Full length article

Assessing the direct effect of financial development on poverty reduction in a panel of low- and middle-income countries

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ARTICLE INFO

ABSTRACT

This paper empirically assesses the directly contribution of financial development to poverty reduction in 67 low- and middle-income countries over the period 1986–2012. The main goal of the paper is to identify and quantify the channels through which financial development affects poverty. The results obtained suggest the important contribution of financial development to the reduction of poverty, and this, independently of the econometric techniques used. On the other hand, instability related to the financial development would penalize the poor population and would annihilate the positive effects of financial development. The final battery of tests is motivated by the issues of overidentification and weak instruments in system-GMM estimator. The results show the validity of the exclusion restrictions and the absence of instrument proliferation. Also, they may call into question the pro-poor public investment policy in low- and middle-income countries.

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1. Introduction

The battle against poverty is considered as one of the main objectives of the development policies and strategies. Consequently, international institutions such as World Bank, IMF, OECD, etc. direct their policies and efforts toward the reduction of poverty.

It is largely allowed that the economic growth is one of the engines intervening in the reduction of poverty. However, it should be stressed that in some countries the benefit of the growth are reduced or destroyed by the increase in inequalities. Indeed, many factors which are considered by the literature as affecting the economic growth, such as macroeconomic stability, economic and trade openness, public expenditure, legal rules and civil liberty, political stability, financial development etc., can also influence the share of the income of the poor in the national income. Regarding financial development, an extensive literature shows that even if it boosts the growth rate of aggregate per capita GDP, this does not necessarily

imply that it helps the poor. Financial development can increase average growth only by increasing the incomes of the rich and hence by increasing income inequality, then financial development will not help those with lower incomes.

The objective of the international community is to make the economic growth more favorable to the poor (the pro-poor growth), and thus due to specific public interventions, in the fields of health, education and productivity in the rural areas (Dollar and Kraay, 2002). The supply of financial services adapted to the poor occupies a dominating place in this strategy.

Stiglitz (1998) likens the financial system to the "brain" of the economy, performing the task of allocating resources across space and time in an environment of uncertainty. From this point of view, the financial development can contribute directly to the reduction of poverty by improving deposit and credit facilities offered to the poor and by optimizing resources allocation. Thus, the contribution of the financial development to the growth is exerted, on the one hand, through the influence exerted by the financial system on the intensity of exchanges and trade and, on the other hand, through the volume and the quality of the investment by the allocation of capital to their most productive uses. The effective utilization of domestic resources is crucial for generating economic growth and reducing poverty.

Some economic models, therefore, show that financial development reduces poverty directly, by disproportionately relaxing credit constraints on the poor by offering better and cheaper services for saving money and making payments, and indirectly, by improving the allocation of capital and accelerating growth.

Theoretically, the indirect effect of the financial development on poverty was studied in a dichotomous way. A first set of works finds a positive correlation between the financial development and the economic growth (King and Levine, 1993; Levine, 1997; Khan and Senhadji, 2000; Levine, 2004; Federici and Caprioli, 2009; Kabir et al., 2011; Barajas et al., 2013, etc.). A second one however finds an increasing relation between the evolution of the average income and the income of the poor (Ravallion, 2001; Bruno et al., 1998; Dollar and Kraay, 2002; Norton, 2002). Financial development produces faster economic growth, but it has been unclear whether it also shrinks poverty. Researchers have not determined whether financial development benefits the whole population, whether it primarily benefits the rich, or whether it disproportionately helps the poor. The impact differs across regions, income levels, and types of economy (developed vs. developing).

The credit belongs to Jalilian and Kirkpatrick (2005), Kpodar (2006), Honohan (2004), Beck and Levine (2004) who were the first to be interested by explaining the direct and indirect impacts of the financial development on poverty.

Many other studies have attempted to provide a theoretical and empirical explanations of a such relationship (Beck et al., 2007a; Honohan and Beck, 2007; Odhiambo, 2009, 2010a,b; Zhuang et al., 2009; Jeanneney and Kpodar, 2011; Jahan and McDonald, 2011; Khan et al., 2012; Uddin et al., 2014 among others). The main conclusions from these studies are that the deepening and the development of the financial sector lead to a reduction in inequality and poverty.

In an interesting paper, Odhiambo (2009) has shown that financial development contributes to poverty reduction in many ways. First, it can improve the access of the poor to formal finance by addressing the causes of financial market imperfections such as informational asymmetries, transaction costs, and contract enforcement costs (Stiglitz, 1998). These credit constraints will impede the flow of capital to poor individuals with high-return projects. Second, financial development enables the poor to draw down accumulated savings or to borrow money to start microenterprises, which eventually leads to wider access to financial services, generates more employment and higher incomes and thereby reduces poverty. Finally, financial development may trickle down to the poor through its influence on economic growth. This is because of the implied positive relationship between financial development and economic growth. According to the trickle-down theory, Aghion and Bolton (1997) have shown that as more capital is accumulated in the economy more funds may be available to the poor for investment purposes. This could contribute to the reduction of poverty. The trickle-down theory has been widely supported by many studies such as Fan et al. (2000), Ravallion and Datt (2002), Norton (2002) and Dollar and Kraay (2002), among others.

According to Zhuang et al. (2009) the most important channel through which financial sector development directly affects poverty is increased access to financial services. These services facilitate transactions, cut the costs of remitting funds, and provide the opportunity to accumulate assets and smooth incomes. Financial services can also help firms and households cope with economic shocks reducing their vulnerability to adverse situations, thus mitigating the risk to fall into poverty (Claessens and Feijen, 2006).

In this context, this paper empirically examines the direct effect of financial development on poverty reduction for a panel of 67 low- and middle-income countries over the period 1986–2012 using system GMM regressions. This issue is of importance for developing economies given the role of financial sector in mobilizing and allocating savings into productive investments. Furthermore, while they have much lower levels of financial depth, the low- and middle-income countries are experiencing financial deepening at rates far faster than higher-income countries. Over the period 2004–2009, cumulative average growth of private credit-to-GDP ratios in low- and middle-income countries was about 63% comparing with 33% for all other income groups (Jahan and McDonald, 2011).

This paper contributes to the literature in several ways. First, it tries to capture the direct effect of the financial development on poverty reduction. Second, it examines in particular the role of financial instability. Third, it looks specifically at low- and middle-income countries reaching more conclusive results on the role of financial development to poverty reduction.

Finally, it takes into account the problems of instrument proliferation, weak instruments and underidentification introduced in the literature by Roodman (2009a).

The remainder of the paper is organized as follows. Section 2 outlines the literature review of the relationship between financial development and/or financial instability and poverty. The data and the underlying methodology are introduced in Section 3. Section 4 reports and discusses empirical findings and Section 5 concludes the paper.

2. Related literature

The theoretical and empirical literature on the effects of financial development on poverty is quite small when compared with that on financial development and economic growth. According to the theoretical literature on the poverty issue, we see that the majority of work examines the impact of economic growth on poverty. However, few studies examine how financial development directly reduces poverty.

