Econ Polit (2018) 35:183–205
https://doi.org/10.1007/s40888-018-0097-3

Inequality and the finance you know: does economic literacy matter?

Anna Lo Prete[1,2]

Received: 1 December 2016 / Accepted: 30 January 2018 / Published online: 7 February 2018

Abstract In a sample of advanced and developing countries observed over the 1980–2007 period, this paper documents that the ability to use financial instruments and deal with financial market complexity that indicators of *economic literacy* proxy for is significantly and robustly associated to a lower variation in income inequality. The direct association between financial development and inequality usually referred to as the "finance-inequality nexus", instead, is not significant in long-run regressions that control for the level of economic literacy nor in panel regressions.

Keywords Inequality · Financial development · Economic literacy

JEL Classification A2 · I3 · O1

1 Introduction

In a world where an increasing number of more or less complicated financial instruments has become available, and decisions about the investment of private savings have been increasingly demanded to individuals as a consequence of government retrenchment from economic activity (Eichengreen 2015), it is important to understand if people are able to reap the benefits of financial market deepening.

✉ Anna Lo Prete
anna.loprete@unito.it

[1] Department of Economics and Statistics, University of Torino, Campus Luigi Einaudi, Lungo Dora Siena 100A, 10153 Torino, Italy

[2] CeRP, Collegio Carlo Alberto, Torino, Italy

In the past decade, economists have started analyzing the importance of financial market improvements for income distribution, questioning if finance was good for the poor. In particular, the discussion focused on understanding whether financial sector developments might have helped reduce income inequality by offering diversification opportunities to a larger group of people (e.g. Demirgüç-Kunt and Levine 2009; Claessens and Perotti 2007).

This paper documents the relevance, to the direct association between financial development and inequality reduction, of a dimension of access to financial markets that quantitative measures of financial market development cannot capture. It focuses, namely, on the ability to use financial instruments and to deal with financial market complexity that indicators of *economic literacy* proxy for. In doing do, the paper creates a bridge between the literature on the so-called "finance-inequality nexus" and those studies that stress the importance of economic literacy to financial market decisions.

The contribution of the paper is twofold. First, it builds a dataset that allows exploiting both cross-sectional and time series information on inequality data. In this respect, it differs from earlier studies on the relationship between finance and inequality. Following Dollar and Kraay (2002) and Beck et al. (2007), indeed, existing papers focused on cross-sectional information mainly. The use of panel analyses was restricted to robustness checks based on uneven and across-countries overlapping sub-periods that did not allow studying the effect of common trends in the variables of interest.

Second, this paper offers a broad analysis of the association between economic literacy, inequality, and financial development. Although the profession has recently recognized the potential effect of economic literacy as a source of unequal access to finance (Lusardi et al. 2017), the study of the impact of economic literacy on inequality is a field yet amenable to research. This paper documents that financial development is not robustly associated to a reduction in income inequality in specifications that include economic literacy as an explanatory variable, nor in panel regressions where time effects control for common trends in the variables of interest. In a sample of advanced and developing countries observed over the 1980–2007 period, the ability to use financial instruments and deal with financial market complexity, measured by indicators of economic-specific competences, instead, is significantly and robustly associated to the variation in income inequality.

The paper is organized as follows. Section 2 reviews the literature. Section 3 describes the dataset and the empirical strategy. Section 4 presents descriptive evidence from the 1980–2007 cross-section. Section 5 reports the main findings from sub-period panel regressions, discusses their robustness, and considers alternative indicators of competence. Section 6 concludes.

2 Literature review

The study of the finance-inequality nexus has attracted significant interest in the literature. In theory, the effect of financial development on income inequality is ambiguous. On the one hand, the degree of income inequality related to the initial

distribution of wealth may decrease if financial market deepening increases the economic opportunities available to the most disadvantaged groups of the society (Galor and Zeira 1993). On the other hand, financial development can lead to an increase in income inequality if it benefits those who are already active in the market as in Greenwood and Jovanovic (1990). They show that formal financial sector's improvements help the rich at early stage of development, and cause a widening of the wealth distribution across income groups (see also Summers et al. 1984; Paukert 1973).

From an empirical point of view, in the 1990s empirical studies identified the variables responsible for inequality variation in a set of country-specific factors that vary slowly over time but are quite different across countries (Deiniger and Squire 1998; Li et al. 1998). Among the others, financial market imperfections are listed as factors that may prevent the poor from investing in education and, thus, may contribute to make inequalities persistent (Banerjee and Newman 1993).

Since the mid-2000s, empirical works have investigated more systematically the relationship between inequality and finance. If in theory the effect of finance on inequality is ambiguous, at the aggregate level empirical findings are unanimous in suggesting that inequality decreases where financial systems deepen (Demirgüç-Kunt and Levine 2009). The influential paper by Beck et al. (2007) shows that financial market development and the growth of income inequality are negatively associated when the data are averaged over the 1960–2005 and the 1980–2005 cross-sections. This empirical finding is consistent with the growth model by Galor and Moav (2004) whereby changes in inequality depend on human capital accumulation that in turn is affected by credit constraints. Complementary evidence in Clarke et al. (2006) points to a negative association between finance and inequality, indicating that the level of income inequality is lower in countries where private credit is higher between the 1960s and the mid-1990s.

