



Reassessing the law, finance, and growth nexus after the recent Great recession

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ABSTRACT

The paper provides a reassessment of the relationship between financial structure, financial development, and economic growth conducting cross-section and panel econometric analyses for a sample of 62 countries over 1980–2016. In line with the traditional literature, we confirm the existence of a positive cross-country relationship between the legal system, financial development, and growth even including the experience of the recent Great recession; in addition, when jointly assessing the effect of financial structure and financial development on growth, it emerges that a more bank-oriented economy enjoys higher benefits, in terms of long-run real GDP per capita growth, than a market-oriented one. When we consider variations across countries and over time, we find that both financial structure and financial development affect growth but in an opposite way as the cross-section analysis. In particular, when we control for their joint effect on growth, we observe a positive impact of market-based financial systems, and a negative impact of the overall financial development. We also provide evidence of the existence of a positive and significant relationship between economic growth and Shadow banking during the 2002–2016 period, highlighting the crucial role played by non-bank financial intermediation in complementing traditional banking and in affecting the real economy.

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1. Introduction

The existing theoretical and empirical literature on finance and growth widely supports the view that financial development is a driving force for growth. After the pioneering works by Schumpeter (1934), Gurley and Shaw (1955), Goldsmith (1969), McKinnon (1973), which first outlined the foundations of the finance and growth nexus, the interest on the causality link has started growing in the mid-80s, when we witnessed to the debate opposing “bank-based” vs “market-based” systems, each one assigning to banks or financial markets, respectively, the leading role in fostering economic growth. Such traditional views were little later overcome by the “financial-services” and “law and finance” approaches, which emphasized the overall efficiency of financial and legal systems rather than the financial structure (King and Levine 1993a,b; Merton and Bodie 1995; Levine 1997; La Porta et al. 1998; Allen and Gale 2001; Levine 2002). Since then, a large body of empirical literature has shown that financial development exhibits a positive impact on growth no matter the type of financial structure

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(see, for instance, earlier contributions by [Levine and Zervos, 1998](#); [Rajan and Zingales, 1998](#); [Beck et al., 2000](#); [Demirgüç-Kunt and Maksimovic, 2002](#); [Beck and Levine, 2004](#); and recent works by [Cecchetti and Kharroubi, 2012](#); [Beck et al., 2014a](#); [Beck et al., 2014b](#); [Beck et al., 2016](#)).¹

However, recent contributions, that take on board lessons from the recent Great recession, shows a kind of reassessment of the finance and growth nexus by paying attention to the role played by financial structure and non-bank financial intermediation, as well as other relevant aspects that were not previously addressed by the literature. In particular, it has emerged that, as the economy develops, the role of capital markets become more important than that of banks in promoting economic growth, notably because market finance is better at promoting innovation and productivity, and at financing new sources of growth (see, for instance, [Shen and Lee, 2006](#), [Demirgüç-Kunt et al., 2011](#), [Gambacorta et al., 2014](#), [Langfield and Pagano, 2016](#)). During the last two decades, market-based intermediation has indeed grown faster than bank-based one, mostly in advanced countries, thanks to advances in technology, financial innovation, and financial globalization.² In addition, accommodative monetary policy and financial deregulation supported the growth of financial systems outside the perimeter of traditional financial intermediation. The role that non-bank financial intermediation, in particular the so-called “Shadow banking” system, potentially plays in altering the financial system cannot, thus, be neglected in the modern analysis of the finance and growth nexus. The term Shadow banking has started to be widely used at the onset of the recent financial crisis, reflecting the increased importance of entities and activities performing bank-like functions outside the regular banking system.³ As well as being partially, or totally, unregulated, shadow banks have no access to central banks’ liquidity backstops or to public sector credit and liquidity guarantees. Mostly driven by regulatory arbitrage, financial innovation, and the search for high-yield investment opportunities, the boom of Shadow banking started in the mid-1990s and lasted until the outbreak of the recent financial crisis. By complementing traditional banking, Shadow banking acts as a catalyst for the financial system and it generates spillovers to the real economy: in good times it provides large scale benefits that may positively affect economic growth, while in bad times it creates large scale deficiencies that may end up to runs and eventually to severe financial crisis ([Gorton and Metrick, 2010](#); [Pozsar et al., 2010](#); [IMF, 2014](#); [FSB, 2018](#)).

Our paper is mainly motivated by the following key rationales: (i) the methodology and the outcomes by [Levine \(2002\)](#), which broadly support the financial-services and the law and finance views, (ii) the recent evidence showing that financial structure can matter for economic growth, and (iii) the growing role of non-bank financial intermediation, in particular of Shadow banking, in altering the financial system.

In its work, Levine studies the relationship between financial structure, financial development and economic growth constructing different indicators that assess the degree of activity, size, and efficiency of financial markets and banks on the one hand, and of the overall financial system on the other hand. The author finds that structure indicators are not significantly related to growth, while overall financial indicators positively affect economic growth. We consider the work of [Levine \(2002\)](#) as the starting point of our analysis since we employ its structure and finance indicators to assess the effects of financial structure and development on growth, but by incorporating recent lessons and advances in the literature on finance and growth both in terms of results and methodological developments.

The aim of the paper is to investigate the relationships between (1) economic growth, financial structure, and financial development, and (2) economic growth, Shadow banking, financial structure, and financial development. Each part of the analysis is associated to different datasets and econometric procedures that we briefly outline.

The relationship between growth, financial structure, and financial development is examined for a set of 62 countries by employing two different datasets, cross-sectional and panel, and considering two different time spans, 1980–2016 and 2002–2016. While the broader time horizon allows to analyze the law, finance and growth nexus by including the impact of the recent Great recession and other minor, but not less relevant, economic and financial events, the 2002–2016 period allows to examine cyclical movements in GDP growth related to the expansion of non-traditional banking in the pre-crisis period, and to the debt-deflation spiral observed in the post-crisis period. The cross-sectional dataset serves to capture long-term relationships between growth, financial structure, and financial development. In addition to the pure OLS cross-country exercise, we employ the instrumental variable approach to examine the link between law, finance, and growth, and make comparisons with the original results by [Levine \(2002\)](#). We run two stages least square (2SLS) regressions by using legal variables, in particular, rule of law and outside investor’s rights, and all other extra controls as instruments for each financial variable. However, being aware that the IV approach is prone to bias in s.e. due to the instruments chosen, we use the IV approach not to address endogeneity issues, rather to see the effect on growth of that part of financial development that is due to the legal system, and thus simply replace the terms representing financial development with their component that is explained by legal variables, i.e., rule of law and investors rights. The panel analysis serves to capture across countries and over time variations among variables by considering data averaged over non-overlapping 5-year windows. We also include country fixed effects in order to control for unobserved heterogeneity across countries and thus account for common factors and unobservable, time-invariant, country-specific effects on economic growth.

¹ Extensive surveys of the theoretical and empirical literature on finance and growth are provided by [Popov \(2017\)](#), [Allen et al. \(2017\)](#), [Fernandez and Tamayo \(2017\)](#), and also from [Levine \(2005\)](#).

² [Popov \(2017\)](#).

³ [FSB \(2011a\)](#).

To examine the effects of Shadow banking on economic growth we use a dedicated panel dataset of 27 countries for the 2002–2016 period. The choice of reducing the number of countries as well as the number of observations has been forced by the need to use reliable and granular data on Shadow banking from the Global Shadow Banking Monitoring Report dataset of the Financial Stability Board (FSB, see [FSB, 2018](#)). We consider both non-overlapping and overlapping 5-year windows in order to exploit time series information, and we control for both country and time fixed effects.

The main questions addressed by this paper are: (i) Has the recent Great recession altered the finance and growth nexus? (ii) What are the effects across countries and over time in the long- and medium-run? (iii) Does the legal environment matter? (iv) What are the effects of Shadow banking on growth? (v) Does the financial structure matter, and does its contribution to growth vary according to the country's degree of economic and financial development?

In line with the previous research, we find that the long-run relationship between the legal system, financial development, and economic growth is robustly confirmed over the 1980–2016 period, for the cross-section analysis: the “financial services” and the “law and finance views”, and thus [Levine \(2002\)](#)'s results, withstand the test of the recent Great recession. In addition, the positive effect on growth of financial development is amplified in a more bank-oriented economy. However, financial development is no longer able to explain cross-country variations in economic growth rates during 2002–2016. Most interestingly, panel data shows that the joint effect of financial structure and financial development works as opposite to the pure cross-section analysis, since we observe a positive link between growth and a more market-based structure, and a negative link between growth and overall financial development. This is particularly true for high-income countries rather than low-income ones. These outcomes are supportive of the recent evidence in the finance and growth literature which shows that, as economies develop, the services provided by securities markets become more important for economic activity, whereas those provided by banks become less important. We also find the existence of a positive significant relationship between economic growth and Shadow banking for the 2002–2016 period, providing evidence that non-bank financial intermediation has played a key role in complementing the financial sector and fostering real GDP growth.

The paper is organized as follows. After a brief review of the literature in [Section 2](#), [Section 3](#) provides data description, while [Section 4](#) introduces the methodology and the econometric specifications of our analysis. [Sections 5](#) and [6](#) provide, respectively, the results for the cross-sectional and panel analysis, and [Section 7](#) reports the outcomes for the effects of Shadow banking on growth. [Section 8](#) concludes. A detailed description of variables and data sources is available in [Appendix A](#).

2. Related literature

Our paper contributes to several strands of the traditional and modern literature that study the effects of financial development on growth. Financial development is considered as the process through which financial systems ameliorate information and enforcement frictions in order to facilitate trade, mobilize savings, and diversify risk. Here we abstract from the theoretical literature on law, finance and growth, while we focus on the empirical contributions that are mostly related to our work. An exhaustive and up-to-date survey of the existing theoretical and empirical literature can be found in [Popov \(2017\)](#).

Among the earlier and most relevant contributions we mention [King and Levine \(1993a,b\)](#), [Levine and Zervos \(1998\)](#), [Rajan and Zingales \(1998\)](#), [Beck et al. \(2000\)](#), [Levine et al. \(2000\)](#), [Wurgler \(2000\)](#), [Levine \(2002\)](#) which show that financial sector development has a large positive effect on economic growth.

