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LOCAL BANKING DEVELOPMENT AND INCOME DISTRIBUTION ACROSS ITALIAN PROVINCES

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Local banking development and income distribution across Italian provinces

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Abstract

What are the effects of local credit institutions on the distribution of income? Why should local banking development matter for the level of inequality? We focus on how different dimensions of banking development and other characteristics of 103 provinces in Italy affect the level of inequality. Using panel estimation and data over the period 2006-2010, we find that local banking development has a significant negative effect on the Gini coefficient and other measures of inequality, i.e. higher banking development is associated with lower inequality. When considering Italian macro-areas subsamples (North, Center, South), the result is robust only for the North; thus suggesting the existence of potential non-linearities in the functioning of the finance-inequality nexus, depending on the level of development. We find that the coefficient on banking development becomes negative and significant after reaching a certain level of the median per capita GDP and after the financial sector has achieved a reasonably high level of development. We, finally, explore other dimensions that might lead to a non linear relationship between finance and inequality by considering the level of unemployment, the level of education and an index of financial dependence of the industrial sector.

JEL Classification: G21; G38; O15
Keywords: income distribution; inequality; financial development; Italy

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1 Introduction

Growing inequality is one of the biggest social, economic and political challenges of our time. But it is not inevitable, says The Economist's Economics Editor.[1] Studying causes and implications of the growing disparity in the income distribution between the rich and the poor in many countries around the world is becoming an increasingly debated issue among economists. Financial sector development has been shown to be highly effective in promoting economic growth, thus suggesting the importance of a deeper analysis of how it can be used to alter income distribution in order to foster pro poor economic growth. A substantial body of theory and evidence suggests that financial development represents an important driver for long-run growth.[2] There is also a growing literature on how financial development affects income distribution and the level of inequality in a country.[3] The empirical literature has also provided robust evidence of a positive relationship between the level of banking development and economic performance, both at the national and the regional level.[4] But what are the effects of local credit institutions on economic development and the distribution of income? The relationship between financial development and income distribution is independently important for understanding the process of economic development. Income distribution can influence savings decisions, the allocation of resources, incentives to innovate, and public policies. Those channels between finance and income distribution indirectly influence growth as well.

The focus of this paper is on the nature of the linkages between the intensity of financial intermediation at the disaggregated level, in particular the development of a local banking sector, and the distribution of income within a single country. We investigate how banking development and other characteristics of 103 provinces in Italy affect income distribution and the level of inequality. We focus our empirical investigation on Italy for many reasons. The focus on the local level in a single country allows us to exploit within country variation, reducing the risk of omitted variable bias and implicitly controlling for differences in formal institutions. The Italian financial system can still be described as bank-based, hence it allows us to better isolate the role of banks in fostering economic performance and affecting income distribution.[5] There were many restrictions on lending and branching across provinces until late

[1] See the Economist Special Report October 2012.

[2] See, among many others, King and Levine (1993), Demetriades and Hussein (1996), Rousseau and Wachtel (1998), Levine et al. (2000), and Rousseau and D'Onofrio (2013). Levine (2005) offers a comprehensive survey.

[3] Demirguc-Kunt and Levine (2009) review the theoretical and empirical literature on finance and inequality.

[4] Levine (2005) offers a comprehensive survey of both theory and empirics of financial development and growth.

[5] The capitalization of the Italian stock market is relative low compared to other advanced economies. For example, in 2010, the ratio between the stock market capitalization and the GDP in Italy was 15.4%, compared with 117.5% in the

nineties, thus the extension of local access to credit is fairly recent and still highly heterogeneous across provinces.[6] A higher availability of local branches is extremely important to extend access to credit since distance matter in the collection and provision of funds (Petersen and Rajan, 2002; Guiso et al., 2004); it is particularly difficult to deposit or borrow in a market other than the local one. The provincial dimension has not been extensively investigated given the difficulty of finding micro level data with the necessary detail for each province. To the best of our knowledge, this is the first study empirically linking provincial banking development to income distribution across Italian provinces.

Using panel estimation and data for 103 Italian provinces over the period 2006-2010, we find that local banking development has a significant negative effect on the Gini coefficient and other measures of income inequality, i.e. higher banking development is associated with lower inequality. However, the detected significant negative effect is not robust through the sample thus suggesting that the existence of potential non-linearities in the functioning of the finance-inequality nexus. When we split our sample according to geographical areas, the negative effect of banking development on inequality is, indeed, significant only in the northern sub-sample. One possible explanation for the last result is the existence of a nonlinear relationship between financial development and income inequality, depending on the level of development, given that the North of Italy is traditionally more industrialized and rich. I.e., as financial development is costly to implement, we might expect that catch-up effects would start manifesting only after the income crosses a certain threshold value. To further analyse the non linear hypothesis, we test whether the effect of banking development on income distribution depends on the stage of economic development. We split the sample according to the level of per capita GDP in each province and find evidence that banking development decreases income inequality only in the richer provinces, as conjectured. Our findings are confirmed by employing a rolling regressions technique to show graphically the evolution of the coefficient on financial development when per capita GDP increases. The coefficient becomes negative and significant after a certain level of the median per capita GDP and after the financial sector has achieved a reasonably high level of development. We, finally, explore other dimensions that might lead to a non linear relationship between finance and inequality by considering the level of unemployment, the level of education and an index of financial dependence of the industrial sector.

United States (The World Bank, 2012).

[6]Between 1936 and 1985, in Italy the number of bank branches grew by 87% versus 1228% in the United States. By contrast, between the end of the 1980s and the late 1990s, that is, after the deregulation, it grew by about 80%, almost double than in the United States.

The remainder of the paper proceeds as follows. Section 2 provides a review of the literature. Section 3 provides a general outlook on the history of local banking development in Italy and on the dynamics of income distribution across Italian provinces. Data and methodology are described in Section 4 and 5 while Section 6 provides the empirical results. Section 8 concludes.

2 Financial development and inequality: theories, evidence and channels

Financial development is expected to enhance growth by enabling the efficient allocation of capital and reducing borrowing and financing constraints. The issue of which segments of the population profit from the growth induced by financial development has not been conclusively addressed and there are many potential channels to be considered. Higher economic growth leads to an expansion in the demand for labor and in the creation of new opportunities in small and medium-sized firms and in the informal private sector. Hence, it could benefit the poor through the creation of more employment opportunities but it could also benefit the entrepreneurs generating higher profit margin.

There are a number of possible channels linking financial development and the distribution of income. Banerjee and Newman (1993), Galor and Zeira (1993) and Aghion and Bolton (1997) show that informational asymmetries produce credit constraints that are particularly binding on the poor because the poor do not have the resources to fund their own projects, nor the collateral to access bank credit. Similar theories thus suggest a negative linear relationship between financial development and income inequality showing that financial market imperfections can perpetuate the initial distribution of wealth in the presence of indivisible investments. Financial development directly eases the opportunity of the poor to access banking services. If the poor do not have access to the credit markets, they are constrained from investing in more education and thus they are automatically excluded from the higher paying job market. Financial development may allow lower income individuals to invest more in education thus reducing inequality. Galor and Zeira (1993) give theoretical insights on this education mechanism.

By ameliorating credit constraints, financial development may also foster entrepreneurship and new firm formation. A second channel thus focuses on the ability of the poor to become entrepreneurs. Lower income individuals do not have the required amount of collateral to apply for bank loans. If banking

development comes with an improvement in bank performance, we might see a decrease in the collateral requirements and in the borrowing costs that would allow an expansion of the access to credit to lower income segments of the population. Banerjee and Newman (1993) offer some foundations for this idea.

Financial development might also come in the form of increased efficiency of the banking sector, for example through a decrease in the interest rates faced by firms on their loans. In this case, the effects of financial development on the distribution of income would operate through an increased demand for labor by firms rather than through an increased access to credit by the poor. The reduced cost of capital would push firms to substitute capital for labor and to increase production that would in turn boost both the demand for labor and for capital. The increased demand for labor would directly and positively affect lower income workers.[7]

Although the relation between inequality and financial development could be linear, it is also possible that different mechanisms operate at different levels of development. Greenwood and Jovanovic (1990) describe how the interaction of financial and economic development can give rise to a non linear relationship, specifically an inverted U-shaped relationship, between income inequality and financial intermediary development; i.e., financial development could widen income inequality during the early period of development, then tend to lessen it as average income rises and more households gain access to financial services. The distributional effect of financial deepening is thus adverse for the poor at early stages, but positive after a turning point.

The empirical literature has provided evidence for the idea that financial development has a significant effect on the pattern of income distribution and reduces inequality. Many cross-country studies empirically assess the relationship between financial development and the distribution of income in an economy by studying the evolution of national Gini coefficients at the aggregate level. Li et al. (1998) explain variations in income inequality across countries and time in a sample of 49 countries over the period 1947-1994, by using standard measures of financial development, such as the ratio of M2 to GDP, and find a negative relationship between financial development and the Gini coefficient. Similarly, Clarke et al. (2006) find that finance is negatively associated with the level of the Gini coefficient using a panel estimator over the 1960-95 period in a sample of 83 countries. Beck et al. (2007) find that there is a negative relationship between financial development and the growth rate of the Gini coefficient, which

[7] Beck et al. (2010) try to test some of these explanations in the case of the US finding that financial development reduced income inequality primarily by boosting the relative demand for low-skilled workers

holds when controlling for real per capita GDP growth, lagged values of the Gini coefficient, and a wide array of other country-specific factors, and when using panel instrumental variable procedures to control for endogeneity and other potential biases. They also find that financial development exerts a disproportionately positive impact on the relatively poor by boosting the growth rate of the income share of the poorest quintile beyond the impact on aggregate growth.

On a more disaggregated level, researchers have studied the impact on both households and firms. For what concerns the impact on households, empirical research suggests that households benefit significantly from financial development. General equilibrium models and natural policy experiments by looking at direct and indirect effects of finance, conclude that the indirect effects are prevalent in reducing inequality. Gine and Townsend (2004) suggest that increased access to financial services has a negative impact on income inequality indirectly through the labor market.[8] The channel suggested is that finance reduces inequality by increasing the demand for labor in the long run, thus offsetting the short run opposite effects.

One interesting and frequently used exogenous change in policy affecting the financial sector is branch deregulation within a country. Burgess and Pande (2005) study the effects of branch deregulation, and the following improved access to finance, in India on the level of poverty in each state. Beck et al. (2010) assess the impact of bank deregulation on the distribution of income across the states of the United States. They find that deregulation tightened the distribution of income by boosting incomes in the lower part of the distribution.