The literature on the finance-inequality nexus reviewed so far suggests that financial sector's frictions can contribute to the persistence of inequality when people face constraints in investing in human and physical capital. This makes it important to understand why access to finance may be unequal.

As summarized by Claessens and Perotti (2007), limited participation in financial markets may arise because of several reasons: fixed transaction costs, entry regulations, political channels through which elites exercise their influence over a country's institutional environment and oppose reforms and financial market deepening (see also Honohan 2009; Rajan and Zingales 2003).

This paper contributes to the literature by focusing on another potential source of unequal access to finance. It documents the relevance of *economic literacy*, defined as the ability to understand basic economic concepts about individual financial decisions and the functioning of a modern economy, to the finance-inequality nexus. More specifically, it argues that economic literacy may be an important dimension of access to financial markets that quantitative measures of financial market development do not capture.

The importance of economic literacy as a determinant of the willingness to participate in financial markets has been recognized by a recent set of works focusing on the role of economic-specific competences. In these papers, the lack of

knowledge of basic economic principles prevents people from taking proper financial decisions and from reaping the benefits of financial markets' development (Lusardi and Mitchell 2014). The evidence from country studies indicates that people with low economic competence are less likely to access financial markets and invest in stocks. For instance, Guiso and Jappelli (2008) show that in Italy the degree of portfolio diversification is higher among individual investors that have a better understanding of basic economic subjects. Van Rooij et al. (2011) document that in the Netherlands financial sophistication is associated to higher participation in stock markets. Lusardi and Mitchell (2007) and Caliendo and Findley (2013) find that people with higher levels of financial literacy are able to accumulate more wealth and plan for retirement.

Cross-country evidence conveys a similar message. We live in a world where financial products are complex, liberalization policies favor financial market deepening, and governments demand decisions about the allocation of private savings to individuals. In this reality, people need specific knowledge of financial instruments to benefit from investment opportunities, and to address financial difficulty in terms of, for example, taking on loans with excessive interest rates in mortgage and consumer credit markets (see Jappelli 2010, and the references therein). Economic and financial literacy is also important to voting behavior. Fornero and Lo Prete (2017) document that the electoral cost of major economic reforms is lower in countries where financial literacy is higher, arguing that a better understanding of the technical content of a reform may reduce the willingness of people to punish the government that enacted it.

Although the profession has recently recognized the potential effect of economic literacy as a source of unequal access to finance, the study of the impact of economic literacy on inequality is a field yet amenable to research. The idea that economic-specific competence may be relevant to income distribution finds theoretical support in Lusardi et al. (2017) who demonstrate in a calibrated model that endogenous accumulation of financial knowledge over the life cycle can generate wealth inequality in a stochastic environment. Preliminary evidence on the relevance of this topic at the macroeconomic level is provided by Lo Prete (2013) who shows that economic literacy might have been a relevant omitted variable in Beck et al. (2007) study on the finance-inequality nexus by performing cross-country regressions on their data.

As discussed in the Sect. 1, this paper offers a broad investigation on the relationship between financial development, income inequality growth, and economic literacy across countries. It tests empirically if economic literacy is relevant to the finance-inequality nexus, and questions the robustness of the negative association between financial development and income inequality that previous empirical studies established as an empirical fact.

3 Data and empirical strategy

The dataset built for the paper includes information on income distribution, financial development, and economic competence, along with data on macroeconomic conditions and demographic profiles.

The analysis focuses on the 1980–2007 period. The length of the time-period allows to compare the results with Beck et al. (2007)'s seminal paper on the finance-inequality nexus, while excluding the admittedly difficult to model effects of the 2007–2008 financial crisis.[1] To characterize the variation in the relevant variables that is not related to business cycles effects or temporary shocks, yearly data are averaged over the 1980–2007 observation period for the cross-sectional analysis, and over seven non-overlapping sub-periods of 4 years each for the panel analysis.

Once data on the main variables of interest (i.e. income inequality, financial development, and economic competence) are merged, the sub-period panel dataset includes a total of 154 observations covering the 34 countries listed in Table 8. The panel sample is unbalanced, because data on income inequality are sparse and their time coverage is different for different countries.

Details on data availability, the compilation strategy, the list and definition of the variables included in the empirical analysis, and descriptive statistics are in what follows.

3.1 Income inequality

Data on income distribution are drawn from the UNU-WIDER World Income Inequality Database (see the "Data appendix" for details). Distributional measures differ in many respects: coverage of the survey, quality of the data, unit of analysis, income definition. The sample analyzed in this paper is restricted according to the following compilation strategy. First, preference is accorded to the most recently updated data and to data of high quality (i.e. to the "reliable" or "most reliable" category). Next, following the recommendations of the Canberra Group, that developed international guidelines to improve comparability of national income statistics, the basic statistical unit of analysis considered is the household.[2] To end up with a set of distributional measures referring to income net of taxes and transfers, preference is given to disposable income data; where these data are not available, to gross income; to consumption welfare measures, otherwise. The resulting sample includes 1087 observations for 119 countries. Table 1 shows their distribution by income definition and by unit of analysis, a category that indicates whether the household is considered independently of its size or if person weights

[1] The study by Beck et al. (2007) considers both the 1960–2005 period and the shorter 1980–2005 period.