Our paper is strongly related to the strand of literature which focuses on the relative importance of bank-oriented and market-oriented financial systems to economic growth. Early studies concluded that there was no general rule that bank- or market-based financial systems were better at fostering growth, and their impact was also dependent on the quality of a country's legal and regulatory framework. [Arestis et al. \(2001\)](#) show that both types of finance foster growth even though the size of their effect is very small. [Levine \(2002\)](#) finds evidence suggesting that neither bank-based nor market-based financial systems affect economic growth, rather it is the activity, size, and efficiency of the overall financial system that matter. [Beck and Levine \(2002\)](#) confirm that greater financial development accelerates the growth of financially dependent industries, while financial structure does not. [Tadesse \(2002\)](#) shows that market-based systems support growth better among countries with developed financial sectors, while bank-based systems are far better among economies with emerging financial sectors. [Beck and Levine \(2004\)](#) use GMM techniques for dynamic panels to investigate the impact of stock markets and banks on economic growth, and find that both stock markets and banks positively influence economic growth. [Demirgüç-Kunt et al. \(2002\)](#) show that overall financial development supports growth of firms across countries while the financial structure does not. However, more recent contributions, that take on board lessons from the recent financial crisis, show a reconsideration of the financial structure and growth nexus by paying attention to the role played by non-bank financial intermediation, and by taking into account other relevant aspects that were not previously addressed in the literature, such as potential non-linear relationship among variables. [Shen and Lee \(2006\)](#), in a sample of 48 countries, find that only stock market development has a positive effect, and that banking development has an unfavorable, if not negative, effect on growth. [Demirgüç-Kunt et al. \(2011\)](#) use a large cross-country sample to show that as countries develop economically, the positive relationship between real output and bank development becomes smaller, while the positive link between real output and securities market development becomes larger. [Gambacorta et al. \(2014\)](#) study relationships be-

tween per capita economic growth and various forms of finance, and document diminishing effects of banking at higher levels of development and increasing effects of securities markets. Langfield and Pagano (2016) find a negative link between growth and the ratio of bank- to market-based intermediation, and, most interestingly, while both bank- and market-based financial systems support economic growth on average, their contribution varies according to economic and financial development. An updated survey of the recent advances in the financial structure and economic development nexus is provided by Allen et al. (2017), which also explore the role of other potential factors such as the recent growth of non-bank financial intermediaries (Shadow banking), the causes and consequences of crises, as well as law and politics.

Other recent contributions have explored whether there are limits to the benefits of financial development by suggesting the existence of a non-linear, inverted U-shape, relationship between finance and growth and, consequently, the identification of a threshold for financial development that may alter the impact of finance on growth. Although there is no consensus on the precise functional form of this relationship, most of the papers conclude that the impact of finance on growth becomes smaller at higher levels of financial development, and thus that the level of financial development supports economic growth only up to a point, after which it becomes a drag on growth (Deidda and Fattouh, 2002; Rioja and Valev, 2004; Aghion et al., 2005; Shen and Lee, 2006; Masten et al., 2008; Huang and Lin, 2009; Beck et al., 2012; Cecchetti Kharroubi, 2012, Law and Singh, 2014, Beck et al., 2014b). Other studies investigate also the effect of financial sector to growth volatility. For instance, Beck et al. (2014a) conduct both a cross-country and a panel analysis over a sample of 77 countries for the period 1980–2007 using non-overlapping 5-year windows, with the purpose to investigate how variations in financial sector size are associated with economic growth and growth volatility. The authors find that intermediation activities increase growth and reduce volatility in the long run. Over shorter time horizons a large financial sector stimulates growth at the cost of higher volatility in high-income countries, while intermediation stabilizes the economy in the medium run especially in low-income countries.

Institutions have been identified as playing a key role in fostering long-run economic growth, in particular through the financial development channel. The basic rationale is that poorly developed financial markets suffer from high information and transaction costs: institutions matter to the extent that they may support financial intermediaries to mitigate such costs.⁴ Our paper is also related to the evidence that connects economic growth with legal rules and other measures of corporate governance, such law enforcement, rule of law, and investor's protection, as reported in the most influential papers by La Porta et al. (1997, 1998, 2000). The authors find that better legal protection and a strong reliance on rule of law principles mitigate agency costs in the financial sector by enabling entrepreneurs to obtain money at better terms both in the stock and bond markets, and thus foster economic growth.⁵ Regarding investors protection, the most relevant contributions come from Djankov et al. (2007, 2008), where they successfully assess the relative cross-country importance of legal rules protecting creditors and shareholders in influencing financial market outcomes, and they also provide an exhaustive dataset on investor rights which represents an important reference for later contributions.

We also contribute to the strand of the literature which addresses endogeneity of financial development to the process of economic and political development, suggesting that simple regression analyses are unable to provide insights about the causal relationship between finance and growth. During the 1990s and early-2000, these identification and specification issues were mainly addressed through the use of instrumental variables (IV) technique. For instance, Rajan and Zingales (1998), Demirgüç-Kunt and Maksimovic (1998), Levine (1998b, 2002), La Porta et al. (1998), Beck et al. (2000) analyze the cross-sectional link between institutions, finance, and growth using legal origins and other legal variables as instruments for financial development, finding a positive correlation between financial development and the efficiency of the legal system that eventually foster economic growth. However, it is well known that the 2SLS approach is prone to bias in standard errors due to the instruments chosen, this is why our paper builds on modern contributions of the finance and growth literature that adopt panel data estimations and control for country or time fixed effects. A common practice is to control for over time variations by considering non-overlapping or overlapping 5-year windows in order to capture medium-term relationships between variables, purge business cycle frequencies from the data, and exploit time series information. Among all we mention Bakaert et al. (2007), Cecchetti and Kharroubi (2012), Beck et al. (2014a), Beck et al. (2014b), Law and Singh (2014), Beck et al. (2016).

Our paper is also related to the modern literature on Shadow banking, since we examine the potential impact of non-traditional banking activities on economic growth. Shadow banking can be broadly defined as credit intermediation involving entities and activities outside the regular banking system, i.e., in an environment where regulatory and supervisory standards are either not applied or applied to a lesser degree than regular banking (Pozsar et al. 2010; FSB, 2011a). Its origins can be traced back to the mid-1900 in the United States, while the phenomenon spread to other majors financial systems only afterwards: driven by regulatory arbitrage, financial innovation, and the search for high-yield investment opportunities, the boom of Shadow banking started at the end of the 1990s and lasted until the outbreak of the recent financial crisis.⁶ The existing literature is not very informative about the empirical link between economic growth and Shadow banking, even though some evidence of positive correlations is provided by FSB (2018). The recent growth of Shadow banking, which increases the reliance of banks on financial markets, also raises new questions in this area. On the one hand, the existence

⁴ See Fernandez and Tamayo (2017).

⁵ See also Beck et al. (2003a,b), and Beck et al. (2010).

⁶ Pozsar et al. (2010), IMF (2014), FSB (2018).

of Shadow banking can reduce the cost of capital through specialization, improve capital allocation, and boost economic growth more efficiently than traditional banking by aligning the needs of intermediaries and investors. On the other hand, it may also make the financial system less stable and economic growth more volatile. At this regard [Beck et al. \(2016\)](#) find evidence that financial innovation, mostly innovative activities of financial intermediaries, helps countries grow faster at high levels of income but it is also associated with higher bank fragility and worse bank performance during a crisis. Their analysis, based on a panel dataset of 32 mostly developed countries over the period 1996–2010, shows important cross-country variation in the relationship of financial innovation with bank- and real sector outcomes. Specifically, they find that the real and financial effects of financial innovation are stronger in countries with larger security markets, and that financial innovation has stronger positive effects on growth in countries with stronger restrictions on banks and overall capital stringency, suggesting that financial innovation allows banks to benefit from higher yield investment opportunities by taking advantage of flaws in the regulatory framework.

3. Data description

Our analysis is conducted on a sample of 62 countries with data covering the 1980–2016 period.⁷ The sample includes both advanced and emerging economies, as well as financial centers (such as the UK, the US, Switzerland, Hong Kong) and offshore financial centers (such as Cyprus, Panama, Philippines), that offer a wide range of variation of financial structure and development across countries. Only when investigating the link between economic growth and Shadow banking the sample is reduced to 27 countries and the time span shortened to 2002–2016 due to data availability. Data have been mainly collected from The World Bank. Macroeconomic data from [The Worldwide Development Indicators \(WDI\)](#), financial data from the [Global Financial Development Database \(GFDD\)](#), and institutional data from [The Worldwide Governance Indicators \(WGI\)](#). Data on schooling have been collected from the [Barro and Lee \(2013\)](#) dataset, while data on Shadow banking from the Financial Stability Board (FSB).⁸ [Tables 1 and 2](#) report, respectively, descriptive statistics and pairwise correlation coefficients for the cross-section and panel datasets, respectively for the 1980–2016 and 2002–2016 periods. While most of the recent works in the literature focus on periods that arrive up to the aftermath of the 2007/2008 financial crisis, our aim is to provide estimates that incorporates the period after the crisis.

3.1. Financial indicators

Our investigation of the finance and growth nexus is mainly based upon the same indicators proposed by [Levine \(2002\)](#) but focusing on different time spans, 1980–2016 and 2002–2016, and adopting a panel data approach in addition to the cross-section analysis. We brief outline the main features of financial structure and development indexes, since an exhaustive description can be found in [Levine \(2002\)](#). Structure and finance indexes are constructed by using indicators that approximate activity, size, and efficiency of the stock markets relatively to the banking sector, or of the overall financial system. Structure-Activity is a measure of the activity of stock markets relatively to the banking sector, which is given by the natural logarithm of the total value traded ratio, i.e., the value of domestic equities traded on domestic exchanges as a share of GDP,⁹ divided by the bank credit ratio, which equals the value of deposit money bank credits to the private sector as a share of GDP.¹⁰ Structure-Size measures the size of stock markets relatively to the banking sector, given by the natural logarithm of the market capitalization ratio, which equals the value of domestic equities listed on domestic exchanges over GDP, divided by the bank credit ratio.¹¹ Structure-Efficiency is a measure of the efficiency of stock markets relatively to the banking sector, which equals the natural logarithm of the total value traded ratio times the overhead costs of the banking sector as a share of total bank assets.¹² Larger values of structure indexes denote a more market-oriented financial system, while lower values a more bank-oriented one. While structure indexes provide us information about the financial structure of the economy, finance indexes offer an assessment of the overall financial development. Finance-Activity is a measure of the activity of stock markets and intermediaries, whose value is obtained by the natural logarithm of the total value traded ratio times the private credit ratio, with the latter equal to the value of credit by banks and non-bank financial institu-

⁷ Included countries are Argentina, Armenia, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Ireland, Italy, Japan, Kenya, Korea Rep., Mexico, Morocco, Nepal, Netherlands, New Zealand, Nigeria, Norway, Panama, Peru, Philippines, Portugal, Romania, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, Uruguay, and Venezuela. Datasets are available from the authors on request.

⁸ See [Appendix A](#) at the end of the paper for a detailed description of all variables and data sources.

⁹ Total value traded is generally used to gauge stock market liquidity. An alternative measure to total value traded is the turnover ratio, which measures the value of stock transactions relative to market capitalization. Performing our analysis with the turnover ratio leads to similar results.

¹⁰ Bank credit includes all depository institutions as recognized by the International Monetary Fund. Credit by banks to the private sector divided by GDP is generally recognized by the literature as the primary measure for financial size or development used to assess the impact of financial intermediation on economic growth (see, among all, [King and Levine, 1993a,b](#); [Levine, 1998a](#); [Levine and Zervos, 1998](#); [Levine, 2002](#); [Beck et al., 2010, 2014a, 2014b](#), [Beck et al., 2016](#)).

¹¹ We also reconstruct the index by adding private bond market capitalization to stock market capitalization (see, for instance, [Laeven, 2014](#) or [Beck et al., 2016](#)), given the growing importance of private bond securities in the recent years, but we obtain similar results.

¹² Same outcomes are obtained by using interest rate margins instead of overhead costs.

Table 1

Descriptive statistics.

