

# DOES PUBLIC DEBT MATTER FOR FINANCIAL INCLUSION: SOME CROSS - COUNTRY EVIDENCE

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## ABSTRACT

*Many studies have analyzed the relationship between public debt and financial inclusion, but only some, if any, have explicitly focused on the factors that shape financial inclusion and public debt. This paper draws on the trove of financial and debt-related data from World Bank to examine the factors influencing public debt. Using a dynamic panel data model for a sample of 145 countries, the study suggests that public debt has an indirect link with financial inclusion and that this link is robust across specifications. This result aligns with previous studies that have indicated the possibility that public debt “crowds out” private activity. More significant levels of public debt are likely to draw out resources from the financial sector, increase interest rates, and reduce availability and access to loans. It may also be the case that the negative relationship between public debt and financial inclusion may result from the unproductive nature of expenditures more than the quantity of public debt itself.*

**Keywords:** Public Debt, Financial Inclusion, Crowd In/Out, Developing Country.

## INTRODUCTION AND BACKGROUND

This paper focuses on the link between financial inclusion and public debt. Although there has been a phenomenal rise in the size, depth, and efficiency of financial markets over the past few decades, this has often gone hand in hand with persistent inequalities in access to finance. Thus, households from poor and socially marginalized communities often find themselves locked out of financial markets, which has had adverse economic effects on them. In this background, financial inclusion has come to the centre of policymaking since the early 2000s, even earning the founder of the Grameen Bank, Muhammad Yunus, a Nobel Peace Prize in 2006. In announcing the prize, the Nobel Committee noted that “lasting peace cannot be achieved unless large population groups find ways to break out of poverty. Micro-credit is one such means<sup>1</sup> Further, the World Bank states, “Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit, and insurance – delivered in a responsible and sustainable way.....a key enabler to reduce extreme poverty and boost shared prosperity<sup>2</sup> Therefore, financial inclusion is an important factor in the path to development and is especially relevant for middle and low-income countries. Indeed, past literature has shown the effectiveness of financial inclusion in reducing poverty and inequality, promoting growth and savings, and encouraging autonomy and entrepreneurship among women ( Burgess & Pande 2005; Lenka & Sharma 2017; Sethi & Acharya, 2018; Swamy 2014).

Given the centrality that has been accorded to financial inclusion, recent studies have also begun to analyze the financial inclusion determinants at the micro and the macro levels (Bozkurt et al., 2018; Eldomiaty et al., 2020; Govindapuram et al., 2023; Honohan, 2008; Zins & Weill, 2016). Missing from this strand of work is the interrelation between public debt and financial inclusion, which is precisely what this paper seeks to analyze. Public debt is an important outcome variable that most countries are grappling with, especially after the Great Financial Crisis (GFC)

and the COVID-19 pandemic. The debate is unsettled on whether high public debt is good or bad for a country because the definitive answer is “it depends.” This is because, for a country with high public debt, if it is using the debt to strengthen the institutions (financial or otherwise), it would reap the benefits of high public debt, and one can see a positive impact on financial inclusion. On the other hand, if a country with high debts is using debt to meet the interest burden, the benefits of financial inclusion may not accrue. Alternatively, a low-debt nation with better social indicators may experience higher financial inclusion. Therefore, one needs to understand what the data has to reveal regarding the relationship between public debt levels and financial inclusion. This omission is surprising given that public debt is an important factor shaping the financial sector in modern-day economies. Theoretically, the orthodox view posits that increased public debt “crowds out” credit available to the private sector and thus impinges on the functioning of the financial sector. Alternatively, as Ismihan and Ozkan (2012:348) put it, “When the government has a dominant presence as a major borrower in the domestic securities market, a rise in public debt crowds-out the funds available to the private sector—a key measure of financial development—which, in turn, reduces economic activity.” Taking on debt, of course, has important uses in smoothing consumption over time and generations, and it also may be crucial for maintaining steady levels of economic activity, but debt accumulation comes with its risks. Economies with larger the size of public debt are more exposed to mild shocks to an aggregate activity which may adversely affect creditworthiness and interest rate dynamics (Cecchetti *et al.*, 2011).