[2] The unit of analysis indicates if income inequality data are based on actual observation of individual units, drawn from household surveys ("household"), or on national statistics ("person"). The choice of the "household" statistical unit of analysis is preferred in international comparisons because estimates drawn from national statistics rely on strong assumption regarding patterns of inequality across countries or over time that cannot be tested if such information is included in the data set, and that are normally used only when household surveys are not available (for a detailed discussion, see e.g. Deininger and Squire 1996).

Table 1 Descriptive statistics on sources of income inequality data

Income definition	Unit of analysis		Total
	Person	Household	
Disposable income	474	168	642
Gross income	104	120	224
Consumption	210	11	221
Total	788	299	1087

are applied. To account for differences in measurement between various welfare definitions, the adjustment procedure by Dollar and Kraay (2002) is applied. It involves regressing the Gini coefficients on a series of area dummy variables and then subtracting the mean difference between groups, as reported in Table 2.

The "growth of Gini" variable is then defined as the growth rate of the Gini coefficient. In the cross-sectional analyses this variable is computed following Beck et al. (2007) as the log difference between the last and the first observation available in the 1980–2007 sample, divided by the number of years between the two. For the sub-period panel analysis, yearly data are interpolated if missing, and income inequality growth is the log difference between the last and the first observation in each 4-year sub-period for which the information is available. Countries are included in the dataset if there are more than 10 years between the first and last observation for the Gini coefficient, thus excluding countries for which only one country-level observation is available.

With respect to previous empirical studies on the finance-inequality nexus, this compilation strategy has the non-negligible advantage of considering equal length non-overlapping sub-periods. Since the seminal paper by Dollar and Kraay (2002) and up to Beck et al. (2007), indeed, sparse income observations were included in the sample if distant at least 5 years from each other. As discussed in the Sect. 1, this choice, motivated by a focus on cross-sectional information mainly, implied using panel datasets where uneven and across-countries overlapping sup-periods did not allow studying the effect of common trends in the variables of interest.

3.2 Finance, economic literacy, control variables

The variable "Financial development", that measures financial market deepening, is the ratio of private credit by deposit money banks and other intermediaries to GDP included in the World Bank's "Financial Development and Structure Database". It measures the amount of financial resources that savers provide to the private sector through domestic money banks (i.e. commercial banks and other financial institutions that accept transferable deposits), and excludes credit to the public sector and state-owned firms as well as central bank assets. As discussed in Beck et al. (2007), this variable is the best proxy to capture the cross-country variation in financial development that matters while studying access to finance by individual investors.

Table 2 Adjustments to Gini coefficients

Dependent variable: Gini coefficient	Coefficient	Standard error
Gross income dummy	5.870***	(1.242)
Consumption dummy	− 0.861	(1.118)
East Asia	10.915***	(1.269)
East Europe and Central Asia	2.514***	(0.816)
Middle East and Nord Africa	7.631***	(1.616)
Latin America and Caribbean	23.508***	(0.821)
South Asia	4.730***	(1.614)
Sub-Saharan Africa	15.657***	(2.661)
Constant	29.381***	(0.251)

Robust standard errors from pooled OLS regressions in parenthesis, (*) (**) (***) denote significance at the (10) (5) and (1) percent level

To document the relevance of economic-specific competences, this paper uses an indicator of "economic literacy". Economic literacy is a well-defined concept. It is the ability to understand basic economic concepts about individual financial decisions and the functioning of a modern economy. Microeconomic indicators of economic literacy evaluate the ability to solve problems that involve simple questions about interest rates on a saving accounts and risk-diversification. These direct microeconomic measures are based on surveys and usually allow for country-studies but not for cross-country analyses. The OECD's Programme on International Student Assessment (PISA) has started collecting data on economic and financial literacy of 15-year-old students' only in recent years (i.e. in 2012) that are out of the reference period of this paper. To perform a macroeconomic analysis, this paper uses the indicator of "economic literacy among the population" compiled by the IMD World Competitiveness Yearbook. This summary indicator of economic knowledge measures economic literacy in 55 countries over the 1995–2008 period. It is based on interviews to senior representatives of the national business community who are asked to evaluate whether the level of economic literacy among the population is high on a 1–10 scale.

The paper considers also other indicators of education to show that narrower or more general dimensions of human capital accumulation do not play the same role of economic literacy in explaining the finance-inequality nexus. A more specific indicator of competence is the index of "education in finance". This measure, compiled by the IMD World Competitiveness Yearbook, refers to the (narrower) set of abilities needed to master financial subjects to the degree requested to work in private enterprises. More general and less subjective indicators of human capital are the levels of "schooling" attainment by Barro and Lee (2013). Finally, the paper considers the PISA test scores for mathematics, an OECD measure that records 15 years old pupils' educational achievement on mathematics. This variable captures mathematical literacy by evaluating the ability to perform sums, subtractions, and more complex mathematics.

As previous studies on the finance-inequality nexus, this paper controls for macroeconomic and demographic country-specific factors that may help explain the association between income inequality and financial development. "Trade openness", "inflation", and "GDP per capita growth" control for the possibility that

income inequality growth differs in economies that are more open to international trade, where prices are less stable, and in countries that feature higher economic growth. "Population growth" and the "dependency ratio" of people aged between 15 and 65 to the total population accounts for the relevance, if any, of country-specific demographic dynamics and profiles.

