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Financial development and the channels to economic growth

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Abstract

This paper examines the empirical relationship between financial development and economic growth. After a thorough review of the main conclusions reached by the available literature on the finance-growth nexus, an empirical analysis of the Italian case has been performed. The analysis is conducted by estimating a panel fixed effects model using data from the 103 Italian provinces over the period 2001-2011. The regression results show that the two employed financial development indicators are positively and significantly related to economic growth. This finding is consistent with the empirical literature.

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1. Introduction

The theory regarding the relationship between financial development and economic growth has its foundation on the structure and the main functions of financial systems.

The financial sector plays an important role in a modern advanced economy by ensuring financial intermediation through the flow of funds from a person or a business without productive investment opportunities to one who has them. This channeling of funds improves the economic welfare of everyone in the society and contributes to economic efficiency. Indeed, financial markets are critical for producing an efficient allocation of capital by channelling funds from lender-savers who have an excess funds but lack productive investment opportunities to borrower-spenders who have productive investment opportunities but have no funds to invest. In addition, financial markets improve the well-being of consumers allowing them to time their purchases better.

Finally, and most importantly, well-functioning financial markets and financial intermediaries play a pivotal role in economic development. They are a key factor in producing high economic growth through capital accumulation, technological change, increasing savings rates and improved efficiency of investments.

The question posed, then, is the following: does financial development cause economic growth, and if it does, how? This is probably one of the most challenging questions that economists have faced in the last century.

Beginning with the study of Schumpeter (1911) which stressed the critical role of financial intermediaries in economic development and growth, there have been numerous studies reported in the literature investigating the relationship between financial development and economic growth.

While it is clear that a positive effect exists between financial development and economic growth, the questions of what determines financial development and how to measure financial development remain imperfectly understood. Financial development is defined as a combination of depth (size and liquidity of markets), access (the ability of individuals and companies to access financial services), efficiency (the ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets) and stability. It can be measured by examining the performance and activities of the financial markets, bond markets, banks and financial institutions.

The main objective of the paper is to offer new perspectives on the long-lasting debate on the finance and growth nexus by investigating the effect of financial development on growth in Italy by using a province-level dataset.

Italy represents an interesting case for studying the relationship between financial development and economic growth, since it is characterized by cross-regional differences (a region comprises different provinces). In particular, the Italian banking system is segmented across provinces with a highly heterogeneous degree of financial development.

The paper is organized as follows: Chapter 2 provides a brief review of the main conclusions reached by the available empirical literature on the relationship between financial development and economic growth; Chapter 3 presents the most commonly used measures of financial development and economic growth in the academic literature; Chapter 4 describes the main features of the banking sector and in general of the financial system in Italy, including a brief review of the historical evolution of the Italian economy. This section also discusses the construction of the aggregate measure for financial development (the IMF financial development index); Chapter 5 presents the data and the econometric approach used to assess the relationship between financial development and economic growth, as well as the empirical results of the analysis; finally, Chapter 6 summarizes the main findings and offers some concluding remarks.

2. Theoretical linkages between financial development and growth

Several studies have analysed the link between financial development and economic growth in order to understand the channels of influence.

Initially, this literature focused on the question whether the financial sector plays a causal role in economic development or if financial intermediaries merely originate from rapid industrialization.

In traditional development economics, there were two famous historical but opposite views about the causal relationship between financial development and growth: Robinson's view (1952) and Schumpeter's view (1911).

According to Robinson (1952), economic growth creates demand for financial services and financial development follows economic growth. In part, this view derived from the neo-classical growth model; as a result of Solow's analyses, many believed that the financial system had only minor effects on the rate of investment in physical capital and that investment had only minor effects on economic growth.

According to Schumpeter (1911), financial intermediaries play a pivotal role in economic development, because they choose which firms are financed through the society's savings. Schumpeterian view highlights the impact of

financial intermediaries on productivity growth and technological change. Specifically, “the financial intermediary sector alters the path of economic progress by affecting the allocation of savings and not necessarily by altering the saving rate” (Beck et al., 2000).

Alternatively, other studies argue that capital accumulation is the key factor underlying economic growth and that better financial intermediaries influence growth primarily by raising domestic savings rates and attracting foreign capital.

The first to empirically show the existence of a positive relationship between financial development and GDP per capita was Goldsmith (1969). The study used data on 35 countries over the period from 1860 to 1963 on the value of financial intermediary assets as a share of economic output. Goldsmith found a positive correlation between the size of the financial intermediary sector and the level of economic activity. According to Goldsmith, finance “accelerates economic growth and improves economic performance to the extent that it facilitates the migration of funds to the best user, i.e. to the place in the economic system where the funds will yield the highest social return” (Fry and Goldsmith, 1970).

Subsequently, McKinnon (1974) and Shaw (1974) argued that financial markets and economic growth rate are positively related, showing that high growth economies tended to have well-developed financial markets.

Although these studies did not resolve the Robinson/Schumpeter debate, which is still open today.

A different set of studies positively linking financial development and growth emerged in the early 1990s as branch of the literature on endogenous

growth. These studies focused on the question whether financial conditions could explain sustained growth in per capita GDP. The central argument was that finance generates an external effect on aggregate investment efficiency, which offsets the decrease in the marginal product of capital.

King and Levine (1993) examined whether financial development affects economic growth. Specifically: “whether higher levels of financial development are significantly and robustly correlated with faster current and future rates of economic growth, physical capital accumulation, and economic efficiency improvements” (King and Levine, 1993). The study used data on 80 countries over the period from 1960 to 1989 on four financial variables (financial depth: the ratio of liquid liabilities to GDP; banks: the ratio of banks deposits to deposits of central banks; credit issued to non-financial private firms divided by total credit; and credit issued to non-financial private firms divided by GDP) and four growth measures (per capita GDP growth, rate of physical capital accumulation, the ratio of domestic investment to GDP, and improvements in economic efficiency) while controlling for other country-specific characteristics affecting long-run growth, such as initial wealth, population growth, and secondary school enrolment. They report two sets of findings. The first set focuses on the contemporaneous relationship between financial development and the growth indicators: “higher levels of financial development are positively associated with higher rates of economic growth, physical capital accumulation, and economic efficiency improvements” (King and Levine, 1993). The second set of findings focuses on the relationship between current financial development and future economic growth: “financial development is a good predictor of long-run growth over the next 10 to 30 years” (King and Levine, 1993).