The pessimistic view of public debt has found support in several studies, the most influential of which is due to Reinhart and Rogoff (2010), who find that after a threshold of 90 percent debt to GDP ratio, public debt is indirectly and significantly impacts on economic growth. Benayed and Gabsi (2020) look at the non-linear association between domestic public debt and financial development for a sample of 20 economies and find evidence of an “inverted U” shape, with a threshold occurring at about 52 percent of GDP. Hauner (2009) explored the link between financial development and public debt. Further, evidence of a non-linear association between public debt and financial development after a threshold supports the “safe asset” view for a limited share of public debt (Hauner 2009; Nigeria, Aliero and Abubakar 2021; Bayar and Sakar 2021). La Porta *et al.* (2002) find that more government ownership in banks results in less efficient and low development of the banking sector. From a macroeconomic point of view, fiscal tightening might harm the credit supply in the economy. Public debt hurts households and businesses in terms of output and capacity expansion through the bank, which decreases the debt held by the private sector (Andrés *et al.*, 2016). Bui (2018) explored the non-linear association between financial development and public debt, using the data from 22 countries using a Panel Smooth Transition Regression (PSTR) approach, allowing for heterogeneity. At the same time, higher levels of integration of financial markets and financial freedom have a significant direct effect on public debt, which reduces the “crowding-out” effect and helps develop the financial sector. De Bonis and Stacchini (2013) studied that there is an inverse and significant link between public debt and bank loans, which supports the “crowding-out” effect. Similarly, Dong (2021) finds that financial openness reduces public debt, and foreign countries with financial openness increase external debt in the home country.

Liquidity and risk channels may increase the impact of public debt on private credit (Altavilla *et al.*, 2017; Klinger & Teplý, 2014). Exposing banks and financial institutions to high-risk government bonds works through the liquidity channel. The study by Janda and Kravtsov (2017) analyses the impact of public debt on private credit on the performance of banks and

financial development in Europe and the Baltic regions and finds that the growth of public debt is indirectly associated with private credit.

Now while the studies described above detail how public debt can be bad for financial and economic outcomes, in contrast to this orthodox view, an alternative view that goes back to the writings of Keynes stresses a more optimistic role of public debt. From this perspective, the orthodox focus on the crowding-out effects of public debt relies on the assumption that savings and incomes are fixed. At a given income level, the more outstanding the public debt, the higher the interest rates, and thus greater is the level of financial repression. However, income levels are not fixed typically because of deficiencies in aggregate demand that arise in the normal working of the market system. In such cases, therefore, public debt can enhance aggregate demand and thus actually stimulate incomes and hence savings. The crowding-out effect can thus potentially be offset by the multiplier effect of government expenditure in an economy with unemployed resources. Recent empirical studies have provided some evidence in favour of this hypothesis (Kutivadze 2011; İlgün 2016). Local financial market growth promotes countries' home government debt and minimizes the burden of state financing (İlgün 2016); as a result, it directly favours the financial system.

To sum up, the literature on the link between public debt and the financial sector reveals two conflicting results, with one set of studies emphasizing the positive effects. At the same time, the other, a more pessimistic take, emphasizes the adverse fallouts. In either case, the effect of public debt on financial inclusion has yet to be analyzed, and it is with this in mind, this paper tries to fill in this gap by drawing on a panel of 145 countries from 2004-17. The paper utilizes dynamic panel methodology to highlight the nature of the link between financial inclusion and public debt.

### **Public Debt and Financial Inclusion: The Theoretical Link**

Incurring debt is a widely used activity both by individuals and states, and as such, the effect of public debt has been a source of significant discussion in economic theory. One vital channel of influence in financial inclusion is the impact of public debt on interest rates, given that financial inclusion requires low and stable interest rates (Salsman, 2017; Ball & Mankiw, 1995). Until the early 20<sup>th</sup> century, it had almost become a truism that balanced budgets, and limited public debt was the most effective policies governments could follow. From David Hume to Adam Smith and David Ricardo, the benefits of a small government and the belief that governments, like households, ought to spend within the limits of their income were widely accepted (Salsman, 2017). Deficit financing was seen as something that was, at best, neutral and, at worst, downright harmful. Ricardo argued that public debt would likely be treated as a form of taxation by individuals. Thus far from spurring spending, it would increase savings and withdraw investments from the real economy (Salsman 2017). Moreover, in a striking historical parallel, they were once again ignited in the aftermath of the Global Financial Crisis (GFC) 2008. One of the most important channels through which the crowding-out effect is said to play out is via the impact of public debt upon interest rates. According to the textbook model, the more the government borrows, the fewer loanable funds are available for private borrowers, thus resulting in higher interest rates (Ball & Mankiw, 1995). This has further knock-on effects regarding exchange rate appreciation, which lowers net exports and diminishes investments from households and firms owing to higher interest rates (Ball & Mankiw, 1995). In the short run, the effects of public debt may be negligible, but if accumulated over a long time horizon, their impact on long-term interest rates could be substantial (Cecchetti *et al.*, 2011). Having said all of this, as Keynes and Keynesians have argued for a very long time, the negative debt-interest relationship rests on the assumption