The "Data appendix" reports descriptive statistics for all the variables used in the empirical analysis to follow (in Tables 9, 10), and more details on data sources and definitions.

3.3 Empirical strategy

The empirical contribution of the paper is to show that economic literacy is relevant to the finance-inequality nexus detected by Beck et al. (2007) and by other studies. To this end, the empirical model presented in the paper is the one first developed by Beck et al. (2007), augmented to include indicators of economic competences.

In regressions that read

$$y_{i,t} = \alpha y_{i,t-1} + \beta FD_{i,t} + \gamma EC_i + \delta X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

and that can be written as

$$y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta FD_{i,t} + \gamma EC_i + \delta X_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $y_{i,t}$ is the logarithm if the Gini coefficient in country i at time t, the growth rate of the Gini coefficient, $y_{i,t} - y_{i,t-1}$, is regressed on its initial value, $y_{i,t-1}$, the level of financial development, $FD_{i,t}$, the level of economic competence, EC_i, and a set of control variables, $X_{i,t}$. Explanatory variables are in averages over the period that is covered by the dependent variable, except for the initial level of the Gini coefficient, $y_{i,t-1}$, that measures the level of inequality at the beginning of the period, and in logarithm when expressed in levels.

The level of economic competence, EC_i, is time-invariant in the main specifications, because there is little information on the time variation of economic literacy.[3] A time-varying version of the economic literacy indicator will be introduced as a robustness check in Sect. 5, but, as the results show, empirical specifications with time-invariant competence indicators capture most of the information in the data, arguably because the relative position of countries has not changed much over the period considered.

Equation 2 is estimated by running OLS regressions both on the 1980–2007 cross-section (in Sect. 4) and on the 1980–2007 panel (in Sect. 5). While the cross-sectional analysis is presented for descriptive purposes mainly, the sub-period panel analysis in Sect. 5 considers potential specification biases. More specifically,

[3] The indicator of economic literacy among the population was compiled for the first time in 1995 for 45 countries. Afterwards, the number of countries included in the survey increased up to 55 in 2008. The choice of using the country-level 1995–2007 average (as in Jappelli 2010) allows to use the maximum number of observations available for the cross-sectional analysis. The results presented in Sects. 4 and 5 are robust to measuring economic literacy as the value in the last year of the sample (i.e. 2007).

instrumental variables (IV) techniques and identification strategies will help address the potential issues of reverse causation and serial correlation in the errors.

4 Descriptive evidence from the 1980–2007 cross-section

This section examines the long-term properties of the sample. To start with, Fig. 1 plots data on financial development on the horizontal axis, and data on income inequality on the vertical axis. It also includes information on economic literacy by weighting country markers by the level of economic literacy (a bigger circle indicates a higher value of economic literacy among the population).

The downward sloping regression fit line in Fig. 1 is consistent with what found in previous studies on the finance-inequality nexus. There is a negative association between financial development and income inequality growth. In the sample, income inequality has increased more in transition economies and in countries where volumes of private credit were higher on average, such as Japan and some Anglo-Saxon countries, than in developing economies and in many Continental European countries.

Interestingly, looking at the size of the circles of country markers, financial development and economic literacy seem to capture different dimensions of the "finance" side of the finance-inequality nexus. There are advanced countries, like Great Britain, where high income inequality growth is associated with high financial market development, but the level of economic literacy is lower than the sample average. And countries like Denmark and Finland, where economic literacy is high, that may record low income inequality growth even if they have a lower level of financial development with respect to similar economies. Somehow, the descriptive evidence in Fig. 1 may be suggestive of empirical regularities that go beyond the association between financial market development and income inequality growth. They may help explain why, while in the period before the 2007–2008 financial crisis financial market volumes grew considerably and credit constraints eased within countries (Bertola and Lo Prete 2009), inequality growth and the level of economic literacy differed quite substantially across both developed and developing countries (Jappelli 2010).

The empirical analysis to follow will test if the heterogeneity in the level of economic literacy, as a proxy for the ability to access and use financial markets, may provide insights on the theoretically ambiguous but empirically well-established finance-inequality nexus.

4.1 Results from cross-sectional regressions

Table 3 presents the results from estimating model (2) by OLS, leaving to the time series analyses in Sect. 5 the task to control for common trends in the variables of interest and for potential estimation biases.