From the existing literature, it emerges that finance has a central role in explaining economic inequality, however the complete understanding of the particular mechanisms linking finance and inequality and in particular how formal financial sector policies, in particular banking sector and securities markets regulations, affect inequality is still a gap in this field. While theory focuses on the importance of broader access, i.e. financial inclusion, there is relatively little empirical evidence linking access to finance to development outcomes. In particular, studies on the impact of finance on inequality within a country are still limited. However, if pro-poor financial development requires expanding the access to financial intermediation by a growing number of poor households, it becomes important to address the issue of what are the main obstacles that discriminate the poor from entering financial intermediation. Theoretical models suggest many potential sources of financial market imperfections, such as adverse selection, moral

[8]They use surveys of Thai households from 1976 to 1996 and find financial liberalization and the increasing access to credit was able to explain the rapid growth of GDP in Thailand.

hazard, transactions costs, entry fees, connections. The relative importance of those potential sources of credit market imperfections could vary from one country to another, hence it becomes crucial to move from cross-country studies and look into country-level studies. Cross-country regressions are important to emphasize between country variation although it is the within country variation that can tell us more about how finance affects income distribution. Institutional and comparative analyses could better answer the economic question of how finance interacts with the real sector to alter the distribution of income in the economy.

Our study also relates to the literature that focuses on local banking development and its effects at a disaggregated level. Following other studies on local financial development (Bonaccorsi Di Patti and Gobbi, 2001; Guiso et al., 2004; Benfratello et al., 2008) we study Italy, which provides an ideal setting, and focus on province-level data. Among other contributions that focus on the provincial level, Hester et al. (2001) use provincial data on banks and ATMs to study the effect of innovation in the banking sector on competition; Beretta et al. (2003) study the relationship between banks' internationalization and export propensity using data at Italian provinces level; Deloof and La Rocca (2012) find that provincial banking development in Italy increases the provision of trade credit.

3 Local Banking Development and dynamics of income distribution in Italy

The Italian financial system is dominated by the banking sector, since the stock market's capitalization is still relatively small. The banking system itself is small if compared to the European counterparts. At the end of 2010 total balance-sheet assets came to 2.5 times the country's GDP, compared with 3.3 times in Germany and Spain and 4.1 times in France. The same comparison holds if we involve other banking business indicators, such as the ratio of deposits and lending to GDP.[9]

The Italian banking system today is the result of two important regulatory interventions. First, in response to the 1930-31 banking crisis, in 1936 the Italian Government approved a Banking Law with the objective of enhancing bank stability through severe restrictions on bank competition. The Banking Law imposed strict limits on the ability of different types of credit institutions to open new branches.

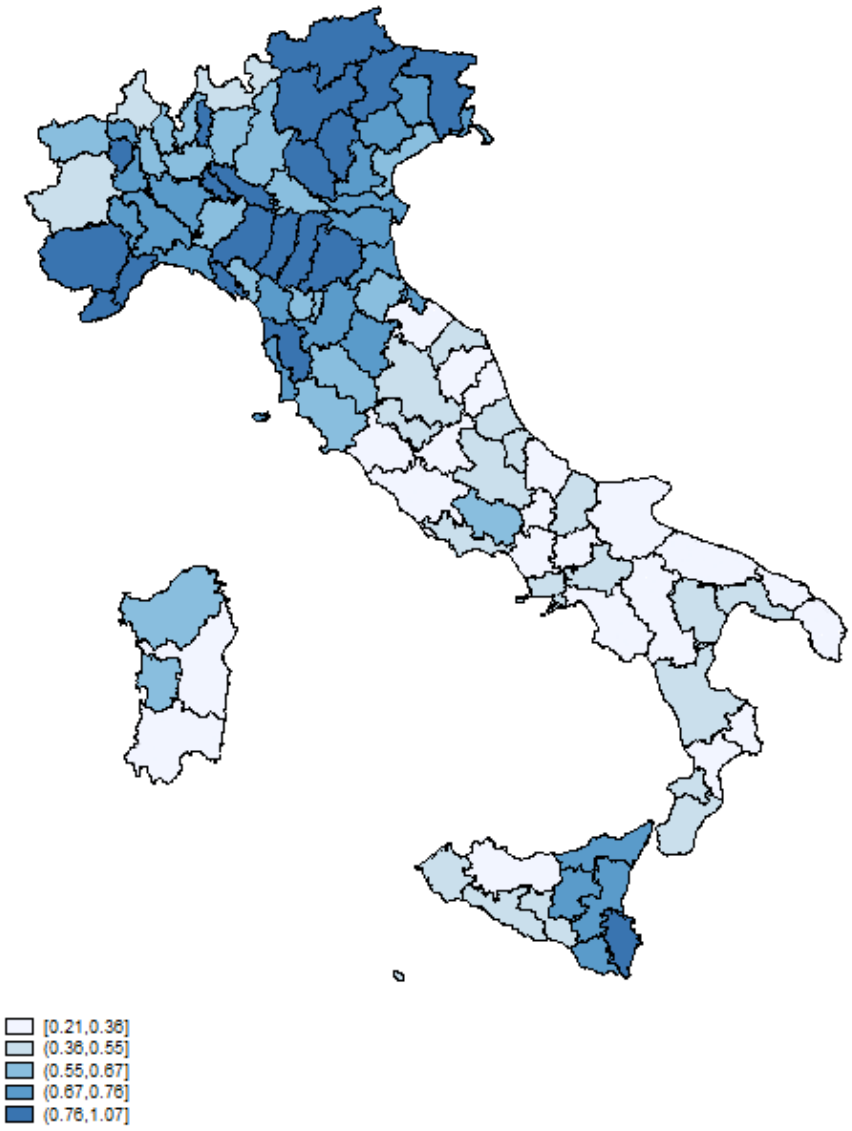
[9]See De Bonis et al. (2012) for a complete overview of the Italian banking system.

Guiso et al. (2003, 2004) show that these banking laws deeply affected local credit markets in the decades that followed. Second, the deregulation of the 1990s is one of the main determinant of the shape of the actual banking system in Italy. A decade of deregulation (1985-1995), markedly changed the structure of the Italian banking system. Entry in the banking market was entirely liberalized in 1990, thanks also to the introduction of European directives about the coordination of banking regulations across the European Union. In 1993, a new banking law, incorporating the Banking European Directive, removed the separation between short and long-term lending. In 1994, the Government started to privatize all the major State-owned banks. The number of bank branches grew by 79 percent, almost twice as much the rate of growth of bank branches in the United States during the same period (43 percent).

Fig. 1 reports a map of the 103 Italian provinces organized by branch density, i.e. the number of branches per thousand inhabitants, that is our main measure of local banking development. Although the process of geographical diffusion of branches started in the early nineties, the gap between the North and South is still very wide with the banking system in the Southern provinces clearly undersized with respect to the served population. Fig. 2 reports a map of the 103 Italian provinces organized by the level of Gini coefficient. Unlike the banking development map, the situation here is more heterogenous across the different macro areas. The number of relatively equal provinces in the North is more or less the same of the number of relatively unequal provinces. However, the North shows the highest number of provinces with the lowest level of the Gini coefficient.

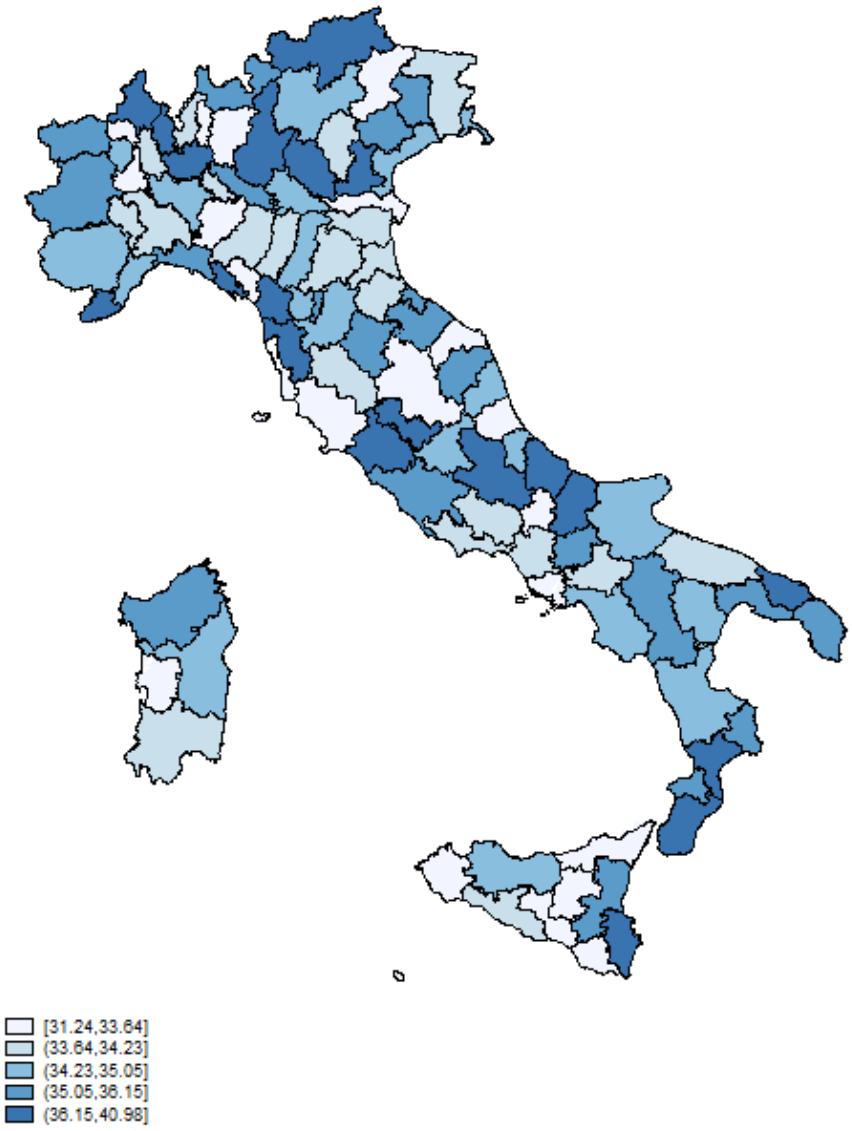
If we consider the average trend of inequality per macro areas (Fig.3), we can notice that, although slightly declining in all areas, southern provinces on average show higher level of inequality than the northern ones. If from one hand, the more unequal distribution of income in the South might be actually lower than what the official figures show, due to a consistent portion of shadow economy, on the other hand, it raises many questions on the difference in the economic structures within a country.[10] For what concerns our study, the latter is a dimension to take into account when studying the potential channels of interaction between finance and inequality. According to Istat (2012), fewer employment opportunities and lower earnings for women, together with the job instability, are among the main causes of inequality in Italy. In 2009, Istat data on income distribution show that most resident households in Italy (about 58 percent) had a net income lower than the average annual amount (29,766 euro, around 2,480 euro a month)

[10]The size of the underground economy is clearly an issue, however, shadow economy is present widespread in Italy. Moreover, it is usually considered that in Italy the value of the underground economy is not likely to affect the analysis based on official figures, unlike other countries, as for example China or India.