that output is fixed at full employment and that; as a result, there can be no quantity adjustments. Keynes (1936) noted in his critique of the classical view that market economies were prone to crisis and that macroeconomic equilibrium was perfectly compatible with unemployment and unutilized capacity. In such cases, Keynes argued that public debt could increase economic performance, enhance income and output, and negate any crowding-out effect on the interest rates. Debts would create their income streams, and thus savings available to borrowers would only increase, not decrease, and hence the entire schema of classical economists regarding the debt-interest rate linkage was mistaken. This general argument has found immense support today, especially after the GFC of 2008 (Baker, 2016; Eichengreen et al., 2011).

The GFC brings us to a second possible channel through which public debt may influence the inclusion process via its effects on aggregate output or productivity shocks. Previous studies have been divided on the effectiveness of the government's role in smoothing out the crisis. In line with Old-Keynesian theory, Auerbach and Gorodnichenko (2012) draw on Organisation for Economic Co-operation and Development (OECD) country-level data and find robust evidence of a strong multiplier effect at work during recessions. The results, the authors suggest, indicate that public spending does not crowd out private activity during recessions, although the multiplier is close to zero during expansionary phases. This result is also confirmed by the empirical analysis of Fazzari *et al.* (2015). On the other hand, it has also been argued that public debt may handicap the government from intervening during the crisis. If anything, high levels of public debt may magnify the effects of aggregate output shocks by limiting how much already leveraged states can borrow from international markets (Capistrán *et al.*, 2013). Thus Cecchetti *et al.* (2011:4) conclude that "When a crisis strikes, the ability of the government to intervene depends on the amount of debt that it has already accumulated as well as what its creditors perceive to be its fiscal capacity, that is, the capacity to raise tax revenues to service and repay the debt. Fiscal authorities may become constrained in their attempt to engage in traditional countercyclical stabilization policies and their role as lenders of last resort during a financial crisis. High levels of public debt can limit essential government functions". Moreover, in an open economy where foreign investments play a significant role, the negative effect could be amplified by the effect of public debt on investors' confidence. An increasing interest rate, of course, could foster foreign investments, but it is also true that this could be offset by the deterioration of a country's risk perception. As public debt increases, investors' fears of default may lead to lowering creditworthiness which is likely to restrict foreign investment and hurt financial development (Ball & Mankiw, 1995). All of this has important implications for financial inclusion. If public debt magnifies aggregate shocks, this will likely harm the financial inclusion process through adverse effects on credit supply, especially micro-credit (Wagner & Winkler, 2013). On the other hand, if public debt enables governments to tackle recessions and take a more proactive role in stabilizing macroeconomic performance, this is likely to improve financial access.

Finally, a third channel through which public debt may affect financial inclusion is via political economy forces. It has been argued that public debt is usually a politically convenient response to the alternative of tax-financed expenditure because the costs of debt can be postponed to later generations in the case of public debt. Tax-financed expenditure, on the other hand, tends to be politically tricky because "those individuals/groups enjoying the marginal benefit of an extra dollar spent on a project are not the same individuals or groups who bear the marginal cost of funding it" (Eichengreen *et al.*, 2011, p. 8). This has been termed the common pool problem in the literature. The risk is that states may want to choose the path of least resistance by incurring debt, even though this may risk future macroeconomic well-being. That is, public debt by construction

tends to be shaped by political expedience rather than long-term economic needs and, therefore, carries with it the risks of profligacy and waste. This is closely related to how resources raised through public debt are utilized. In the context of developing countries, the increasing levels of public debt have gone hand in hand with increasing interest rates on government bonds. Thus, a large body of studies has pointed out that, public debt since the 1990s has become a prime vehicle through which public resources have been transferred to financial elites at the cost of more productive kinds of investments in industries (Bresser-Pereira *et al.*, 2020; Bin, 2016). Such transfers often go hand in hand with low investments and reductions of lending to small-scale industries, small peasants, and other vulnerable sectors. Public debt may lead to remarkably high fiscal costs if not appropriately utilized, although, in practice, recent studies have indicated how fiscal costs can be negligible.