After the study of King and Levine, a number of cross-country studies emerged trying to extend the analysis of the finance and growth relationship beyond bank credit.

Levine and Zervos (1996) analysed the relationship between the equity market and economic growth. The study used data on 42 countries over the period from 1976 to 1993 on market size, market liquidity, and integration with world capital markets as measures of stock market development. The authors investigated whether capital accumulation and productivity growth are affected by stock market development. The data suggest that “after controlling for the initial level of GDP per capita, initial investment in human capital, political stability, and measures monetary, fiscal, and exchange rate policy, stock market development remains positively and significantly correlated with long-run economic growth” (Levine and Zervos, 1996). These results are consistent with the view that liquidity of stock markets smooths long-run growth (Levine, 1991; Holmstrom and Tirole, 1993; Bencivenga et al., 1995).

More recently, research has demonstrated that the size and depth of an economy's financial system is positively correlated with its future growth.

De Gregorio and Guidotti (1995) examined the link between financial development and economic growth trying to identify whether financial development affects growth by increasing the volume of investment, its efficiency or both. They conducted growth regressions on a sample of 98 countries over the period from 1960 to 1985 and found that the main channel through which financial development stimulates economic growth is the efficiency effect.

Jayaratne and Strahan (1996) explored the relationship between financial development and growth. Specifically, they analysed whether financial

markets affected economic growth after the relaxation of bank branch restrictions in the US in the early 1970s. The results showed that state banking deregulation increased banks efficiency, loan quality, and real per capita growth rates. This study supports the idea that “the principal channel through which finance influences growth is through improved efficiency of investment and not through increased volumes of investment [De Gregorio and Guidotti 1994; King and Levine 1993b]” (Jayaratne and Strahan, 1996). Beck, Levine and Loayza (2000) investigated the relationship between financial development and economic growth, total factor productivity growth, physical capital accumulation, and private savings rates. The study used data on 63 countries over the period from 1960 to 1995 on three financial variables (private credit: credit by financial intermediaries to private sector divided by GDP, the ratio of liquid liabilities of the financial system to GDP, and bank domestic assets) and four growth measures (real per capita GDP growth, total factor productivity growth, physical capital accumulation, and private savings rates). The authors found that “that (1) financial intermediaries exert a large, positive impact on total factor productivity growth, which feeds through to overall GDP growth; and (2) the long-run links between financial intermediary development and both physical capital growth and private saving rates are tenuous” (Beck et al., 2000). The results are consistent with the Schumpeterian view of financial development: financial intermediaries increase economic growth by affecting productivity growth and technological change.

3. Measuring financial development, growth, and its sources

This section describes the most commonly used measures of financial development and economic growth in the literature.

3.1. Indicators of financial development

Researchers have used different measures and methodologies to examine the financial health of different economies.

A number of studies have chosen monetary aggregates measures to examine the relationship between financial development and economic growth. Initially, the empirical studies focused on the ratio of different types of monetary aggregates (M1, M2 or M3) to nominal GDP as the financial development indicators mainly because these variables are widely available. However, monetary indicators might be a poor proxy for financial development since they measure the extent of monetization rather than the financial deepening; they are more related to the ability of the financial system to provide transaction services than to the ability to channel funds from savers to borrowers. As a result of the criticism on monetary

aggregates measures, alternative financial development indicators have been proposed and the measure of credit to the private sector has been favored in several studies. The main advantage of this indicator is that, by excluding credit to the public sector, it reflects more accurately the actual volume of funds channeled to the private sector.

King and Levine (1993) constructed four indicators of the level of financial sector development to evaluate the different functions of financial intermediaries in the system: the first indicator (*LLY*) is the ratio of liquid liabilities to GDP to measure “financial depth” (that is, the size of financial intermediaries); the second indicator (*BANK*) is the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets to indicate the relative significance of particular financial institutions; the third indicator (*PRIVATE*) is the ratio of claims on the non-financial private sector to total domestic credit (excluding credit to money banks) to measure the proportion of credit allocated to private enterprises by the financial sector; the fourth indicator (*PRIVY*) is the ratio of claims on the non-financial private sector to *GDP* to measure domestic assets distribution. However, there are problems with these financial development measures. King and Levine admit that the “the variable *BANK* does not measure to whom the financial system is allocating credit” (King and Levine, 1993) and that the measures of *PRIVATE* and *PRIVI* “may reflect the overall size of the public sector and the degree of public sector borrowing and therefore not accurately indicate the level of financial services” (King and Levine, 1993).

Beck, Levine and Loayza (2000) constructed three indicators of financial intermediary development to evaluate the impact of financial intermediaries

on growth and its sources. The first indicator is *PRIVATE CREDIT* which equals the value of credits by financial intermediaries to the private sector (excluding credit to the public sector) divided by GDP. According to the authors, this is “a broader measure of financial intermediary development than used by Levine and Zervos (1996) and Levine (1998), since it includes all financial institutions not only deposit money” (Beck et al., 2000). However, it would be valuable to construct a measure of financial intermediary development that identifies credits issued by privately owned financial intermediaries and to incorporate measures of securities market development. The second indicator is the ratio of liquid liabilities of the financial system to GDP to measure the size of the system. The third indicator is the ratio of commercial bank domestic assets to commercial bank plus central bank domestic assets to measure the degree to which commercial banks or the central bank allocate society’s savings.

This paper uses deflated financial intermediary statistics; financial development indicators are usually measured at the end of the period, while GDP is measured over the period and, as a consequence, dividing these indicators by the GDP can produce misleading measures of financial development.

