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Financial Access and Inequality: A Quantile Assessment

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ABSTRACT

This paper examines finance – inequality relations by focusing on whether financial access mitigates income inequality at different levels of inequality. Applying quantile regressions to a cross-country data set of 73 countries, we find evidence that financial access serves as an inequality-mitigating factor only when income inequality of a country is low. In other words, for countries experiencing high inequality, emphasizing financial access in the development of finance may not reduce income inequality. From the analysis, we also find the significant role of trade openness and infrastructure in equalizing income distribution respectively at low and high inequality levels. The implications of these results are clear: there is no single policy that would fit all. In countries with low income inequality, the policy emphasis should be on widening financial access. Meanwhile, infrastructure development should be given priority in countries with high income inequality.

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INTRODUCTION

While the role of finance as a catalyst for long term growth has been much emphasized, its implication on income inequality has received less attention. Over recent years, an increasing number of studies has emerged but painted mixed pictures on how inequality is related to financial development. Using panel data samples of developed and developing countries, Li et al. (1998), Clarke et al. (2006), Beck et al. (2007) and Hamori and Hashiguchi (2012) all provide empirical evidence that financial development is favourable to income equality. By contrast, looking at the European Union over 1995-2000, Rodriguez-Pose and Tselios (2009) document inequality-increasing effect of financial development. Gimet and Lagoarde-Segot (2011) further point to the increase in inequality in response to shocks in domestic credit to GDP ratio in a panel sample of 49 countries. Thus, financial development can be pro-rich (see also Roines et al., 2009).

Theoretically, as portrayed by the theoretical works of Galor and Zeira (1993) and Banerjee and Newman (1993) and the recent studies by Classens and Perotti (2007), the main mechanism through which finance affects inequality is financial access. That is, finance would serve as an effective inequality mitigating factor when the development of finance facilitates financial access. But if finance develops to cater only the established interests, income inequality may worsen. In light of this theoretical link between finance and inequality, some studies have focused on factors that would facilitate financial access and hence account for the beneficial effects of finance on income distribution, among which include institutional quality, economic literacy, level of financial development and economic development (Law et al., (2014); Prete, (2013); Kim and Lin, (2011); Hamori and Hashiguchi, (2012)). These studies illustrate that there exist non-linear relations between finance and inequality depending on institutional quality, degree of financial development and level of economic development. Meanwhile, other studies have directly assessed the link between financial access or typologies of financial reforms and income inequality (Mokerjee and Kalipioni, 2010; Agnello et al., 2012). Mokerjee and Kalipioni (2010), in particular, show that financial access contributes to better income distribution.

Building on these studies, this paper further assesses the relationship between financial access and inequality. Our contribution to the literature is threefold. First, instead of looking at the relations between financial development and income inequality, we follow the footstep of Mokerjee and Kalipioni (2010) by focusing directly on financial access and its implication on income inequality. However, we differ from them in that we make use of the recent composite measure of financial access constructed by Honohan (2008). The access to financial services is generally proxied by the number of bank branches or barriers to open bank accounts or apply bank loans. Acknowledging that measuring financial access is not easy, we believe that by employing an alternative measure can serve as robustness check on earlier findings. And second, in the spirit of Huang et al. (2007), we ask whether the level of income inequality is relevant for the issue at hand. In other words, in light of policy prescriptions from existing studies, we evaluate further whether they fit all countries regardless of the severity of income inequality. From a different perspective, the present study complements existing studies by bringing a different form of non-linearity. And finally, from a methodological perspective, we employ the quantile regression technique in the analysis which, unlike the traditional linear regression, measures the empirical relations across different quantiles of the conditional distribution. Thus, it offers a further insight as to which level of inequality that financial access would be most or least beneficial for better income distribution.

The rest of the paper is structured as follows. In the next section, we present the empirical approach and data. Then, we present and discuss the results. The final section concludes the paper with a summary of the main findings and concluding remarks.

EMPIRICAL APPROACH AND DATA

In the literature, the empirical analysis on income inequality is generally based on the Kuznets hypothesis (1995), which posits an inverted U-shaped relation between income inequality and the level of economic development. According to Kuznets (1955), income distribution would first worsen as an economy develops. Then, as the economy surpasses a certain threshold development level, income distribution would improve. This postulation has attracted much empirical attention and, later, has been augmented and modified to include other factors that are the focus of the studies. Among others, these factors include openness (Chen et al., 2015; Meschi and Vivarelli, 2009), inflation

(Chen et al., 2015), financial reforms (Agnello et al., 2012), political regimes (Kemp-Benedict, 2011), economic freedom (Carter, 2006), and growth volatility (Huang et al., 2015).