## Empirical Methodology

Grounded on the above discussion, we estimate the financial inclusion-public debt linkage for a set of 145 countries. Public debt may affect people's access to finance through various mechanisms, many of which cannot be modelled by static models. Most macro studies use dynamic panel data models to understand the determinants of financial inclusion better to capture the feedback and lag effects in the relationship (Kumar, 2013; Nkoa & Song, 2020). We, therefore, adopt a dynamic model to estimate the link between public debt and financial inclusion. The following is the basic model used for estimating the impact of public debt on financial inclusion:

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 PD_{i,t} + \beta_3 X_{i,t} + \epsilon_{i,t} \quad (1.1)$$

Our outcome variable  $Y_{it}$  is a measure of the level of financial inclusion. Here, we use several bank branches per 100,000 inhabitants as a proxy for financial inclusion, as it is one of the most widely used indicators of financial inclusion (Célerier & Matray, 2019; Chireshe & Ocran, 2020; Sarma & Pais, 2011).  $X_{it}$  refers to the matrix of control variables that impact financial inclusion. Variables are transformed using logarithms. The primary variable of interest is public debt (lnPD), which we proxy with the “total credit to government and state-owned enterprises as a percentage to GDP (%)” following Hauner (2009). Other explanatory variables include GDP per capita income (lnGDPPC), which is Gross Domestic Product per-capita income (Constant 2005 USD), levels of education (lnEdn), rates of urbanization (lnUrb), and life expectancy (lnLE). Details of the variables used are explained below:

- **Bank Branches (lnBRANCHES):** The number of bank branches significantly indicates demographic access to formal banking services. If a bank or bank branch is available to the people, they can get easy access to formal financial services, increasing the levels of financial inclusion (Beck et al., 2007).
- **Public Debt (lnPD):** The primary variable of interest is public debt (lnPD), which is a “credit to government and state-owned enterprises as a percentage of GDP” (Bui, 2018; Hauner, 2009). Based on our analysis of previous literature, there are reasons to expect either positive or negative signs, depending on how public debt affects the ability of people to access the financial sector.
- **Income (lnGDPPC):** Developed countries, presumably due to better infrastructure, governance, and so on, have higher levels of financial development (Demirguc-Kunt & Klapper, 2012). There is a direct relationship between financial inclusion and income. As income increases, individuals may be more likely to invest in financial institutions (Claessens & Laeven, 2003; Hauner, 2009).
- **Education (lnEdn):** The number of years of secondary school levels as a proxy for education. We expect that there is a direct link between financial inclusion and the levels of education. Individuals with higher education levels have higher financial literacy and skills, which increases their ability to access financial services (Zins & Weill, 2016).

- **Life Expectancy (InLE):** We expect a positive relationship between financial inclusion and life expectancy. Previous studies have indicated a positive link between life expectancy and saving rates. We may therefore surmise that as life expectancy improves, individuals may seek practical ways of transferring income to their old age (Datta & Singh, 2019).
- **Urbanisation (InUrb):** Urban residents typically have better access to public infrastructure than rural residents due to the benefits of agglomeration that accrue to cities (Eberts & McMillen, 1999). Hence, we expect a direct relationship between financial inclusion and levels of urbanization rates (Sarma & Pais, 2011).
- **Trade Openness (InTRADE):** We use this as a proxy for the extent of liberalization. The link between trade openness and financial inclusion is a priori ambiguous because even as external openness has been shown to have manifold benefits, as far as financial inclusion is concerned, studies have also pointed to its downsides in terms of hurting financial stability and aggravating social exclusion (Dymski, 2005; Zhang et al., 2015).

Definitions and sources of all the variables and also descriptive statistics and figures can be seen in Appendix. We consider two-year averages for the period 2004-05 to 2016-17 for all the variables as this helps in smoothing data and allows us to account for the non-availability of data for some years. The regressions use logarithmic transformations for all the variables, and the regressions account for country and time-fixed effects. Now, given the dynamic nature of the relationship, fixed effect estimators tend to be biased upwards (Nickell, 1981). This is true even when the model is transformed with the first differences because the lagged values are correlated with the error term. A usual procedure to overcome these issues is to utilize first-differenced Generalised Methods of Moments (GMM), where past values of the outcome variable are used as an internal instrument. The estimates are consistent but are not efficient since they lose out on available information. The main issue is that the lagged instruments in difference-GMM become weak in asymptotic samples and create biases in the estimation of parameters, especially where the corresponding variance is small or the sample size is limited (Alonso-Borrego & Arellano, 1999; Blundell & Bond, 1998).

