * are the robust standard errors at the 1%, 5%, and 10% levels, respectively.

First and fourth column in Table 4 present the results without the influence of institutional quality and in both cases (FE and GMM), public debt shows adverse relationship with FD while using broad money as a proxy of FD. Column 2 and column 5 present the results using institutional quality variable and column 3 and column 6 present the results using institutional quality as an intermediating variable in the relationship between FD and public debt. In column 2 and column 5, public debt has negative relationship with broad money and institutional quality shows positive relationship with broad money. These results are consistent with the previous results. Moreover, in column 3 and 6, although public debt adversely affects FD, but when it is interacted with institutional quality, it becomes positive. This shows that public debt is a function of institutional quality. By using equation (3), we calculate the threshold value by considering the results of two step system GMM as this is

the benchmark of this study. The threshold value is 7.55. Moreover, we can calculate the marginal value (slope= $-0.0370+0.0049 \times IQ$) using results of two-step system GMM (for results see Appendix A2).

Furthermore, Sargan-Hansen test shows validity of instruments and Arellano-Bond test shows that the first order AR(1) is serially correlated and rejected whereas the second order AR(2) shows no serial correlation.

5. Conclusions

The empirical relationship between FD and public debt is investigated in this study. Despite the fact that this relationship has been widely researched in the past, the primary contribution we made in this work is to include the interaction term of institutional quality. The recent global financial crisis engendered considerable animosity toward the financial industry, as well as broad doubt about its advantages to growth. After the global financial crisis, there is continuous increase in public debt levels of many developed and developing countries and governments are failed to maintain debt at a sustainable level. In maintaining the sustainable level of public debt, Investors may refuse to acquire public debt even if it does not beyond the sustainable level if the government has only partial control over the flow of future resources. The effect of public debt on FD is adverse and this adverse effect increases with the increase in public debt level. We employed the institutional quality variable as an intermediating variable to check its role in the relationship between FD and public debt.

In recent years, Institutional quality has gained popularity, particularly as a means of promoting economic growth and FD. To measure this relation, we employ FE (LSDV) and two-step system GMM estimation techniques. Our empirical results indicate that public debt has crowding out relationship with FD. At the same time, when we employ the interaction term between public debt and institutional quality, the crowding out effect of public debt is vanished and the interaction terms show the positive relationship with FD. This indicates that high level of institutional quality is necessary condition for public debt to have crowding in effect on FD. This shows that public debt is a function of institutional quality and as the quality of institutions becomes better, the crowding out effect of public debt decreases and after the threshold value of institutional quality, the crowding out effect of public debt becomes crowding in.

The government's pivotal role as a political institution in establishing huge trade monopolies that allowed for the development of global financial institutions. A low level of corruption has a significant and beneficial influence on market capitalization and traded items. Bribery has a substantial and detrimental impact on a country's financial system; for example, highly transparent countries have lower transaction costs than corrupt ones due to less information asymmetry. Institutional considerations have a major influence on financial growth and economic development, in addition to pressing politicians to implement consistent changes that may minimize uncertainty. Also, evidence shows that countries with strong legal systems have more long-term debt than those with weak legal

systems. Short-term liabilities are lower in nations with robust legal systems, suggesting that these countries are trading long-term debt for short-term debt.

The findings of the study have policy significance, especially in terms of strengthening institutional legitimacy through a well-defined and well-integrated institutional framework. Emerging countries are going through a tough era in terms of institutional and FD and not all of them have the same institutional and financial skills. As a result, governments must fully comprehend the importance of intelligence in ensuring long-term prosperity. Financial and economic growth is slowed in countries with weak institutions. In this situation, policymakers must focus on nations with insecure institutions and financial sectors, which are falling behind owing to high levels of corruption and a lack of transparency and accountability. In this way, public debt can be used efficiently and effectively results in FD.

To summarize, quality institutions are critical for reducing the crowding out effects of public debt and making effective use of it in the growth of a financial sector. Because their institutions are of inferior quality, developing and underdeveloped countries suffer greatly from greater levels of public debt. Countries where the public debt is high, needs to improve the quality of their institutions, needs to encourage more and more investment, promote competition among the stakeholders, and reduce bribery and corruption and effective use of government spending.

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Appendix A

Appendix A1. List of countries

Albania	Brazil	Gambia, The	Lebanon	Sierra Leone
Algeria	Bulgaria	Georgia	Madagascar	Singapore
Antigua and Barbuda	Burkina Faso	Guatemala	Malaysia	Sri Lanka
Argentina	Cabo Verde	Guinea	Mauritius	Sweden
Armenia	Canada	Haiti	Mexico	Switzerland
Australia	Chile	Honduras	Mongolia	Tanzania
Bahamas, The	China	Hong Kong SAR, China	Niger	Thailand
Bahrain	Colombia	Hungary	Nigeria	Togo
Bangladesh	Comoros	Indonesia	Oman	Uganda
Barbados	Costa Rica	Jamaica	Pakistan	Ukraine
Belarus	Cote d'Ivoire	Japan	Paraguay	Uruguay
Belize	Croatia	Jordan	Peru	Vanuatu
Benin	Czech Republic	Kenya	Philippines	Venezuela, RB
Bhutan	Dominican Republic	Korea, Rep.	Romania	Vietnam
Bolivia	Egypt, Arab Rep.	Kyrgyz Republic	Russian Federation	Zimbabwe
Botswana	Fiji	Lao PDR	Seychelles	

Appendix A2. Marginal effect of public debt through institutional quality from Equation (3) as $(\frac{\partial FD_{it}}{\partial Debt_{it}} = \beta_2 + \beta_4 IQ_{it})$ when using two-step system GMM estimations.

IQ	Crepri	Crebank	BM
Mean	-0.0336	-0.0297	-0.0132
Minimum	-0.0597	-0.0048	-0.0282
Maximum	-0.0012	-0.0064	0.0055