The activity of stock markets is also analysed in some studies to examine the impact of developed stock market on financial development and growth. Levine and Zervos (1996) studied the size of the stock market and liquidity of banking development measures. They constructed “a multifaceted measure of overall stock market development that combines the different individual characteristics of the functioning of stock market” (Levine and Zervos, 1996): market size, liquidity, and integration with world capital markets. The first indicator is the ratio of market capitalization (total market

value of listed shares) to GDP to measure the size of the stock market. The second indicator is the ratio of total value of trades to GDP to measure the value of equity transactions compared with the size of the economy. The third indicator is the turnover ratio (that is, the ratio of total value of trades to market capitalization) to measure the value of equity transactions compared with the size of the equity market. These two indicators are used together to measure the liquidity of the stock market. The fourth indicator is Korajczyk's (1996) estimate of the degree of stock markets international integration to measure the capability of agents to diversify risk.

3.2. Indicators of economic growth

Different methods can be employed to assess economic growth. The most well-known and widely used indicator is the gross domestic product (GDP). A number of studies have chosen GDP or related indicators, such as the rate of physical capital accumulation or productivity growth which are derived from the GDP calculation, to measure economic growth.

King and Levine (1993) used four indicators of economic growth to examine whether financial development promotes economic growth (and whether Schumpeter was right). The first indicator is the real per capita GDP growth rate. The second indicator is the rate of physical capital accumulation (data from Benhabib and Spiegel (1991) physical capital stock measures). The third indicator is the average annual domestic investment divided by GDP. The fourth indicator is a residual measure of improvements in the efficiency of physical capital allocation, constructed to measure the residual of the real per capita GDP growth after accounting for physical

capital accumulation. The third and fourth economic growth indicators are designed to improve the data of physical capital stock which, according to the authors, present some statistical and conceptual problems.

Levine and Zervos (1996) simply used the growth rate per capita GDP as the only growth indicator in their analysis of the relationship between stock market development and economic growth. The authors obtained the real per capita GDP growth rate data from the World Bank's National Accounts Database.

The study of the relationship between financial intermediary development and the sources of growth by Beck, Levine and Loayza (2000) includes four growth measures: economic growth, capital growth, productivity growth, and private savings. The first measure (Economic Growth) is the growth rate of real per capita GDP calculated as the geometric rate of growth for the panel data. The second measure (Capital Growth) is the per capita growth rate of physical capital accumulation and is constructed using data from Penn World Tables. The third measure (Productivity Growth) is the growth rate of productivity per capita and is calculated as follows:

$$\textit{Productivity Growth} = \textit{Economic Growth} - 0.3 \times \textit{Capital Growth}$$

The fourth measure (Private Saving) is the ratio of gross private saving (that is, the difference between gross national saving and gross public saving) to gross private disposable income (that is, the difference between gross national disposable income and gross public disposable income). The authors obtained the data on the private saving rates from the World Saving Database.

4. An overview of Italian economical and financial situation

4.1 A general outlook on the Italian economy

Italy is one of the world's largest economies: it is the 8th world largest economy by nominal GDP and the 3rd largest economy in the Eurozone.

From an historical point of view, there have been three main phases in the evolution of the Italian economy from the unification of the country onwards (Toniolo, 2013; Felice & Vecchi, 2015):

- the first period, from the unification of Italy (1861) to the 1890s, is characterized by a stagnant growth. At the time of unification, agriculture was the main productive sector and the main source of growth. Italy's GDP per person (0.6-0.7% per year) was roughly half of that of Great Britain, the economic power of the time;
- the second period, from 1890s to 1990s, is characterized by a sharp growth acceleration interrupted by the two World Wars (1914-1918 and 1939-1945, respectively). In particular, during the so-called "Giolitti age" (1901-1913) the economic growth rate more than doubled; during World War I total and per capita GDP reduced by 2.7% and 4.6% respectively; between 1919 and 1938 GDP per

person grew at an annual average rate of 1.5% with a conspicuous slowdown following the 1929 crisis; after World War II, Italy's GDP showed an upward trend with a turning point at the beginning of the 1990s;

- the third period, from 1990s to today, is characterized by a sluggish growth which has been exacerbated by the global financial crisis of 2008-2009 and the recession following it;

The Italian economy has been deeply affected by the global financial crisis of 2007-2008 and experienced its worst recession. Structural reforms and accommodative monetary conditions contributed to a gradual economic recovery since 2014, with real GDP growth of 1.7% in 2017, 0.8% in 2018 and 0.2% in 2019 (ISTAT).

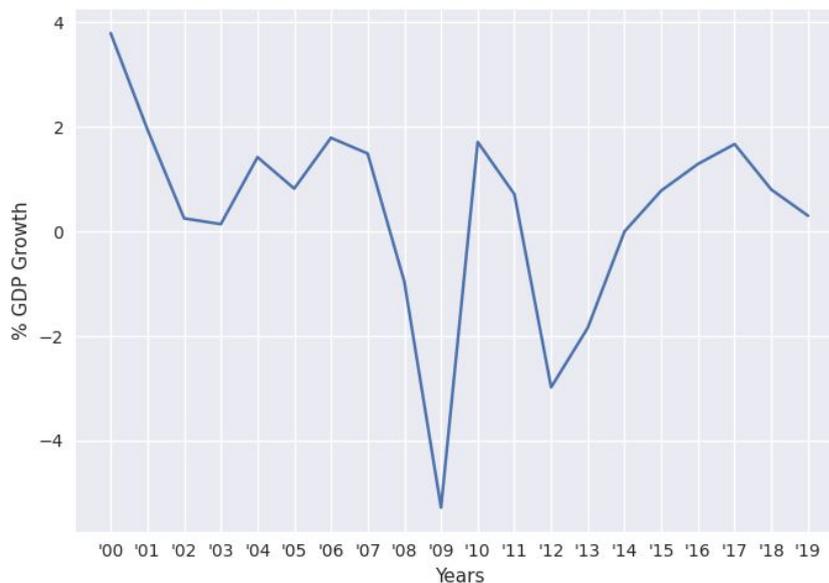


Figure 4.1.1: Italian GDP Growth.