Taking lead from these studies, we also adopt the Kuznets curve extended to include financial access and other control variables as a basis of our empirical analysis. That is,

$$Ine_i = \beta_0 + \beta_1 Access_i + \beta_2 y_i + \beta_3 y_i^2 + \theta X_i + \varepsilon_i \quad (1)$$

where *Ine* is income inequality, *Access* is financial access, *y* is economic development and *X* is a vector of controlled variables. In the equation, both *y* and y^2 are included to represent the inverted-U shaped relation between inequality and economic development as hypothesized by the Kuznets curve. We follow Mookerjee and Kalipioni (2010) by considering inflation, trade openness and infrastructure as the controlled variables. In addition, we also include corruption control in the equation. The application of least squares estimation methods to the above equation yields the effects of covariates on the conditional mean of income inequality. Thus, it will not be able to capture the impacts of covariates including financial access across the whole income inequality distribution.

Being a conditional mean equation, equation (1) addresses only the impact of financial access and other included variables on mean income inequality. Since the severity of the income inequality may require different policy measures, the equation may be inadequate. Accordingly, we adopt quantile regression as proposed by Koenker and Basset (1978), which is suitable for investigating the relations between financial access and inequality across different levels of inequality. Denoting Z a vector of independent variables including constant, we write the conditional quantile function as:

$$Q_\tau(Ine_i|Z_i) = \beta_\tau Z_i \quad (2)$$

where $\tau \in (0, 1)$. The estimated parameters for the τ^{th} quantile are the solution to the following problem:

$$\min_{\beta_\tau}\left[\sum_{i\in\{i:Ine_i\geq\beta_\tau Z_i\}}\tau \mid Ine_i - \beta_\tau Z_i \mid + \sum_{i\in\{i:Ine_i<\beta_\tau Z_i\}}(1-\tau) \mid Ine_i - \beta_\tau Z_i \mid\right] \quad (3)$$

Unlike the OLS, the quantile regression is based on minimizing weighted sum of the absolute residuals with the weight equals to τ when they are positive and $(1 - \tau)$ when negative. Thus, the estimation can be carried out by varying τ. Apart from its ability to address our research objective, the quantile regression technique has an econometric advantage in that it is robust to deviation from normality. As the distribution of income inequality can be highly skewed, the quantile regression would be more appropriate than the normal conditional mean regression.

In the analysis, the access to financial services is based on the indicator by Honohan (2008). He constructs the access measure for 138 countries by combining information from survey data as well as indicators from different sources (see Honohan, 2008 for details). We use the household income inequality data compiled by the University of Texas Inequality Project (UTIP), the advantages of which are elaborated in Hamori and Hashiguchi (2012). The inequality data are averaged over 2001 – 2007.[1] By mapping these two data sets, we arrive at 73 developed and developing countries.[2] For the remaining variables, we employ real GDP per capita in constant US dollar as a measure of economic development, the sum of exports and imports to GDP ratio for trade, telephone per 100 population for infrastructure, and corruption control index. Real GDP, trade and infrastructure data are from the WDI while the corruption control index is from the International Country Risk Guide (ICRG). These data are averaged over 2001-2007. Table 1 provides their descriptive statistics. In the analysis, we express all variables except inflation and corruption control in natural logarithm.

[1] We employ 2001-2007 averaged inequality because access to financial services is constructed by Honohan (2008) using information from roughly the same period. To maximize the sample size, we include all countries that have at least three data points over the period.

[2] Countries: Albania, Austria, Azerbaijan, Belgium, Botswana, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Georgia, Germany, Greece, Hungary, India, Indonesia, Iran, Ireland, Italy, Jamaica, Jordan, Kazakhstan, Latvia, Lesotho, Lithuania, Luxembourg, Macedonia, Madagascar, Malaysia, Malta, Mauritius, Moldova, Mongolia, Morocco, Netherland, Norway, Oman, Panama, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Syria, Tanzania, Turkey, Ukraine, United Kingdom, United States, Uruguay, Yemen.