To correct these biases, we use system-GMM (sysGMM), which has come to be widely applied in dynamic panel models because it considers possible solutions to the inconclusiveness created by differenced-GMM. The system-GMM estimation is usually used in cases where unobserved country-specific effects are prevalent. The methodology can also control the potential endogeneity of independent variables in a dynamic panel setting, which are typical problems in estimating panel models. In addition to the usual differenced process, the lagged first difference of the variables is used as the instrumental variables. In estimating the system-GMM, there are two methods: one-step and two-step system-GMMs. One-step GMM estimation considers independent weighting matrices, which are not dependent on the parameters. The two-step system GMM uses optimum weighting matrices to give appropriate weighting to various moment conditions through a consistent approximation of the covariance matrices. Using two-step GMM estimation for small sample data creates issues due to the estimated standard error and proliferation of instruments. Two diagnostic tests can verify the consistency of the GMM estimation. One is the Hansen (1982) test for validating the over-identifying restrictions for the validity of our instruments. Another one is the Arellano-Bond test, which validates the null hypothesis that the difference equations error term is not autocorrelated at the first-order autocorrelation (AR1) and second-order autocorrelation (AR2) (Roodman, 2009).

## RESULTS AND ANALYSIS

This section presents results for estimation through the two-step system-GMM (sysGMM) method. In Table 1, we can see the results of five reported models. As we move from one model

to another, we add additional explanatory variables that influence financial inclusion. In Model 1, it is shown that there is a negative link between financial inclusion and public debt. In other models, the coefficient ranges between -0.071 to -0.074, and these results are significant in all the models. As noted earlier previous studies which have looked at the link between financial development and public debt have provided support to the “crowding-out” hypothesis, i.e., the idea that the more the government borrows, the less there is left for the private sector (Bui, 2018; De Bonis & Stacchini, 2013; Hauner, 2009). The results here suggest that the same processes may also be at play in the context of financial inclusion. The results here do not indicate what exact channels these effects work through. For instance, it may very well be the case that this result may be driven not so much by the quantity of public debt as much as its quality, i.e., by how public debt is utilized (Salsman, 2017).

Moving on to other results, we expect per-capita income to affect finances positively, but our results suggest that the relationship between the two is more complicated (De Bonis & Stacchini, 2013).. More precisely, income positively and significantly impacts financial inclusion up to a point after which it turns negative. Of course, GDPPC loses significance from model 3 onwards, although the signs remain consistent with this hypothesis. We expect education levels to positively impact financial inclusion as literacy is essential in shaping financial inclusion (Datta & Singh, 2019; Zins & Weill, 2016). However, our results suggest a negative relationship between education and financial inclusion. This result is related to previous macro studies on returns to human capital, which have suggested insignificant, or at best, a shallow impact of human capital on growth (Benhabib & Spiegel, 1994; Pritchett, 2001). There are several reasons for this, but studies suggest that low quality of education is an important driving factor. Our results echo some of these findings of previous studies and show that the benefits of literacy may be small and even negative regarding financial inclusion. From model 3, we have added urbanization rates, and as can be seen, there is a positive coefficient on urbanization, but it is not significant in any of the models. We added the life expectancy variables in the fourth and fifth models, but the coefficients remain insignificant. In the final model, we added a macroeconomic variable: trade openness. Trade openness and financial inclusion have negative relation, but it is not significant either.