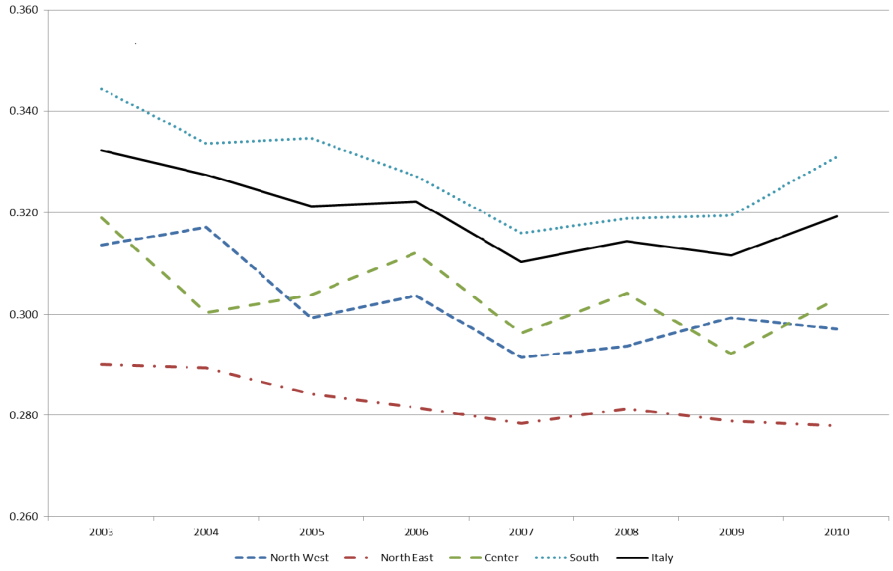
Note: Our calculations on Bank of Italy and Istat data. The map shows branch density, measured as the number of branches per thousands inhabitants, in 2010 in the 103 Italian provinces, classified in quintiles.

Fig. 1. Branch density: 2010.



Note: Our calculations on Italian Department of Finance and Istat data. The map shows the level of the Gini coefficient, in 2010 in the 103 Italian provinces, classified in quintiles.

Fig. 2. Gini coefficient: 2010.

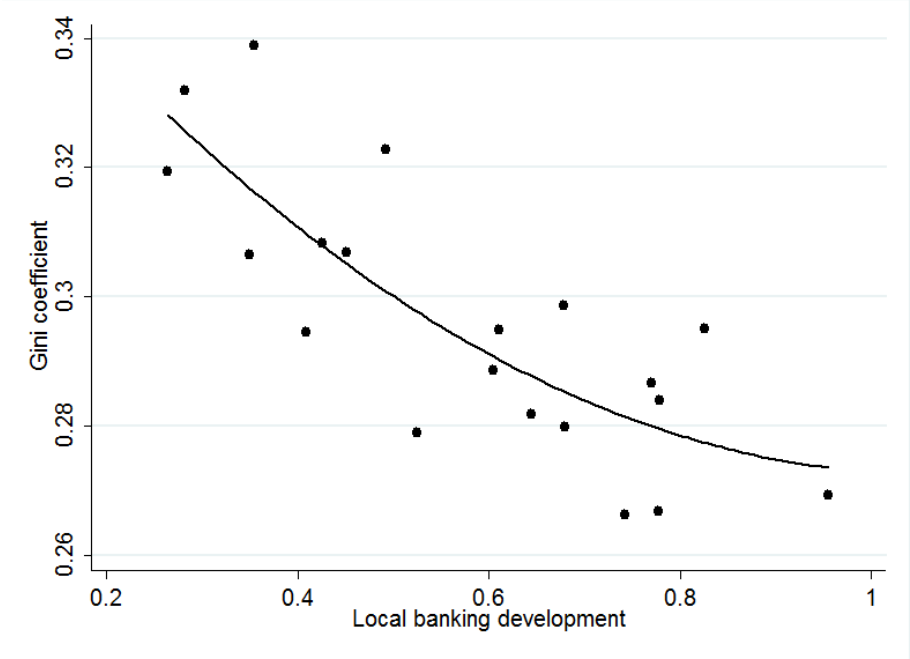


Note: Our calculations on Istat data.

Fig. 3. Gini coefficient: 2003-2010.

while 50 percent of households received less than the median value of 24,673 euro (2,056 euro a month). Calabria has the lowest average annual income (16,252 euro) while Valle d'Aosta shows the highest average annual household income (34,227), followed by Trentino-Alto Adige (32,274), Emilia Romagna (31,048) and Lombardia (29,954). In Sicilia, there is the highest income concentration with the value of the Gini index standing at 36.152; values above the average national value are also recorded in Campania and Puglia. A high degree of income distribution equality is observed, conversely, in Piemonte, Friuli-Venezia Giulia, Umbria, Basilicata and Sardegna.

Fig. 4 shows the average (2003-2010) of branch density and the Gini index of inequality, registered at regional level, slightly less disagreggated than the provincial one. It is possible to notice that inequality tends to be substantially of low level when the level of banking development is high. We interpolate data using a weighted least squares method that provides a generally smooth curve, in order to have a more clear pattern in the graph, to reduce the spread of data and to see how the phenomenon occurs. Indeed, such preliminary considerations call for a deeper analysis of the potential interactions among finance, and particularly local banking development and inequality.



Note: Our calculations on Bank of Italy and Istat data for Italian regions.

Fig. 4. Local banking development and inequality

4 Data and descriptive statistics

This section describes our indicators and data for income inequality and financial development as well as the set of conditioning information. We collect data from four main data sources: the municipality-level database on tax revenue compiled by the Italian Department of Finance, the Statistical Bulletin of the Bank of Italy, the Istat province-level database and the Geoweb Starter, a database containing local, provincial and regional statistical information produced by Istituto Guglielmo Tagliacarne.

Since measures of income distribution detailed by province are not readily available, we compute them starting from the income data. We use information on the distribution of taxable income for each of the 8,092 Italian municipalities from the Department of Finance website over the 2006-2010 period.[11] We arrange our data in order to obtain the distribution of taxpayers' income at the provincial level. The dataset specify the frequency and the average income of 18 income classes for each province and each year. Starting from these data, we are able to compute the traditional indicators employed in the inequality

[11] The choice of this specific time period is forced by the limited availability of income data from the Italian Department of Finance website.

literature. First, we derive the Gini coefficient of income distribution from the Lorenz curve. Larger values of the Gini coefficient imply greater income inequality. The Gini coefficient is equal to 0 if everyone receives the same income, and it is equal to 100 if a single individual receives the income of the entire economy. As an alternative measure of income distribution, we compute the Theil index. Similarly to the Gini, the Theil index is also increasing in the degree of income inequality: if all individuals have the same income, the index is equal to 0, while the index is equal to $ln(n)$, if one individual receives all of the economy's income, where n is the number of individuals.

The recent literature on the relationship between local banking development and economic growth has developed several indicators to proxy for the ability of financial intermediaries to improve loan monitoring and screening. We concentrate on branch density by province (number of branches divided by population) as a measure of the level of development of the local credit markets. This is a standard measure used in the empirical literature on banking (see, e.g., Jayaratne and Strahan, 1996; Degryse and Ongena, 2005). The rationale behind the choice of this variable is, on one hand, the fact that physical proximity by increasing the capacity of collecting "soft" information, improves the quality of screening and monitoring of borrowers, making these actions less costly (see, e.g., Petersen and Rajan, 1994; Presbitero and Rebelotti, 2013).[12] On the other hand, branch density shows a large intra-provincial dispersion, as it is evident in Fig. 1, and captures the dimension of banking development that is largely affected by the regulation and deregulation processes (see, Benfratello et al., 2008, and Section 3). Data on branch density come from the Statistical Bulletin of the Bank of Italy.

For some of the control variables, we use the information coming from the Istat website for what concerns per capita GDP, unemployment rate, female activity rate, population by provinces and regional percentage of school dropouts. The index of infrastructure endowment, that allows to control for some relevant factors that might differ across the macro areas of Italy but do not change over time, is instead taken from the Geoweb Starter database.

Table 1 contains summary statistics at the regional level.[13] The data show that average income inequality, measured by Gini index or Theil index, is similar among the three Italian macro-areas (North, Center and South). Instead, the number of bank branches per 1,000 inhabitants is larger in the North

[12] Furthermore, Bonaccorsi and Gobbi (2001) show that provinces with a high number of bank branches relative to their population have greater bank credit.

[13] For a matter of space, we report the statistics at the provincial level in Table A.1 of the Appendix.

Table 1. Summary statistics

	Gini coefficient		Theil coefficient		Branches per 1,000 inhab		GDP per capita		Unemployment rate	
VARIABLES	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*
Piemonte	33.763	*1.165*	0.241	*0.016*	0.677	*0.119*	27,301	*2,238*	5.057	*1.597*
Valle d'Aosta	34.966	*1.028*	0.249	*0.028*	0.770	*0.014*	34,227	*903*	3.655	*0.703*
Lombardia	35.251	*2.079*	0.265	*0.035*	0.699	*0.080*	29,954	*3,185*	4.334	*1.109*
Trentino-Alto Adige	36.370	*2.009*	0.271	*0.030*	0.952	*0.117*	32,724	*2,738*	3.015	*0.565*
Veneto	34.339	*1.926*	0.249	*0.028*	0.760	*0.086*	29,418	*1,391*	4.165	*1.111*
Friuli-Venezia Giulia	33.477	*1.028*	0.231	*0.017*	0.747	*0.101*	28,783	*1,914*	4.455	*1.046*
Liguria	35.563	*1.351*	0.256	*0.021*	0.606	*0.040*	26,496	*1,560*	5.537	*1.361*
Emilia-Romagna	35.178	*1.336*	0.257	*0.019*	0.827	*0.100*	31,048	*2,379*	4.126	*1.685*
North	34.755	*1.780*	0.253	*0.027*	0.738	*0.121*	29,436	*2,928*	4.436	*1.423*
Toscana	34.843	*1.275*	0.249	*0.018*	0.670	*0.077*	27,084	*2,185*	5.546	*1.760*
Umbria	33.552	*0.534*	0.230	*0.010*	0.622	*0.051*	24,013	*949*	5.561	*1.039*
Marche	34.047	*0.259*	0.239	*0.006*	0.777	*0.058*	25,836	*2,261*	5.237	*1.689*
Lazio	35.145	*3.312*	0.244	*0.050*	0.491	*0.111*	24,608	*4,077*	8.458	*1.666*
Center	34.640	*1.897*	0.244	*0.028*	0.643	*0.126*	25,964	*2,917*	6.182	*2.089*
Abruzzo	34.145	*1.219*	0.232	*0.019*	0.530	*0.058*	21,458	*758*	7.241	*1.516*
Molise	34.220	*0.357*	0.231	*0.007*	0.432	*0.047*	20,133	*884*	8.727	*0.818*
Campania	35.415	*1.182*	0.243	*0.019*	0.294	*0.040*	16,981	*961*	11.410	*2.122*
Puglia	35.136	*1.618*	0.244	*0.022*	0.336	*0.033*	16,891	*1,157*	12.530	*2.278*
Basilicata	33.837	*0.458*	0.224	*0.006*	0.424	*0.009*	17,993	*564*	11.209	*1.751*
Calabria	34.509	*0.859*	0.228	*0.013*	0.256	*0.026*	16,252	*1,529*	12.295	*1.300*
Sicilia	36.152	*1.074*	0.251	*0.017*	0.364	*0.028*	16,829	*1,264*	13.413	*3.279*
Sardegna	33.425	*1.701*	0.218	*0.026*	0.435	*0.054*	19,452	*1,887*	12.270	*2.732*
South	34.918	*1.503*	0.237	*0.021*	0.369	*0.089*	17,833	*2,095*	11.661	*3.009*
Italy	34.789	*1.714*	0.246	*0.026*	0.590	*0.200*	24,673	*5,826*	7.317	*3.940*

(0.738) and in the Center (0.643) than in the South (0.369). Per capita GDP and the unemployment rate show the same trends. In particular, the regions located into the South of Italy report, on average, a lower level of per capita GDP (17,833 euro, that is lower than the national average of 24,673 euro) and a higher unemployment rate (11.66 versus a national average of 7.31). Table 2 reports the correlation matrix. Gini and Theil index show a high positive correlation, meaning that they are capturing similar phenomena. Per capita GDP shows a low correlation with the inequality indicators meaning that inequality is not necessarily driven by economic development.