2.1. Financial development–poverty nexus

Stiglitz (1998) consider that market failure is one of the fundamental causes of poverty in developing countries. Financial market imperfections often prevent the poor from borrowing against future earnings to invest. According to the author, addressing the causes of financial market failure, particularly asymmetric information and high fixed costs of small scale lending, it is possible to improve the opportunities of the poor to access formal finance. In this context, the World Development Report has stressed that improving the poor's access to financial services[1], particularly to credit and insurance-against-risk services, strengthens the productive assets of the poor, enhances their productivity, and increases the potential for reaching sustainable livelihoods (World Bank, 2001). However, there is a major difficulty regarding access to financial services. Based on this difficulty, the existing literature has identified two direct effects of financial development on poverty: the capital conduit effect and the threshold effect.

The *capital conduit effect* was developed by McKinnon (1973) which consider an economy with a lack of organized financial markets and the absence of a distinction between savers and investors. These characteristics are consistent with economies of most developing countries where investors are themselves savers. The financial system is characterized by the weakness or the absence of external funding, which encourages agents, in particular the poor, to focus on the accumulation required in the form of real assets or as cash monetary, in order to achieve coverage of private investment spending. This is to achieve a great deal of self-financed investments to total investments. And, on the basis of self-financing, there is complementarity between money and real assets, due to the parallel increase in real yields of money detention on the one hand, and the incentives to invest on the other hand. This means that real yields of money increase, which encourages the poor to hold money and therefore a large part of investment, will be self-financing. This effect reflects the concept of money as a "capital conduit" (Kpodar, 2006).

In the same context, McKinnon explained that the reserves of money are essential to capital formation. Thus, liquid savings and capital accumulation vary in the same direction. We note therefore the importance of a developed financial system in providing opportunities for deposits and financial services to all economic agents, particularly for the poor in order to diversify self-financing possibilities. If the poor finds that holding money is more attractive, the opportunity cost of saving is automatically reduced and therefore the McKinnon capital conduit was amplified and financial development does not contribute to the poverty reduction.

The *threshold effect* was deduced from the direct relationship between financial development and poverty based on the following hypothesis: "As the financial system develops, it may extend its services to the poor". In other words, in order to facilitate the access of the poor to financial services, it is necessary that the financial system reaches a threshold level of efficiency and competitiveness in providing services to poor.

In the case of developing countries, the poor face many constraints blocking their access to formal credit markets and/or limiting their access to financial services. These factors concern the lack of adequate guarantees, the existence of physical constraints, and the lack of financial institutions specialized in providing financial services to the poor.

The development of the financial sector can comfort the credit constraints hitherto faced by poor and underprivileged limiting their abilities to undertake productive investment. The better access to credit constitutes a real opportunity to the poor to participate in more productive activities, increasing their incomes and their consumption spending and improving thereby their welfare. However, finance can have an unbearable impact on the poor if access to credit is limited to wealthy households decreasing thereby the income of the poor (Greenwood and Jovanovic, 1990).

Another way by which financial development can directly affect poverty has been developed by Rajan and Zingales (1998) and is related to the abilities of bigger and more powerful financial intermediaries to bear the costs of small credits. According to Chigumira and Masiyandima (2003) the marginal cost of lending to the poor and SMEs is higher than that of lending to the rich and large businesses. SMEs are considered as the most obvious hunting ground for poverty reduction in less developed countries because they are employment intensive, and job creation is important in poverty reduction.

2.2. Financial development, financial instability and poverty

The same mechanism through which financial development reduces poverty also makes financial development susceptible to shocks impeding, ultimately, either directly or indirectly, its role in poverty reduction. So, financial instability hurt individuals both directly and indirectly.

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[1] Such as loans, deposits, insurance, money transfers, etc.

Directly it hurts poor population more as compared to rich, because they are unable to diversify their risk by investing in foreign banks and as they have less power of negotiation (McKinnon, 1973).

Indirectly; financial system instability hurts poor by way of growth. Financial instability reduces fund available for investment and therefore it further affects the growth rate (Ramey and Ramey, 1995). Financial instability also affects real exchange rate because the tradable goods are directly related to credit level (Jeanneney and Kpodar, 2006). Likewise, Jeanneney and Kpodar (2008) point out that financial instability hurts the poor and partially offsets the benefits of financial development.

In a more recent study, Jeanneney and Kpodar (2011) suggested that the poor benefit primarily from the ability of the banking system to facilitate transactions and provide savings opportunities rather than reaping the benefit of greater access to credit. They also show that financial development promotes financial instability and the poor do not benefit from the greater availability of credit.

Finally, financial instability is considered as disrupting financial system leading to the instability in investment and exchange rates which consequently influence unfavorably economic growth, aggravating as a result the vulnerability of the poor (Minsky, 1982).

2.3. Empirical literature

A number of empirical studies examining a more direct relationship between financial sector development and poverty reduction provide mostly inconclusive results. Thus, the main empirical works selected are those of Jalilian and Kirkpatrick (2005), Kpodar (2006), Beck et al. (2007a), Honohan and Beck (2007), Beck et al., 2007, Odhiambo (2010a,b), Perez-Moreno (2011), Khan et al. (2012) and Uddin et al. (2014).

In their empirical study, Jalilian and Kirkpatrick (2005) have attempted to examine the causal link between financial development, economic growth and poverty. The main issue in this study concerns the indirect effect of financial development on poverty. The authors concluded that an exogenous 1% point increase in the financial development indicator leads to an improvement of 0.4% point in the income of the poor people in developing countries. In addition to the indirect effect (through growth) of financial development on poverty, Kpodar (2006) has studied the direct effect. The results confirm the hypothesis that financial development contributes positively to the reduction of poverty. Thus, an increase of 1% point in the financial development indicator induces a 0.28% point decrease of the poverty rate.

Beck et al. (2007a) have shown that financial development disproportionately boosts incomes of the poorest quintile and reduces income inequality. They emphasize that financial development is associated with a drop in the fraction of the population living on less than $ 1 a day, a result which holds when conditioning on average growth, emphasizing thus the importance of the financial system for the poor.

In another study, Beck et al. (2007b), argue that firms' and households' access to financial services rises with financial development. A more developed and inclusive financial system facilitates transactions, reduces the costs of remitting funds, and provide the opportunity to accumulate assets and for income smoothing. Similarly, Honohan and Beck (2007) suggested that financial depth is indeed conducive to poverty reduction, so that deep financial system also seems to have a lower incidence of poverty than others at the same level of national income.

Otherwise, Odhiambo (2010a) found that financial development Granger causes domestic savings and hence poverty reduction in Kenya. Using a similar approach, Odhiambo (2010b) investigated intertemporal causality between financial development and poverty in the case of Zambia. The causality results matter with the measure of financial development. Once measured by domestic credit to private sector as share of GDP, the financial development causes poverty reduction, but it is caused by poverty reduction once M2/GDP is the proxy.