Panel A. Cross-sectional data					
Variables	Obs.	Mean	Std. dev.	Min	Max
1980–2016					
Real GDP per capita growth rate (%)	62	2.02	1.48	−1.11	8.62
Structure-activity	62	−1.74	1.75	−7.69	0.95
Structure-size	62	−0.45	0.79	−3.25	1.00
Structure-efficiency	62	3.04	1.75	−2.27	6.20
Finance-activity	62	6.02	2.60	−0.94	10.62
Finance-size	62	7.31	1.56	2.82	10.32
Finance-efficiency	62	1.15	2.56	−6.36	4.93
2002–2016					
Real GDP per capita growth rate (%)	62	2.42	1.84	−0.44	8.96
Structure-activity	62	−1.72	1.94	−7.73	1.42
Structure-size	62	−0.46	0.91	−4.09	1.17
Structure-efficiency	62	3.21	1.98	−2.60	6.86
Finance-activity	62	6.47	2.84	−1.03	11.24
Finance-size	62	7.74	1.73	2.60	11.04
Finance-efficiency	62	1.45	2.74	−6.16	5.37
Panel B. Panel data					
1980–2016 (62 countries, non-overlapping 5-year windows)					
Real GDP per capita growth rate (%)	476	1.99	2.98	−24.21	14.16
Structure-activity	399	−1.99	1.89	−9.70	1.77
Structure-size	393	−0.61	1.06	−6.21	1.35
Structure-efficiency	281	3.11	2.00	−4.01	7.37
Finance-activity	399	5.82	2.82	−2.44	11.63
Finance-size	393	7.21	1.93	−2.54	10.88
Finance-efficiency	281	1.32	2.78	−7.98	5.92
2002–2016 (62 countries, non-overlapping 5-year windows)					
Real GDP per capita growth rate (%)	186	2.42	2.42	−3.34	13.64
Structure-activity	184	−1.89	2.18	−9.37	1.64
Structure-size	181	−0.49	0.97	−4.30	1.29
Structure-efficiency	184	3.01	2.22	−4.58	7.44
Finance-activity	184	6.24	3.06	−2.89	11.54
Finance-size	181	7.62	1.77	1.39	10.88
Finance-efficiency	184	1.30	2.96	−7.68	5.58
2002–2016 (27 countries, non-overlapping 5-year windows)					
Real GDP per capita growth rate (%)	81	2.20	2.39	−1.19	10.14
Structure-activity	80	−0.42	0.98	−3.37	1.64
Structure-size	78	0.03	0.61	−1.42	1.29
Structure-efficiency	81	4.44	1.25	0.69	7.44
Finance-activity	80	8.13	1.90	1.72	11.54
Finance-size	78	8.54	1.35	4.67	10.88
Finance-efficiency	81	3.13	1.64	−2.63	5.58
OFls assets to GDP (%)	81	115.41	208.14	0	1317.56
2002–2016 (27 countries, overlapping 5-year windows)					
Real GDP per capita growth rate (%)	270	2.22	2.42	−2.02	11.03
Structure-activity	266	−0.34	0.99	−3.40	1.89
Structure-size	258	0.05	0.62	−1.44	1.27
Structure-efficiency	270	4.52	1.28	0.56	7.51
Finance-activity	266	8.23	1.87	1.65	11.56
Finance-size	258	8.57	1.30	4.68	11.01
Finance-efficiency	270	3.23	1.64	−2.68	5.82
OFls assets to GDP	268	123.23	210.43	0.56	1322.92

tions to the private sector as a share of GDP.¹³ Finance-Size is a measure of the size of stock markets and intermediaries: it is equal to the natural logarithm of the market capitalization ratio times the private credit ratio.¹⁴ Finance-Efficiency is a measure of the overall financial sector efficiency, given by the natural logarithm of the total value traded ratio divided by overhead costs. Larger values of finance indexes are associated to a more developed financial system.

¹³ The use of private credit by banks and non-bank financial institutions has intensified in the literature of finance and growth since the 2000 in order to take into account the changing nature of financial intermediation characterized by the growing role of bank-like entities performing credit intermediation.

¹⁴ As for the structure-size index, we have reconstructed the finance-size index by adding private bond market capitalization to stock market capitalization without changing the results.

Table 2

Pairwise correlations.

Panel A. Cross-sectional data								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1980–2016								
(1) Real GDP per capita growth rate (%)	1							
(2) Structure-activity	0.05	1						
(3) Structure-size	−0.14	0.74***	1					
(4) Structure-efficiency	0.05	0.96***	0.67***	1				
(5) Finance-activity	0.15	0.88***	0.52***	0.91***	1			
(6) Finance-size	0.12	0.73***	0.54***	0.77***	0.92***	1		
(7) Finance-efficiency	0.17	0.90***	0.54***	0.87***	0.98***	0.89***	1	
2002–2016								
(1) Real GDP per capita growth rate (%)	1							
(2) Structure-activity	−0.27	1						
(3) Structure-size	−0.13	0.76***	1					
(4) Structure-efficiency	−0.29**	0.96***	0.71***	1				
(5) Finance-activity	−0.37***	0.89***	0.55***	0.92***	1			
(6) Finance-size	−0.38***	0.75***	0.58***	0.81***	0.93***	1		
(7) Finance-efficiency	−0.35***	0.91***	0.57***	0.89***	0.98***	0.89***	1	
Panel B. Panel data								
1980–2016 (62 countries, non-overlapping 5-year windows)								
(1) Real GDP per capita growth rate (%)	1							
(2) Structure-activity	0.03	1						
(3) Structure-size	0.10**	0.73***	1					
(4) Structure-efficiency	−0.12**	0.95***	0.68***	1				
(5) Finance-activity	−0.01	0.85***	0.51***	0.90***	1			
(6) Finance-size	0.01	0.65***	0.60***	0.73***	0.91***	1		
(7) Finance-efficiency	−0.13**	0.89***	0.54***	0.87***	0.97***	0.86***	1	
2002–2016 (62 countries, non-overlapping 5-year windows)								
(1) Real GDP per capita growth rate (%)	1							
(2) Structure-activity	−0.10	1						
(3) Structure-size	0.04	0.76***	1					
(4) Structure-efficiency	−0.15**	0.96***	0.71***	1				
(5) Finance-activity	−0.28***	0.88***	0.53***	0.92***	1			
(6) Finance-size	−0.34***	0.70***	0.52***	0.77***	0.91***	1		
(7) Finance-efficiency	−0.25***	0.91***	0.56***	0.89***	0.98***	0.87***	1	
2002–2016 (27 countries, non-overlapping 5-year windows)								
(1) Real GDP per capita growth rate (%)	1							
(2) Structure-activity	0.04	1						
(3) Structure-size	0.11	0.42***	1					
(4) Structure-efficiency	−0.01	0.87***	0.33***	1				
(5) Finance-activity	−0.13	0.67***	−0.03	0.74***	1			
(6) Finance-size	−0.16	0.36***	0.10	0.51***	0.88***	1		
(7) Finance-efficiency	−0.09	0.62***	−0.11	0.56***	0.93***	0.78***	1	
(8) OFIs assets to GDP	−0.11	−0.28**	−0.27**	−0.20*	0.09	0.22*	0.11	1
2002–2016 (27 countries, overlapping 5-year windows)								
(1) Real GDP per capita growth rate (%)	1							
(2) Structure-activity	0.09	1						
(3) Structure-size	0.18***	0.45***	1					
(4) Structure-efficiency	0.04	0.88***	0.37***	1				
(5) Finance-activity	−0.14**	0.66***	−0.05	0.72***	1			
(6) Finance-size	−0.21***	0.35***	0.06	0.48***	0.88***	1		
(7) Finance-efficiency	−0.12**	0.60***	−0.13**	0.51***	0.93***	0.78***	1	
(8) OFIs assets to GDP	−0.25***	−0.37***	−0.36***	−0.29***	0.07	0.23***	0.10*	1

*, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

In addition to financial structure and development indexes, we have gathered financial data in order to gauge the size of the Shadow banking system. As pointed out by the FSB, “there is no unique way to monitor the shadow banking system as it varies across jurisdictions and evolves over time” (FSB, 2011b). However, the efforts of the FSB and other international authorities in developing and implementing an effective monitoring framework for Shadow banking have led to important outcomes. Since 2011, the FSB conducts yearly monitoring exercises (Global Shadow Banking Monitoring Reports - GSBMR) that analyze the scale, trends, and developments of the phenomenon. The FSB considers three monitoring

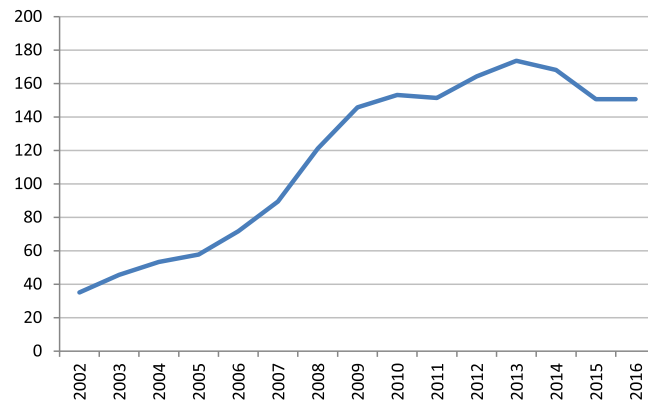


Fig. 1. OFIs assets to GDP (%; 2002–2016). Yearly average data of 27 countries. The sample includes Argentina, Australia, Belgium, Brazil, Canada, Chile, China, France, Germany, Hong Kong, India, Indonesia, Ireland, Italy, Japan, Korea Rep., Mexico, Netherlands, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Turkey, United Kingdom, and United States. Source: FSB (2017).

aggregates¹⁵: (1) the Monitoring Universe of Non-bank Financial Intermediation (MUNFI), including other financial intermediaries (OFIs),¹⁶ insurance corporations, and pension funds, which is the starting point for authorities to assess the potential involvement of non-bank financial entities in Shadow banking, (2) a “broad” measure of Shadow banking, consisting of OFIs, (3) a “narrow” measure of Shadow banking, consisting of the sub-set of OFIs which potentially pose systemic risks and regulatory arbitrage concerns to the financial system.

Henceforth, when talking about Shadow banking we will refer to aggregate 2, i.e., the broad measure of Shadow banking consisting of all other financial intermediaries. We will analyze the link between economic growth and Shadow banking by considering the total OFIs assets-to-GDP ratio. This decision stems from the reason that FSB data on Shadow banking are definitely more granular and reliable than those obtainable from the GFDD but with the drawbacks of having a reduced sample of 27 countries¹⁷ and a smaller time span, 2002–2016, at our disposal. Such limit also motivate the choice of conducting the cross-section and panel analyses for the full sample of 62 countries over the 2002–2016 period, in order to make comparisons with the analysis on growth and Shadow banking. Fig. 1 shows an overall increasing trend in the average share of OFIs assets to GDP over time across our sample of countries: the ratio dramatically grew from 35% in 2002 to 145% in 2009 (almost 315% variation), consistently with the boom phase of Shadow banking in the pre-crisis period, then it showed a less pronounced upward tendency up to 2013, with a peak of 173%, that ended up to a slight downward trend during 2014–2016.