As in Beck et al. (2007), income inequality growth is regressed on financial development and on the initial level of the Gini coefficient in column 1, and on a larger set of control variables in column 2. The results in Table 3 indicate that the negative and significant association between income inequality growth and financial

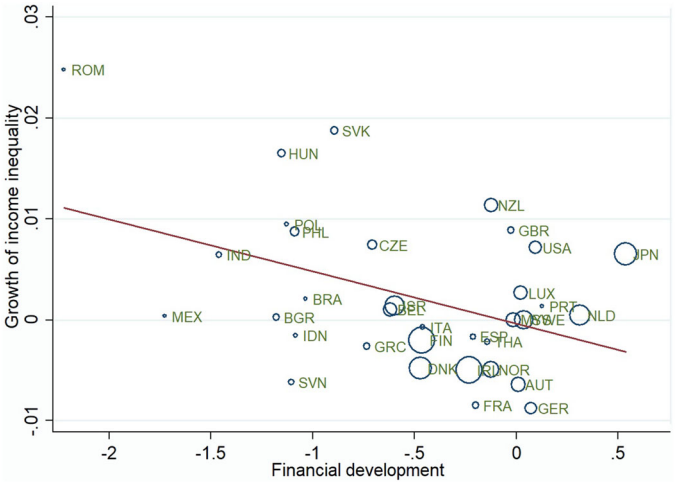

Fig. 1 Financial development and inequality growth. Linear regression fit: partial correlation coefficient = − 0.005, standard error = 0.003, *t* statistic = − 2.04. Country markers are weighted by the level of economic literacy, a bigger circle indicating a higher level of economic literacy

Table 3 Cross-sectional evidence

	Dependent variable: growth of Gini		
	(1)	(2)	(3)
Economic literacy			− 0.010*
			(0.005)
Financial development	− 0.005**	− 0.004	− 0.001
	(0.002)	(0.002)	(0.003)
Initial Gini level	− 0.013***	− 0.022***	− 0.027***
	(0.004)	(0.007)	(0.007)
Trade openness		− 0.003	− 0.003
		(0.002)	(0.003)
Inflation		0.001	0.002
		(0.001)	(0.001)
Dependency ratio		0.028	0.042*
		(0.019)	(0.021)
Population growth		− 0.018	− 0.023
		(0.021)	(0.020)
GDP per capita growth		0.005	0.002
		(0.095)	(0.103)
R-squared	0.353	0.449	0.490
Observations	34	34	34

OLS estimates. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) and (1) percent level. All specifications include a constant, not reported

development found in previous studies holds in the empirical model of column 1, that controls for a few conditioning factors. However, the coefficient of financial development is not precisely estimated in column 2, where indicators of trade openness, inflation, and GDP per capita growth account for the effect of macroeconomic conditions, and demographic variables account for the age structure of the population. This is a relevant difference with respect to previous studies. The evidence in Table 3 suggests that in the sample under analysis the variation in financial development does not suffice in characterizing the variation in income inequality growth across countries.

The role of control variables is consistent with the findings by Beck et al. (2007). The associations between income inequality growth and the control variables are often not significant at conventional levels, with one exception: the negative and significant coefficient of the initial Gini level. This indicates that income inequality growth is lower in countries where the distribution of income is more unequal at the beginning of the period. Here, as in Beck et al. (2007), dynamics play a relevant role. The next section will discuss the role of these dynamics in details, to show that least squares estimates are not biased by serial correlation in the errors.

The model in column 3 of Table 3 includes the level of economic literacy among the explanatory variables. The results indicate that, while financial development is not precisely estimated, the level of economic literacy is negatively and significantly associated to the growth of income inequality. Consistently with the evidence in Lo Prete (2013) and with the theoretical insights in Lusardi et al. (2017), these findings suggest that the ability to access financial markets and use their instruments may be a relevant dimension of the finance-inequality nexus. Inequality growth is lower in countries where economic literacy is on average higher and allows people to benefit from more developed financial markets. To give a sense of magnitude to the economic literacy-inequality association, over the 1980–2007 period income inequality growth was one percent lower in the country with the lower level of economic literacy (i.e. Mexico) and two percent lower in the country with the higher level of economic literacy (i.e. Finland).

The results from a variety of robustness checks (not reported) that control for the potential relevance of outliers, confirm the importance of the association between economic literacy and income inequality growth.[4]

5 Results from sub-period panel regressions

This section moves to a medium-term perspective and presents results from models where time dummies control for common trends in the variables of interest. In all the empirical models, annual data are averaged over seven non-overlapping sub-periods of 4 years each, to control for the effect, if any, of business cycle fluctuations and temporary shocks.

[4] Economic literacy is a significant determinant of income inequality in regressions that considers the role of potential outliers in Fig. 1, by dropping Romania or by introducing a dummy variable for transitions economies.

Table 4 Main results, panel analysis

	Dependent variable: growth of Gini		
	(1)	(2)	(3)
Economic literacy			− 0.078**
			(0.038)
Financial development	− 0.005	0.001	0.017
	(0.009)	(0.010)	(0.012)
Initial Gini level	− 0.070**	− 0.137***	− 0.182***
	(0.028)	(0.034)	(0.039)
Trade openness		− 0.014	− 0.007
		(0.010)	(0.011)
Inflation		0.003	0.004*
		(0.002)	(0.002)
GDP per capita growth		0.397	0.491*
		(0.267)	(0.278)
Dependency ratio		0.230***	0.299***
		(0.077)	(0.087)
Population growth		0.013	− 0.003
		(0.029)	(0.028)
R-squared	0.069	0.123	0.151
Observations	154	154	154

Pooled-OLS estimates. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) and (1) percent level. All specifications include time effects and a constant, not reported

Table 4 reports results from estimating model (2) by pooled-OLS. Interestingly, the results in columns 1 and 2 indicate that financial development is not significantly associated to income inequality growth when the specification includes a few conditioning factors, nor when it includes the set of control variables considered in Table 3. As in the cross-sectional analysis of Sect. 3, and in Beck et al. (2007)'s study, the negative and significant association with the initial Gini level indicates that income inequality growth is lower in countries that record a higher level of inequality at the beginning of each sub-period.