**Table 1**  
**BRANCHES AND PUBLIC DEBT WITH SYSGMM**

VARIABLES	(1)	(2)	(3)	(4)	(5)
	lnBRANCH	lnBRANCH	lnBRANCH	lnBRANCH	lnBRANCH
L.lnBRANCH	1.297*** (0.108)	1.342*** (0.094)	1.346*** (0.090)	1.335*** (0.090)	1.326*** (0.087)
lnPD	-0.106** (0.042)	-0.073** (0.034)	-0.074** (0.034)	-0.071** (0.033)	-0.073** (0.033)
lnGDPPC	0.061*** (0.022)	0.305*** (0.071)	0.257*** (0.071)	0.166 (0.151)	0.145 (0.159)
gdppc2	-0.013*** (0.003)	-0.024*** (0.005)	-0.022*** (0.005)	-0.017* (0.009)	-0.016* (0.009)
lnEdn		-0.342*** (0.095)	-0.353*** (0.094)	-0.344*** (0.094)	-0.328*** (0.090)
lnUrb			0.084 (0.066)	0.074 (0.066)	0.086 (0.069)
lnLE				0.096 (0.152)	0.102 (0.159)

lnTrade					-0.005
					(0.038)
Observations	911	721	721	711	702
AR (2)	0.780	0.883	0.888	0.874	0.877

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Source: Authors calculations.

(lnBRANCH – Log of Bank Branches, lnPD- log of Public Debt, lnGDPPC- Log of Gross Domestic Product-Per Capita Income, lnEdn-Log of Education, lnUbe -Log of Urbanisation, lnLE- Log of Life Expectancy, and lnTrade -Log of Trade)

Table 2 results for the model above are presented using an array of corrections following Gantman and Dabós (2012). Model 1 shows the results of the full model in Table 2, using robust standard errors. Model 2 shows results for the same without robust stand errors, and model 3 presents results after “collapsing” the number of instruments, thus reducing the problems arising from the proliferation of instruments (Roodman 2009). The relationship between public debt and financial inclusion in all the regressions is negative and significant in all three models.. Further, as we see in Table 1. GDP per capita income shows a positive relationship with financial inclusion in all the models, and it is insignificant as earlier. Similarly, the squared term of GDP per capita has a negative sign, and its significance is as before. Levels of education and financial inclusion have a negative and significant relationship among all three models. Urbanization is positive but significant only in model 2 (when considering without robust standard errors). Life expectancy has a positive coefficient, but like before, it is insignificant in any model. Trade openness coefficients are insignificant. There is no serial correlation nor the problem of over-identification of the models used in Table 2.

<b>Table 2</b>			
<b>ERROR CORRECTION (WITH ROBUST, WITHOUT ROBUST, AND COLLAPSED)</b>			
	(1)	(2)	(3)
VARIABLES	(With robust)	(without)	(collapse)
L.lnBRANCH	1.353*** (0.093)	1.353*** (0.073)	1.495*** (0.122)
lnPD	-0.077** (0.034)	-0.077*** (0.021)	-0.093** (0.041)
lnGDPPC	0.141 (0.166)	0.141 (0.131)	0.285 (0.211)
gdppc2	-0.016* (0.009)	-0.016** (0.007)	-0.026** (0.012)
lnEdn	-0.346*** (0.095)	-0.346*** (0.077)	-0.451*** (0.139)
lnUrb	0.087 (0.070)	0.087* (0.050)	0.101 (0.087)
lnLE	0.123 (0.167)	0.123 (0.132)	0.057 (0.209)
lnTrade	-0.011 (0.039)	-0.011 (0.029)	-0.035 (0.047)
Observations	702	702	702
AR (2)	0.903	0.902	0.942

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Source: Authors



calculations.

<b>Table 3</b>					
<b>PD- FD (PUBLIC DEBT – FINANCIAL DEVELOPMENT) WITH SYSGMM</b>					
	(1)	(2)	(3)	(4)	(5)
VARIABLES	lnBRANCH	lnBRANCH	lnBRANCH	lnBRANCH	lnBRANCH
L.lnBRANCH	1.101***	1.288***	1.299***	1.289***	1.286***
	(0.063)	(0.085)	(0.082)	(0.083)	(0.082)
PDFD	-0.013	-0.005	-0.007	-0.002	-0.001
	(0.015)	(0.025)	(0.024)	(0.024)	(0.024)
lnGDPPC	0.036***	0.263***	0.215***	0.181	0.173
	(0.012)	(0.062)	(0.065)	(0.140)	(0.150)
gdppc2	-0.007***	-0.021***	-0.020***	-0.018**	-0.017**
	(0.002)	(0.005)	(0.004)	(0.008)	(0.009)
lnEdn		-0.313***	-0.327***	-0.316***	-0.310***
		(0.086)	(0.088)	(0.086)	(0.085)
lnUrb			0.085	0.071	0.074
			(0.065)	(0.064)	(0.067)
lnLE				0.039	0.055
				(0.138)	(0.147)
lnTrade					-0.017
					(0.034)
Observations	910	720	720	710	701
AR (2)	0.770	0.824	0.829	0.819	0.849

Standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Source: Authors calculations.