3.2. Other variables

As well as financial variables, standard finance and growth econometric models typically consider real per capita GDP growth as a function of some universally recognized macroeconomic and institutional determinants.¹⁸ While we consider real GDP per capita growth rate as the dependent variable, we also consider a set of macroeconomic and institutional variables consisting of real GDP per capita, the average years of schooling of the population aged 25 and above, inflation, the ratio of government expenditure to GDP, and trade openness, measured as the sum of exports plus imports to GDP. Many authors also controls for institutional variables, such as indicators of civil liberties, investors protection, bureaucratic efficiency, corruption, rule of law, in order to capture the impact of the quality and efficiency of legal institutions to economic growth (La Porta et al., 1998; Levine, 1998a; Demirgüç-Kunt and Maksimovic, 1998; Rajan and Zingales, 1998; La Porta et al., 1999; Levine, 1998b, 2002). In our dataset we include the rule of law index from the Worldwide Governance

¹⁵ FSB (2011a,b, 2018).

¹⁶ All financial institutions that are not classified as banks, insurance corporations, pension funds, public financial institutions, central banks, or financial auxiliaries.

¹⁷ The dataset include Argentina, Australia, Belgium, Brazil, Canada, Chile, China, France, Germany, Hong Kong, India, Indonesia, Ireland, Italy, Japan, Korea Rep., Mexico, Netherlands, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Turkey, United Kingdom, and United States. We do not employ the World Bank's GFDD because it does not provide granular and reliable estimates of Shadow banking as those provided by the FSB, and because it suffers of discontinuity and unavailability of data for non-bank financial intermediation. At the same time, we do not use the FSB's narrow measure of Shadow banking (aggregate 3) since data are available only from 2010.

¹⁸ Among all, King and Levine (1993a), Barro (1996), Levine (1998b), La Porta et al. (1998), Levine and Zervos (1998), La Porta et al. (1999), Levine (2002).

Indicators (WGI),¹⁹ and an index denoting the protection of outside investors (both creditors and shareholders) obtained by combining the datasets of Djankov et al. (2007, 2008) and of Doing Business (2018).

4. Methodology

Our econometric analysis is aimed to investigate (1) the relationship between growth, financial structure, and financial development, and (2) the relationship between growth, Shadow banking, financial structure, and development. Each one is associated to different datasets and econometric procedures that are described in the following sub-sections.

4.1. Growth, financial structure and financial development

We investigate the relationship between growth, financial structure, and financial development, for a set of 62 countries by employing two different datasets, cross-sectional and panel, and considering two different time spans, 1980–2016 and 2002–2016.²⁰ While the broader time horizon allows to check the law, finance and growth nexus by including the impact of the recent Great recession and other minor, but not less relevant, economic and financial events (such as the Latin American crisis in the 1980s, the Scandinavian banking crisis in the 1990s, the Asian financial crisis of 1997/98, the burst of the “dotcom” bubble in 1999/2000, and the 9/11 terrorists attacks in 2001), the 2002–2016 period allows to examine cyclical movements in GDP growth related to the growing role of non-traditional banking activities in the pre-crisis period, and to the debt deflation spiral observed in the post-crisis period.

First, we use a cross-sectional dataset in order to capture long-term relationships between growth, financial structure, and financial development. In this case, data are averaged over each sample period for each country. The regression equations are as follows:

$$Growth_{i,t} = \alpha_0 + \alpha_1 F_structure_{i,t,j} + \alpha_3 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$Growth_{i,t} = \alpha_0 + \alpha_2 F_development_{i,t,j} + \alpha_3 X_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$Growth_{i,t} = \alpha_0 + \alpha_1 F_structure_{i,t,j} + \alpha_2 F_development_{i,t,j} + \alpha_3 X_{i,t} + \varepsilon_{i,t} \quad (3)$$

The dependent variable is the annual real GDP per capita growth rate for each time span t (1980–2016 and 2002–2016) and for each country i . $X_{i,t}$ is the vector of other control variables consisting of beginning-of-period real GDP per capita and schooling, inflation, government expenditure over GDP, and trade over GDP.²¹ $F_structure$ and $F_development$ denote, respectively, the j th financial structure and financial development index included one-at-a-time in Eqs. (1) and (2), while jointly in Eq. (3), with $j=1,2,3$ associated, respectively, to activity, size, and efficiency type of the index. While the first two equations analyze the effect on economic growth of each single financial index, Eq. (3) tells us information about the joint effect on growth from each type of financial indicator. The predictions for the coefficients of financial indicators are related to the underlying theoretical views of financial systems: (i) $\alpha_1 < 0$, and $\alpha_2 > 0$ for the bank-based view, (ii) $\alpha_1 > 0$, and $\alpha_2 > 0$ for the market-based view, (iii) $\alpha_2 > 0$ for the financial-services view and for the law and finance view. In addition to the pure cross-country exercise, we employ the instrumental variable approach in order to examine the link between law, finance, and growth. We run two stage least square (2SLS) regressions by (i) using legal variables, i.e., rule of law and outside investors rights, and all the other controls X as instruments for each financial index, at the first stage, and (ii) regressing growth on the set of controls X and the predicted value of financial indicators, at the second stage. The IV approach has been largely used in the finance and growth literature up to the early 2000s as a way to address the endogeneity of financial development to the process of legal and political development. Institutional variables have been used as instruments of financial development to obtain consistent estimates of the effect of the latter on economic growth. However, we are well aware that the IV approach is prone to bias in s.e. due to the instruments chosen. As reported by Beck et al. (2000), the conditions under which the legal variables could serve as appropriate instruments for financial development are that they have to be exogenous to economic growth, and correlated with financial development. If the set of legal controls influences growth not only through the financial index, and such influence is not captured entirely by the set X , then the error term would be correlated with legal variables, and hence with the predicted value of the financial index at the first stage. The estimation would result inconsistent and biased. However, our real purpose here is not to use the IV approach to treat endogeneity, rather to see the effect on growth of that part of financial development that is due to the legal system, and thus simply replace the terms representing financial development with

¹⁹ The rule of law index captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. WGI data have been properly weighted and integrated, where possible, with the datasets of La Porta et al. (1998, 1999), and Levine (2002) in order to obtain averages for the 1980–2016 period.

²⁰ This approach is similar to Beck et al. (2014a) who investigate the relationship between financial intermediation and size with growth and growth volatility, using cross-sectional and panel datasets.

²¹ A similar set of control variables has been used, for instance, by Beck et al. (2000), Levine (2002), Beck and Levine (2004), Beck et al. (2012), and Beck et al. (2014a).

their component that is explained by legal variables, i.e., rule of law and investors rights. Given the severity of the issue, we emphasize that the adoption of the IV approach in our work serves as a mere exercise of comparison between our outcomes and those of [Levine \(2002\)](#), and maybe as a way to provide useful insights that may be subject of further research.

In the second part of our analysis, we construct a panel dataset where data are averaged over non-overlapping 5-year windows, in order to check the relationships between growth, financial structure, and financial development by taking into account variations across countries and over time. We thus have 8 observations per country for the 1980–2016 period (i.e., 1980–1984, 1985–1989, 1990–1994, 1995–1999, 2000–2004, 2005–2009, 2010–2014, and 2015–2016), and 3 observations per country for the 2002–2016 period (i.e., 2002–2006, 2007–2011, 2012–2016). As a common practice in the recent literature, using 5-year periods allows to capture relationships among variables in the medium term.²² This leads us to estimate the following regression equations:

$$Growth_{i,t} = \alpha_0 + \alpha_1 F_structure_{i,t,j} + \alpha_3 X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (4)$$

$$Growth_{i,t} = \alpha_0 + \alpha_2 F_development_{i,t,j} + \alpha_3 X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (5)$$

$$Growth_{i,t} = \alpha_0 + \alpha_1 F_structure_{i,t,j} + \alpha_2 F_development_{i,t,j} + \alpha_3 X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (6)$$

where i stands for country and t for time periods, and μ_i denotes country fixed effects in order to control for unobserved heterogeneity across countries and thus account for common factors and unobservable, time-invariant, country-specific effects on economic growth. The estimates capture how changes in financial structure or development indicators, within the same country, impact on growth.²³

4.2. Growth, Shadow banking, financial structure, and financial development

To examine the potential link between economic growth, Shadow banking, financial structure, and financial development we use a dedicated panel dataset of 27 country with data covering the 2002–2016 period. The choice of reducing the number of countries, as well as the number of observations, has been forced by the need to find reliable and granular data on Shadow banking which comes from the Global Shadow Banking Monitoring Report dataset of the FSB ([FSB, 2018](#)). We use both non-overlapping 5-year windows (thus having 3 observations per country, i.e., 2002–2006, 2007–2011, and 2012–2016), and overlapping 5-year windows (resulting in 10 observations per country) in order to exploit time series information.²⁴ The estimated regression equations are:

$$Growth_{i,t} = \alpha_0 + \alpha_1 F_structure_{i,t,j} + \alpha_3 Z_{i,t} + \alpha_4 sh_banking_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (7)$$

$$Growth_{i,t} = \alpha_0 + \alpha_2 F_development_{i,t,j} + \alpha_3 Z_{i,t} + \alpha_4 sh_banking_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (8)$$

$$Growth_{i,t} = \alpha_0 + \alpha_1 F_structure_{i,t,j} + \alpha_2 F_development_{i,t,j} + \alpha_3 Z_{i,t} + \alpha_4 sh_banking_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (9)$$

where $sh_banking_{i,t}$ denotes the share of OFIs assets to GDP for country i at time period t . Regression equations are similar to [Eqs. \(4\), \(5\), and \(6\)](#) but with the following changes: (i) we include time-fixed effects (λ_t) so that our regressions control for the upward tendency of the OFIs assets-to-GDP ratio over time as reported in [Fig. 1](#), (ii) the set of policy and macroeconomic controls, now denoted by $Z_{i,t}$, consists only of initial GDP and government expenditure in order to overcome the drawback of having less observations and thus low degrees of freedom in our analysis. It is reasonable to suppose that the increasing relevance of non-bank financial intermediation during the last two decades has played a key role in fostering financial development, and economic growth as well, thus we predict a positive relationship between the variables in question, i.e., $\alpha_4 > 0$. In [Eqs. \(7\) and \(8\)](#) we check the effects on growth of Shadow banking by controlling for each single financial index, while in [Eq. \(9\)](#) we control for the joint impact of financial structure and development.

5. Cross-sectional results

This Section reports the cross-sectional regressions results for the 1980–2016 and 2002–2016 periods.

5.1. 1980–2016 period

One of the great advantages of considering the 1980–2016 period is that we cover a 37-year time span that proliferates of many financially and economically relevant events, and thus we are able to check the robustness of the long-term relationship between the financial and the real sector of the economy. [Table 3](#) reports cross-sectional regression results for

²² [Beck et al. \(2000\)](#), [Beck et al. \(2014a\)](#), [Beck et al. \(2014b\)](#), [Beck et al. \(2016\)](#).

²³ See [Beck et al. \(2014a\)](#) and [Beck et al. \(2016\)](#).

²⁴ [Bakaert et al. \(2007\)](#) and [Beck et al. \(2016\)](#) follow a similar approach.

Table 3

Law, finance, and economic growth (cross-section analysis, 1980–2016).