The model in column 3 of Table 4 includes the indicator of economic literacy and confirms the findings from the cross-sectional analysis. In panel data too, it is possible to find a negative association between economic literacy and the variation of income inequality, while the association of financial development with income inequality growth is not significant at conventional levels.

In all specification of Table 4, the initial level of the Gini coefficient is significantly associated to lower income growth. Consistently with Beck et al. (2007), this indicates that it is important to allow for and to model dynamics. Since the model includes the initial level of the Gini coefficient as independent variable, however, pooled-OLS estimates can be biased. This is not the only issue to deal with while estimating Eq. (2) by pooled-OLS. Indeed, the estimates can be biased also if

financial development responds endogenously to income inequality growth, or if some unobservable country characteristic is correlated with the independent variables and also influences inequality.[5] The analysis to follow will test if the main results reported in Table 4 hold when accounting for reverse causation and for serial correlations in the errors by using instrumental variables (IV) techniques.

Let us start by considering the possibility that pooled-OLS estimates are biased by reverse causation. This may happen if financial development responds endogenously to income inequality growth. To address this issue, we need to find variables that are associated to financial development but not to income inequality growth. Following Jappelli (2010), we include in the set of instruments the "legal origin" dummies defined by La Porta et al. (1999), and the "strength of investor protection index" compiled by the Doing Business Project, a measures of the strength of regulations that shelter minority shareholders against self-dealing and misuse of corporate assets by directors. Second-stage results from IV estimation are in column 1 of Table 5. They confirm previous findings from the baseline model in column 3 of Table 4. Economic literacy is negatively and significantly associated with income inequality growth, while there is no evidence supporting the relevance of the finance-inequality nexus. Test statistics reported at the bottom of the table indicate that the power of the instruments is high (the weak identification tests record values higher than 10). The test of over-identifying restriction shows that the instruments are not correlated with the residuals, and the endogeneity tests that financial development can actually be treated as exogenous.[6]

Pooled-OLS estimates can be biased also if the errors are serially correlated, due to the inclusion of the initial level of the Gini coefficient among the regressors. To address this issue, it is possible to instrument the initial level of the Gini coefficient using its lagged values and the lagged dependent variable. More precisely, the specifications in columns 2 and 3 of Table 5 use as instruments for the lagged dependent variable the first lag of the initial Gini level and the lagged dependent variable (in column 2) and the earlier two lags of the initial Gini level and the lagged dependent variable (in column 3). The sample size decreases, due to the inclusion of the lags. Despite the reduction of the number of observations, however, the results from the IV specifications confirm the main findings from the empirical models in Table 4. Test statistics indicate that the instrument are not weak, and that they are not correlated with the residuals in column 3, where the set of instruments includes the second lag of the initial Gini level.

The last column of Table 4 reports estimates from a model where both the level of financial development and the initial level of the Gini coefficient are instrumented. Including in the set of instruments the legal origin dummies, the

[5] To remove the bias related to cross-country unobservable characteristics, it would be necessary to find source of cross-country variation that can serve as instruments, or to use fixed-effect or first-difference specifications that cannot estimate the coefficient of time-invariant literacy.

[6] The strength of investor protection might have a direct impact on the dynamics of the income distribution if protection existed only for small groups of well-connected people (see Pagano and Volpin 2005, and related literature). Results from IV regressions where the set of instruments includes legal origin dummies only confirm the findings on the relations of interest, as historical differences in legal systems may arguably capture well cross-country differences in legal protection (La Porta et al. 1997).

Table 5 IV estimates

	Dependent variable: growth of Gini			
	(1)	(2)	(3)	(4)
Economic literacy	− 0.102**	− 0.097**	− 0.102*	− 0.105*
	(0.048)	(0.045)	(0.057)	(0.064)
Financial development	0.030	0.005	0.007	0.011
	(0.020)	(0.015)	(0.024)	(0.036)
Initial Gini level	− 0.199***	− 0.204***	− 0.239***	− 0.242***
	(0.046)	(0.044)	(0.054)	(0.063)
Trade openness	− 0.005	− 0.000	0.014	0.014
	(0.011)	(0.012)	(0.018)	(0.018)
Inflation	0.005**	− 0.010	− 0.103	− 0.078
	(0.002)	(0.012)	(0.278)	(0.319)
GDP per capita growth	0.541*	0.331	0.331	0.375
	(0.279)	(0.344)	(0.404)	(0.474)
Dependency ratio	0.338***	0.154	0.212	0.222
	(0.097)	(0.134)	(0.171)	(0.172)
Population growth	− 0.009	1.726	2.332*	2.231*
	(0.026)	(1.077)	(1.366)	(1.344)
Over-ident. restrictions	2.193	2.985	4.608	5.157
	[0.70]	[0.08]	[0.10]	[0.52]
Endogeneity test	0.586	0.374	0.001	0.443
	[0.44]	[0.54]	[0.97]	[0.80]
Weak identification test	20.87	629.09	400.52	6.506
Observations	154	120	86	86

IV estimates. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) and (1) percent level. Statistics (p-values in square brackets) computed by the ivreg2 (Baum et al. 2007) Stata module: test of over-identifying restrictions, under the null that all instrumental variables are orthogonal to the second-stage error term; endogeneity test, under the null that the specified endogenous regressors can actually be treated as exogenous; the weak identification test refers to the Kleibergen–Paap Wald rk F statistic, robust to non-i.i.d. errors. All specifications include time effects and a constant, not reported

index of investor protection, the earlier two lags of the initial Gini level, and the lagged dependent variable, the main results from Table 4 hold.