5 Methodology

We use a panel specification to assess the relationship between local financial development and income distribution, based on the following regression set-up:

$$Y_{pt} = a_1 + b_1 B_{pt} + b_2 C_{pt} + E_t + \varepsilon_{pt} \tag{1}$$

with $p = 1, ..., 103$, $t = 2006, ..., 2010$. Y_{pt} is a measure of income inequality (e.g., the logarithm of the Gini index or of the Theil index) in province p and in year t, C_{pt} is a vector of time-varying province level control variables, E_t is a vector of year dummies that account for year fixed effects and ε_{pt} are the error terms. The variable of interest is B_{pt}, a measure of local financial development (e.g., log of branch density) in province p and in year t. The coefficient b_1, therefore indicates the impact of financial development on income inequality. A positive and significant b_1 suggests that financial development increases income inequality, while a negative and significant coefficient indicates that financial development mitigates the level of inequality. In total, by considering 103 provinces and five years of data, we end up with 515 province-year observations' dataset that serves as the basis for much of our analysis.

As explained in Section 1, considering the provinces of a single country enables us to reduce the risk of omitted variable bias and to implicitly control for differences in formal institutions. Moreover, including year-specific dummy variables allows us to control for nation-wide shocks and trends that shape income distribution over time, such as business cycles (e.g., the financial crisis of 2007-2008), national changes in regulations and laws. Nevertheless, in testing for the effect of banking development on income inequality, we also account for the possibility that the two phenomena are jointly determined and that

Table 2. Correlation matrix

	Gini index (ln)	Theil index (ln)	Branches (ln)	GDP pc (ln)	School drop. (ln)	Material Infr. (ln)	Self empl. (ln)	Female act. (ln)	Unempl. (ln)
Gini index (ln)	1								
Theil index (ln)	0.9167	1							
	[0.000]								
Branches (ln)	-0.0862	0.2063	1						
	[0.051]	[0.000]							
GDP per capita (ln)	0.0753	0.3737	0.8762	1					
	[0.088]	[0.000]	[0.000]						
School dropout	0.13	-0.0265	-0.5103	-0.5724	1				
	[0.003]	[0.548]	[0.000]	[0.000]					
Material Infr. (ln)	0.0301	0.0583	0.1471	0.2391	-0.1818	1			
	[0.495]	[0.187]	[0.001]	[0.000]	[0.000]				
Self employed (ln)	0.0123	-0.2015	-0.565	-0.6458	0.5886	-0.1862	1		
	[0.781]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]			
Female activity (ln)	-0.0869	0.2059	0.8788	0.9074	-0.5727	0.1792	-0.5442	1	
	[0.048]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]		
Unemploment (ln)	0.0371	-0.269	-0.821	-0.8514	0.4707	-0.1436	0.5266	-0.7913	1
	[0.401]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	

Notes: The table reports the pairwise correlation coefficients for the variables included in the regression analysis. P-values are reported in brackets.

there might exist unobserved factors that are correlated with both. We address these endogeneity issues using an instrumental variable (IV) approach. Let I_p be a vector of instruments that are correlated with local banking development but affect income inequality only through the banking channel. The effect of these instruments on B_{pt} is captured by b_4 in the local banking development equation:

$$B_{pt} = b_3 C_{pt} + b_4 I_p + E_t + u_{pt} \tag{2}$$

where C_{pt} refer to the control variables in (1), I_p is the vector of instruments, E_t is the vector of year dummies and u_{pt} are the residuals.

We first estimate the empirical model in (1) with OLS. Then, we estimate the model (1)-(2) using a two-stage least square (2SLS) estimator. To do this, we need an appropriate set of instruments. Following Guiso et al. (2004) and Herrera and Minetti (2007), we exploit the 1936 banking law which subjected the Italian banking system to strict regulation of entry until the end of the 1980s. To understand the choice of these instruments, we need to discuss the Italian banking regulation. In response to the 1930-31 banking crisis, in 1936 the Italian Government approved a Banking Law. The objective of the 1936 Italian banking regulation was to enhance bank stability through severe restrictions on bank competition. The banking law that was enacted imposed strict limits on the ability of different types of credit institutions to open new branches. Specifically, each credit institution was assigned a specific geographical area of competence based on its presence in 1936. Banks' ability to grow and lend was restricted to that area. A further directive issued in 1938 modified the regulation in relation to the ability of credit institutions to grow. In particular, national banks (the so called *banche di interesse nazionale*) could open branches only in the main cities; local commercial banks and cooperative banks could open branches within the boundaries of the province where they operated in 1936; savings banks could expand within the boundaries of the region (which includes several provinces). Since the prevalence of the different types of institutions varied across Italian provinces, the tightness of financial constraints varies geographically. The regulatory system for bank entry in local credit markets was completely liberalized only towards the end of the 1990s. Guiso et al. (2004) demonstrate that these banking laws deeply affected local credit markets (creation and location of new branches) in the decades that followed 1936. Thus, we expect that this regulation shaped the local banking structure during the decades in which it was in place and that this impact persisted for several years after the removal of the regulation. Hence, we expect the 1936 banking regulation to be correlated

with the current local banking development. As shown by Guiso et al. (2003, 2004), the distribution of types of banks across provinces in 1936, and hence the constrictiveness of regulation in a province, stemmed from "historical accident".[14] In addition, the regulation was not designed looking at the specific needs of each province. The differences in the restrictions imposed on the various types of banks were related to differences in the connections of the banks with the Fascist regime. Therefore, the regulation is unlikely to have any direct impact on the income inequality nowadays.

We choose as instruments two of the four indicators that Guiso et al. (2004) employ to characterize the local structure of the banking system in 1936. These indicators are: the number of bank branches in the province (per 100,000 inhabitants) and the number of savings banks in the province (per 100,000 inhabitants). Based on the discussion above, provinces with more bank branches in 1936 and with relatively more savings banks should have suffered less from the regulatory freeze.

After estimating the empirical model on the full sample, we split the data in three different subsamples corresponding to the three different geographical areas (North, Center, South) in which Italy is usually divided. In this part of the study we move to the main focus of our paper and study the existence of potential non-linearities in the functioning of the finance-inequality nexus. To further exploit the issue of non-linearity, we split again the sample according to the level of per capita GDP (i.e. below or above the median value). We finally use a rolling-regression technique that has been recently used in the literature on finance and growth.[15] In the first part of our analysis, the split-up of the sample is obtained mostly through discrete measures that might suppress the actual non linear relationship between financial development and other variables. The use of a rolling-regression framework by ordering the data according to the level of a variable of interest, for instance per capita GDP, can be thought as a continuous, rather than discrete, analysis.

We employ rolling-window OLS and 2SLS regressions with an initial window of 140 observations after ordering the data according to the variable of interest. For example, when using per capita GDP as the ordering variable, the initial regression includes the 140 observations with the lowest levels of per

[14] In particular, the distribution of banking types reflected the interaction between previous waves of bank creation and the history of Italian unification. For instance, the strong presence of savings banks in the North East and the Center stemmed from the fact that this institution originated in Austria and started to operate first in the provinces dominated by the Austrian Empire (Lombardia and the North East) and in close-by states (especially Tuscany and the Papal States).

[15] For example, Rousseau and Wachtel (2002) apply the rolling-regression framework to look for inflation thresholds in the finance-growth nexus while Yilmazkuday (2011) extends the analysis to figure out how non linear growth estimates and their significance change if all the observations are ordered by a variable of interest.

capita GDP and rolls in additional observations one by one and rolls out the initial observations one by one, so that each coefficient is estimated with a constant window size. The selection of a constant window size is important for comparison of coefficients across the windows while the actual size of the window, i.e. 140 observations, is important to ensure a fair distribution across the power of the regressions and the degree of non linearity. These regressions give us also some insights on the potential mechanisms through which the finance-inequality nexus works. We summarize the results from the rolling-window regressions by plotting the coefficient estimates of interest, i.e. the coefficient on branch density, against the ordering variable.

6 Empirical results

This section describes the empirical results from the analysis. Table 3 indicates that local financial development negatively affects the Gini coefficient. Column 1 reports the results of a regression with only the log of branch density and the log of per capita GDP, while columns 2 through 6 provide regression results controlling for some province-level control variables, including a proxy for education (school dropout), a proxy for infrastructure, unemployment or female activity rate, self-employment. Column 7 reports the results from the 2SLS regression with all the controls, while columns 8 and 9 provide OLS and 2SLS regression results with the log of the Theil index as the dependent variable.[16] All the regressions include year-specific and geographical area dummy variables. As shown, financial development enters significantly in all the regressions. These findings indicate that branch density tightens the distribution of income even when accounting for year fixed effects and time-varying province-level factors. Moreover, we find that a higher level of per capita GDP is associated with higher level of inequality. The finding of a positive direct effect of GDP on the Gini coefficient, allow us to better isolate the impact of financial development by itself on inequality.

Higher education, measured by the proportion of school dropouts, is associated with a lower level of inequality, confirming some of the implications of the Galor and Zeira (1993) model on the importance of education in the distribution of income. Higher unemployment rate is associated with higher income inequality, similar to what Beck et al. (2010) found for the US; alternatively, we also find that a higher

[16] In the next Tables we report only the results for the estimations with the Gini index as dependent variable. All our results are virtually identical whether we consider Theil index.