	Economic growth								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Panel A: OLS estimation									
Structure-activity	0.224** (0.089)						−0.423** (0.174)		
Structure-size		−0.112 (0.194)						−0.766*** (0.214)	
Structure-efficiency			0.225** (0.089)						−0.340** (0.157)
Finance-activity				0.262*** (0.062)			0.548*** (0.132)		
Finance-size					0.320*** (0.109)			0.613*** (0.128)	
Finance-efficiency						0.272*** (0.062)			0.495*** (0.119)
Initial GDP	−1.127*** (0.182)	−0.969*** (0.186)	−1.132*** (0.182)	−1.224*** (0.168)	−1.140*** (0.178)	−1.214*** (0.165)	−1.220*** (0.161)	−1.132*** (0.161)	−1.183*** (0.161)
Schooling	0.325*** (0.081)	0.274*** (0.087)	0.311*** (0.081)	0.313*** (0.074)	0.303*** (0.079)	0.331*** (0.073)	0.269*** (0.073)	0.225*** (0.075)	0.332*** (0.071)
Government expenditure	0.012 (0.041)	0.013 (0.044)	0.016 (0.041)	−0.001 (0.038)	0.002 (0.041)	−0.008 (0.038)	−0.012 (0.036)	−0.015 (0.037)	−0.029 (0.038)
Inflation	−0.002 (0.002)	−0.003 (0.002)	−0.002 (0.002)	−0.001 (0.002)	−0.002 (0.002)	−0.001 (0.002)	−0.000 (0.001)	−0.001 (0.002)	−0.000 (0.002)
Trade	0.008*** (0.003)	0.008*** (0.003)	0.008*** (0.003)	0.007** (0.003)	0.006** (0.003)	0.006** (0.003)	0.005** (0.003)	0.005* (0.002)	0.005* (0.003)
Constant	9.098*** (1.191)	7.649*** (1.145)	8.112*** (1.076)	8.360*** (0.988)	6.955*** (1.084)	9.524*** (1.046)	6.499*** (1.217)	5.342*** (1.081)	10.446*** (1.097)
Observations	62	62	62	62	62	62	62	62	62
Adjusted-R ²	0.453	0.394	0.453	0.541	0.474	0.550	0.578	0.566	0.579
Panel B: 2SLS estimation (outside investors rights and rule of law as instruments for financial indicators)									
Structure-activity	0.573* (0.303)						−1.481* (0.781)		
Structure-size		−0.148 (0.565)						−1.444** (0.609)	
Structure-efficiency			0.544* (0.301)						−1.155* (0.613)
Finance-activity				0.444*** (0.132)			1.119*** (0.389)		
Finance-size					0.655*** (0.212)			0.933*** (0.227)	
Finance-efficiency						0.446*** (0.126)			0.929*** (0.293)
Initial GDP	−1.341*** (0.270)	−0.962*** (0.212)	−1.334*** (0.271)	−1.386*** (0.207)	−1.297*** (0.209)	−1.357*** (0.198)	−1.081*** (0.295)	−1.152*** (0.201)	−1.027*** (0.284)
Schooling	0.384*** (0.103)	0.270** (0.108)	0.344*** (0.094)	0.330*** (0.079)	0.320*** (0.086)	0.359*** (0.080)	0.146 (0.135)	0.158 (0.104)	0.317*** (0.093)
Government expenditure	0.008 (0.047)	0.013 (0.044)	0.019 (0.046)	−0.011 (0.041)	−0.011 (0.045)	−0.022 (0.041)	−0.033 (0.051)	−0.033 (0.042)	−0.072 (0.053)
Inflation	−0.000 (0.002)	−0.003 (0.002)	−0.001 (0.002)	0.001 (0.002)	−0.000 (0.002)	0.001 (0.002)	−0.000 (0.002)	0.001 (0.002)	0.000 (0.002)
Trade	0.008** (0.003)	0.008*** (0.003)	0.007** (0.003)	0.006* (0.003)	0.004 (0.003)	0.005* (0.003)	0.003 (0.004)	0.004 (0.003)	0.003 (0.003)
Constant	11.165*** (2.160)	7.610*** (1.291)	8.590*** (1.267)	8.763*** (1.092)	6.097*** (1.258)	10.641*** (1.315)	1.515 (4.040)	3.762** (1.515)	12.020*** (1.653)
Observations	62	62	62	62	62	62	62	62	62
Adjusted-R ²	0.299	0.394	0.327	0.469	0.383	0.485	0.242	0.483	0.345

The dependent variable is real GDP per capita growth rate. Standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

Eqs. (1)–(3) either considering OLS estimation (Panel A) or 2SLS estimation (Panel B). In general, it emerges that the law, finance and growth nexus is confirmed over the broad time horizon 1980–2016, thus even considering the recent Great recession.

Let us first focus on Panel A. All of the finance indexes are positive and statistically significant at the 1% level, either when included singularly (Models 1–6) or jointly (Models 7–9) in the regressions. Financial development is thus confirmed to be positively and significantly related to economic growth in all of its forms (activity, size, and efficiency) in

the pure cross-section analysis. Our findings are in line with those of [Levine \(2002\)](#), and thus support the financial services view.²⁵

Focusing on Models (1) and (3), it emerges that structure-activity and structure-efficiency are positive and statistically significant at the 5% level. We point out that the two models basically share the same results due to the very high and positive correlation between the two indexes (0.96), and thus we can restrict the interpretation only to one model. For instance, a 1% change of the structure-activity index, thus a more market-oriented structure of the economy, produces a 0.224% change on economic growth, while the opposite occurs if the percentage change of the index is negative, thus denoting a more bank-oriented economy.²⁶ As a consequence, the positive coefficients of structure-activity and structure-efficiency imply that changes towards a more market-oriented structure produce positive effects on growth in the long-run. However the interpretation of these coefficients must be reconsidered when we focus on Models (7)–(9), where we include both structure and finance indexes by type. Here we find that financial structure indexes become statistically significant (structure-size at 1% level, while others at 5%) with a negative coefficient. When jointly considering structure and financial indexes, the activity, size, or efficiency of banks relatively to stock markets is able to explain cross-country variations of growth rates. Specifically, a more bank-oriented economy enjoys higher benefits in terms of real GDP per capita growth than market-oriented ones. In addition, a change towards a more bank-based structure increases amplify the positive effects of the overall financial development, since the coefficients of finance indexes almost double with respect to those observed in Models (4)–(6).²⁷ This is a very interesting and novel result that also represents a departure from the existing literature since it suggests that a bank-based financial structure matters for the long-run economic growth. A valid motive supporting this outcome is that, since the mid-90s there has been a remarkable increase in traditional and non-traditional banking activities that was associated with (i) a rise both in the bank credit ratio and private credit ratio, and (ii) a potential decrease in the reliance on stock markets from investors, who moved towards the attractive investment opportunities manufactured by the Shadow banking system.

We can draw the same conclusions and interpretations when analyzing estimates in Panel B of [Table 3](#). Here we run 2SLS regressions by using rule of law and outside investors rights as instruments for financial indicators. Even if these outcomes must be used in a cautious way, due to the several issues related to the IV approach that we explained in [Section 4](#), we find that the law, finance, and growth nexus still holds in the 1980–2016 period. It emerges that the component of financial development explained by the legal environment (here defined by rule of law and outside investors rights) is strongly and positively related to economic growth: all of the finance indexes are statistically significant at the 1% level either when included singularly (Models 4–6) or when included jointly with their respective structure index (Models 7–9). The estimated coefficients are larger than those from the pure OLS regression of Panel A, implying that countries with higher level of rule of law and better investors protection allow financial system to provide larger benefits to the economy, than countries with a weaker legal environment. The law and finance view emerges to be less statistically significant when applied to structure indexes, though interesting results are obtained when we test for the joint effect of structure and finance indexes on growth. As in Panel A, we observe negative structure coefficients associated to positive finance coefficients suggesting that a stronger legal environment allows more bank-oriented financial structure to largely impact on real growth in the long-run. During the 1980–2016 period, cross-country variations in economic growth rates are thus positively, and significantly, related with financial development and with the surrounding legal environment. The financial services view and the law and finance view still hold even including the effects of the recent Great recession.

Turning to the control variables, we find evidence for a convergence effect in the growth regressions, as initial GDP per capita enters negatively and significantly at the 1% level in each Model, evidence for a positive relationship between education and growth, and also for a positive impact of trade openness to growth. None of the other control variable enters significantly in a consistent manner across the cross-sectional regressions.

5.2. 2002–2016 period

During the 2002–2016 period many economies have experienced a boom phase in their financial sectors, mostly due to the rise in non-bank financial intermediation, followed by severe debt deflation spirals and recessions after the outbreak of the 2007/2008 financial crisis. Results for OLS and 2SLS cross-country regressions are reported in [Table 4](#). The outcomes for the 1980–2016 are now drastically changed since it emerges no statistically significant relationship either between financial structure, financial development and growth (Panel A), or legal environment, financial structure, financial development and growth (Panel B). We observe only two exceptions: structure-size in Model 8 (coefficient -0.405 , significant at the 10% level) and finance-efficiency in Model 9 (coefficient 0.305 , significant at the 10% level), both in Panel A, that however do not allow us to draw any relevant or valid conclusion, except that a more bank-oriented size of the financial system seems

²⁵ As opposite to [Levine's \(2002\)](#) results, it emerges that finance-size is statistically and positively related to economic growth, implying that in the very long-run even market capitalization can provide robust implications on growth.

²⁶ We remind that lower (negative) values of structure indexes imply a more bank-based financial system, while higher (positive) values denote a more market-oriented economy.

²⁷ An additional interpretation could be that a very well-developed financial system allows a more bank-based structure to impact positively on growth.

Table 4

Law, finance, and economic growth (cross-section analysis, 2002–2016).