Data from ISTAT.

However, Italian growth rates are still below those of most European countries and Europe as a whole (Figure 4.1.2).

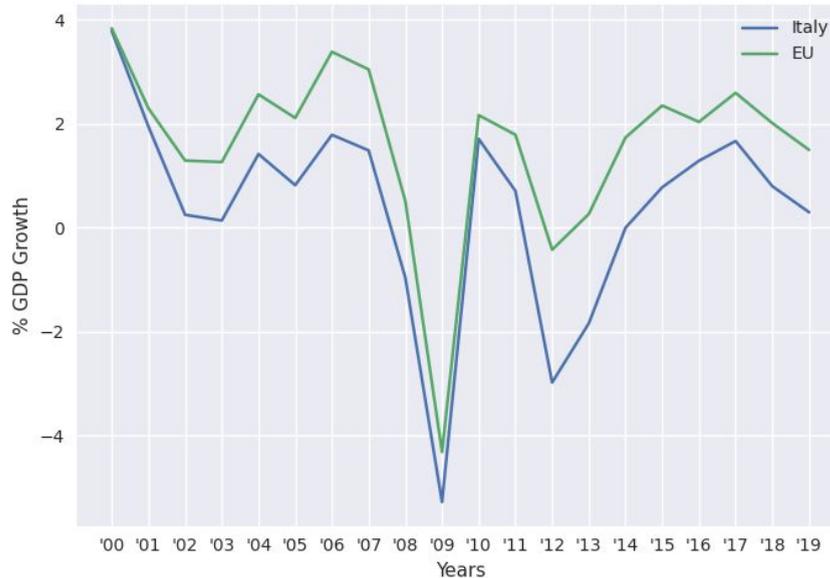


Figure 4.1.2: Italian and European GDP Growth.
Data from ISTAT (Italy) and OECD (Europe).

4.2 The Italian financial system and its main characteristics

The Italian financial system is traditionally bank-centric (Gaspar et al., 2003; Visco, 2015): banks play a key role in financial intermediation and are the main source of finance for the Italian economy. The domestic financial system is structurally dominated by the banking sector: 80% of financial assets and less than 16% of intermediaries were independent from banks or banking groups, in 2010 (Consolandi et al., 2013). In fact, despite

the recent significant growth of other financial institutions, such as insurance companies, investment funds and pension funds, banks continue to dominate the Italian financial system.

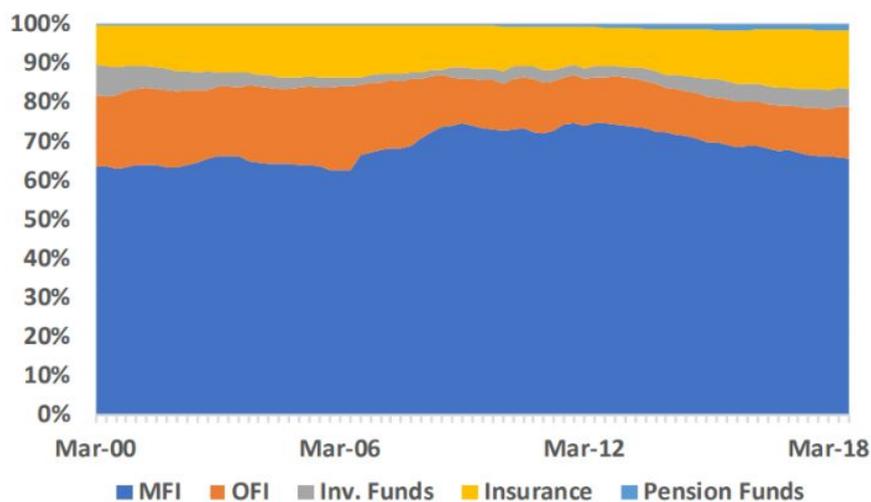


Figure 4.2.1: Total financial assets of intermediaries in percentage of total financial assets in the Italian system.

Source: IMF.

As of September 2019, total assets of the banking sector accounted for 216.2% of the Italian GDP and the financial intermediation ratio, which is measured as total financial assets of financial corporations over total financial assets, was 51.4% (Bank of Italy; ISTAT).

Italian capital markets are relatively small compared with the overall size of the economy and historically less developed than those of other financially advanced countries.

The stock market is not a fundamental element of the Italian financial system since it does not play a major role in firm financing. Italy's only stock exchange is Borsa Italiana S.p.A., which is split into four different markets: Mercato Telematico Azionario (MTA) and the Alternative

Investment Market (AIM Italia) where companies are listed, and the Market for Investment Vehicles (MIV) and the Partnership Equity Markets where financial vehicles are listed. By the end of 2019, the total market capitalization of listed companies is worth €651.3 billion, representing only 36.8% of Italy's GDP (Borsa Italiana).

On the contrary, the Italian bond market is one of the world's largest bond markets (3rd largest in the world after the US and Japan and the largest in the Eurozone). It has a large number of bond issues that can be divided into corporate bonds, government bonds, and municipal bonds. By the end of 2019, the size of the Italian bond market is estimated at €2,673.8 billion, which accounts for 149.6% of GDP (ECB; ISTAT).

4.3 Financial Development Index – Italy

The International Monetary Fund defines the Financial Development Index (FDI) as “an aggregate of the Financial Institutions index and the Financial Markets index.