Table 3. Baseline estimates

VARIABLES	(1) OLS Gini (log)	(2) OLS Gini (log)	(3) OLS Gini (log)	(4) OLS Gini (log)	(5) OLS Gini (log)	(6) OLS Gini (log)	(7) 2SLS Gini (log)	(8) OLS Theil (log)	(9) 2SLS Theil (log)
Branches density (log)	-0.072***	-0.074***	-0.073***	-0.071***	-0.066***	-0.044***	-0.163***	-0.080***	-0.369***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)	(0.034)	(0.024)	(0.074)
Per capita GDP (log)	0.211***	0.225***	0.224***	0.223***	0.236***	0.296***	0.350***	0.645***	0.775***
	(0.030)	(0.030)	(0.030)	(0.029)	(0.031)	(0.029)	(0.030)	(0.060)	(0.060)
School dropouts (log)		0.047***	0.047***	0.053***	0.051***	0.038***	0.047***	0.086***	0.109***
		(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.012)	(0.021)	(0.024)
Material infrastructure (log)			0.002	0.003	0.001	-0.000	-0.009	-0.015	-0.035***
			(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.012)	(0.013)
Self employed (log)				-0.026	-0.023	0.002	0.001	-0.014	-0.017
				(0.019)	(0.019)	(0.019)	(0.019)	(0.040)	(0.043)
Unemployment rate (log)					0.014				
					(0.009)				
Female rate of activity (log)						-0.137***	-0.052	-0.260***	-0.054
						(0.021)	(0.034)	(0.045)	(0.076)
Constant	1.354***	1.080***	1.085***	1.168***	1.002***	0.933***	-0.025	-7.180***	-9.502***
	(0.308)	(0.311)	(0.311)	(0.293)	(0.315)	(0.273)	(0.371)	(0.574)	(0.739)
Observations	515	515	515	515	515	515	515	515	515
R^2	0.174	0.204	0.204	0.208	0.211	0.264	0.110	0.349	0.150
F instruments							37.57		37.57
Overid p-value							0.916		0.763

Notes: The table reports regression coefficients and associated standard errors (in parentheses). The dependent variables and the estimation method are reported at the top of each column. The set of instruments includes: the number of bank branches in the province in 1936 (per 100,000 inhabitants) and the number of savings banks in the province in 1936 (per 100,000 inhabitants). The regressions include year-specific and geographical area dummy variables. *** significant at 1%, ** significant at 5%, * significant at 10%. The table reports the value of the R^2 and the value of the F-statistics for a test of the weakness of the instruments. The table also reports the p-values of a Sargan test, as a test of overidentifying restrictions.

rate of female activity is associated with lower inequality.

The literature suggests that the effect of financial development on inequality might be non linear (Greenwood and Jovanovic, 1990). In Table 4, we report regression results for subsamples of provinces, selected according to the geographical area (i.e. North, Center, South).[17] Regressions results depicted in Table 4 indicate that local banking development enters significantly, and with the expected sign, only in the regression for the Northern provinces. The signs on the control variables are the same as in the case of the full sample besides the one referring to education and female activity rate. When considering the Center and South sample, the coefficient on financial development is not significant anymore. Since the North of Italy is the area with the highest level of per capita GDP, the last finding could suggest that the effectiveness of banking development in reducing the level of income inequality varies according to the different stage of economic development. We further test this conjecture by splitting the sample according to the median per capita GDP (euro 25,816). We report the regressions results in columns 1 to 4 of Table 5. We find that financial development enters the regression significantly and with a negative sign only when the level of GDP is higher than the median, thus confirming our conjecture that the finance-inequality nexus is non linear according to the different level of economic development. This hypothesis is also in line with some influential theories about the relationship between financial development and income inequality. The general equilibrium model developed by Greenwood and Jovanovic (1990) generates a nonlinear relationship between financial development, income inequality, and economic development. During the various stages of economic development, financial development improves capital allocation, boosts aggregate growth, and helps the poor through this channel. However, the distributional effect of financial development, and hence the net impact on the lower percentile of the income distribution, depends on the level of economic development. At early stages of development, only the rich can afford to access and directly profit from better financial markets. At higher levels of economic development, many people access financial markets so that financial development directly helps a larger proportion of the society. In the specific case of our sample, we are probably capturing the behavior from the middle of the distribution on, when the level of economic development is sufficiently high to enable more segments of the population to have access to the financial system.

In columns 5 to 8 of Table 5, we study how the level of financial development (below or above the

[17] North includes all the provinces from the regions of Piemonte, Valle d'Aosta, Lombardia, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Liguria and Emilia-Romagna. Center includes the provinces from the regions of Toscana, Umbria, Marche and Lazio; while South includes all the remaining regions.

Table 4. Sub-samples estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	North		Center		South	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
VARIABLES	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)
Branches density (log)	-0.103***	-0.319***	0.003	0.018	0.014	0.120
	(0.018)	(0.056)	(0.023)	(0.034)	(0.016)	(0.087)
Per capita GDP (log)	0.361***	0.491***	0.333***	0.335***	0.171***	0.134***
	(0.037)	(0.042)	(0.046)	(0.044)	(0.040)	(0.048)
School dropouts (log)	-0.067***	-0.055**	0.005	0.003	0.070***	0.076***
	(0.021)	(0.025)	(0.045)	(0.043)	(0.013)	(0.013)
Material infrastructure (log)	-0.012	-0.032***	0.027**	0.026**	-0.041***	-0.034***
	(0.007)	(0.010)	(0.011)	(0.010)	(0.012)	(0.012)
Self employed (log)	0.056**	0.063**	-0.141***	-0.147***	0.003	0.115
	(0.025)	(0.025)	(0.053)	(0.052)	(0.037)	(0.103)
Female rate of activity (log)	0.018	0.105*	0.101	0.089	-0.170***	-0.229***
	(0.043)	(0.062)	(0.069)	(0.061)	(0.028)	(0.071)
Constant	-0.255	-2.097***	0.240	0.287	2.298***	2.546***
	(0.391)	(0.475)	(0.392)	(0.378)	(0.350)	(0.425)
Observations	230	230	105	105	180	180
R^2	0.409	0.039	0.606	0.604	0.345	0.201
F instruments		17.74		78.95		3.299
Overid p-value		0.906		0.0314		0.0129

Notes: The table reports regression coefficients and associated standard errors (in parentheses). The dependent variables and the estimation method are reported at the top of each column. The set of instruments includes: the number of bank branches in the province in 1936 (per 100,000 inhabitants) and the number of savings banks in the province in 1936 (per 100,000 inhabitants). The regressions include year-specific dummy variables. *** significant at 1%, ** significant at 5%, * significant at 10%. The table reports the value of the R^2 and the value of the F-statistics for a test of the weakness of the instruments. The table also reports the p-values of a Sargan test, as a test of overidentifying restrictions.

Table 5. Non linearities: economic and financial development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Per capita GDP $\leq 25,816$		Per capita GDP $> 25,816$		Branches per 1,000 inhab ≤ 0.62		Branches per 1,000 inhab > 0.62	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
VARIABLES	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)
Branches density (log)	0.015	0.032	-0.085***	-0.338***	-0.012	-0.081*	-0.035	-0.259***
	(0.013)	(0.036)	(0.017)	(0.061)	(0.014)	(0.048)	(0.022)	(0.085)
Per capita GDP (log)	0.130***	0.123***	0.438***	0.500***	0.275***	0.287***	0.392***	0.437***
	(0.039)	(0.041)	(0.035)	(0.040)	(0.048)	(0.048)	(0.034)	(0.033)
School dropouts (log)	0.054***	0.053***	-0.068***	-0.046*	0.057***	0.057***	-0.030	-0.006
	(0.010)	(0.010)	(0.024)	(0.027)	(0.011)	(0.012)	(0.023)	(0.026)
Material infrastructure (log)	-0.017*	-0.017*	0.002	-0.029**	-0.018**	-0.017*	0.014*	-0.001
	(0.010)	(0.009)	(0.008)	(0.012)	(0.009)	(0.009)	(0.008)	(0.010)
Self employed (log)	0.026	0.028	0.009	0.051**	0.025	0.019	-0.043*	-0.041*
	(0.024)	(0.025)	(0.028)	(0.026)	(0.025)	(0.025)	(0.025)	(0.023)
Female rate of activity (log)	-0.141***	-0.154***	0.003	0.135*	-0.163***	-0.106**	-0.091***	-0.027
	(0.027)	(0.037)	(0.040)	(0.071)	(0.029)	(0.041)	(0.033)	(0.056)
Constant	2.544***	2.683***	-0.845**	-2.309***	1.165***	0.801	0.128	-0.767*
	(0.336)	(0.405)	(0.352)	(0.431)	(0.431)	(0.517)	(0.315)	(0.410)
Observations	258	258	257	257	255	255	260	260
R^2	0.304	0.299	0.451	0.017	0.242	0.183	0.355	0.193
F instruments		30.91		18.58		17.85		12.35
Overid p-value		0.689		0.289		0.562		0.516

Notes: The table reports regression coefficients and associated standard errors (in parentheses). The dependent variables and the estimation method are reported at the top of each column. The set of instruments includes: the number of bank branches in the province in 1936 (per 100,000 inhabitants) and the number of savings banks in the province in 1936 (per 100,000 inhabitants). The regressions include year-specific and geographical area dummy variables. *** significant at 1%, ** significant at 5%, * significant at 10%. The table reports the value of the R^2 and the value of the F-statistics for a test of the weakness of the instruments. The table also reports the p-values of a Sargan test, as a test of overidentifying restrictions.

median) affects the finance-inequality nexus. In particular, we split the sample according to the median of branch density (0.62 branches per 1,000 inhabitants). The results show that the effect of financial development is significant for both the sub-samples in the 2SLS regressions. However, the coefficient of branch density is larger and more significant for the provinces with a higher level of financial development. These results indicate that the finance-inequality nexus is more relevant in certain economic environments: provinces with more developed financial sectors or provinces with higher levels of per capita GDP have a stronger and significant impact of financial development on income inequality.

In Fig. 5 we address these issues of nonlinearity from a different perspective by using a rolling-regression technique that has been recently used in the literature on finance and growth to study the issue of nonlinearity, as explained in Section 5. We employ rolling-window OLS and 2SLS regressions with an initial window of 140 observations after ordering the data according to the median level of per capita GDP (upper panel) and the median level of branch density (lower panel). The coefficients depicted in Fig. 5 reflect the effects of finance on inequality at the different stage of economic and financial development.

The horizontal axis shows the median of the ordering variable in 140 sample windows (i.e., the variable according to which all the observations have been sorted) corresponding to each particular point estimate. The vertical axis measures the coefficient estimates of the finance variable. The blu lines show the coefficient estimates while the green and red lines are the 5-percent confidence intervals bands. Fig. 5 report graphs from the OLS (left charts) and 2SLS (right charts) rolling regressions. Considering the upper panel, we find that the coefficient on financial development becomes negative and significant after a certain level of the median per capita GDP. In particular, this threshold level of median per capita GDP has a value between euro 24,000 and euro 26,000 approximately. The graphs in the lower panel show that the financial sector needs to achieve a reasonably high level of development to reduce income inequality effectively, otherwise the financial effects on inequality approach zero as financial development decreases. Independent of the regression model used, the coefficient estimates of financial development were found to be significant for provinces with branch density approximately between 0.5 and 0.65 branches per 1,000 inhabitants. These results are in line with the findings from the literature on finance and growth (King and Levine, 2003 and Rousseau and Wachtel, 2002).