In a more recent study, Perez-Moreno (2011) analyzed the causal relationship between financial development and poverty reduction using data for 35 developing economies. He found unidirectional causality running from financial development to poverty reduction but reverse is not valid.

Khan et al. (2012) reinvestigated the impact of financial development on poverty reduction by using several indicators of financial development such as M2/GDP domestic credit to the private sector and domestic money bank assets. The results are sensitive to the use of econometric methodology and proxy of financial development but overall results suggest that financial development reduces poverty.

Finally, Uddin et al. (2014) investigated the relationship between financial development, economic growth and poverty reduction in Bangladesh using ARLD bounds testing approach to cointegration. The results support the existence of a long-run relationship between financial development, economic growth and poverty reduction. Financial development helps to reduce poverty, but its effect is not linear.

2.4. Rather than the size, it's the ability of the financial system. . .

Following this literature review, we can emphasize that all the above works take a macro-view of financial development by considering only the size of the financial system. However, and as documented in the literature, rather than size, the ability of the financial system to fulfill its various functions would matter more and more for economic development and thereby for poverty reduction. These works include, among others, Mookerjee and Kalipioni (2010), Kabir et al. (2011), Gimet and Lagoarde-Segot (2011, 2012), and Lagoarde-Segot (2013).

To determine the relationship between financial access and income inequality, Mookerjee and Kalipioni (2010) employ a "financial penetration measures" as a proxy for financial access to financial services and financial development. These measures are more micro focused in order to better capture how financial development impacts income inequality. Empirical results support the idea that the so called micro based measures such as greater access to bank branches and therefore banking services have positive effects on income distribution and therefore considered as pro-poor.

The study of Kabir et al. (2011) seeks to determine the nature of the relationship between financial development and economic growth in low- and middle-income countries. Their results support the existence of short-run two-way causality between the two variables and one-way strong long-run linkages between them. Moreover, rather than their sizes, well-functioning financial systems seem to catalyze production and boost economic growth.

From another side, to capture the relationship between financial development and income distribution, Gimet and Lagoarde-Segot (2011) estimate a panel Bayesian S-VAR model for 49 countries over the period 1994–2002. The authors use a novel approach including the specific channels linking capital markets, banking sector and income inequality. The merits of this study consists at demonstrating that while the financial sector development significantly impacts the income distribution, the relationship depends more and more on the features of banks and capital markets. Thus, the efficiency, the strength and the international integration of banks and financial markets matter more than their sizes.

Using a panel of 138 countries over the period 2002–2009, Gimet and Lagoarde-Segot (2012) analyze the determinants of both macro- and micro-level access to finance using panel VECM and GMM techniques. They show that rather than the size of financial system, its ability to fulfill its various functions matters more in enhancing economic development. Thus, promoting financial market development, fostering interbank competition and developing macroprudential rules and constitute the main policies to develop competitive and stable financial systems improving thereby the financial inclusion of the poor.

In the same order of ideas, Lagoarde-Segot (2013) tests whether the increases in stock market size (measured by the market-level liquidity) affect the financing conditions of firms in emerging markets namely in the Tunisian Stock Exchange (TSE). He develops time varying liquidity scores for all listed firms and demonstrates that increased market size does not necessary contribute to a better functioning of the TSE and did not improve the firm-level liquidity, limiting thereby the firm's access to finance.

3. Methodology and data

This section is devoted to an econometric study of the impact of financial development on poverty. For this reason, we test an econometric model on a panel of 67 low- and middle-income countries[2] over the period 1986–2012. This time period has been chosen because, in the 1980s, many financial systems in developing countries started to develop as they were freed from government regulations (Pill and Pradhan, 1997).

3.1. Model and variables

We assume, initially, that financial development has a positive impact on economic growth. Then, thanks to the McKinnon conduit effect, we assume that financial development has a direct and positive effect on the incomes of the poor. However, in regions where financial instability is associated with financial development, it has a negative effect as well on the economic growth as on poverty reduction, which reduces the positive effects of financial development.

The specification adopted indicates that the average per capita income of the poorest countries is explained by the level of real per capita GDP, the level of financial development and its instability, and a vector of control variables.

According to the literature cited above, the baseline specification is:

$$\text{Pov}_{it} = \beta_0 + \beta_1 \text{Pov}_{it-1} + \beta_2 \text{LogGDP}_{it} + \beta_3 \text{FD}_{it} + \beta_3 \text{FI}_{it} + A'X_{it} + u_i + \vartheta_t + \varepsilon_{it} \tag{1}$$

Pov is the poverty indicator, GDP is the gross domestic product per capita, FD is the level of financial development, FI represents the level of financial instability, X_{it} is a vector of control variables namely: inflation rate, trade openness, financial openness, etc. u_i unobserved country-specific effect, ϑ_t time-specific effect, ε_{it} the error term, i the individual dimension of the panel (country), t the temporal dimension.

Several additional specifications are also considered. On the one hand, the aim of the first specification is to test whether the beneficial effect of liquidity and credit levels on the poor is conditional on the level of economic development or the access to the banking system (columns 1 to 4), captured also by the interaction between the financial development indicator and bank concentration as a proxy of access to the banking system (column 9). These specifications allow us to confirm whether the McKinnon conduit effect is the most relevant.

On the other hand, the introduction of the initial level of the poverty indicator in the model (Log of the initial income of the poorest 20%), consist at testing the existence of a potential convergence effect as in Beck et al. (2007a). It aims at assessing whether countries with initial high poverty levels are likely to reduce poverty faster than those with initial low levels (column 5).

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[2] The list of the countries is in Appendix A.

Table 1
Definitions and sources of variables.

Variables	Sources	
Poverty indicators	The income of the poorest quintile (Log of mean income of the poorest 20%)	Dollar and Kraay (2002)
	Poverty gap: The average shortfall of the poor with respect to the poverty line, multiplied by the headcount ratio	World Bank Global Poverty Index Database, World Bank 2014
Log of real GDP per capita	Log of GDP per capita based on purchasing power parity (PPP), constant 2000 US $.	World Development Indicators, World Bank 2014
Financial development indicators	Private Credit by Deposit Money Banks to GDP Liquid liabilities as a percentage of GDP: M3/GDP. M3 is defined as currency plus demand and interest-bearing liabilities of banks and other financial intermediaries	
	Bank concentration: total assets of the three largest banks in each country to total banking sector assets	Financial Structure Dataset, World Bank 2014
Financial instability	The most common indicator of instability is the standard deviation of the considered variable	Author calculations
Control variables (macroeconomic and institutional framework)	Inflation rate: growth of the Consumer Price Index Government consumption/GDP Trade openness: (exports + imports)/GDP Financial openness Sum of short and long term private debts, publicly or not guaranteed, divided by GDP	World Development Indicators, World Bank 2014
	Civil liberty index	Freedom House database

Finally, specifications with indicators for economic growth and its volatility, and inflation volatility are introduce (columns 6, 7 and 8) to check whether the detrimental impact of financial instability on the poor results from the fact that they disproportionately bear the cost of economic crises and inflation variability.