To further probe the relationship, in Table 3, we check the robustness of the relationship between public debt and financial inclusion by replacing our measure of public debt lnPD with a variable that measures the relative size of public debt vis-à-vis the level of financial development. We take the difference between public debt (lnPD) and financial development (lnFD) as measured by the amount of credit to the private sector. The primary variable of interest is the difference between public debt and financial development (PDFD). The results show that the link between financial inclusion and the PDFD is negative but insignificant in all specifications. GDP per capita income is positive and significant up to model 3, and then it lost its significant levels. The squared term of GDP per capita is negative and significantly related to financial inclusion. It

shows a non-linear link between financial inclusion and per-capita income. Levels of education are significant in all the models. Urbanization and life expectancy rates have positive coefficients, but none are significant in the above models. In the last column, the coefficient on trade openness is harmful and not significantly related to financial inclusion.

In Table 3, by following De Bonis and Stacchini (2013), the entire sample is divided into two sub-samples based on the time period: one is from 2004-05 to 2010-11 (half period sample) and the other from 2004-05 to 2016-17 (full period sample). The results were like the above specification. In the half-period sample (2004-05 to 2010-11), the relationship between public debt and financial inclusion was negative and significant. This is similar to the above one. Initially, GDP per capita is positive and significant, then the squared term is negative and significant, showing a non-linear relation between financial inclusion and public debt. The results were similar in the full period sample. There is a negative and significant relationship between financial inclusion and public debt. Other variables share similar relationships as before.

<b>Table 3</b>		
<b>SUB – SAMPLES</b>		
	(1)	(2)
VARIABLES	(2004-05 to 2010-11)	(2004-05 to 2016-17)
L.lnBRANCH	1.411*** (0.157)	1.326*** (0.087)
lnPD	-0.064** (0.029)	-0.073** (0.033)
lnGDPPC	0.348** (0.160)	0.145 (0.159)
gdppc2	-0.028*** (0.010)	-0.016* (0.009)
lnEdn	-0.434*** (0.140)	-0.328*** (0.090)
lnUrb	0.089 (0.081)	0.086 (0.069)
lnLE	0.008 (0.133)	0.102 (0.159)
lnTrade	-0.055 (0.034)	-0.005 (0.038)
Observations	361	702
AR (2)	0.413	0.124

Standard errors in parentheses. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1. Source: Authors calculations.

## CONCLUSION

Previous studies have analyzed the effects of public debt on various outcomes. A strand of analysis has looked into the public-debt finance relationship, but most, if not all, of this literature, has focused on the impact of debt on financial development. In contrast, this paper has sought to statistically analyze public debt's effect on financial inclusion. Using a dynamic panel data model for a sample of 145 countries, the study suggests that public debt has an indirect link with financial inclusion and that this link is robust across specifications. This result aligns with previous studies that have indicated the possibility that public debt “crowds out” private activity. More significant levels of public debt are likely to draw out resources from the financial sector, increase interest

rates and reduce availability and access to loans. It may also be the case that the negative relationship between public debt and financial inclusion may result from the unproductive nature of expenditures more than the quantity of public debt itself. In developing countries, in particular, globalization of capital flows has gone hand in hand with increases in domestic interest rates. Public debt has often just been used to cover the interest component of past debts rather than to cover investments, capital, infrastructure, and so on. Therefore, political economy channels through which public debt and the financial sector interact may also be crucial.

## ENDNOTES

<sup>1</sup>Award ceremony speech. NobelPrize.org. Nobel Prize Outreach AB 2021. Fri. 17 Sep 2021. <https://www.nobelprize.org/prizes/peace/2006/ceremony-speech/>

<sup>2</sup><https://www.worldbank.org/en/topic/financialinclusion/overview>

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**Received:** 11-Jun-2025, Manuscript No. AMSJ-25-15997; **Editor assigned:** 12-Jun-2025, PreQC No. AMSJ-25-15997(PQ); **Reviewed:** 10-Jul-2025, QC No. AMSJ-25-15997; **Revised:** 25-Jun-2025, Manuscript No. AMSJ-25-15997(R); **Published:** 30-Jul-2025