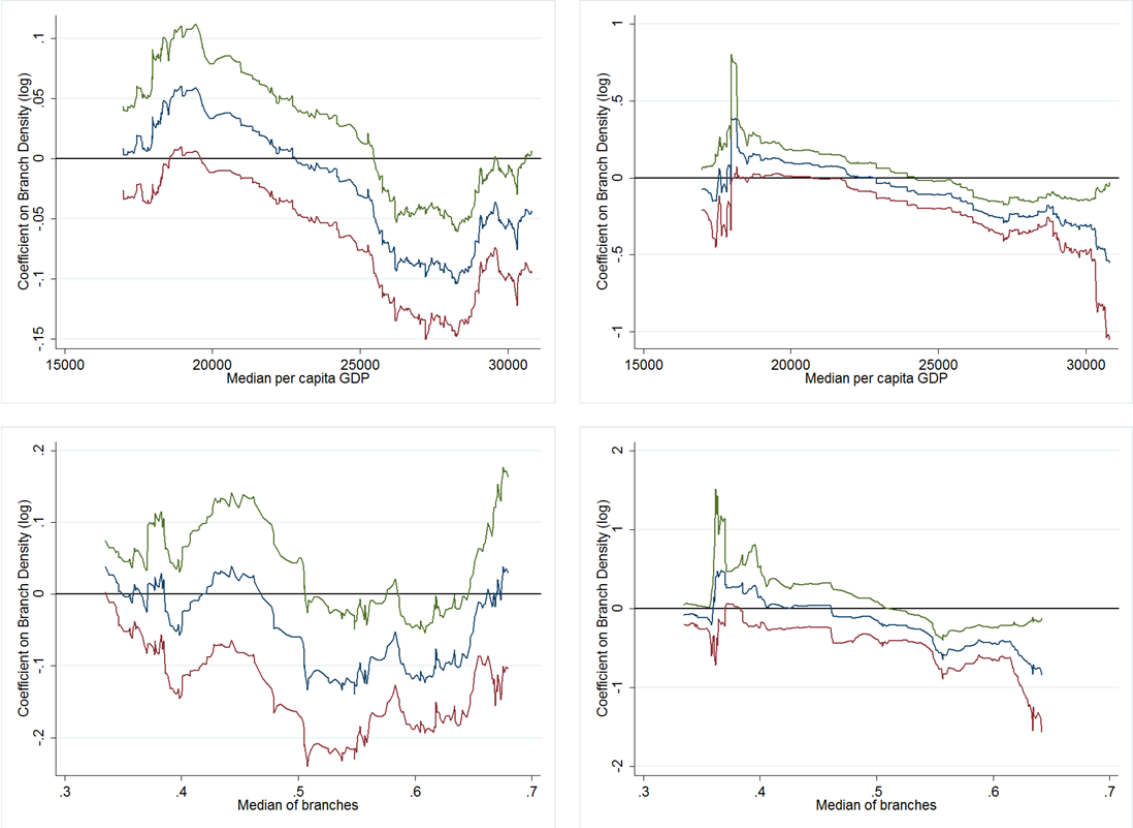


Fig. 5. Evolution of finance coefficients in rolling regressions ordered by increasing per capita GDP and financial development. The Figure shows graphs from the OLS (left charts) and 2SLS (right charts) rolling regressions.

7 Non linearities in the finance-inequality nexus: the role of financial dependence, education, unemployment

In the previous sections we assessed the positive contribution of financial development in reducing income inequality. The basic theoretical idea behind it is that by ameliorating credit constraints, financial development may foster entrepreneurship and new firm formation, thus affecting the labor demand, and may also reduce the particularly binding credit constraint on the poor given that the poor do not have the resources to fund their own projects and investment, as for example education, nor the collateral to access bank credit. The ideal setting for the following of our analysis would be to detect what are the channels underlying our findings. Since we do not have the data with the necessary detail to conduct a proper analysis, we try to do some preliminary exploration of possible explanations. To do that we rely again on the study of potential nonlinearities in the operation of the finance-inequality nexus depending on other specific variables. We basically try to find whether there are some third variables according to which the

Table 6. Non linearities: financial dependence, education and unemployment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Financial dependence ≤ 0.258		Financial dependence > 0.258		Secondary education ≤ 0.32		Secondary education > 0.32		Unemployment rate ≤ 5.84		Unemployment rate > 5.84	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
VARIABLES	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)	Gini (log)
Branches density (log)	0.002	-0.021	-0.092***	-0.261***	0.006	0.004	-0.091***	-0.237***	-0.084***	-0.388***	-0.017	-0.029
	(0.013)	(0.037)	(0.018)	(0.047)	(0.019)	(0.060)	(0.015)	(0.033)	(0.018)	(0.096)	(0.015)	(0.034)
Per capita GDP (log)	0.166***	0.179***	0.379***	0.445***	0.196***	0.197***	0.354***	0.430***	0.357***	0.486***	0.240***	0.243***
	(0.032)	(0.033)	(0.034)	(0.035)	(0.032)	(0.039)	(0.035)	(0.035)	(0.034)	(0.048)	(0.048)	(0.048)
School dropouts (log)	0.036***	0.040***	0.027	0.016	0.058***	0.058***	0.034**	0.055***	-0.044*	-0.018	0.052***	0.052***
	(0.012)	(0.013)	(0.020)	(0.021)	(0.013)	(0.013)	(0.014)	(0.017)	(0.023)	(0.031)	(0.012)	(0.011)
Material infrastructure (log)	-0.004	-0.005	-0.005	-0.022**	-0.000	-0.000	-0.014**	-0.029***	-0.005	-0.037***	-0.009	-0.009
	(0.007)	(0.007)	(0.009)	(0.010)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.013)	(0.011)	(0.010)
Self employed (log)	0.060**	0.058**	-0.042	-0.023	-0.021	-0.021	0.045**	0.055***	0.015	0.030	0.003	0.001
	(0.023)	(0.024)	(0.028)	(0.028)	(0.026)	(0.030)	(0.021)	(0.021)	(0.029)	(0.031)	(0.027)	(0.027)
Female rate of activity (log)	-0.143***	-0.126***	-0.119***	-0.025	-0.186***	-0.184***	-0.053	0.080*	0.042	0.206**	-0.149***	-0.139***
	(0.026)	(0.040)	(0.038)	(0.057)	(0.025)	(0.040)	(0.032)	(0.046)	(0.043)	(0.088)	(0.026)	(0.032)
Constant	2.120***	1.918***	0.160	-0.981**	2.181***	2.161***	-0.134	-1.612***	-0.262	-2.459***	1.528***	1.456***
	(0.309)	(0.389)	(0.326)	(0.477)	(0.275)	(0.424)	(0.329)	(0.434)	(0.339)	(0.697)	(0.428)	(0.462)
Observations	256	256	259	259	231	231	284	284	254	254	261	261
R^2	0.211	0.203	0.420	0.214	0.364	0.364	0.378	0.164	0.424	-0.245	0.233	0.231
F instruments		17.99		25.22		12.36		41.05		9.981		53.00
Overid p-value		0.232		0.577		0.677		0.681		0.0570		0.497

Notes: The table reports regression coefficients and associated standard errors (in parentheses). The dependent variables and the estimation method are reported at the top of each column. The set of instruments includes: the number of bank branches in the province in 1936 (per 100,000 inhabitants) and the number of savings banks in the province in 1936 (per 100,000 inhabitants). The regressions include year-specific and geographical area dummy variables. *** significant at 1%, ** significant at 5%, * significant at 10%. The table reports the value of the R^2 and the value of the F-statistics for a test of the weakness of the instruments. The table also reports the p-values of a Sargan test, as a test of overidentifying restrictions.

finance-inequality linkage works differently. Similarly to the methodology described in section 5 and 6, we consider three different variables that we think interfere with the finance-inequality virtuous cycle, split the sample according to the median level of that variable and run two separate regressions. Then, we order the sample observations according to the level of the same variable and run rolling regressions. The three variables that we use are an indicator of financial dependence, the fraction of people with a secondary education degree and the unemployment rate.

Since data on the actual use of external financing by the firms are typically not available, for financial dependence we construct our own indicator starting from the seminal work of Rajan and Zingales (1998). We took data on the industrial sectors composition of each province from the Italian Chamber of Commerce. We matched the Ateco 2007 codes with the International Standard Industrial Classification (ISIC) codes used in Rajan and Zingales.[18] We were then able to tabulate the fraction of firms in each province that show external financial dependence, mainly concentrated in the manufacturing sector. We assigned to each Ateco code the value of the index of financial dependence created by Rajan and Zingales (1998) and built our own indicator as a weighted average of the value of the index with weights given by the fraction of each type of industry in each province. The median level of our indicator is 0.258 and the results from the regressions on the two subsamples are reported in columns 1-4 of Table 6. The coefficient on branches density is negative and significant only in the subsample of observations above the median level of financial dependence. Similarly, in the upper panel of Fig. 6 we show that the coefficient on branch density in the Gini regression becomes negative and significant only after the level of financial dependence exceed 0.25. We interpret the results of this simple exercise as a further evidence that financial development is key to the mitigation of income inequality given that it is more effective when the need for financial dependence is actually higher. Rajan and Zingales (1998) suggest that one way to check whether a channel is at work is to see whether industries that might be most affected by a channel grow differentially in countries where that channel is likely to be more operative and they show that industrial sectors that are relatively more in need of external finance develop disproportionately faster in countries with more developed financial markets. We do a completely different test but somehow apply a conceptually similar reasoning. We tried to adapt the idea of external finance dependence to our context by testing whether financial development affects the level of inequality differentially at different

[18]Since January 2008 Istat has adopted the new ATECO 2007 classification of economic activities. This classification is the national version of the European nomenclature, Nace Rev. 2, published in the Official Journal of 20 December 2006 (Regulation (EC) no 1893/2006 of the European Parliament and of the Council of 20 December 2006).

level of financial dependence and found that this is actually the case.

We conducted the same exercise by considering as a third variable of interest the level of education, that we proxy through secondary education achievements. We created this variable by looking at the Survey on Household Income and Wealth (SHIW) of the Bank of Italy and calculated the fraction of people with a secondary education degree in each province based on the surveys' answers. The median level in our sample is 0.32, meaning that the 32 percent of the population in the median province is holding a secondary education degree. The regressions results from the subsamples in this case are depicted in columns 5-8 of Table 6. As in the previous case, we find again evidence that the virtuos relationship between financial development and inequality is in operation only in the subsample with observations of secondary education above the median. The results from the rolling regressions for this case are contained in the graphs of the center panel of Fig. 6. Financial development coefficient becomes negative and significant after the level of secondary education is above 0.3. With this variable we are trying to catch the importance of education and more general of human capital. From a theoretical point of view, in terms of human capital accumulation, financial imperfections might represent huge barriers to the poor purchasing education. Hence, higher financial development meaning lower credit constraints, will reduce income inequality by allowing poor people to achieve high skills by borrowing and financing education. The fact that we find a significant coefficient of banking development in reducing the level of Gini in association with relatively high level of secondary education seems to point in this direction.