Finally, as microeconomic studies have identified some important determinants of poverty, we introduce government consumption, trade openness and civil liberties to check the robustness of results.

3.2. Definition and sources of data

To conduct our analyses, we need measures of financial development and poverty. We explain more these interest variables in the text below, and then Table 1 includes the definitions of all variables and their corresponding sources.

3.2.1. Financial development

The variables measuring financial development used in our study are the ones commonly found in the empirical literature: the ratio of domestic credit provided by banking sector relative to GDP, the ratio of domestic credit to the private sector relative to GDP, the ratio of bank liquid reserves relative to bank assets, the ratio of market capitalization relative to GDP, etc. Note that a few superficial data on the stock and bond markets and insurance companies in some low- and middle-income countries are insufficient to conduct empirical studies on these sectors. The non-inclusion of such variables can be explained by the fact that financial systems of the majority of low- and middle-income countries are dominated by banking activity (bank-based financial systems). Financial markets are much more developed in developed countries; therefore, the level of financial development should not be measured by the same indicators in both types of countries. Moreover, in this type of countries banks are more likely to identify profitable investments, monitor managers, facilitate risk management, and mobilize savings. Such services prove to be particularly beneficial for less developed countries (Gambacorta et al., 2014).

For these reasons and in order to rely on commonly used measures of financial development that are robustly related to economic growth, we use only conventional variables to measure the banking sector development; especially we use private credit by deposit money banks to GDP, liquid liabilities to GDP and bank concentration. Private credit/GDP expresses the value of credits granted by financial intermediaries to the private sector as a share of GDP. It comprises credit to private firms and households from banks and non-bank financial intermediaries. This indicator is a good proxy variable for the extent to which private sector agents have access to financial intermediation or access to loans. M3/GDP, the liquid assets of the financial system as a share of GDP, is related to the ability of financial systems to provide transaction services and saving opportunities. It is generally used to test for the McKinnon conduit effect described in Section 2.

Finally, the bank concentration is measured by the ratio of total assets of the three largest banks in each country to total banking sector assets. This variable captures the degree of concentration in the banking industry. Empirical evidence on low- and middle-income countries shows that bank concentration is a significant determinant of financial development. In our analysis, we use it to detect the interactional effect between the activity of the banking sector and the coverage rate of banking.

3.2.2. Poverty

In many developing countries a major shortcoming of the poverty analyses is that time series data are very limited and cover far fewer years. A number of indicators for measuring poverty have been proposed in the literature such as the Gini coefficient, the annual per capita income, the rate of population living within 1 or 2 $ per day. These series do not extend over the entire period from 1986 to 2012 and for all the countries of our sample. Also, they are not without critics. As an example, the annual per capita income does not take into account other dimensions of poverty. For these reasons we use two indicators measuring the poverty level, the income of the poorest quintile and the poverty gap. The first measure is defined as the average per capita income of the poorest 20% of the population. The poverty gap takes into account the distance of the poor from the poverty line. This measure characterizes how far below the poverty line lies the average income of the poor and provides some sense of distribution. This indicator captures a decrease or increase in the income of the poor even when it does not cross the poverty line.

3.2.3. Financial instability

We assume that there is a positive correlation between financial development and financial instability which, in turn, negatively impacts poverty. To estimate the effect of financial instability on poverty, we use an indicator of instability which is generated from the respective series of financial development indicators. The most common indicator of instability is the standard deviation of the considered variable.

3.3. Econometric methodology

In panel estimation, neither the generalized least squares estimator nor the fixed effect estimator will produce consistent estimates in the presence of dynamics and endogenous regressors (Baltagi Badi, 2009). Arellano and Bond (1991) and Arellano and Bover (1995) have proposed a dynamic panel generalized-methods-of-moments (GMM) estimator to take into account country-specific effects and control for endogeneity, measurement errors, and omitted variables in the OLS regressions[3].

The standard approach consists at estimating the baseline specification (Eq. (1)) in first differences, using previous lags of the explanatory variables as instruments. The system GMM is based on the idea that additional moment conditions can be introduced by adding the level equations to the first-differenced equations and using lagged differences of the explanatory variables as instruments for the level equations (Bond et al., 2001). In other words, the system GMM estimator combines the previous set of equations in first differences with suitable lagged levels as instruments with an additional set of equations in levels with suitably lagged first differences as instruments. Blundell and Bond (1998) have established from Monte Carlo simulations that this difference estimator may not perform well when there is persistence in the lagged dependent variable and that the system GMM, initially proposed by Arellano and Bover (1995) may be better suited and performs better than the first-differenced GMM, which is biased in small samples when the instruments are weak (Blundell et al., 2000).

Another advantage of the systems GMM approach is that the endogeneity of the explanatory variables can be addressed by using appropriate lags of these variables as instruments. Thus, there's no need to use external instruments to control for potential endogeneity in the model. Endogeneity can also arise with two other possible causes: measurement error and omitted variable bias. This can be addressed by using alternative measures of financial development.

The economic justification for the use of instruments is that, even though countries with higher levels of financial development may have more macroeconomic stability and a high degree of civil liberties, financial development may not be causing these results. There could be an omitted variable that is driving financial development. Also it is possible that a high purchasing power and a more stable political environment can promote financial development as more people demand financial services. Instruments help us to determine if financial development is causing the improved poverty measures. In that case, they must be uncorrelated with the error term yet are correlated with financial development.

To test the validity of the variable chosen as instrument, two diagnostics are computed to test for first order and second order serial correlation in the disturbances. We use the standard Hansen test of over-identifying restrictions (OIR), where the null hypothesis is that the instrumental variables are not correlated with the residual, and the serial correlation test, where the null hypothesis is that the errors exhibit no second-order serial correlation. In our regressions, both tests suggest that we accept the null hypotheses.

Besides, given that financial development may indirectly reduce poverty by promoting economic growth, we control for the growth of GDP per capita. The regressions are then able to investigate the direct effect of financial development on changes in poverty beyond any impact of economic growth. We also include the growth of the consumer price index to control for inflation (as a measure of stability of the macroeconomic environment).

Finally, in order to ensure the validity of the system-GMM estimations, the robustness check estimations perform two specification tests. In the first step, we estimate alternative specifications including additional variables in order to control for macroeconomic and institutional policies to minimize the potential omitted variable bias. These variables include government consumption to GDP, trade openness and civil liberty index.

In the second step, the battery of tests deals with the most recent econometric literature (Roodman, 2009a,b) that requires more caution and thoughtfulness when applying system-GMM estimator because of its inclination toward instrument pro-

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[3] The GMM panel estimator is usually attributed to Arellano and Bond (1991), but it is first proposed by Holtz-Eakin et al. (1988).

Table 2
Summary statistics.

