

## **Responses to the Referee Report 1**

Manuscript No. 2019-11

Manuscript title: The effects of income and inflation on financial development: Evidence from heterogeneous panels.

Dear Editor,

Thank you for the opportunity given to us to revise our paper. We appreciate the insightful comments of the reviewer, which are fundamental to improve the quality of the manuscript. We addressed the comments point-by-point as follows:

### **Referee Report 1**

The paper studies the effects of income level and inflation on financial development, measured by two proxies, credit to the private sector relative to GDP and liquid liabilities relative to GDP. It is overall done well but in my view creating a better connection between the economics and the econometrics would be important.

The introduction of the paper is well-written, laying out three channels through which effects may arise. Here, they should already define what they mean by financial development. The term captures a number of different issues, among them growth of credit. It however also covers other aspects that go beyond the mere volume of credit. The World Bank calls these “access”, “efficiency”, and “stability”.

Even within “depth”, which you proxy, there may be some reverse causality. For example, if the central bank increases the money supply, there is likely to be more credit, more inflation and more private sector credit relative to GDP. You should discuss (1) what drives the proxies you use in addition to the drivers that you study in your model and (2) whether these cause any empirical problems for your approach or why your approach can deal with them.

The authors write that knowing in which countries there is a relationship between income/inflation and financial development is important. They however do not discuss the findings of their estimations in any detail so far. Are there no interesting patterns to discuss? Average inflation in low and middle income sample is over 50 percent p.a., which must be driven by countries that experience hyperinflation. Could that be an interesting subgroup?

You suggest one should use policies to reduce inflation. Any suggestions which could do so without also reducing financial development (according to your proxies) directly?

## **Responses:**

First, we add footnote No. 4 on page 5 to explain the connection between the economics and the econometrics of our study as follows:

“Our econometric model is consistent with the finance literature, where financial development is specified as a function of GDP, inflation and other control variables (e.g. Baltagi et al., 2009; Kim & Lin, 2010; Law & Habibullah, 2009). Theoretical economic literature opined that an increase in GDP has the capacity to enhance financial development since it enables households and firms to increase their demands for financial products, services, intermediaries and institutions. To meet these increased demands, the financial sector embarks on innovations and technology which facilitate the development of the sector (Gozgor, 2015; Huang & Lin, 2009; Peia & Roszbach, 2015). Similarly, theoretical literature asserted that high and volatile long-term inflation is deleterious to financial development, while low and stable inflation enhances financial deepening. Hence, countries that have higher inflation rates are likely to have less efficient financial markets due to the higher interest rates that accompany higher inflation (Boyd & Smith, 1998; Huybens & Smith, 1999). Moreover, the econometric results of this study are consistent with the economic literature, as GDP enhances financial development, while inflation impedes it. Finally, the economic implication of the econometric results is that countries could accelerate the development of the financial system by increasing GDP and reducing the inflation rate.”

Second, we add explanation on the meaning of financial development on page 2 as follows:

“Conceptually, a financial system is considered developed when it can efficiently and effectively perform the resource mobilization and allocation functions aimed at promoting capital accumulation, productivity improvement and economic growth (Levine & Zervos, 1998). Levine (2005) noted that financial development occurs when financial markets, intermediaries and instruments eliminate or reduce the effects of information, transaction and enforcement costs, and effectively provides the major functions of the financial system. Such functions include mobilizing and pooling savings; easing the exchange of goods and services; facilitating the trading, diversification, and management of risks; monitoring investments and implementing corporate governance after providing capital; and producing information concerning possible investments. Besides, Sahay et al. (2015) opined that financial development comprises the depth (market size and liquidity), access (individual's ability to access financial services) and efficiency (institution's ability to offer financial services at minimum cost with sustainable income). In measuring financial development, the depth, access, and efficiency of the system are considered, and factors that enhance (inhibit) any of these aspects could promote (hinder) financial development.”

Third, we rephrase the paragraph on page 6 regarding our proxies for financial development as follows:

“This study employs the preferred and most commonly used proxy of financial development in the finance literature namely domestic credit to private sector relative to GDP (see Arcand et al.,

2015; Baltagi et al., 2009; Beck et al. 2000; Ehigiamusoe & Lean, 2018; Kim & Lin, 2010; Law & Habibullah, 2009; Law et al., 2018; Levine et al., 2000). It measures the credits issued by the banking institutions to the private sector and excludes credits issued to governments, its agencies, public enterprises as well as credits issued by the central bank. As a complement, we use liquid liabilities relative to GDP which measures financial depth and the overall size of the financial intermediary sector relative to the size of the economy. It is the addition of currency, demand and interest-bearing liabilities of both banks and non-bank financial institutions. It consists of broad money supply plus commercial paper, travelers' checks, foreign currency time deposits, and shares of mutual funds or market funds held by residents as a ratio of GDP (see WDI, 2016). Liquid liabilities relative to GDP is more concerned with the capacity of the financial system to provide transaction services rather than the capacity to channel funds from savers to borrowers (see Khan & Senhadji, 2003). Basically, the main drivers of credit to private sector and liquid liabilities include real GDP (economic activity), real interest rate, real property prices, institutions, inflation, financial and trade openness (Baltagi et al, 2009; Bzhalava, 2014; Habibullah & Law, 2009; Hofmann, 2001; Kim & Lin, 2010). For instance, an increase in real economic activity, real property prices, institutional quality, financial and trade openness enhance credit to private sector, whereas an increase in real interest rate and inflation rate impede credit to private sector. These drivers of the proxies of financial development do not cause any empirical concern in the approach employed in this study.”