The Financial Institution index (FI) is an aggregate of:

- Financial Institutions Depth index (FID) which compiles data on bank credit to the private sector in percent of GDP, pension fund assets to GDP, mutual fund assets to GDP and Insurance premiums, life and non-life to GDP;
- Financial Institutions Access index (FIA) which compiles data on bank branches per 100,000 adults and ATMs per 100,000 adults;
- Financial Institutions Efficiency index (FIE) which compiles data on banking sector net interest margin, lending-deposits spread,

non-interest income to total income, overhead costs to total assets, return on assets, and return on equity;

The Financial Markets index (FM) is an aggregate of:

- Financial Markets Depth index (FMD) which compiles data on stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP and total debt securities of financial and nonfinancial corporations to GDP;
- Financial Markets Access index (FMA) which compiles data on percent of market capitalization outside of top 10 largest companies and total number of issuers of debt (domestic and external, nonfinancial and financial corporations) per 100,000 adults;
- Financial Markets Efficiency index (FME) which compiles data on stock market turnover ratio (stocks traded to capitalization)”;

Financial Development Index (FDI)					
Financial Institutions index (FI)			Financial Markets index (FM)		
FID	FIA	FIE	FMD	FMA	FME

Table 4.3.1: Components of the Financial Development Index.

Source: adapted from IMF.

The IMF ranks over 180 countries according to the depth (size and liquidity of financial institutions and financial markets), access (degree to which individuals and companies can and do use financial services) and efficiency of their financial institutions and financial markets, respectively with annual frequency (Figure 4.3.1 and 4.3.2).

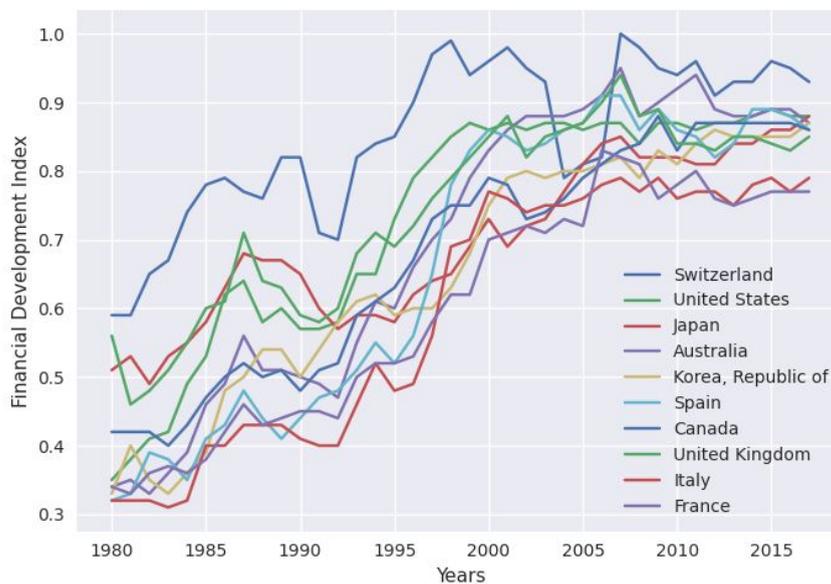


Figure 4.3.1: Financial Development Index top 10.

Data from IMF.

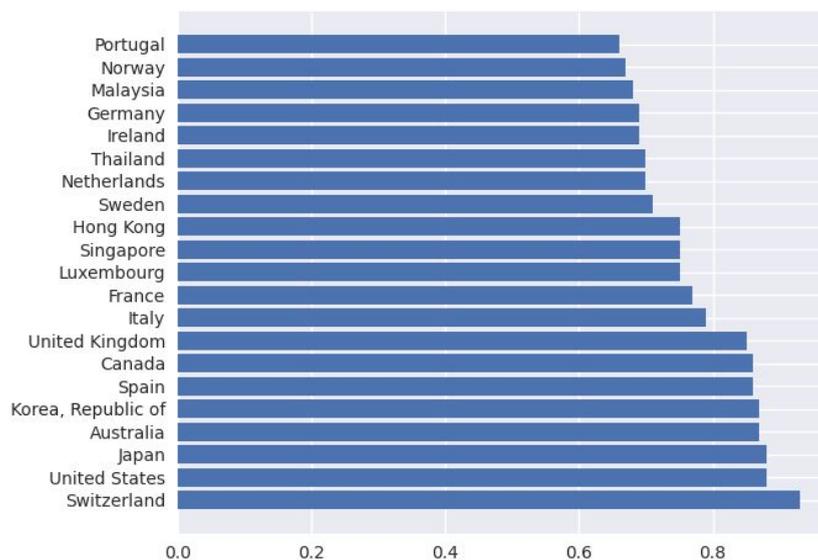


Figure 4.3.2: Financial Development Index top 10 in 2017.

Data from IMF.

The Financial Development Index 2017 ranks Italy 9th overall (fourth in the Euro area after Switzerland, Spain, and the United Kingdom), performing consistently well in terms of bank and non-bank financial intermediaries and financial markets. In particular, Italy scores high in terms of financial markets efficiency and financial institutions access.

Financial Institutions Index	0.78
Financial Institutions Depth index	0.6
Financial Institutions Access index	0.92
Financial Institutions Efficiency index	0.63
Financial Markets Index	0.79
Financial Markets Depth index	0.7
Financial Markets Access index	0.68
Financial Markets Efficiency index	1
Financial Development Index	0.79

Table 4.3.2: Italian Financial Development Index in 2017.

Data From IMF.

Financial institutions efficiency (Figure 4.3.3) significantly decreases, most notably following the Italian sovereign debt crisis in 2011 (Italy 10-year government bond yield and spread vis-à-vis Germany reached record highs of 7.3 and 5.5 percentage points, respectively) and has remained medium-low since then. Both financial institutions depth and financial institutions access show an upward trend with a decline in 2008 of financial institutions depth (0.46) and a peak in 2009 of financial institutions access,

reaching its highest value (0.99).