	Mean	Std. Dev.	Min	Max
Income of the poorest quintile	5.11	2.90	1.21	9.97
Poverty gap	6.80	9.2	0.65	51.2
GDP per capita	4685.7	3180.4	629.9	16,225.9
Private credit/GDP	0.41	0.26	0.05	1.398
M3/GDP	0.51	0.28	0.18	1.19
Bank concentration	54.63	19.57	21.4	100
Inflation	21.2	46.91	0.98	433.56
Government consumption/GDP	14.94	11.03	1.37	164.69
Trade openness	73.84	39.19	17.77	211.59

Source: authors' calculations

liferation, weak instruments and underidentification. The author shows that having numerous instruments can result in an over-fitting of the model. The explanatory variables still correlated to their endogenous components, potentially leading to biased estimations. In this case, Hansen tests may produce very high *p*-values. In such case, we adopt two ways of restricting the number of instruments used in the system-GMM estimations. The first is to collapse the instrument sets, such that the GMM estimator is based on one instrument per variable instead of one instrument for each variable at each period. The second approach is to use certain lags instead of all possible lag lengths for instruments in each first-differenced equation.

According to Murray (2006) and Bazzi and Clemens (2013), the problems of underidentification or weak instruments in the system-GMM estimations may persist even after reducing the number of instruments. We mobilize for this issue the Kleibergen–Paap rk Wald *F* (K–P rk Wald *F*) statistic test when testing for the strength of instruments.

4. Results and discussions

4.1. Summary statistics

Table 2 presents some descriptive statistics for the period 1986–2012. Indeed, there is greater variability in the poverty gap than in the income of the poorest quintile. Moreover, on average, there is more money supply (51% of GDP) than private credits (41% of GDP) in low- and middle-income countries. Also, inflation is high at an average of 21% per year. As shown in Table 2, banking systems in the low- and middle-income countries tend to be quite concentrated, with a mean of 55%. Finally, there is considerable variation among financial development indicators.

4.2. Unit root test results

In panel data methodology, conducting both time and cross sectional analyses, the variables should be stationary to show real relationships between them (Table 3). This study investigates common unit root processes with panel unit root tests according to LLC (Levin et al., 2002), IPS (Im et al., 2003) and HD (Hadri, 2000). LLC and IPS tests are generalizations of the ADF principle. The null hypothesis of a unit root is investigated against the alternative of a stationary process for all (LLC) or at least for one cross section (IPS). The HD procedure, however adjusts the KPSS time series test to panels.

Table 3 shows that all *p*-values are lower than at least 0.05 critical value and then we reject the presence of a unit root in all variables. They are then stationary in levels [$I(0)$], a short run relationship may exist and no need for cointegration estimation.

Table 3
Panel unit root test results.

	LLC	IPS	HD
Income of the poorest quintile	−3.229[*] (0.000)	−2.998[*] (0.000)	8.211[*] (0.000)
Poverty gap	−3.018[*] (0.000)	−3.111[*] (0.000)	7.652[*] (0.000)
GDP per capita	−2.819[*] (0.000)	−2.198[*] (0.000)	6.981[*] (0.000)
Private credit/GDP	−3.009[*] (0.000)	−3.341[*] (0.000)	7.005[*] (0.000)
M3/GDP	−2.924[*] (0.000)	−2.861[*] (0.000)	9.122[*] (0.000)
Bank concentration	−2.877[*] (0.000)	−3.008[*] (0.000)	8.754[*] (0.000)
Inflation	−3.135[*] (0.000)	−2.929[*] (0.000)	6.008[*] (0.000)
Government consumption/GDP	−3.279[*] (0.000)	−3.111[*] (0.000)	7.317[*] (0.000)
Trade openness	−3.119[*] (0.000)	−2.799[*] (0.000)	6.333[*] (0.000)

LLC: Levin, Lin, Chu (2002), IPS: Im, Pesaran, Shin (2003); HD: Hadri (2000).

[*] Indicates the rejection of the null hypothesis of non-stationarity (LLC, IPS) or stationarity (HD). P-values are between parentheses.

4.3. Results' interpretations

4.3.1. The income of the poorest quintile as endogenous variable

Tables 4 and 5 present the regression results of the impact of financial development on poverty. They differ in the measure of financial development. Specifically, in Table 4, the ratio M3/GDP is used while in Table 5, it is the bank credits to GDP ratio which's used. The variables of interest in our model are the real GDP per capita, the level of financial development and the level of financial instability.

In Table 4, the results suggest a positive and significant correlation between the level of real GDP per capita, the level of financial development (M3/GDP) and the average income of the poor. In this case, the hypothesis of a direct and positive effect of financial development on the standard of living of the poor is confirmed. In the first two columns, an improvement of 1 percentage point of GDP per capita (in logarithm) increases the average income of the poor of 1.17 percentage point. Regarding the indicator of financial development, an increase of 1 percentage point of the liquidity ratio M3/GDP led to an improvement of 0.65 percentage point of the standard of living of the poorest 20% of the population.

On the other hand, the results for the third variable of interest, the level of financial instability, are significant. Thus, all coefficients of the instability of M3/GDP are negative. These results are interpreted by the presence of a negative impact of financial instability on the living standard of the poor. In other words, the more there is a disruption to financial development, the higher the income of the poor are threatened and even reduced. Specifically, in the second column, an increase of 1 percentage point of financial instability induces a decrease of 4.62 percentage point of the average income of the poorest 20%. Finally, as for the inflation, the results are not significant and most coefficients are negative; thus, inflation has an adverse impact on the income of the poor.

In columns 3 and 4, the financial development and the Log of GDP per capita are assumed endogenous. Thus, we introduce their one period lagged value as instruments. From column 5, we introduce new control variables. In this case, an increase of 1 percentage point of initial income of the poorest 20% led to an improvement of the average income of the poor by 0.43 percentage points. The second instrument introduced in the column 6 is the growth rate of GDP per capita which is positively correlated with the level of living of the poorest 20%. In column 7, the volatility of growth led to significantly decrease of poverty (the coefficient is about −1.85). Contrary to inflation, volatility of inflation (column 8) indicates a positive effect in improving the average income of the poorest 20%.

The interaction term between the liquidity ratio (M3/GDP) and the banking concentration has a positive and significant coefficient (column 9). This explains that geographical coverage of banks helps to improve the level of financial development, which consequently has a positive impact on the income of the poor.

In Table 5, we consider an alternative measure of financial development, the bank credits to GDP ratio instead of M3 to GDP ratio. The results are quite different. Indeed, the credit indicators (level and instability) are not significant except for the OLS estimate, where the coefficient for the banking credit ratio is significant at 10%. This result can be explained by the small size of banking systems in developing countries and hence the low level of distributed credits. Also, for inflation the majority of results indicate the presence of an adverse effect hampering the improvement of the standard of living of the poor and hence preventing the reduction of poverty.

In sum, independently of the indicator used to measure the level of financial development, it induces a positive direct effect in improving the incomes of the poor and hence in poverty reduction.

4.3.2. The poverty gap as endogenous variable

In this section, poverty is measured by the poverty gap (expressed as a percentage of the poverty line). It provides information on how far poor households are above or below the poverty line. Unlike the poverty index, poverty gap is more sensitive to an improvement or deterioration in the situation of the poor whose incomes are below the poverty line. As before, the regression results are presented in Tables 6 and 7 as the indicator of financial development is measured by the ratio M3/GDP or by bank credits to GDP.