Finally, we consider the unemployment rate. The median level in our sample is 5.84. Columns 9-12 of Table 6 refer to this part of the analysis. In this case financial development has a negative and significant value in the Gini regressions when the level of unemployment is below the median level. The same dynamics is confirmed in the rolling regressions graphs contained in the bottom panel of Fig. 6. Basically, we find that financial development reduces the level of Gini in association with low unemployment rates. This result is in line with the expectations. In fact, as explained in Beck et al. (2010), one of the main channels through which financial development reduces income inequality is by boosting the relative demand for low-skilled workers. However, our results suggest that this channel is effective only for the provinces where the unemployment rate is below a threshold. With some caution, we link this result to the idea that banking development is operating on the labor demand side. Financial development reduces the cost of capital, thus leading firms to both substitute capital for labor and increase output which in turn

increases the demand for capital and labor. We believe that the output effect dominates thus creating an increased demand for labor. This would explain why we find that the virtuous circle finance-inequality works in association with low unemployment.

We are aware that this part of the analysis is just a preliminary exploration since each explanation needs independent investigation with individual-level longitudinal data sets and longer time series. Nevertheless, we provide this extension to further motivate and guide future research on potential mechanisms linking banking development and the distribution of income.

8 Conclusion

Financial development is expected to enhance growth by enabling the efficient allocation of capital and reducing borrowing and financing constraints. However, this does not necessarily imply that financial development reduces income inequality and it does not say anything about which segments of the population profit from the growth induced by financial development. If it increases average growth only by increasing incomes of the rich, hence increasing income inequality, then financial development will not help those with lower incomes.

In this paper, we empirically address the relationship between financial development and income distribution by studying potential non linearities. In particular, we analyze the connection between local banking development, measured as branch density, and inequality across Italian provinces. Using panel estimation and data over the period 2006-2010, we find that local banking development has a significant negative effect on the Gini coefficient and other measures of inequality, i.e. higher banking development is associated with lower inequality. When considering Italian macro areas sub-samples (North, Center, South), the result is significant only for the North; thus suggesting that the relationship is non linear, depending on the level of development. Also, when the sample is divided in two sub samples according to the median level of per capita GDP, we find a significant effect of financial development on inequality only in the sample where the level of income is above the median. These non linearities are further confirmed when we employ the rolling regressions technique and show graphically that the coefficient on financial development becomes negative and significant after a certain level of the median per capita GDP and after the financial sector has achieved a reasonably high level of development.

When we split the sample according to the indicator of financial dependence, education and un-

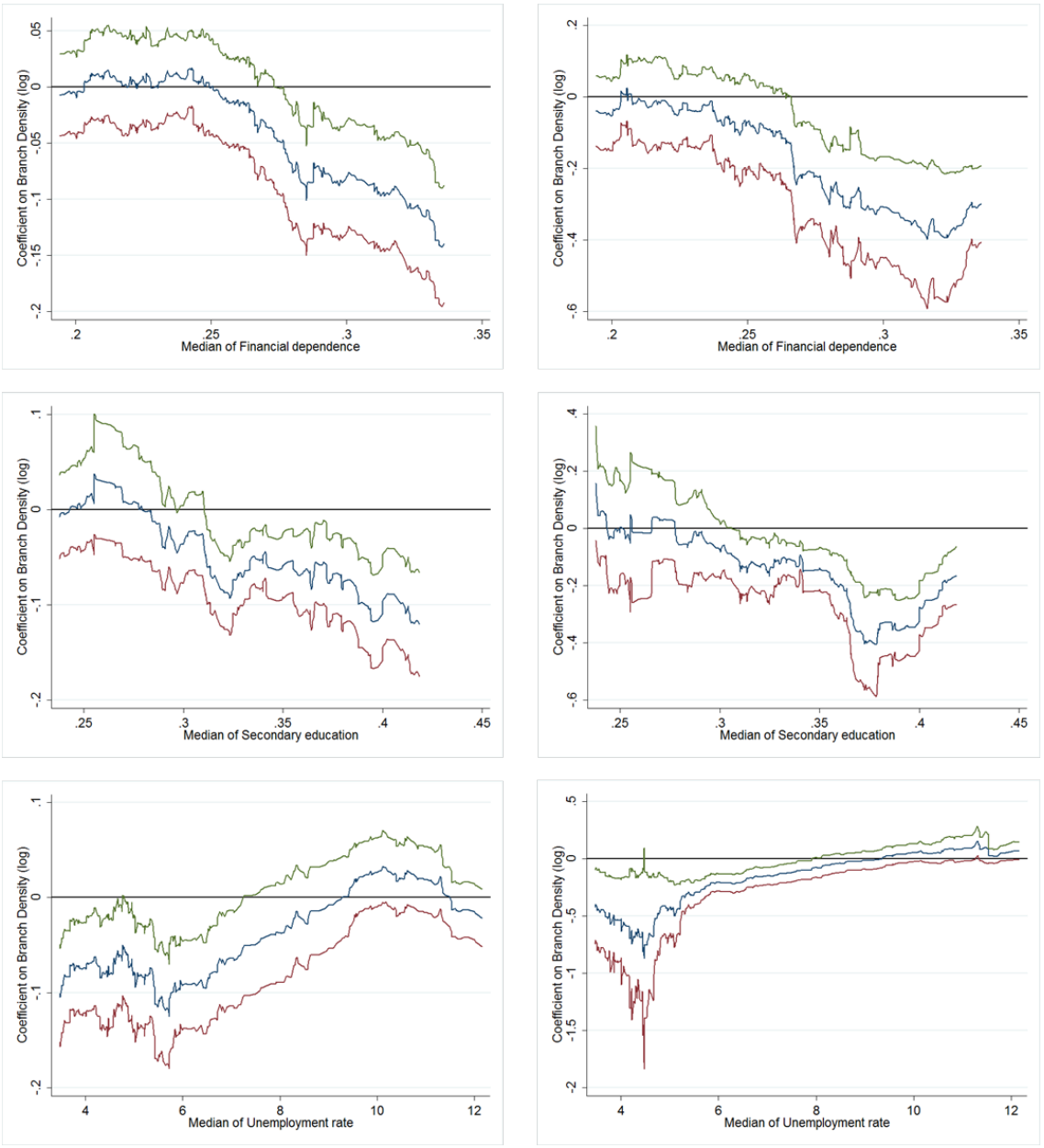


Fig. 6. Evolution of finance coefficients in rolling regressions ordered by increasing financial dependence, secondary education and unemployment rate. The Figure shows graphs from the OLS (left charts) and 2SLS (right charts) rolling regressions.

employment we find additional evidence that the linkages between finance and inequality are not linear. Financial development is significant when the level of financial dependence is above the median, when the proxy for education is above the median and when the unemployment rate is below the median. The last findings are confirmed also when running rolling regressions.

The empirical evidence reported in this paper confirms the importance of financial development for economic growth and takes one step further looking at the effect on the distribution of income. The main limitation of the current study is the availability of data. As explained in Section 4, the Italian Department of Finance publishes income data for each province only for the period 2006-2010, thus rather than the time dimension, we have exploited the spatial one and tried to capture eventual differences in the functioning of financial development across different territories of a single country. Financial development is usually expected to exert its positive impact in the medium and long run especially when it is connected to growth, that by definition is a long run phenomenon. Here we have a time span of five years and we are not looking at the linkages between finance and growth but between finance and income distribution. The latter is also not a short run phenomena since it might involve some intergenerational mobility; however, it is fairly common in the inequality literature to rely on cross-sectional data more than on time series. Thus, our main focus is on how and under what condition the relationship changes in spatial terms across the different Italian provinces. The entire study could be thought of as a snapshot of the Italian situation. We can certainly conclude that there are significant differences in the economic structures within Italy and that those differences are affecting also the way income is distributed. Given the limited time span, our findings at this stage are only suggestive. But they do indicate that financial development, and in particular local banking development matters for the distribution of income.

One possible extension is to repeat the same analysis on a longer time period to see whether the general pattern is confirmed or the phenomenon that we are capturing is limited to a specific time period, that incidentally coincides for the most part with the Great Recession. Greater availability of data will also make possible to test more carefully what are the channels linking financial development and inequality in order to make more targeted policy prescriptions. The importance of having a well functioning financial system for reducing the level of inequality within a country highlights the priority that financial development should have on policy makers' agenda.