Table 1 Descriptive Statistics

Variables	Mean	Maximum	Minimum	Std. Dev.	N
Inequality	42.770	54.326	30.140	5.898	73
Financial Access	55.904	100	5	29.146	73
Real GDP Per Capita	13238.97	79292.061	154.483	16668.995	73
Inflation	5.399	23.391	0.902	4.106	71
Trade	94.590	392.494	24.571	57.114	73
Infrastructure	27.226	64.335	0.418	18.568	73
Corruption Control	2.937	6	1.482	1.102	67

*Note: the statistics are based on raw data, before natural logarithmic transformation.

RESULTS

We first present the OLS results corrected for heteroskedasticity using White procedure in Table 2. Three observations can be made from the Table. First, the coefficient of financial access is negative and significant across all estimation. This conforms well to Mookerjee and Kalipioni (2010). Second, we see that its coefficient drops in magnitude once controlled variables are added, signifying the importance of including controlled variables in the analysis. The result from the most general model (regression 7) indicates that a 10% increase in financial access is associated with a reduction in income inequality by roughly 0.65%, all else equal. And finally, the OLS regression results validate the Kuznets curve and suggest significant contributions of trade and infrastructure to inequality reduction. However, inflation and corruption control are found to be insignificant.

Setting $\tau = 0.10, 0.25, 0.50, 0.75, 0.90$, we present the quantile regression results in Table 3. We consider the specifications as in Table 2. We note that the coefficients of inflation and corruption control are consistently insignificant and other results remain largely similar. Hence, we drop from the analysis specifications that include inflation and corruption control. In model (1) of Table 3, we leave out all controlled variables. While we observe that the strength of the relations between access and inequality increases when we move from lower quantiles to upper quantiles, the preceding OLS results caution us on the potential omitted variable problem. Accordingly, we refer to models with controlled variables as a basis for inference on the relations between income distribution and financial access.

In model (2), we add the Kuznets curve variables, i.e. y and y^2. Then, we further add alternatively trade and infrastructure in (3) and (4). Finally (5) includes all controlled variables (except inflation and corruption). The results from these specifications seem quite consistent in pinpointing the significant role of financial access in inequality reduction at the lower half of the income inequality. In all cases, the coefficient of financial access at the 75^{th} and 90^{th} quantiles is indistinguishable from zero. By contrast, it is significant in most cases at the other quantiles. Thus, our finding echoes the results of Mookerjee and Kalipioni (2010) that financial access reduces income inequality but only for countries that face low or mild inequality problem. As for countries that face high income distribution, other mitigating measures should be called for.

Table 2 OLS Regression Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Access	-0.1457	-0.0744	-0.0765	-0.0740	-0.0700	-0.0808	-0.0649
	(0.000)	(0.050)	(0.043)	(0.036)	(0.053)	(0.063)	(0.090)
y	--	0.1498	0.1208	0.1675	0.3625	0.2009	0.3390
		(0.017)	(0.080)	(0.011)	(0.000)	(0.020)	(0.000)
y^2	--	-0.0112	-0.0096	-0.0120	-0.0209	-0.0146	-0.0194
		(0.001)	(0.013)	(0.001)	(0.000)	(0.004)	(0.000)
Inf	--	--	-0.0003	--	--	--	-0.0004
			(0.926)				(0.897)
Trade	--	--	--	-0.0608	--	--	-0.0594
				(0.004)			(0.006)
Infra	--	--	--	--	-0.0733	--	-0.0702
					(0.001)		(0.002)
Corrupt Control	--	--	--	--	--	0.0147	-0.0058
						(0.397)	(0.728)
Adjusted R^2	0.4808	0.5641	0.5689	0.6079	0.6253	0.5535	0.6552

*Note: numbers in parentheses are p-values

As for our included variables, the results from Table 3 reveals the followings. First, the results provide unequivocal support for the validity of the Kuznets curve regardless of the severity of the inequality problem (see Model 4 and Model 5). This means that these countries should focus on growth policies to arrest the problem of unequal income distribution. Second, our results also provide indication that trade is more effective in reducing income. As may be observed from the Table, the trade coefficients are negative in all cases and are significant at conventional significance levels in almost all regressions. The finding that trade is inequality-reducing is in line with Chen et al. (2015) and Acar and Dogruel (2012) but contradicts Meschi and Vivarelli (2009). From the estimated coefficients, we may not that the effect of trade on income inequality is low in countries with severe inequality problem. And third, we find that the infrastructure development tends to work well when the inequality is at the higher level. Like trade, the coefficients of infrastructure are negative and significant at all income inequality levels, which is in line with Mookerjee and Kalipioni (2010). However, the magnitude of the coefficients is higher for countries with high income inequality. This means that for countries that have high level of income inequality, development of infrastructure is most important in dampening income inequality.