In columns 1 and 2 of Table 6, the two variables of interest, the level of GDP per capita and the level of financial development (M3/GDP) are negatively and significantly correlated with the poverty gap. Specifically, any increase in the level of GDP per capita or in the liquidity ratio leads to reducing the poverty gap inducing a poverty reduction. Concerning the instability of financial development, the results show that a disturbance in financial development induces an increase in the poverty gap.

In column 5, while the growth rate of GDP had no effect on the poverty gap, instability growth is negatively correlated with the poverty gap (column 6), reducing in that way poverty. Moreover, instability in inflation increases the poverty gap by 0.35 percentage point (column 7). Finally, the combined M3/GDP and bank concentration has a negative and significant impact on the poverty gap. Thus, the increased number of banking financial institutions and the sophistication and diversification of financial products allow the reduction of poverty.

In Table 7, we change the indicator of financial development; so we use the ratio of bank credits/GDP instead of M3/GDP (Table 6). The results obtained are almost the same as those of Table 4. Thus, the logarithm of GDP per capita and the ratio of bank credits/GDP are negatively correlated to poverty gap. However, the impact of the bank credits to GDP ratio is not significant, as in Table 5 where the endogenous variable is the Log of the income of the poorest 20%.

These results can be explained by the fact that, in lower and middle income countries, credit access for the poor remains a challenge and that the main channel of the impact of financial development on the poor is the McKinnon's conduit effect captured by the liquidity ratio. In other words, an increase in the bank credit ratio does not necessarily improve the

Table 4

Financial development, financial instability and income of the poor. Financial development indicator: M3/PIB. Endogenous variable: log of the income of the poorest quintile.

	OLS regressions		System GMM regressions						
	1	2	3	4	5	6	7	8	9
Log of GDP per capita	1.17 (21.15)***	1.17 (24.25)***	1.38 (11.25)***	1.26 (14.25)***	0.84 (7.24)***	1.31 (9.12)***	1.26 (13.33)***	1.26 (13.12)***	1.55 (10.25)***
M3/GDP	0.41 (3.27)***	0.65 (2.97)***	0.09 (0.45)	0.55 (2.01)*	0.43 (2.01)*	0.47 (2.00)*	0.44 (1.81)*	0.55 (1.89)*	0.54 (1.92)*
Instability of M3/GDP		−4.62 (−1.81)*		−5.70 (−2.22)**	−5.10 (−1.98)*	−5.05 (−1.79)*	−4.96 (−1.92)*	−5.77 (−2.00)**	−6.11 (−1.88)*
Inflation	−0.15 (−0.87)	0.01 (0.10)	−0.31 (−0.79)	−0.01 (−0.06)	−0.05 (−0.33)	0.05 (0.32)	0.04 (0.24)	−0.13 (−0.29)	0.05 (0.37)
Log of the initial income of the poorest 20%					0.43 (3.42)***				
GDP per capita growth						0.01 (1.83)*			
Growth instability							−1.85 (−0.62)		
Inflation instability								0.27 (0.60)	
(M3/GDP)*(Bank concentration)									0.02 (2.28)**
Constant	−1.31 (−2.51)***	−1.30 (−3.24)***	−2.79 (−2.79)***	−1.95 (−2.97)**	−1.31 (−1.99)*	−2.39 (−3.12)***	−1.84 (−2.75)**	−1.94 (−2.58)**	−2.27 (−0.80)
R^2	0.59	0.67							
Number of countries			67	67	67	67	67	67	67
Hansen test (p-value)			0.42	0.96	0.71	0.75	0.98	0.96	0.95
AR(2) (p-value)			0.47	0.83	0.18	0.87	0.78	0.50	0.70

AR(2): Arellano and Bond test of second order autocorrelation. Values in brackets are the robust t statistics. Hansen test for over-identifying restrictions provides the probability value for H0: joint validity of the instruments. Higher probability value suggests that the instruments are exogenous and not correlated with the error term.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 5
Financial development, financial instability and income of poor. Financial development indicator: bank credits/GDP. Endogenous variable: log of the income of the poorest quintile.

	OLS regressions		System GMM regressions						
	1	2	3	4	5	6	7	8	9
Log of GDP per capita	1.53 (25.1)***	1.53 (26.21)***	1.81 (13.02)***	1.65 (12.12)***	1.10 (8.14)***	1.72 (9.17)***	1.64 (9.33)***	1.65 (12.9)***	2.02 (9.55)***
Bank credits/GDP	0.53 (1.97)*	0.85 (1.99)*	0.11 0.45	0.72 (0.62)	0.56 (0.42)	0.61 (0.78)	−0.58 (−0.92)	0.73 (0.79)	−0.71 (−0.89)
Instability of bank credits/GDP		−6.04 (−1.91)*		−7.46 (−1.31)	−6.67 (−1.89)*	−6.61 (−1.08)	−6.49 (−1.04)	−7.54 (−2.22)**	−8.00 (−1.19)
Inflation	−0.20 (−0.87)	0.02 (0.10)	−0.40 (−0.79)	−0.02 (−0.06)	−0.06 (−0.33)	0.07 (0.32)	0.05 (0.24)	−0.17 (−0.29)	0.06 (0.37)
Log of the initial income of the poorest 20%					0.56 (4.08)***				
GDP per capita growth						0.02 (1.99)*			
Growth instability							−2.42 (−0.62)		
Inflation instability								0.35 (0.60)	
(Bank credits/GDP)*(Bank concentration)									0.03 (2.85)**
Constant	−1.72 (−2.66)***	−1.70 (−3.85)***	−3.65 (−2.59)***	−2.55 (−2.81)**	−1.72 (−1.89)*	−3.13 (−3.22)***	−2.41 (−2.68)**	−2.20 (2.58)**	−2.97 (−0.80)
R^2		0.77	0.88						
Number of countries			67	67	67	67	67	67	67
Hansen test (p-value)			0.55	1.25	0.93	0.98	1.28	1.25	1.24
AR(2) (p-value)			0.62	1.08	0.23	1.13	1.02	0.66	0.92

AR(2): Arellano and Bond test of second order autocorrelation. Values in brackets are the robust *t* statistics. Hansen test for over-identifying restrictions provides the probability value for H0: joint validity of the instruments. Higher probability value suggests that the instruments are exogenous and not correlated with the error term.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 6

Financial development, financial instability and income of the poor. Financial development indicator: M3/PIB. Endogenous variable: poverty gap.