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Appendix

Table A.1 Summary statistics

	Gini coefficient		Theil coefficient		Branches per 1,000 inhab		GDP per capita		Unemployment rate	
	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*
Torino	35.60	*0.30*	0.266	*0.009*	0.501	*0.006*	28228	*985*	6.436	*2.323*
Vercelli	31.90	*0.20*	0.216	*0.002*	0.755	*0.008*	28803	*1003*	4.658	*0.806*
Novara	34.30	*0.30*	0.251	*0.009*	0.587	*0.014*	27960	*806*	6.115	*1.407*
Cuneo	34.70	*0.20*	0.252	*0.001*	0.888	*0.005*	30036	*1007*	2.922	*0.506*
Asti	34.30	*0.30*	0.245	*0.008*	0.731	*0.009*	25032	*1106*	4.729	*1.26*
Alessandria	33.60	*0.10*	0.233	*0.003*	0.695	*0.005*	27524	*1168*	4.979	*0.51*
Aosta	35.00	*1.00*	0.249	*0.028*	0.77	*0.014*	34227	*903*	3.655	*0.703*
Imperia	36.10	*0.30*	0.262	*0.003*	0.553	*0.007*	25231	*1360*	6.276	*2.19*
Savona	35.40	*0.20*	0.255	*0.003*	0.659	*0.011*	27698	*897*	4.773	*0.492*
Genova	37.20	*0.30*	0.282	*0.002*	0.596	*0.009*	27654	*1123*	5.366	*0.787*
La Spezia	33.60	*0.30*	0.225	*0.004*	0.616	*0.01*	25400	*811*	5.735	*1.282*
Varese	35.40	*0.30*	0.265	*0.006*	0.553	*0.015*	29460	*1149*	4.351	*1.424*
Como	36.40	*0.20*	0.283	*0.004*	0.631	*0.01*	27646	*1513*	4.541	*0.826*
Sondrio	33.30	*0.10*	0.234	*0.004*	0.7	*0.017*	29498	*1776*	4.638	*1.101*
Milano	40.90	*0.50*	0.36	*0.013*	0.652	*0.014*	37498	*637*	4.603	*1.063*
Bergamo	34.90	*0.30*	0.264	*0.007*	0.703	*0.017*	31447	*985*	3.205	*0.502*
Brescia	35.70	*0.30*	0.275	*0.009*	0.776	*0.023*	31171	*965*	4.228	*1.24*
Pavia	34.90	*0.20*	0.252	*0.005*	0.63	*0.011*	26906	*1220*	4.817	*0.841*
Cremona	33.60	*0.10*	0.237	*0.002*	0.809	*0.015*	28546	*1205*	4.724	*1.35*
Mantova	34.10	*0.20*	0.247	*0.005*	0.82	*0.009*	32110	*813*	4.369	*1.432*
Bolzano	38.10	*1.00*	0.296	*0.017*	0.841	*0.01*	35191	*1055*	2.621	*0.184*
Trento	34.60	*0.40*	0.245	*0.008*	1.064	*0.006*	30256	*728*	3.409	*0.544*
Verona	36.50	*0.10*	0.279	*0.004*	0.812	*0.014*	30181	*485*	4.108	*0.578*
Vicenza	34.00	*0.20*	0.251	*0.006*	0.774	*0.013*	30281	*873*	4.302	*1.011*
Belluno	32.20	*0.10*	0.222	*0.004*	0.909	*0.024*	29885	*863*	3.17	*1.231*
Treviso	35.50	*0.30*	0.27	*0.008*	0.76	*0.018*	28938	*859*	4.409	*1.281*
Venezia	34.40	*0.20*	0.243	*0.006*	0.615	*0.009*	29843	*754*	4.73	*1.439*
Padova	36.50	*0.30*	0.279	*0.008*	0.708	*0.011*	30052	*624*	4.227	*1.035*
Rovigo	31.20	*0.20*	0.202	*0.003*	0.744	*0.012*	26745	*1064*	4.206	*1.046*
Udine	34.10	*0.20*	0.241	*0.005*	0.879	*0.005*	28548	*1071*	4.49	*1.232*
Gorizia	31.80	*0.30*	0.205	*0.007*	0.772	*0.012*	26396	*630*	4.756	*1.242*
Trieste	34.20	*0.20*	0.24	*0.003*	0.604	*0.012*	31154	*522*	4.219	*0.54*
Piacenza	35.70	*0.20*	0.263	*0.007*	0.781	*0.022*	29838	*1082*	2.363	*0.401*
Parma	36.70	*0.20*	0.278	*0.005*	0.845	*0.022*	32126	*553*	3.012	*0.816*
Reggio Emilia	34.50	*0.40*	0.248	*0.008*	0.8	*0.017*	30684	*1120*	3.434	*1.647*
Modena	35.60	*0.30*	0.266	*0.007*	0.74	*0.02*	33412	*1520*	4.321	*1.652*
Bologna	36.50	*0.30*	0.276	*0.007*	0.866	*0.012*	34609	*800*	3.19	*1.087*
Ferrara	32.70	*0.20*	0.22	*0.002*	0.631	*0.009*	27182	*1768*	5.387	*1.767*
Ravenna	34.30	*0.30*	0.245	*0.004*	0.883	*0.013*	29681	*667*	4.218	*1.386*
Forli'-Cesena	34.10	*0.30*	0.246	*0.006*	0.916	*0.019*	31537	*1400*	5.281	*0.916*
Pesaro Urbino	34.20	*0.10*	0.244	*0.001*	0.855	*0.01*	25685	*1075*	4.448	*1.05*
Ancona	34.10	*0.20*	0.238	*0.005*	0.794	*0.013*	29114	*746*	4.387	*0.944*
Macerata	34.20	*0.20*	0.242	*0.005*	0.754	*0.015*	24933	*716*	4.763	*0.732*
Ascoli Piceno	33.70	*0.20*	0.231	*0.004*	0.704	*0.015*	23609	*1171*	7.351	*1.861*

Massa-Carrara	34.00	*0.10*	0.239	*0.004*	0.547	*0.009*	22808	*727*	9.535	*1.494*
Lucca	35.80	*0.20*	0.266	*0.003*	0.686	*0.012*	28213	*1439*	5.138	*1.953*
Pistoia	33.10	*0.10*	0.224	*0.003*	0.673	*0.01*	25658	*635*	5.505	*1.112*
Firenze	36.80	*0.20*	0.28	*0.006*	0.703	*0.014*	31060	*420*	4.433	*0.596*
Livorno	34.20	*0.20*	0.235	*0.003*	0.613	*0.015*	26831	*546*	5.54	*0.902*
Pisa	35.00	*0.10*	0.249	*0.004*	0.685	*0.012*	28005	*889*	4.714	*0.779*
Arezzo	32.90	*0.20*	0.227	*0.005*	0.694	*0.02*	26704	*576*	5.155	*0.543*
Siena	36.30	*0.10*	0.267	*0.003*	0.827	*0.024*	28153	*899*	4.241	*0.737*
Grosseto	35.40	*0.40*	0.249	*0.004*	0.698	*0.036*	25726	*851*	4.698	*0.56*
Perugia	34.00	*0.20*	0.239	*0.004*	0.669	*0.005*	24638	*668*	5.562	*1.126*
Terni	33.10	*0.20*	0.222	*0.003*	0.574	*0.016*	23387	*776*	5.559	*1.078*
Viterbo	35.40	*0.40*	0.241	*0.002*	0.658	*0.008*	22073	*861*	9.762	*1.837*
Rieti	32.60	*0.30*	0.203	*0.004*	0.538	*0.015*	21905	*1097*	6.867	*1.222*
Roma	40.90	*0.10*	0.336	*0.004*	0.508	*0.005*	32359	*633*	7.456	*1.227*
Latina	35.20	*0.60*	0.24	*0.005*	0.347	*0.01*	23721	*655*	9.442	*1.293*
Frosinone	31.60	*0.30*	0.199	*0.004*	0.406	*0.019*	22982	*618*	8.763	*0.864*
Caserta	35.00	*0.50*	0.235	*0.007*	0.233	*0.004*	15873	*248*	9.592	*0.794*
Benevento	34.70	*0.30*	0.229	*0.002*	0.321	*0.015*	16794	*810*	10.598	*0.807*
Napoli	37.30	*0.50*	0.275	*0.01*	0.269	*0.005*	16485	*252*	14.319	*1.22*
Avellino	34.10	*0.40*	0.226	*0.006*	0.31	*0.007*	17795	*563*	9.843	*1.33*
Salerno	35.90	*0.40*	0.25	*0.005*	0.339	*0.006*	17960	*732*	12.695	*1.345*
L'aquila	33.70	*0.40*	0.217	*0.007*	0.504	*0.002*	21038	*1024*	7.787	*1.532*
Teramo	33.50	*0.20*	0.229	*0.004*	0.61	*0.011*	21570	*577*	6.397	*1.296*
Pescara	36.10	*0.10*	0.262	*0.004*	0.548	*0.014*	21521	*810*	7.508	*1.345*
Chieti	33.20	*0.40*	0.221	*0.002*	0.458	*0.005*	21701	*612*	7.273	*1.931*
Campobasso	34.10	*0.40*	0.226	*0.003*	0.475	*0.007*	20433	*1209*	9.191	*0.89*
Foggia	36.30	*0.70*	0.259	*0.006*	0.361	*0.006*	15349	*663*	11.914	*1.72*
Bari	37.00	*0.30*	0.272	*0.002*	0.385	*0.008*	18232	*404*	11.101	*1.359*
Taranto	33.00	*0.50*	0.217	*0.004*	0.303	*0.009*	17814	*242*	10.443	*1.241*
Brindisi	33.80	*0.50*	0.223	*0.003*	0.305	*0.004*	16406	*262*	13.518	*1.068*
Lecce	35.60	*0.20*	0.249	*0.005*	0.327	*0.005*	16656	*808*	15.674	*1.267*
Potenza	33.50	*0.30*	0.222	*0.005*	0.428	*0.006*	18478	*203*	10.746	*0.734*
Matera	34.20	*0.30*	0.227	*0.005*	0.42	*0.01*	17507	*294*	11.671	*2.413*
Cosenza	35.10	*0.80*	0.233	*0.011*	0.28	*0.006*	16887	*440*	11.447	*0.877*
Catanzaro	35.00	*0.50*	0.238	*0.01*	0.287	*0.005*	18681	*325*	12.43	*1.55*
Reggio Calabria	33.90	*0.70*	0.221	*0.01*	0.248	*0.005*	16006	*258*	11.463	*0.826*
Trapani	36.10	*0.50*	0.248	*0.005*	0.398	*0.006*	16053	*543*	11.228	*1.042*
Palermo	37.80	*0.30*	0.275	*0.007*	0.338	*0.006*	17500	*742*	17.561	*1.308*
Messina	35.30	*0.30*	0.239	*0.007*	0.359	*0.005*	17894	*247*	12.463	*1.766*
Agrigento	35.50	*0.30*	0.24	*0.007*	0.369	*0.006*	14642	*662*	16.735	*2.157*
Caltanissetta	35.20	*0.20*	0.236	*0.005*	0.368	*0.011*	16785	*535*	15.728	*0.877*
Enna	35.10	*0.20*	0.235	*0.005*	0.389	*0.008*	15649	*393*	16.161	*0.636*
Catania	37.20	*0.30*	0.272	*0.008*	0.341	*0.008*	16697	*310*	11.852	*0.381*
Ragusa	37.60	*0.50*	0.272	*0.004*	0.396	*0.011*	17849	*418*	8.269	*0.947*
Siracusa	35.60	*0.30*	0.24	*0.004*	0.317	*0.006*	18394	*818*	10.721	*1.326*
Sassari	35.30	*0.50*	0.247	*0.008*	0.438	*0.01*	19024	*396*	14.53	*4.075*
Nuoro	31.90	*0.50*	0.194	*0.009*	0.445	*0.045*	18970	*1150*	10.683	*1.401*
Cagliari	34.70	*0.60*	0.237	*0.01*	0.364	*0.008*	22244	*586*	11.017	*1.07*
Pordenone	33.70	*0.40*	0.238	*0.01*	0.734	*0.011*	29032	*1134*	4.354	*1.282*
Isernia	34.30	*0.30*	0.235	*0.007*	0.388	*0.013*	19833	*267*	8.263	*0.417*

Oristano	31.80	*0.50*	0.195	*0.007*	0.494	*0.025*	17571	*638*	12.85	*1.958*
Biella	32.60	*0.40*	0.236	*0.011*	0.708	*0.016*	27504	*1146*	5.77	*1.606*
Lecco	35.40	*0.20*	0.266	*0.005*	0.697	*0.019*	29052	*1289*	3.756	*1.107*
Lodi	33.20	*0.30*	0.228	*0.005*	0.722	*0.039*	26162	*828*	4.438	*1.09*
Rimini	36.50	*0.20*	0.272	*0.003*	0.983	*0.017*	30361	*1696*	5.931	*1.725*
Prato	34.80	*0.30*	0.251	*0.006*	0.573	*0.011*	27687	*331*	6.499	*0.924*
Crotone	34.70	*0.90*	0.233	*0.014*	0.217	*0.004*	14428	*407*	12.498	*1.187*
Vibo Valentia	33.80	*0.60*	0.216	*0.009*	0.246	*0.007*	15260	*392*	13.636	*0.886*
Verbania	33.20	*0.10*	0.232	*0.005*	0.548	*0.013*	23316	*1060*	4.848	*1.286*