	Economic growth								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Panel A: OLS estimation									
Structure-activity	0.067 (0.091)						−0.135 (0.206)		
Structure-size		−0.227 (0.172)						−0.405* (0.236)	
Structure-efficiency			0.050 (0.090)						−0.254 (0.181)
Finance-activity				0.088 (0.076)			0.191 (0.176)		
Finance-size					−0.014 (0.128)			0.189 (0.173)	
Finance-efficiency						0.111 (0.078)			0.305* (0.159)
Initial GDP	−1.378*** (0.203)	−1.287*** (0.187)	−1.364*** (0.203)	−1.456*** (0.220)	−1.309*** (0.216)	−1.489*** (0.219)	−1.500*** (0.231)	−1.418*** (0.222)	−1.570*** (0.225)
Schooling	0.392*** (0.097)	0.351*** (0.094)	0.386*** (0.096)	0.407*** (0.097)	0.371*** (0.098)	0.421*** (0.098)	0.410*** (0.098)	0.373*** (0.096)	0.446*** (0.099)
Government expenditure	−0.068 (0.046)	−0.074 (0.046)	−0.068 (0.046)	−0.070 (0.045)	−0.068 (0.046)	−0.071 (0.045)	−0.073 (0.046)	−0.079* (0.046)	−0.075 (0.045)
Inflation	−0.005 (0.026)	−0.017 (0.026)	−0.006 (0.026)	0.002 (0.027)	−0.011 (0.028)	0.004 (0.027)	0.008 (0.029)	−0.003 (0.028)	0.011 (0.027)
Trade	0.005* (0.003)	0.006** (0.003)	0.005* (0.003)	0.005* (0.003)	0.005* (0.003)	0.005* (0.003)	0.004* (0.002)	0.005* (0.003)	0.004 (0.003)
Constant	12.378*** (1.328)	11.825*** (1.165)	12.035*** (1.195)	12.299*** (1.212)	11.951*** (1.211)	12.894*** (1.346)	11.821*** (1.421)	11.349*** (1.241)	14.023*** (1.558)
Observations	62	62	62	62	62	62	62	62	62
Adjusted-R ²	0.581	0.590	0.579	0.587	0.577	0.592	0.583	0.592	0.599
Panel B: 2SLS estimation (outside investors rights and rule of law as instruments for financial indicators)									
Structure-activity	0.089 (0.309)						−0.471 (0.575)		
Structure-size		−0.115 (0.484)						−0.470 (0.588)	
Structure-efficiency			0.088 (0.325)						−0.431 (0.534)
Finance-activity				0.205 (0.230)			0.493 (0.422)		
Finance-size					0.327 (0.382)			0.506 (0.432)	
Finance-efficiency						0.219 (0.233)			0.466 (0.383)
Initial GDP	−1.397*** (0.323)	−1.304*** (0.200)	−1.395*** (0.332)	−1.636*** (0.401)	−1.594*** (0.376)	−1.653*** (0.401)	−1.677*** (0.409)	−1.673*** (0.377)	−1.665*** (0.395)
Schooling	0.397*** (0.122)	0.362*** (0.106)	0.393*** (0.118)	0.449*** (0.127)	0.445*** (0.129)	0.466*** (0.135)	0.435*** (0.130)	0.435*** (0.126)	0.474*** (0.134)
Government expenditure	−0.068 (0.046)	−0.071 (0.047)	−0.068 (0.046)	−0.072 (0.047)	−0.069 (0.049)	−0.074 (0.046)	−0.081* (0.049)	−0.081 (0.050)	−0.079* (0.046)
Inflation	−0.004 (0.032)	−0.013 (0.029)	−0.003 (0.034)	0.018 (0.041)	0.023 (0.047)	0.018 (0.039)	0.027 (0.042)	0.027 (0.046)	0.019 (0.039)
Trade	0.005* (0.003)	0.005* (0.003)	0.005* (0.002)	0.004 (0.003)	0.003 (0.003)	0.004 (0.003)	0.003 (0.004)	0.004 (0.003)	0.004 (0.003)
Constant	12.533*** (2.421)	11.872*** (1.184)	12.122*** (1.394)	12.801*** (1.548)	11.227*** (1.493)	13.841*** (2.368)	10.819*** (2.884)	10.651*** (1.615)	15.031*** (2.756)
Observations	62	62	62	62	62	62	62	62	62
Adjusted-R ²	0.580	0.587	0.578	0.569	0.523	0.578	0.560	0.553	0.591

The dependent variable is real GDP per capita growth rate. Standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

to explain part of the cross-country variations in growth rates during 2002–2016, as well as the overall efficiency of the financial system.²⁸ From a statistical point of view, the finance and growth nexus appears to be broken when we restrict the time span of our analysis: neither the financial services view nor the law and finance view are able to explain long-

²⁸ The latter can be interpreted as a sign of recovery of financial development due to the intervention of policy makers and international authorities aimed to increase the resilience of financial sectors (FSB, 2011b, 2012, 2018).

run cross-country variations in economic growth rates. The financial crisis and the consequent debt deflation spiral have certainly altered the causal link between finance and growth.

Turning to other control variables, we basically find the same evidence as for the 1980–2016 cross-country analysis.

6. Panel data results

In this Section we provide the panel data regressions results for the 1980–2016 and 2002–2016 periods.

6.1. 1980–2016 period

Table 5, Panel A, reports results for the panel data analysis using non-overlapping 5-year windows, and controlling for country fixed effects. When we focus on Models (1)–(6), we find similar evidence to the cross-sectional analysis. Structure-activity and structure-size are positive and statistically significant at the 1% level, while structure-efficiency positive and significant at 5%, implying that the financial structure of the economy is able to explain variation across country and over time of the GDP per capita growth rate. Specifically, positive coefficients of the structure indexes denote that a more market-oriented (bank-oriented) financial system positively (negatively) affects economic growth. Excluding finance-efficiency, finance-activity and finance-size are significantly related to economic growth, at 5% and 1% level respectively, with positive coefficients, implying that the overall financial development impacts positively on growth when it is considered alone, i.e., without structure indexes. When focusing on Models (7)–(9) we find opposite results to the cross-section analysis that contradict the financial services view of the finance and growth literature. Each structure indexes is statistically significant at the 1% level, confirming the importance of the financial structure in affecting economic growth, even when finance indexes are included in the regressions. However, contrary to the results of Table 3, Panel A, the coefficients of structure indexes are positive, while those of finance indicators are negative, with finance-activity and finance-efficiency significant at the 10% and 5% level, respectively. When we consider variations of GDP per capita growth across countries and over time, it thus emerges that the joint role of financial structure and financial development matters, but in an opposite way as to the pure cross-section analysis, since we observe a positive link between growth and a more market-based structure of the economy, and a negative link between growth and the overall financial development.

The common outcome between the cross-sectional and panel analysis is that financial structure and financial development do matter for economic growth, considering either their single or joint effect. The single effect is in general positive, implying that a more market-oriented economy and a more developed financial system foster growth. Their joint impact on growth changes, instead, according to the variations considered: (i) real growth is positively affected by financial development and by a more bank-oriented economy when focusing only on cross-country variations, (ii) real growth is affected positively by a more market-oriented structure while negatively by financial development when considering variations across country and over time.

Turning to control variables, we find again evidence for a negative and significant relationship between growth on the one hand and initial GDP, government expenditure, and inflation on the other hand.

6.2. 2002–2016 period

Results and comments for the panel analysis in 2002–2016 (Table 5, Panel B) are basically similar to those of the broader time span. In general, we observe larger coefficients (almost doubled) than those of the 1980–2016 analysis, as well as an increase in robust standard errors. Structure indexes are positively and significantly related to economic growth at the 1% level, with the exception of structure-efficiency (5% level in Model 3, and 10% level in Model 9), thus confirming the importance of financial structure in affecting the real sector of the economy. Finance indexes are not significant when included singularly in the regression equations, while they are negatively and significantly (at the 1% level, excluding finance-efficiency) related to growth when included along with structure indexes. It is reasonable to suppose that the recent Great recession have altered, to some extent, the link between financial development and economic growth.²⁹

We also find evidence for a negative and significant relationship between initial GDP and growth, and between government expenditure and growth.

So far, the results of the panel analysis are supportive of the recent evidence in the finance and growth literature showing that, as economies develop, the services provided by securities markets become more important for economic activity, whereas those provided by banks become less important.³⁰ The marginal contribution of banks to economic growth declines, while that of capital markets increases with economic development, notably because market finance is better at promoting innovation and productivity, and at financing new sources of growth. During the last two decades, market-based intermediation has grown faster than bank-based one, notably in advanced countries, also due to advances in technology, financial innovation, and financial globalization.

²⁹ We point out that we have also run regressions by including the squared terms of financial indexes in order to investigate the potential non-linear relationship between finance and growth as a cause of the changing relationships among structure and finance indexes, but we did not find any relevant and important result.

³⁰ See for instance Shen and Lee (2006), Demirgüç-Kunt et al. (2011), Gambacorta et al. (2014), Langfield and Pagano (2016), Popov (2017).

Table 5

Economic growth, financial structure and financial development (panel data analysis, non-overlapping 5-year windows).

	Economic growth								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Panel A: 1980–2016									
Structure-activity	0.461*** (0.116)						0.803*** (0.246)		
Structure-size		1.076*** (0.187)						1.132*** (0.255)	
Structure-efficiency			0.306** (0.133)						0.589*** (0.180)
Finance-activity				0.247** (0.094)			−0.391* (0.210)		
Finance-size					0.589*** (0.188)			−0.074 (0.225)	
Finance-efficiency						0.056 (0.123)			−0.398** (0.191)
Initial GDP	−2.542*** (0.612)	−2.437*** (0.637)	−2.281** (0.921)	−2.921*** (0.707)	−3.257*** (0.833)	−2.281** (0.936)	−2.013*** (0.670)	−2.348*** (0.697)	−2.005** (0.928)
Schooling	0.100 (0.147)	−0.006 (0.149)	0.058 (0.223)	0.167 (0.139)	0.018 (0.156)	0.018 (0.228)	0.175 (0.136)	0.009 (0.146)	0.114 (0.219)
Government expenditure	−0.181** (0.084)	−0.223** (0.085)	−0.262* (0.139)	−0.206** (0.086)	−0.259*** (0.091)	−0.278* (0.144)	−0.167** (0.081)	−0.220** (0.083)	−0.258* (0.136)
Inflation	−0.002* (0.001)	−0.002* (0.001)	−0.031*** (0.009)	−0.002** (0.001)	−0.002** (0.001)	−0.031*** (0.010)	−0.003* (0.001)	−0.001* (0.001)	−0.032*** (0.009)
Trade	0.014* (0.007)	0.016* (0.009)	0.016* (0.010)	0.015** (0.008)	0.019* (0.011)	0.018* (0.010)	0.013* (0.007)	0.015* (0.009)	0.014 (0.009)
Constant	27.930*** (5.237)	28.201*** (5.319)	25.367*** (7.406)	28.836*** (5.788)	31.102*** (6.473)	26.659*** (7.532)	25.190*** (5.346)	27.778*** (5.458)	22.032*** (7.589)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	62/391	62/386	62/279	62/391	62/386	62/279	62/391	62/386	62/279
Adjusted-R ²	0.163	0.269	0.148	0.123	0.182	0.132	0.175	0.267	0.157
Panel B: 2002–2016									
Structure-activity	0.479*** (0.178)						1.602*** (0.301)		
Structure-size		1.853*** (0.384)						2.364*** (0.407)	
Structure-efficiency			0.390** (0.162)						0.745* (0.408)
Finance-activity				−0.024 (0.146)			−1.444*** (0.320)		
Finance-size					−0.152 (0.404)			−1.064*** (0.337)	
Finance-efficiency						0.104 (0.197)			−0.483 (0.446)
Initial GDP	−5.781*** (1.377)	−5.125*** (1.288)	−6.153*** (1.483)	−6.198*** (1.527)	−5.931*** (1.566)	−6.303*** (1.519)	−3.177*** (1.120)	−3.306*** (1.071)	−5.848*** (1.591)
Schooling	−0.056 (0.253)	0.020 (0.225)	0.012 (0.252)	−0.143 (0.271)	−0.142 (0.269)	−0.069 (0.267)	−0.039 (0.216)	0.029 (0.203)	0.047 (0.244)
Government expenditure	−0.203* (0.113)	−0.181* (0.108)	−0.228** (0.114)	−0.255* (0.128)	−0.254* (0.135)	−0.260* (0.131)	−0.113 (0.100)	−0.110 (0.099)	−0.213** (0.105)
Inflation	−0.008 (0.012)	−0.025 (0.017)	−0.008 (0.010)	−0.013 (0.009)	−0.011 (0.009)	−0.011 (0.008)	−0.006 (0.016)	−0.017 (0.019)	−0.008 (0.010)
Trade	0.003 (0.012)	0.013 (0.013)	−0.000 (0.012)	0.003 (0.012)	0.007 (0.016)	0.001 (0.012)	0.005 (0.012)	0.014 (0.013)	−0.002 (0.012)
Constant	61.299*** (11.497)	53.323*** (10.814)	62.912*** (12.430)	66.161*** (12.532)	64.259*** (12.548)	66.526*** (12.482)	46.106*** (9.004)	43.196*** (8.729)	59.204*** (13.859)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	62/184	62/181	62/184	62/184	62/181	62/184	62/184	62/181	62/184
Adjusted-R ²	0.462	0.548	0.448	0.428	0.422	0.427	0.544	0.589	0.459

The dependent variable is real GDP per capita growth rate. Country fixed effects are included but not reported. Robust and clustered standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

Table 6

Economic growth, financial structure and financial development in high-income countries (panel data analysis, non-overlapping 5-year windows).