	OLS regressions		System GMM regressions					
	1	2	3	4	5	6	7	8
Log of GDP per capita	−0.08 (−5.98)***	−0.09 (−6.12)***	−0.08 (−2.87)**	−0.10 (−4.68)***	−0.09 (−2.95)***	−0.11 (−3.98)***	−0.12 (−2.57)***	−0.12 (−3.27)***
M3/GDP	−0.16 (−3.11)***	−0.23 (−4.44)***	−0.07 (−0.79)	−0.18 (−2.17)**	−0.23 (−2.84)***	−0.17 (−2.66)**	0.00 (0.22)	−0.12 (−1.37)
Instability of M3/GDP		1.19 (1.94)*		1.21 (1.91)*	1.21 (1.89)*	1.38 (1.88)*	−1.01 (−1.12)	1.20 (1.97)*
Inflation	0.03 (1.96)*	−0.03 (−0.84)	0.04 (2.12)**	−0.03 (−0.75)	−0.03 (−0.76)	−0.04 (−0.87)	−0.09 (−1.00)	−0.04 (−0.85)
GDP per capita growth					0.00 (0.41)			
Growth instability						−0.53 (−0.93)		
Inflation instability							0.35 (2.77)***	
(M3/GDP)*(Bank concentration)								−0.01 (−2.08)**
Constant	0.79 (7.21)***	0.85 (6.99)***	0.78 (2.88)***	0.95 (4.85)***	0.85 (3.99)***	1.00 (4.78)***	1.07 (4.01)***	1.06 (4.11)***
R^2	0.41	0.45						
Number of countries			63	63	63	63	63	63
Hansen test (p-value)			0.69	0.43	0.55	0.84	0.81	0.74
AR(2) (p-value)			0.38	0.37	0.38	0.39	0.36	0.38

AR(2): Arellano and Bond test of second order autocorrelation. Values in brackets are the robust t statistics. Hansen–Sargent test for over-identifying restrictions provides the probability value for H0: joint validity of the instruments. Higher probability value suggests that the instruments are exogenous and not correlated with the error term.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 7

Financial development, financial instability and income of poor. Financial development indicator: bank credit/GDP. Endogenous variable: poverty gap.

	OLS regressions		System GMM regressions					
	1	2	3	4	5	6	7	8
Log of GDP per capita	−0.08 (−5.88)***	−0.09 (−6.12)***	−0.08 (−2.45)**	−0.10 (−3.78)***	−0.08 (−2.96)***	−0.11 (−3.48)***	−0.12 (−2.65)***	−0.11 (−3.22)***
Bank credits/GDP	−0.15 (−0.65)	−0.23 (−0.98)	−0.07 (−0.85)	−0.17 (−0.28)	−0.23 (−2.77)***	−0.17 (−2.33)**	0.00 (0.11)	−0.12 (−1.31)
Instability of bank credits/GDP		1,17(1.87)*		1.19 (1.08)	1.20 (1.89)*	1.36 (1.06)	−1.00 (−1.03)	1.19 (1.94)*
Inflation	0.03 (1.91)*	−0.03 (−0.84)	0.04 (2.31)**	−0.03 (−0.75)	−0.03 (−0.76)	−0.04 (−0.87)	−0.09 (−1.00)	−0.04 (−0.85)
GDP per capita growth					0.00 (0.41)			
Growth instability						−0.52 (−0.93)		
Inflation instability							0.34 (2.77)***	
(Bank credits/GDP)*(Bank concentration)								−0.01 (−2.33)**
Constant	0.78 (7.57)***	0.84 (7.12)***	0.77 (2.99)***	0.94 (4.77)***	0.84 (4.11)***	0.99 (4.88)***	1.06 (4.17)***	0.00 (3.18)***
R^2	0.40	0.45						
Number of countries			63	63	63	63	63	63
Hansen test (p-value)			0.68	0.42	0.54	0.83	0.80	0.73
AR(2) (p-value)			0.38	0.37	0.38	0.39	0.35	0.38

AR(2): Arellano and Bond test of second order autocorrelation. Values in brackets are the robust t statistics. Hansen–Sargent test for over-identifying restrictions provides the probability value for H0: joint validity of the instruments. Higher probability value suggests that the instruments are exogenous and not correlated with the error term.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 8
Financial development, financial instability and the income of the poor (two-step system GMM). Financial development indicator: M3/GDP. Endogenous variable: log of the income of the poorest quintile.

	Full instrument set				Collapsed instrument set				Restricted instrument set			
	1	2	3	4	9	10	11	12	5	6	7	8
Log of GDP per capita	0.82	0.80	0.84	0.81	1.12	0.82	0.79	1.05	1.04	0.94	0.92	1.12
	(11.12)***	(9.98)***	(10.75)***	(12.45)***	(8.01)***	(9.01)***	(9.12)***	(10.10)***	(12.01)***	(9.71)***	(10.89)***	(11.71)***
M3/GDP	0.44	0.33	0.43	0.45	0.81	0.81	0.28	0.92	0.72	0.93	0.33	0.81
	(1.55)	(1.89)*	(1.18)	(0.99)	(3.25)***	(2.42)**	(2.18)**	(2.30)**	(3.15)***	(2.92)**	(2.98)***	(3.29)***
Instability of M3/GDP	−2.33	−3.09	−3.77	−3.12	−0.94	−3.3	−3.19	−2.21	−0.88	−4.22	−3.85	−2.11
	(−1.25)	(−1.88)*	(−2.10)**	(−1.90)*	(−1.99)*	(−1.9)*	(−1.87)*	(−2.19)**	(−1.97)*	(−2.23)**	(−2.49)**	(−2.44)**
Inflation	−0.08	−0.08	−0.17	−0.05	−1.21	−0.66	−0.77	−0.60	−1.01	−0.98	−0.89	−0.72
	(−0.35)	(−0.41)	(−0.78)	(−0.58)	(−1.87)*	(−1.29)	(−2.01)**	(−2.60)**	(−2.19)**	(−1.92)*	(−2.16)**	(−1.91)*
Government Consumption/GDP	−1.21			−0.85	−1.8			−0.1	−2.99			−0.09
	(−1.39)			(−0.88)	(−1.89)*			(−1.4)	(−2.38)**			(−1.89)*
Civil liberty index		−0.01	0.00			−0.17		0.04		0.11		0.06
		(−0.21)	(0.10)			(−0.88)		(1.19)		(1.01)		(1.10)
Trade openness			0.00	0.01			0.81	0.97			0.69	0.88
			(1.08)	(1.11)			(1.41)	(1.45)			(1.79)*	(1.90)*
Constant	−0.72	−0.71	−0.94	−1.16	−1.17	−1.16	−1.28	−1.40	−1.12	−1.08	−1.29	−1.32
	(−1.32)	(−1.22)	(−1.89)*	(−2.68)**	(−1.08)	(−1.3)	(−1.9)*	(−1.89)*	(−1.41)	(−1.27)	(−2.33)**	(−2.31)**
Countries	67	66	44	42	67	67	65	42	67	67	65	42
Observations	1742	1716	1144	1092	1742	1742	1690	1092	1742	1742	1690	1092
No. of instruments in system-GMM	71	71	71	71	31	31	31	31	46	46	46	46
Hansen test p-value	0.77	0.53	0.60	0.49	0.02	0.06	0.09	0.05	0.21	0.29	0.19	0.09
Difference-in-Hansen test overid. p-value	0.97	0.83	0.88	0.91	0.03	0.09	0.08	0.04	0.27	0.26	0.20	0.39
No. of instruments in difference model	43	43	43	43	16	16	16	16	34	34	34	34
AR(1) p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR(2) p-value	0.38	0.21	0.31	0.18	0.82	0.59	0.78	0.61	0.39	0.19	0.25	0.27
K–P underid. difference p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
No. of instruments in levels model	21	21	21	21	11	11	11	11	21	21	21	21
K–P underid. levels p-value	0.68	0.59	0.55	0.61	0.25	0.21	0.19	0.23	0.70	0.52	0.57	0.59