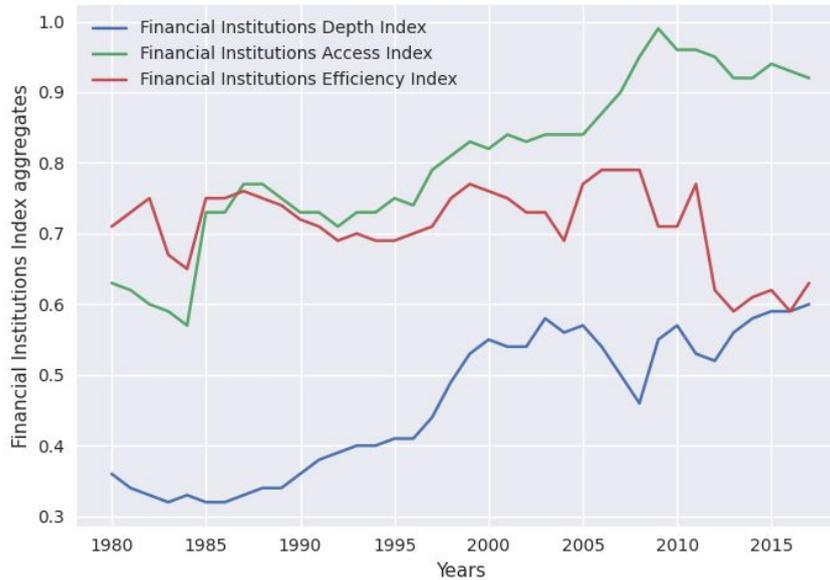


Figure 4.3.3: Italian Financial Institutions Index aggregates: FID, FIA, FIE.

Data from IMF.

Financial markets efficiency, depth and access (Figure 4.3.4) significantly improved in 1998, after the privatization process of Borsa Italiana S.p.A. was completed and the Italian stock market became operative. As a result, the overall financial markets index experienced an increase and has been stable around a value of 0.75 since 2000 (Figure 4.3.5).

In addition, financial markets depth and efficiency had a further improvement following the introduction of the Euro (1 January 2002).

On the whole, a comparison of the two indexes shows an initial gap which has reduced to zero following the sharp growth of the the financial markets index (Figure 4.3.5).

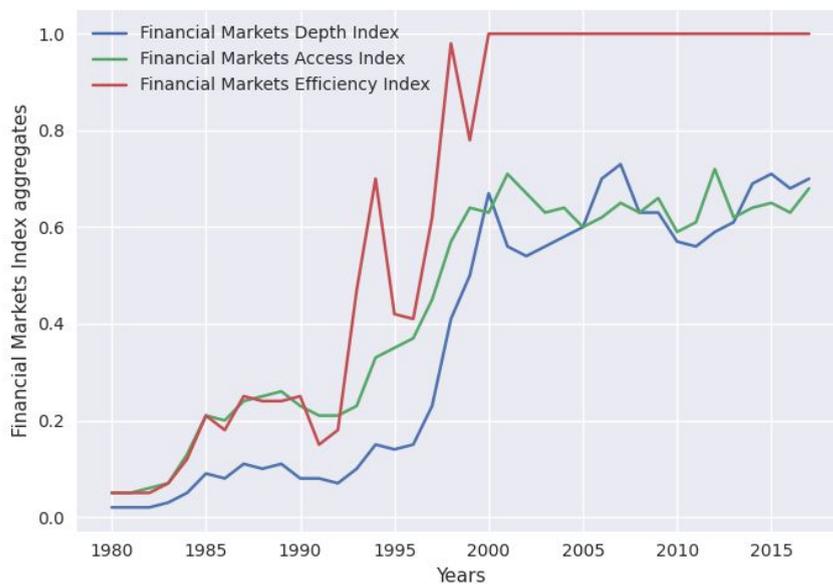


Figure 4.3.4: Italian Financial Markets Index aggregates: FMD, FMA, FME.

Data from IMF.



Figure 4.3.5: Italian Financial Development Index aggregates: FI and FM.

Data from IMF.

5. Data analysis and methodology

This section presents the empirical study of the relationship between financial development and economic growth.

5.1 Panel data and summary statistics

The analysis is conducted using a dataset with panel data from the 103 Italian provinces over the period from 2001 to 2011. The data are drawn from three main sources: the province-level database of the Italian National Statistics Office (ISTAT), the Statistical Bulletin of the Bank of Italy (Bank of Italy) and Geoweb Starter, a database containing local, provincial and regional statistical information produced by the Istituto Guglielmo Tagliacarne (GEOWEB).

The following table describes the data sources and the definitions of the variables used in the empirical analysis.

Variable	Definition and Source
Dependent variable	

per_capita_gdp_log	Logarithm of provincial GDP per capita (ISTAT)
Independent variables	
sportelli_pop_log	Logarithm of the number of bank branches normalized by the number of inhabitants in the province (Bank of Italy)
loans_to_gdp	Bank credit to the private sector (the value of loans made by banks to private enterprises and households) as a share of GDP in the province (Bank of Italy)
Control variables	
trade_log	Logarithm of the ratio of trade (exports plus imports) to GDP in the province (ISTAT)
partecip_secondaria	Share of the provincial population with the secondary school degree (ISTAT)
material_infrast	Synthetic index of material infrastructure in the province. This data contains informations about: Road Network, Railways, Ports, Airports, Environmental Energy Networks, Broadband Services, Business Structure (GEOWEB)
perc_lav_agric	Share of total workers occupied in the agriculture sector in the province (ISTAT)
perc_lav_manifat	Share of total workers occupied in the manufacturing sector in the province (ISTAT)
perc_lav_costr	Share of total workers occupied in the construction sector in the province (ISTAT)
perc_lav_servizi	Share of total workers occupied in the service sector in the province (ISTAT)

Table 5.1.1: Data sources and variables definitions.

The analysis includes only one measure of economic growth: the logarithm of provincial GDP per capita. On the other hand, following the empirical literature on the finance and growth nexus, two measures of financial sector development are used: the logarithm of the number of bank branches per inhabitants in the province and bank credit to the private sector as a share of GDP in the province. Moreover, in order to control for other factors associated with economic growth not linked to financial development, a comprehensive set of province-level control variables is used including an indicator of the degree of openness of the economy (the logarithm of the ratio of trade to GDP in the province), a proxy for education (the share of provincial population with the secondary school degree), a synthetic index of material infrastructure in the province and the share of total workers occupied in the agriculture, manufacturing, construction and service sectors in the province.