In a nutshell, while our results reiterate the commonly heard policy prescription mantra "one size does not fit all", they do suggest certain policy recommendations to mitigate income inequality. For countries at low or mild level of income inequality, promoting financial access would help. Likewise, trade and infrastructure development can also be effective. However, for countries engulfed with severe inequality problems, financial access would not be effective. Instead, for these countries, the most effective way to reduce unequal income distribution is through infrastructure development.

CONCLUSION

The present paper applies quantile regression to assess the contribution of financial access to income distribution using a cross-country data set of 73 countries. Our results provide consistent evidence that financial access is central in efforts to reduce income inequality especially for countries at the low level of income inequality. Trade openness also emerges as a viable mechanism for inequality reduction particularly for countries at low inequality level. As for the countries stuck with high inequality, development of infrastructure seems to be most important.

Table 3 Quantile Regression Results

	Quantiles				
Variables	0.10	0.25	0.50	0.75	0.90
Model (1)					
Access	-0.1327	-0.1363	-0.1455	-0.2073	-0.1825
	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)
Pseudo-R^2	0.2510	0.3295	0.3514	0.2432	0.2024
Model (2)					
Access	-0.0563	-0.0995	-0.0742	-0.0713	-0.0377
	(0.237)	(0.005)	(0.088)	(0.268)	(0.408)
y	-0.0393	0.0696	0.1560	0.2714	0.2430
	(0.728)	(0.348)	(0.127)	(0.023)	(0.006)
y^2	-0.0003	-0.0053	-0.0113	-0.0183	-0.0175
	(0.957)	(0.213)	(0.046)	(0.004)	(0.001)
Pseudo-R^2	0.2812	0.3715	0.4360	0.3660	0.3537
Model 3					
Access	-0.0070	-0.0810	-0.0655	-0.0238	-0.0754
	(0.883)	(0.034)	(0.067)	(0.680)	(0.154)
y	0.0368	0.1973	0.2113	0.1510	0.2698
	(0.782)	(0.020)	(0.025)	(0.295)	(0.047)
y^2	-0.0055	-0.0136	-0.0148	-0.0127	-0.0181
	(0.467)	(0.006)	(0.006)	(0.116)	(0.020)
Trade	-0.1042	-0.0969	-0.0688	-0.0312	-0.0514
	(0.045)	(0.010)	(0.014)	(0.248)	(0.051)
Pseudo-R^2	0.3447	0.4128	0.4715	0.3824	0.3845
Model 4					
Access	-0.0845	-0.0611	-0.0723	-0.0696	-0.0508
	(0.047)	(0.298)	(0.109)	(0.229)	(0.241)

Table 3 Cont.

y	0.3065	0.3972	0.3684	0.4317	0.3918
	(0.015)	(0.018)	(0.001)	(0.004)	(0.000)
y^2	-0.0170	-0.0222	-0.0200	-0.0240	-0.0234
	(0.011)	(0.010)	(0.001)	(0.002)	(0.000)
Infra	-0.0683	-0.0873	-0.0997	-0.0903	-0.0746
	(0.000)	(0.014)	(0.000)	(0.016)	(0.025)
Pseudo-R^2	0.3435	0.4127	0.4881	0.4051	0.3840
Model 5					
Access	-0.0733	-0.0999	-0.0635	-0.0849	-0.0494
	(0.026)	(0.064)	(0.141)	(0.102)	(0.214)
y	0.2783	0.5027	0.3945	0.4690	0.3547
	(0.048)	(0.000)	(0.000)	(0.002)	(0.003)
y^2	-0.0165	-0.0280	-0.0224	-0.0255	-0.0201
	(0.028)	(0.000)	(0.000)	(0.002)	(0.003)
Trade	-0.0753	-0.0858	-0.0701	-0.0433	-0.0391
	(0.004)	(0.002)	(0.006)	(0.107)	(0.028)
Infra	-0.0471	-0.0838	-0.0821	-0.0957	-0.0816
	(0.023)	(0.001)	(0.001)	(0.005)	(0.021)
Pseudo-R^2	0.4081	0.4711	0.5246	0.4464	0.4161

*Note: numbers in parentheses are p-values

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