AR(1) and AR(2): p-values of Arellano and Bond tests for first- and second-order serial correlation respectively in the first differenced equations under the H0 of no serial correlation. All models estimated using Blundell–Bond two-step GMM estimators with robust bias corrected standard errors (Windmeijer, 2005). Hansen tests for overidentifying restrictions under the H0 that all instruments are valid. Diff-in-Hansen tests for exogeneity of instruments under the H0 that instruments used for the equations in levels are exogenous. The K–P test tests the H0 that the first stage regression is underidentified, reported for the difference models.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

well-being for the poor (non-significant effect). This result apparently contradicts that of Beck et al. (2007a), who find a significant and positive impact of the private credit ratio on the income growth of the poorest quintile of the population. The reason could lie in the sample composition. Our sample consists of developing countries but theirs comprises both developing and developed economies that have bigger and more diversified financial systems.

Finally, the main result to be stressed concerns the volatility of inflation that appears having a detrimental effect on the poor by increasing the poverty gap (column 7). Regarding the interaction term (bank credits/GDP × bank concentration), its negative effect indicates that the increase in the number of banking agencies helps the poor to profit more from bank credits, to increase their saving and to earn more remuneration on their deposits, which is likely to reduce the poverty gap.

4.3.3. Robustness checks

The results are presented in Table 8. For the first set of estimations introducing the full instrument set, similar results to the baseline models were obtained (columns 1–4). Accordingly, we show a very weak evidence of a positive association between financial development (M3/GDP) and the income of the poor. Moreover, the link between government consumption dispenses and civil liberty on the one hand and the income of the poor on the other hand is found to be weakly negative. Finally, no significant effect of trade openness on poverty reducing was found.

By examining the correlation structure of the error terms, we note high p-values of AR(2) test indicating the absence of serial correlation in the error structure. To test the significance of the excluded instruments set we apply the Hansen test which performs very well in our case. But, when testing the exclusion of the additional instruments in the levels equation, the difference-in-Hansen test indicates potential problems with identification due to the high p-values (columns 1–4 of Table 8). If the additional instruments may overfit the model and may not be able to remove the endogenous component from estimations, the system-GMM approach may suffer from many problems (Roodman, 2009b).

As regards the underidentification, we report two statistics of the K–P rank Wald test: the first one for the difference and the second one for the levels equation. The results show no underidentification problem for the difference model (all p-values are equal to zero); but, as we can't reject the null hypothesis of underidentification (high p-values) the problem does exist for the levels model. One might argue that this problem probably arises from instrument proliferation. The solution consists at restricting the instrument count either by collapsing the instrument set or by limiting the number of lags of the endogenous variables in the instrument set.

Columns (5–8) present the results with the collapsed instrument set. We follow Roodman (2009b) and use only two lags for GMM estimators. The number of instruments is reduced to 31. Like the previous estimations, financial development measure (M3/GDP) continues to be statistically significant and exert a stronger impact on poverty reduction than its instability. GDP/capita also performs very well. As before, Inflation keeps the same negative sign reducing the income of the poor, but it becomes significant.

The p-values of the Hansen test reject the null hypothesis of exclusion restriction in all specifications. This rejection casts doubts on the validity of instruments and consequently of results. As an alternative to both the full and collapsed instrument sets we employ the restricted instrument set. Results are reported in Table 8 (columns 9–12). All variables have the expected sign and are statistically significant. Interestingly, the civil liberty index – the governance measure – is not only positive as in one case before but it is also statistically significant in two cases. Ensuring good governance might conduct to ameliorating the income of the poor. This result supports that of Sen (1981) and Drèze and Sen (1989) who have argued that free press forces government to take pro-poor actions avoiding famine.

Finally, the results of the Hansen tests show that the exclusion restrictions are actually valid. The p-values of the difference-in-Hansen test indicate that instrument proliferation is not an issue. Also, the two Kleibergen–Paap rk Wald F statistics indicate that the estimated models are correctly identified and there is not a problem of weak identification. The instruments introduced are then appropriate.

5. Conclusion

In this paper, we examined the various aspects of the relationship between financial development and poverty. The main results are as follows: independently of the indicators of poverty and financial development used, financial development contributes directly to reducing poverty. Financial development is thus beneficial for the poor by increasing its access to various sources of funding. Increases in M3 to GDP or bank credits to GDP ratios directly translate into improved well-being for the poor. Finance facilitates transactions, provides the opportunity to accumulate assets and to smooth consumption. Our results support both the McKinnon's conduit effect and the argument of Beck et al. (2007a).

However, financial instability presents a problem that particularly threatens the poor and reduces the benefits of financial development. Financial instability significantly affects the poor and bears the risk to annihilate the benefit of financial development. Liquidity constraints and bank crises are particularly detrimental to the poor as the availability of their deposits is no longer ensured and the financing of their investments more and more difficult.

The final battery of tests is motivated by the issues of overidentification and weak instruments in system-GMM estimator. The Hansen and the difference-in-Hansen tests show the validity of the exclusion restrictions and the absence of instrument proliferation. Also, the Kleibergen–Paap rk Wald F statistic indicates that government consumption to GDP and trade openness are appropriate instruments. The negative sign of the coefficient assigned to the government consumption to GDP ratio may reflect the weakness of the pro-poor public expenditure policy in low- and middle-income countries.

The main policy recommendation suggested by the paper indicates that financial sector reforms should be directed at abolishing credit constraints and easing credit availability for the poor. Interest rates liberalization is one of the policies that foster financial development by eliminating financial repression. Savings should be channeled toward making credit available to the poor. Finally, the financial instability issues should be taken into consideration by the agenda reform.

The results found here suggest possible areas for future research. One of these areas would be the estimation of the financial development–poverty relationship using other poverty indicators (i.e. welfare indicators or income-based poverty indicators). We recommend also the use of a composite and consistent indicator of financial development based on the different measures of financial structure. Another important area of future research is to determine how financial development can be pro-poor. The regulatory and public policy implications of this kind of studies would be of the highest importance.

Appendix A.

A.1. List of countries

Selected countries respect the World Bank classification:

Algeria, Argentina, Bangladesh, Benin, Bolivia, Brazil, Burkina Faso, Cambodia, Chad, Chile, China, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Gambia, Ghana, Guinea, Guyana, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Madagascar, Malawi, Malaysia, Mauritania, Mauritius, Mexico, Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Russia, Rwanda, Senegal, Sierra Leone, Sri Lanka, Swaziland, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Uganda, Ukraine, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

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