Regarding the issue of reverse causality, we rephrase the paragraph on page 8 as follows:

“Financial development (proxied by domestic credit to private sector relative to GDP and liquid liabilities relative to GDP) could have a potential impact on GDP growth (reverse causality), while there could also be a potential simultaneity or endogeneity between financial development and GDP or inflation. To address these issues, we employ the dynamic panel system Generalized Method of Moments (GMM) estimator proposed by Arellano and Bover (1995), and further extended by Blundell and Bond (1998). This estimator can also control for country-specific effect, endogeneity, autocorrelation, among others (see Arellano & Bover, 1995; Baltagi et al., 2009; Beck et al. 2000; Blundell & Bond, 1998; Law et al., 2018; Levine et al., 2000). The system GMM estimator combines the difference equation and level equation, as well as uses additional moment conditions as instruments. Since financial development, GDP and inflation rate are quite persistent, system GMM is appropriate for this study.”

Fourth, we add more discussion to show the pattern of our findings on page 15 as follows:

#### **4. Discussion and Policy Implications**

“The findings of this study are summarized as follows: First, GDP enhances financial development in high income and middle-income countries while the effect is insignificant in low-income countries. This finding is consistent with some previous studies (e.g. Baltagi et al., 2009; Bittencourt, 2011; Kim & Lin, 2010; Law & Habibullah, 2009) who reported a significant positive impact of GDP on financial development. Robinson (1952) also posited that GDP growth facilitates the development of the financial sector because "where enterprises go finance follows. However, this current study has advanced the extant literature by showing that the level

of income is important in determining the impact of GDP on financial development. For instance, the average GDP in low-income countries during the 1981-2015 period was only USD572.38 compared to USD3970.20 and USD30323.22 in middle income and high-income countries, respectively. This suggests that the expansion of the economy probably engenders firms and households to demand more financial services, products, instruments, and institutions, which prompts the financial system to respond positively through expansion to satisfy this higher demand. Hence, at the early stage of economic development, GDP has a negligible impact on financial development probably because of the low demand for financial products and services. But as the economy achieves a higher income level, the impact of GDP on financial development becomes more apparent.

Second, inflation has a deleterious effect on financial development in middle income and low-income countries, while the effect is insignificant in high-income countries. Also, inflation has a negative effect on financial development in high and medium inflation countries but an insignificant effect in low inflation countries. This result could be due to the high level of inflation rate in middle income and low-income countries compared to high-income countries during the period. For instance, the average inflation rates were 56.66% and 51.59% in middle income and low-income countries, respectively compared to 6.49% in high-income countries. This finding is consistent with some studies (e.g. Bittencourt, 2011; Boyd et al., 2001; Kim & Lin, 2010) who documented a negative impact of inflation on financial development. Theoretical literature opines that high and volatile long-term inflation is repugnant to financial development, whereas low and stable inflation aids the deepening of the financial sector. High and persistent inflation reduces the returns on savings thereby decreasing savings and savers, and causing credit scarcity in the economy (Bittencourt, 2011). Countries with higher inflation rates are also likely to have less efficient financial markets due to the higher interest rates that accompany higher inflation (Boyd & Smith, 1998; Huybens & Smith, 1999). Hence, we conclude from the above results that inflation is only detrimental to financial development when the inflation rate is high.

Third, apart from the direct deleterious effects, the inflation rate also has an indirect adverse effect on financial development via GDP in middle income and low-income countries. In other words, inflation negatively influences the effect of GDP on financial development, as the marginal effect of GDP on financial development declines as the inflation rate rises. This implies that GDP has a higher impact on financial development at a lower level of inflation compared to a higher level of inflation. This is consistent with some empirical studies which showed that the impact of inflation on financial development depends on the threshold level of inflation (Boyd et al., 2001; Khan et al., 2006). For instance, Boyd et al. (2001) argued that inflation has a negative effect on financial development when the rate exceeds a threshold level of 15% percent. In our study, the average inflation rates during the 1980-2015 period were 56.66% and 51.59% in middle income and low-income countries, respectively.

Fourth, although there is no robust evidence of a non-linear relationship between GDP and financial development in the heterogeneous panels, the study reveals a non-linear relationship in 77 countries (with an inverted U-shaped relationship in 39 countries, and U-shaped relationship in 38 countries). For the countries with an inverted U-shaped relationship, greater income will increase financial development while the reverse is the case in countries with an inverted U-shaped relationship.

Finally, the pattern of our findings shows that GDP enhances financial development in countries with high-income level, whereas inflation has direct and indirect deleterious effects on financial development in countries with a high inflation rate. Our finding was not driven by countries with hyperinflation since we categorized the countries into panels based on their levels of inflation.

Regarding the policy implication of the study, we rephrase the paragraph on page 16 as follows:

“This study has some fundamental policy implications. First, low-income countries should formulate policies and programmes that can accelerate real GDP with a view to boosting the development of the financial sector. Such policies should accelerate capital accumulation and productivity growth which are the sources of economic growth. It may be necessary to facilitate the development of physical capital, human capital, infrastructure and institutions which are fundamental for economic growth. These are essential because as countries move from low income to high income, the beneficial effects of GDP on financial development increases while the adverse effects of inflation rate declines. Second, countries that have high inflation rate (especially low income and middle-income countries) should employ the appropriate policies to reduce the inflation rate in order to enhance financial development. The negative impact of inflation on financial development suggests that policies aimed at reducing inflation will enhance the development of the financial system. In this regard, countries should employ the necessary fiscal policy instruments (e.g. government expenditure and taxation) and monetary policy instruments (e.g. open market operations) to control inflation. These policies can control inflation without harming the financial sector.”

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Yours truly,

Kizito Uyi Ehigiamusoe (Corresponding Author)