Interestingly, in all specifications of Table 5 economic literacy is significantly associated to the medium term variation in income inequality, and financial development is not directly associated to the growth of the Gini coefficient. While the identifying assumptions underlying each of the empirical model are of course debatable, it is important to find that the coefficients are not strongly affected by the estimation method. Moreover, formal tests at the bottom of Table 5 fail to reject exogeneity. Given that financial development and the initial level of the Gini coefficient can be treated as exogenous, the following tables report pooled-OLS

estimates to perform robustness checks and to consider alternative indicators of competence.

5.1 Robustness checks

Table 6 presents the results from a set of models meant to test the robustness of the findings from estimating Eq. (2) by pooled-OLS.

The first two columns check if income inequality growth is different in advanced countries (column 1) or in transition economies (column 2), by including a dummy variable that allows countries belonging to different groups to have different intercepts. The empirical results from the main specification (reported in column 3 of Table 4) are basically unaffected. The negative and significant association between economic literacy and inequality holds also in column 3 of Table 6, where the interaction between the initial level of income inequality and the growth of GDP per capita accounts for the possibility that the initial distribution of income matters to aggregate income growth. The negative and significant sign of the interaction coefficient indicates that the positive association between income inequality growth and per capita GDP growth is lower in countries with more skewed initial income distributions.

In column 4 of Table 6, the model includes also an interaction term between financial development and economic literacy, to control for the possibility that economic literacy is relevant to the finance-inequality nexus indirectly, by allowing better financial decisions. The results in column 4 show that this interaction term and the main effect of financial development are not significantly different from zero. The relationship that holds true is the one between economic literacy and income inequality growth. If we interpret the interaction from another point of view, this evidence supports the argument that financial market development is not relevant to inequality directly, nor indirectly by smoothing the mitigating effect of economic literacy on inequality in countries where financial markets are less developed.

Finally, the model in column 5 of Table 6 considers if the importance of economic literacy had changed over the period under analysis. It includes the interaction terms between economic literacy and the sub-period time effects and, to avoid an excessive loss of degrees of freedom, includes a few other conditioning factors. There is no evidence of an evolution of the importance of economic literacy as an explanatory variable for the variation in income inequality. Together with the evidence in column 4, these results suggest that the economic literacy-inequality nexus has been quite stable over time. Certainly, data on economic-specific competence have little time variation, and the robustness checks in Table 5, while fostering confidence on the relevance of the association under analysis, have a descriptive relevance mainly.

To sum up, the results presented so far suggest that economic literacy, as an indicator of people's ability to use financial markets and their instruments, is negatively associated to a reduction of income inequality. The direct association between financial development and inequality usually referred to as the "finance-inequality nexus", instead, is not significant in the medium term nor in cross-

Table 6 Robustness checks

	Dependent variable: growth of Gini				
	(1)	(2)	(3)	(4)	(5)
Economic literacy	− 0.073*	− 0.076**	− 0.083**	− 0.064*	− 0.113*
	(0.039)	(0.037)	(0.037)	(0.036)	(0.069)
Financial development	0.020	0.019	− 0.048	− 0.044	0.002
	(0.013)	(0.016)	0.048	(0.047)	(0.011)
Initial Gini level	− 0.192***	− 0.181***	− 0.131***	− 0.139***	− 0.089***
	(0.041)	(0.042)	(0.041)	(0.042)	(0.031)
Trade openness	− 0.007	− 0.008	− 0.005	− 0.003	
	(0.011)	(0.011)	(0.011)	(0.011)	
Inflation	0.004*	0.004*	0.004*	0.004*	
	(0.002)	(0.002)	(0.002)	(0.002)	
GDP per capita growth	0.446	0.492*	9.428**	9.406**	
	(0.285)	(0.279)	(3.669)	(3.742)	
Dependency ratio	0.275***	0.305***	0.295***	0.289***	
	(0.095)	(0.095)	(0.085)	(0.084)	
Population growth	− 0.005	− 0.003	− 0.003	− 0.006	
	(0.029)	(0.028)	(0.027)	(0.027)	
Advanced	− 0.017				
	(0.021)				
Transition		0.004			
		(0.026)			
Initial Gini × GDP per capita growth			− 2.575**	− 2.562**	
			(1.039)	(1.060)	
Financial dev. × economic literacy				0.044	
				(0.034)	
Economic literacy × sub-period 1984–1987					0.003
					(0.089)
Economic literacy × sub-period 1988–1991					0.137
					(0.091)
Economic literacy × sub-period 1992–1995					0.043
					(0.098)
Economic literacy × sub-period 1996–1999					0.098
					(0.102)
Economic literacy × sub-period 2000–2003					0.038
					(0.098)
Economic literacy × sub-period 2004–2007					0.109
					(0.082)
R-squared	0.154	0.151	0.161	0.187	0.105
Observations	154	154	154	154	154