The following table displays summary statistics for the variables mentioned above.

	Count	Mean	St. Dev.	Min	Max
North-West					
per_capita_gdp_log	264	10.096	0.128	9.765	10.441
sportelli_pop_log	264	-7.327	0.147	-7.665	-7.013
loans_to_gdp	264	0.809	0.201	0.452	1.539
trade_log	264	-0.709	0.450	-2.330	0.243
partecip_secondaria	264	88.974	3.466	84.200	98.100
material_infrast	264	113.406	52.379	35.710	272.860
perc_lav_agric	264	0.039	0.028	0.002	0.112

perc_lav_manifat	264	0.246	0.086	0.056	0.419
perc_lav_costr	264	0.081	0.019	0.049	0.161
perc_lav_servizi	264	0.634	0.082	0.498	0.800
<hr/>					
North-East					
<hr/>					
per_capita_gdp_log	242	10.157	0.095	9.841	10.353
sportelli_pop_log	242	-7.163	0.143	-7.488	-6.846
loans_to_gdp	242	0.935	0.214	0.526	1.438
trade_log	242	-0.677	0.345	-1.588	-0.016
partecip_secondaria	242	91.851	5.570	73.000	97.500
material_infrast	242	131.832	98.164	40.150	609.560
perc_lav_agric	242	0.039	0.018	0.007	0.079
perc_lav_manifat	242	0.255	0.073	0.111	0.424
perc_lav_costr	242	0.074	0.013	0.042	0.106
perc_lav_servizi	242	0.633	0.077	0.484	0.837
<hr/>					
Center					
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per_capita_gdp_log	231	10.001	0.142	9.526	10.319
sportelli_pop_log	231	-7.409	0.221	-8.081	-7.059
loans_to_gdp	231	0.823	0.230	0.369	1.518
trade_log	231	-1.025	0.614	-2.808	0.427
partecip_secondaria	231	97.507	2.104	93.200	101.000
material_infrast	231	117.637	74.379	40.940	494.560
perc_lav_agric	231	0.043	0.031	0.003	0.145
perc_lav_manifat	231	0.213	0.076	0.063	0.429

perc_lav_costr	231	0.081	0.015	0.056	0.140
perc_lav_servizi	231	0.663	0.070	0.502	0.860
<hr/>					
South					
<hr/>					
per_capita_gdp_log	396	9.601	0.137	9.214	9.918
sportelli_pop_log	396	-7.955	0.240	-8.457	-7.385
loans_to_gdp	396	0.582	0.165	0.276	1.095
trade_log	396	-1.960	1.093	-4.257	1.160
partecip_secondaria	396	93.464	4.409	83.500	105.200
material_infrast	396	88.249	49.703	24.810	489.420
perc_lav_agric	396	0.099	0.046	0.013	0.239
perc_lav_manifat	396	0.144	0.054	0.065	0.340
perc_lav_costr	396	0.087	0.012	0.050	0.123
perc_lav_servizi	396	0.671	0.062	0.512	0.826
<hr/>					
Total Sample					
<hr/>					
per_capita_gdp_log	1133	9.917	0.269	9.214	10.441
sportelli_pop_log	1133	-7.528	0.380	-8.457	-6.846
loans_to_gdp	1133	0.760	0.242	0.276	1.539
trade_log	1133	-1.204	0.943	-4.257	1.160
partecip_secondaria	1133	92.898	5.035	73.000	105.200
material_infrast	1133	109.412	70.403	24.810	609.560
perc_lav_agric	1133	0.061	0.044	0.002	0.239
perc_lav_manifat	1133	0.206	0.086	0.056	0.429
perc_lav_costr	1133	0.081	0.016	0.042	0.161

perc_lav_servizi	1133	0.653	0.074	0.484	0.860
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Table 5.1.2: Summary statistics.

The table shows that there is substantial variation at provincial level and over time in local financial development measured by the number of bank branches per inhabitants in the province and bank credit to the private sector as a share of GDP in the province. The minimum values of sportelli_pop_log and loans_to_gdp between 2001 and 2011 were -8.457 and 0.276, while the maximum ones were -6.846 and 1.539 respectively. Also the logarithm of provincial GDP per capita displays remarkable variability: the range of variation of per_capita_gdp_log is pretty extensive, from a minimum of 9.214 to a maximum of 10.441. On average the regions located in the South of Italy exhibit lower values of sportelli_pop_log, loans_to_gdp and per_capita_gdp_log with respect to the rest of the country.

5.2 Econometric methodology

The econometric methodology employed for the analysis of the relationship between financial development and economic growth is the fixed effects model.

The method of fixed effects regression is employed in a panel data setting and allows to control for time-invariant variables which cannot be observed or measured but may be correlated with the observed explanatory variables. The model takes the following general form:

$$y_{it} = \alpha_i + \beta x_{it} + e_{it} \text{ for } i = 1, \dots, N \text{ and } t = 1, \dots, T$$

where:

- y_{it} is the dependent variable observed for individual i at time t ;
- α_i is the individual specific intercept for each variable that captures the unobserved effects of those time-invariant variables, which are treated as fixed, on each i -th individual;
- β is the slope of the panel regression line. It is the $(K \times 1)$ vector of coefficients to be estimated for the vector of variables x_{it} ;
- x_{it} is the exogenous $(1 \times K)$ vector of explanatory variables;
- e_{it} is the error term;

Assumptions

In order for OLS to produce unbiased estimates, the fixed effects regression model presents four assumptions that need to hold. The model assumptions are the following:

1. The error term e_{it} has conditional mean equal to zero, that is $E(e_{it} | x_{i1}, x_{i2}, \dots, x_{iT}) = 0$. The error term is uncorrelated with all observations of the variable x for entity (individual) i over time t , and this means that there is no omitted variable bias;
2. $(x_{i1}, x_{i2}, \dots, x_{iT}, e_{i1}, \dots, e_{iT})$, $i = 1, \dots, N$ are independent and identically distributed draws from their joint distribution;
3. Large outliers are unlikely: (x_{it}, e_{it}) have nonzero finite fourth moments;
4. There is no perfect multicollinearity;

Properties: Hypothesis Testing

The estimated coefficients contained in vector β are subject to an error sample. This means that when the sample parameter is different from zero, not necessarily also the population parameter will be different from zero.