	Economic growth								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Panel A: 1980–2016									
Structure-activity	0.493*** (0.104)						1.314*** (0.335)		
Structure-size		1.125*** (0.173)						1.487*** (0.328)	
Structure-efficiency			0.215 (0.232)						0.668*** (0.223)
Finance-activity				0.149 (0.094)			−0.890*** (0.317)		
Finance-size					0.166 (0.251)			−0.615* (0.354)	
Finance-efficiency						−0.187 (0.204)			−0.592** (0.232)
Initial GDP	yes	yes	yes	yes	yes	yes	yes	yes	yes
Schooling	yes	yes	yes	yes	yes	yes	yes	yes	yes
Government expenditure	yes	yes	yes	yes	yes	yes	yes	yes	yes
Inflation	yes	yes	yes	yes	yes	yes	yes	yes	yes
Trade	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	35/228	35/228	35/159	35/228	35/228	35/159	35/228	35/228	35/159
Adjusted-R ²	0.316	0.371	0.239	0.254	0.246	0.239	0.385	0.398	0.268
Panel B: 2002–2016									
Structure-activity	0.772*** (0.261)						2.902*** (0.423)		
Structure-size		2.376*** (0.545)						3.260*** (0.536)	
Structure-efficiency			0.724** (0.302)						1.440*** (0.431)
Finance-activity				−0.277 (0.308)			−2.656*** (0.434)		
Finance-size					−0.829* (0.465)			−2.266*** (0.388)	
Finance-efficiency						−0.146 (0.371)			−0.992** (0.419)
Initial GDP	yes	yes	yes	yes	yes	yes	yes	yes	yes
Schooling	yes	yes	yes	yes	yes	yes	yes	yes	yes
Government expenditure	yes	yes	yes	yes	yes	yes	yes	yes	yes
Inflation	yes	yes	yes	yes	yes	yes	yes	yes	yes
Trade	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	35/103	35/101	35/105	35/103	35/101	35/105	35/103	35/101	35/105
Adjusted-R ²	0.515	0.631	0.505	0.463	0.462	0.458	0.743	0.756	0.567

The dependent variable is real GDP per capita growth rate. Country fixed effects are included but not reported. The coefficients of the constants and other control variables are not reported for brevity. Complete estimates are available upon request. Robust and clustered standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

6.3. High- and low-income countries

The importance of these outcomes in the context of the modern literature deserves a more involved investigation, therefore we also perform additional panel regressions by income level. Table 6 shows results for the 35 high-income countries belonging to our sample, while Table 7 shows results for the 27 low-income countries. Our previous outcomes are confirmed for high-income countries for both the time spans, with even more larger effects (coefficients have almost doubled, in particular for the 2002–2016 period) than those obtained when considering the full 62 sample. Finance indexes are no longer significant when considered alone, while they react in the same way as in Table 5 when considered jointly with structure indexes: positive coefficients for structure indexes while negative for finance indicators, with larger values during 2002–2016. Financial structure and development react differently in low-income countries. For the 1980–2016 period there is no significant evidence for the joint effect of structure and development indexes on growth, while each single indicator enters positively and significantly in the regression equations. In particular, the most robust outcomes are for structure-size and finance-size (both significant at 1%), and finance-activity (significant at 5%), implying that, for low-income countries with low-developed financial system, the overall financial development and a more market-oriented financial structure do matter for growth. For the 2002–2016 period the behavior of structure and finance indexes partially, but with a smaller

Table 7

Economic growth, financial structure and financial development in low-income countries (panel data analysis, non-overlapping 5-year windows).

	Economic growth								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Panel A: 1980–2016									
Structure-activity	0.407* (0.200)						0.311 (0.316)		
Structure-size		0.927*** (0.334)						0.627 (0.395)	
Structure-efficiency			0.298* (0.154)						0.309 (0.292)
Finance-activity				0.368** (0.160)			0.117 (0.229)		
Finance-size					0.721*** (0.214)			0.341 (0.234)	
Finance-efficiency						0.288* (0.150)			−0.015 (0.309)
Initial GDP	yes	yes	yes	yes	yes	yes	yes	yes	yes
Schooling	yes	yes	yes	yes	yes	yes	yes	yes	yes
Government expenditure	yes	yes	yes	yes	yes	yes	yes	yes	yes
Inflation	yes	yes	yes	yes	yes	yes	yes	yes	yes
Trade	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	27/163	27/158	27/120	27/163	27/158	27/120	27/163	27/158	27/120
Adjusted-R ²	0.160	0.238	0.164	0.152	0.224	0.157	0.156	0.245	0.156
Panel B: 2002–2016									
Structure-activity	0.513** (0.215)						1.245*** (0.407)		
Structure-size		1.518*** (0.528)						1.819*** (0.522)	
Structure-efficiency			0.356* (0.186)						−0.031 (0.264)
Finance-activity				0.240 (0.182)			−0.941*** (0.447)		
Finance-size					−0.047 (0.651)			−0.718 (0.578)	
Finance-efficiency						0.497** (0.234)			0.527 (0.355)
Initial GDP	yes	yes	yes	yes	yes	yes	yes	yes	yes
Schooling	yes	yes	yes	yes	yes	yes	yes	yes	yes
Government expenditure	yes	yes	yes	yes	yes	yes	yes	yes	yes
Inflation	yes	yes	yes	yes	yes	yes	yes	yes	yes
Trade	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	27/81	27/80	27/79	27/81	27/80	27/79	27/81	27/80	27/79
Adjusted-R ²	0.515	0.549	0.497	0.476	0.465	0.510	0.543	0.561	0.503

The dependent variable is real GDP per capita growth rate. Country fixed effects are included but not reported. The coefficients of the constants and other control variables are not reported for brevity. Complete estimates are available upon request. Robust and clustered standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

magnitude, turns up to be the same as that observed for the full set of countries: none of the finance indexes is significant alone (only finance-efficiency at 5%), while only structure-activity, finance-activity, and structure-size are significant (at 1% level) when we assess the joint effect of financial indicators. This might be related to the fact that when considering a small and recent time window, i.e., 2002–2016, some of the included countries have gradually developed over time. The outcomes from Tables 6 and 7 strengthen our previous results supporting the evidence that, as per capita income rises, the countries' financial structures move towards non-bank financing and the marginal contribution of banks to economic growth declines, while that of capital markets increases.

7. Economic growth, Shadow banking, financial structure, and financial development

We devote a separate Section to the investigation of the potential relationship between economic growth and Shadow banking, in order to check whether or not the dramatic rise in non-bank financial intermediation has had a significant impact on real GDP growth during the 2002–2016 period. Our econometric exercise is conducted using a reduced panel dataset of 27 countries in order to employ the relevant and reliable data on Shadow banking available from the FSB. We

Table 8

Economic growth, financial structure, financial development, and Shadow banking (panel data analysis, 2002–2016, non-overlapping 5-year windows).

	Economic growth									
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
OFIs assets to GDP	0.002*** (.000)	0.002*** (.001)	0.002*** (.001)	0.002*** (.000)	0.002*** (.000)	0.002*** (.000)	0.002*** (.000)	0.001*** (.000)	0.002*** (.001)	0.002*** (.000)
Structure-activity		0.436 (.406)						1.231* (.662)		
Structure-size			2.184*** (.618)						2.187*** (.675)	
Structure-efficiency				0.249 (.266)						0.315 (.318)
Finance-activity					-0.327 (.368)			-1.132* (.618)		
Finance-size						0.505 (.507)			-0.016 (.578)	
Finance-efficiency							-0.210 (.458)			-0.281 (.500)
Initial GDP	-4.939*** (1.330)	-5.011*** (1.336)	-3.882*** (1.144)	-5.173*** (1.445)	-4.360** (1.670)	-5.227*** (1.596)	-4.734*** (1.631)	-3.138** (1.429)	-3.859** (1.433)	-4.960*** (1.684)
Government expenditure	-0.548** (.227)	-0.473* (.245)	-0.343* (.170)	-0.499** (.215)	-0.574** (.242)	-0.577** (.240)	-0.559** (.237)	-0.418* (.212)	-0.342* (.172)	-0.502** (.210)
Constant	59.930*** (12.303)	59.540*** (12.034)	45.970*** (10.606)	60.344*** (13.025)	57.231*** (12.973)	58.890*** (13.045)	58.751*** (13.744)	49.688*** (10.366)	45.887*** (11.295)	58.877*** (14.749)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	No	No	No	No	No	No
Countries/Observations	27/81	27/80	27/78	27/81	27/80	27/78	27/81	27/80	27/78	27/81
Adjusted-R ²	0.475	0.481	0.614	0.474	0.476	0.469	0.473	0.523	0.609	0.474

The dependent variable is real GDP per capita growth rate. Given the reduced number of observations due to the small set of countries, we have included less macroeconomic controls in the regression while leaving financial indicators. However, as a robustness check, we have also run regressions including inflation and trade obtaining similar results. Country fixed effects are included but not reported. Robust and clustered standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

start from Table 8, which reports the results of the panel data analysis with country fixed effects and no time fixed effect for non-overlapping 5-year windows. It emerges a positive and statistically significant relationship between Shadow banking, here considered as the ratio of other financial intermediaries' assets to GDP (i.e., the so-called broad measure of Shadow banking, as defined by the FSB) and economic growth. Even though the impact of Shadow banking on growth is very small (about 0.002), the coefficients are significant at the 1% level for each model from (1) to (10). The inclusion of financial structure and development indexes in the regressions can be viewed as a way to test the robustness of the link between economic growth and Shadow banking, but it also serves to examine the behavior of financial indexes when including Shadow banking. We find that only structure-size in Model (3) and (9), as well as structure-activity and finance-activity in Model (8) are statistically significant (at the 1% level for structure-size, and 10% level for activity indexes). These outcomes emphasize the role played by financial structure in affecting economic growth, and in particular the positive influence of market-based financial systems.

Testing the relationship between growth and Shadow banking using a small set of countries and considering non-overlapping 5-year time windows could not be so much informative. Therefore, as a robustness check, we also perform an additional panel exercise using overlapping 5-year windows in order to exploit time series content and have more observations at our disposal. At this regard, we perform the regressions as in Eqs. (7)–(9) first by including only country fixed effects, and then adding time fixed effects. Results are reported in Table 9. The OFIs assets-to-GDP ratio emerges to be strongly and positively linked with real growth either when controlling only for country fixed effects (Table 9, Panel A) or when controlling for both country and time fixed effects (Table 9, Panel B). The coefficients are almost close to 0.002 and are statistical significant at the 1% level (except Models 2, 3, 8 and 9 of Panel B, where the significance is 5%). These outcomes definitely denote the existence of a positive and statistically significant relationship between economic growth and Shadow banking: Shadow banking is able to explain part of cross-country and over time variations of real GDP per capita growth rate. Comments about the behavior of financial indicators are basically the same as for the outcomes of Table 8. Specifically, the coefficient of structure-size continues to be positive and significant in Models (3) and (9), either with country fixed effects alone, or with both country and time fixed effects. In addition, the coefficient of finance-size emerges to be positive and significant in Model (6) for both Panel A and B, at the 5% and 1% level respectively.

Turning to other macroeconomic controls, from Tables 8 and 9 it emerges robust evidence that initial GDP and government expenditure are negatively and significantly related to growth.

Table 9

Economic growth, financial structure, financial development, and Shadow banking (panel data analysis, 2002–2016, overlapping 5-year windows).

	Economic growth									
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Panel A: with country fixed effects and no time fixed effects										
OFIs assets to GDP	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.001)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.001)	0.002*** (0.000)
Structure-activity		−0.026 (0.385)						0.367 (0.846)		
Structure-size			1.561** (0.695)						1.386* (0.807)	
Structure-efficiency				−0.212 (0.217)						−0.210 (0.245)
Finance-activity					−0.267 (0.366)			−0.518 (0.817)		
Finance-size						1.014** (0.423)			0.553 (0.699)	
Finance-efficiency							−0.041 (0.435)			−0.014 (0.441)
Initial GDP	−6.006*** (1.278)	−5.992*** (1.240)	−4.501*** (1.073)	−5.892*** (1.223)	−5.659*** (1.379)	−6.420*** (1.247)	−5.995*** (1.347)	−5.225*** (1.448)	−5.091*** (1.259)	−5.889*** (1.263)
Government expenditure	−0.591** (0.212)	−0.608** (0.226)	−0.462** (0.174)	−0.633*** (0.207)	−0.632** (0.232)	−0.603** (0.219)	−0.594** (0.229)	−0.591** (0.220)	−0.462** (0.173)	−0.634*** (0.218)
Constant	71.074*** (11.767)	71.123*** (11.032)	53.956*** (9.538)	71.604*** (11.301)	70.446*** (11.748)	66.545*** (11.068)	71.158*** (11.668)	67.690*** (10.002)	55.019*** (9.362)	71.629*** (11.186)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	No	No	No	No	No	No
Countries/Observations	27/268	27/264	27/256	27/268	27/264	27/256	27/268	27/264	27/256	27/268
Adjusted-R ²	0.513	0.516	0.568	0.515	0.520	0.540	0.512	0.521	0.573	0.513
Panel B: with country and time fixed effects										
OFIs assets to GDP	0.002*** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.001** (0.000)	0.001** (0.000)	0.002*** (0.000)
Structure-activity		0.790* (0.460)						1.026 (0.822)		
Structure-size			2.032*** (0.692)						1.806** (0.787)	
Structure-efficiency				0.202 (0.301)						0.213 (0.302)
Finance-activity					0.284 (0.377)			−0.333 (0.787)		
Finance-size						1.299*** (0.424)			0.699 (0.693)	
Finance-efficiency							0.417 (0.409)			0.422 (0.428)
Initial GDP	−6.579*** (1.401)	−6.414*** (1.330)	−5.606*** (1.052)	−6.762*** (1.463)	−6.778*** (1.482)	−7.183*** (1.359)	−6.493*** (1.295)	−6.074*** (1.339)	−6.181*** (1.135)	−6.685*** (1.425)
Government expenditure	−0.657*** (0.230)	−0.546*** (0.195)	−0.559*** (0.166)	−0.626*** (0.201)	−0.628** (0.239)	−0.653*** (0.229)	−0.614** (0.252)	−0.549*** (0.193)	−0.546*** (0.166)	−0.580** (0.215)
Constant	77.889*** (14.783)	74.708*** (13.497)	66.412*** (10.377)	78.277*** (14.996)	77.004*** (14.899)	72.640*** (14.317)	75.109*** (14.516)	74.198*** (12.847)	65.923*** (10.511)	75.483*** (14.757)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries/Observations	27/268	27/264	27/256	27/268	27/264	27/256	27/268	27/264	27/256	27/268
Adjusted-R ²	0.594	0.617	0.683	0.595	0.597	0.623	0.604	0.618	0.692	0.606

The dependent variable is real GDP per capita growth rate. Given the reduced number of observations due to the small set of countries, we have included less macroeconomic controls in the regression while leaving financial indicators. However, as a robustness check, we have also run regressions including inflation and trade obtaining similar results. Country fixed effects are included in Panel A but not reported. Country and time fixed effects are included in Panel B but not reported. Robust and clustered standard errors are reported in parentheses. *, **, *** denote, respectively, statistical significance at 10%, 5% and 1% level.

8. Conclusions

Our econometric analysis leads to different findings depending on (i) whether we adopt the cross-sectional or panel approach, (ii) the time span considered, i.e., 1980–2016 or 2002–2016.

We first find cross-country evidence that overall financial development positively affects economic growth over the 1980–2016 period, and that its effect is amplified by an efficient legal environment. This outcome supports the “financial services”

and the “law and finance views”, and thus [Levine \(2002\)](#)’s results, showing that the long-run positive relationship between the legal system, financial development and growth still hold even including the experience of the recent Great recession. A novel and interesting result is that, when jointly considering structure and financial indexes, a more bank-oriented economy enjoys higher benefits, in terms of long-run real GDP per capita growth, than a market-oriented one, and it also amplifies the positive effect of financial development. However, when we restrict our cross-sectional exercise to 2002–2016 it emerges that financial development is no longer able to explain cross-country variations in economic growth rates, and the law, finance and growth nexus appears to be broken.

When we consider variations of GDP per capita growth and financial variables across countries and over time, it emerges that financial structure and financial development matter for growth, but in an opposite way as the pure cross-section analysis, and this applies for both the 1980–2016 and 2002–2016 periods. Specifically, when indexes are included singularly in regression equations, we observe a positive relationship between market-oriented economies and growth on the one hand, and between financial development and growth on the other hand, the latter true only for the broader time horizon. When we control for the joint effect of structure and finance indexes on growth we observe a positive link between growth and market-based structure, and a negative link between growth and overall financial development. It emerges that these outcomes are particularly true for high-income countries rather than low-income countries.

We thus document that the joint impact of financial structure and financial development on growth changes according to the variations considered: (i) real growth is positively affected by a greater financial development and by a more bank-oriented economy, when considering only cross-country variations, (ii) real growth is affected positively by a more market-based structure while negatively by financial development, when considering variations across country and over time.

Our results from the panel analysis are coherent with the recent strand of the finance and growth literature supporting that, as economies develop, the role played by financial markets in fostering economic growth becomes more important than that of banks. This seems to be coherent with the remarkable growth of non-bank financial intermediation observed during the last two decades, mostly in advanced countries, due to advances in technology, financial innovation, and financial globalization. At this regard, we provide robust evidence of a positive relationship between Shadow banking, here considered as the ratio of other financial intermediaries assets to GDP, and economic growth, either when controlling for fixed effects or when controlling for both country and time fixed effects. By complementing traditional banking, Shadow banking acts as a catalyst for the financial system and it generates spillovers to the real economy: in good times it provides large scale benefits that positively affect economic growth, while in bad times it creates large scale deficiencies that negatively affect the real economy. Even when controlling for Shadow banking, the role played by financial structure in affecting economic growth remains significant, and specifically the positive influence of market-based economies.

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Conflict of interest

None.

Appendix A. Data description and sources

Variable	Definition	Source
Economic growth	Real GDP per-capita growth rate	World Development Indicators, The World Bank, 2018 (indicator code NY.GDP.PCAP.KD.ZG)
Initial GDP	Ln of real GDP per capita (2010 US\$) at beginning of period	World Development Indicators, The World Bank, 2018 (indicator code NY.GDP.PCAP.KD)
Schooling	Average years of schooling in the working age population at beginning of period	Barro and Lee (2013)
Government expenditure	Government expenditures as percentage of GDP	World Development Indicators, The World Bank, 2018 (indicator code NE.CON.GOV.TS)
Inflation	Ln of (1 + consumer price annual % change)	World Development Indicators, The World Bank, 2018 (indicator code FP.CPI.TOTL.ZG)
Openness	Imports plus exports divided by GDP	World Development Indicators, The World Bank, 2018 (indicator code NE.TRD.GNFS.ZS)
Bank credit ratio	Credit by deposit money banks (commercial banks and other financial institutions that accept transferable deposits, such as demand deposits) to the private sector over GDP	Global Financial Development Database, The World Bank, 2018 (indicator code GFDD.DI.01)
Bank overhead costs ratio	Operating expenses of a bank as a share of the value of all assets held	Global Financial Development Database, The World Bank, 2018 (indicator code GFDD.EI.04)
OFIs assets	Assets of other financial intermediaries divided by GDP	OFIs assets are obtained from FSB (2018) while real GDP (constant 2010 US\$) is from World Development Indicators, The World Bank, 2018 (indicator code NY.GDP.MKTP.KD)
Private credit ratio	Credit by deposit money banks (commercial banks and other financial institutions that accept transferable deposits, such as demand deposits) and other financial institutions to the private sector over GDP.	Global Financial Development Database, The World Bank, 2018 (indicator code GFDD.DI.12)
Market capitalization ratio	Total value of all listed shares in a stock market as a percentage of GDP	Global Financial Development Database, The World Bank, 2018 (indicator code GFDD.DM.01)
Total value traded ratio	Value of domestic shares traded on domestic exchanges over GDP.	Global Financial Development Database, The World Bank, 2018 (indicator code GFDD.DM.02)
Structure-activity	Ln (Total value traded ratio/bank credit ratio). Larger values imply a more market-based financial system.	
Structure-size	Ln (Market capitalization ratio/bank credit ratio). Larger values imply a more market-based financial system.	
Structure-efficiency	Ln (Total value traded * overhead costs). Larger values imply a more market-based financial system.	
Finance-activity	Ln (Total value traded * private credit ratio). Larger values imply a more active financial system.	
Finance-size	Ln (Market capitalization ratio * private credit ratio). Larger values imply a broader financial system.	
Finance-efficiency	Ln (Total value traded/overhead costs). Larger values imply a more efficient financial system.	
Outside rights	A composite index given by the sum of shareholders and creditors rights. It ranges from 0 (lowest protection) to 8 (highest protection).	We have integrated data from DMS 2007 and DLLS 2008 with Doing Business (2018).
Rule of law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The index has been rescaled from 0 (weakest) to 10 (strongest) governance performances.	The Worldwide Governance Indicators, The World Bank Group, 2017. Data are integrated with La Porta et al. (1998)'s dataset (variable "rule of law") to obtain an average for the 1980–2016 period.

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