The following hypothesis test is used to verify whether the explanatory variable has an impact on the dependent variable:

$$H_0: \beta_k = 0$$

$$H_1: \beta_k \neq 0$$

If the null hypothesis H_0 is rejected, then β_k is statistically significant and there is evidence that the explanatory variable has an impact on the response variable.

A t-ratio must be computed and a significance level α , which specifies the smallest permissible probability that the null hypothesis is true, must be chosen (common values are 0.1, 0.05 and 0.01).

If $|T| > t_{1-\alpha/2}$ the null hypothesis is rejected, otherwise it cannot be rejected meaning that the k^{th} regressor has no influence on the dependent variable.

The hypothesis test on β_k can also be computed using the p-value, which represents the minimum significance level for which the null hypothesis is rejected. If $p\text{-value} < \alpha$ the null hypothesis is rejected, otherwise it cannot be rejected.

To perform the empirical investigation, two fixed effects regressions were run. Specifically, a different model has been estimated for each employed measure of financial development (`sportelli_pop_log` and `loans_to_gdp`), regressing the logarithm of provincial GDP per capita on (1) the logarithm of the number of bank branches per inhabitants in the province (2) bank credit to the private sector as a share of GDP in the province and a number of controls (Table 5.3.1).

5.3 Model results

The estimation results are presented in the following table. The observed coefficients are used to estimate the relationship between the explanatory variables and the response variable.

	(1)	(2)
Dep. Variable	per_capita_gdp_log	Per_capita_gdp_log
No. Observations	1133	1133
R-squared	0.5997	0.5878
sportelli_pop_log	0.7192 (16.445)	
loans_to_gdp		0.2335 (15.261)
trade_log	-0.0045 (-0.6208)	0.0072 (0.9878)
partecip_secondaria	0.0071 (9.6643)	0.0071 (9.5136)
material_infrast	0.0001 (3.3079)	0.0001 (3.9649)
perc_lav_agric	-9134.7 (-0.1906)	-1.753e+04 (-0.3604)
perc_lav_manifat	-9134.7 (-0.1906)	-1.753e+04 (-0.3604)

perc_lav_costr	-9131.6	-1.752e+04
	(-0.1905)	(-0.3603)
perc_lav_servizi	-9133.4	-1.753e+04
	(-0.1905)	(-0.3604)
Effects	Entity	Entity

Table 5.3.1: Regression coefficients.

T-stats reported in parentheses.

The table indicates that the two financial development indicators enter with positive and significant coefficients at the 1 percent level. Thus, the logarithm of the number of bank branches per inhabitants in the province and bank credit to the private sector as a share of GDP in the province are strongly associated with economic growth. In addition, the sizes of the coefficients imply that the relationship between financial development and growth may be economically important: the coefficient of 0.7192 on `sportelli_pop_log` suggests that a province with a one unit increase of `sportelli_pop_log` would have increased `per_capita_gdp_log` by almost 0.72 percent per annum and the coefficient of 0.2235 on `loans_to_gdp` suggests that a province with a one unit increase of `loans_to_gdp` would have increased `per_capita_gdp_log` by approximately 2.2 percent per annum. The variables in the conditioning information set also have significant coefficients with the expected sign (positive for `partecip_secondaria` and `material_infrast`), except for `trade_log` and those variables concerning the distribution of workers among sectors (`perc_lav_agric`, `perc_lav_manifat`, `perc_lav_costr` and `perc_lav_servizi`).

On the whole, this evidence strongly suggests that financial development

has a positive significant impact on economic growth (measured by the logarithm of provincial GDP per capita). More specifically, the results suggest a stronger role for `loans_to_gdp` than for `sportelli_pop_log`: a one unit increase of bank credit to the private sector divided by GDP in the province would result in a higher growth in the province than a one unit increase of the logarithm of the number of bank branches per inhabitants in the province.

6. Conclusions

This paper theoretically and empirically evaluated the relationship between financial development and economic growth.

The first part of this paper (Chapter 2 and Chapter 3) is dedicated to the review of the available literature on the finance-growth nexus. Theory and empirical evidence suggest that there is a strong and positive relationship between financial development and economic growth.

In the second part of this paper, the Italian case is examined: Chapter 4 describes the historical evolution of the Italian economy, the Italian financial system and its main characteristics. In addition, this section discusses the construction of the IMF financial development index, an aggregate measure for financial development.

The third part of this paper presents the empirical analysis on the case of Italy using province-level data (Chapter 5). In particular, two measures of local financial development have been used (the logarithm of the number of bank branches normalized by the population in the province and bank credit to the private sector as a share of GDP in the province). On the other hand, only one measure of economic growth has been employed (the logarithm of

provincial GDP per capita). The results showed that the logarithm of provincial GDP per capita is positively influenced by the logarithm of the number of bank branches normalized by the population in the province and bank credit to the private sector as a share of GDP in the province. In turn, this finding supports the view that financial development has a positive impact on provincial economic growth, once controlled for other important local characteristics such as the degree of openness of the economy, education, material infrastructures and the distribution of workers among sectors. In summary, the empirical results support the hypothesis that (local) financial development positively affects long-run economic growth.

More work is needed to better understand the transmission mechanisms linking financial development and economic growth. Nevertheless, this study has important policy implications. The results of the empirical analysis suggest that policies should aim at reinforcing and stimulating banking activities and, in turn, promoting financial development in order to foster economic growth.

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