Pooled-OLS estimates. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) and (1) percent level. All specifications include time effects and a constant, not reported

Table 7 Alternative measures of competence

	Dependent variable: growth of Gini			
	(1) Education in finance	(2) Schooling	(3) PISA score	(4) Time varying economic literacy
Competence indicator	− 0.063	− 0.034	− 0.281*	− 0.115**
	(0.043)	(0.023)	(0.158)	(0.050)
Financial development	0.010	− 0.000	0.014	0.006
	(0.012)	(0.010)	(0.013)	(0.018)
Initial Gini level	− 0.173***	− 0.154***	− 0.210***	− 0.309***
	(0.040)	(0.037)	(0.048)	(0.074)
Trade openness	− 0.011	− 0.010	− 0.020	− 0.018
	(0.010)	(0.010)	(0.015)	(0.022)
Inflation	0.005*	0.003	0.002	0.379*
	(0.003)	(0.002)	(0.002)	(0.224)
GDP per capita growth	0.441	0.330	0.483	0.131
	(0.279)	(0.276)	(0.390)	(0.512)
Dependency ratio	0.305***	0.206**	0.189	0.067
	(0.095)	(0.079)	(0.132)	(0.184)
Population growth	0.008	0.012	0.020	4.468**
	(0.026)	(0.032)	(0.034)	(1.910)
R-squared	0.141	0.136	0.155	0.280
Observations	154	154	132	71

Pooled-OLS estimates. Robust standard errors in parenthesis, (*) (**) (***) denote significance at the (10) (5) and (1) percent level. All specifications include time effects and a constant, not reported

sectional regressions controlling for the level of economic literacy. With such evidence at hand, the last section of the paper will consider alternative measures of "competence".

5.2 Alternative indicators of competence

The indicator of economic literacy measures economic-specific competences. This might not be the only dimension of education relevant to the relationship between inequality and finance. This section considers indicators that account for narrower sets of competence as well as for general schooling.

A more specific indicator of competence is the index of "education in finance" by the IMD World Competitiveness Yearbook. Estimation results in the first column of Table 7 show that education in finance is negatively associated to inequality growth, but not significantly so at conventional levels. This might suggest that what matter most to the variation of income inequality at the aggregate level is the ability to understand basic economic concepts of the population in general, rather than the level of skills needed to perform specific tasks while working in enterprises.

Table 7 reports also results on the association between income inequality growth and more general and less subjective indicators of human capital, such as the level of schooling attainment. Using the data by Barro and Lee (2013) on secondary schooling attainment, the estimates in column 2 suggest that the level of human capital might not be crucial when it comes to operate on financial markets for consumption smoothing or households' portfolio diversification purposes. Next, the specification in column 3 of Table 7 considers the PISA test scores for mathematics, the OECD measure that records 15 years old pupils' educational achievement on mathematics. This variable is significantly and negatively associated to income inequality growth, maybe indicating that also being mathematically literate and able to perform sums, subtractions, and more complex mathematics, helps make well-founded decisions in financial markets increasing people ability to benefit from them.

The indicators of competence considered in this section refer to more or less specific sets of competence. Of course, their information content is to some extent overlapping. For instance, it may well be the case that countries where people can apply basic economic concepts years later school enrollment, also record high PISA scores, as suggested by the correlations reported in Table 11 of the "Data appendix". Interestingly, results from the empirical models considered in Table 7, that include one indicator of competence at a time to avoid collinearity, indicate that they capture different dimensions of human capital accumulation with respect to economic literacy.

The last column of Table 7 reports results from the shorter sample for which time series information on the economic literacy indicator is available on a yearly basis. Since the indicator of economic literacy was computed starting in 1995, regressions are run on the three sub-periods for which full data are available (i.e. 1996–1999, 2000–2003, 2004–2007). As discussed in Sect. 4, time series information on economic literacy does not to add much to the analysis, because the relative position of countries has not changed much over the period considered. Despite the loss of information due to the shorter time-span, the association between economic literacy and income inequality growth is still negative and significant in all specification, while the coefficient of financial development is not precisely estimated.[7]

In summary, the estimates in Table 7 may be interpreted as supportive of the argument that economic literacy plays a crucial role as a factor relevant to access to financial markets: people seem to need economic-specific knowledge to take advantage from the wide range of opportunities that increasingly complex financial markets are offering. Also being able to master mathematics may help increase the awareness needed to make everyday decisions correctly, and in turn play a role in explaining the variation of aggregate income distributions, while general education, as measured by schooling attainment, has not a significant explanatory power.

[7] Results are robust to alternative ways of measuring time-varying economic-specific competences, e.g. as the last value of economic literacy in each sub-period, that would allow to run regressions on four sub-periods.

6 Conclusions

This paper documents a robust association between economic literacy and income inequality growth. Both in cross sectional and panel data, the ability to understand and use financial instruments that economic literacy proxies for is negatively and significantly associated to inequality. The same is not true for the association between financial market development and inequality usually referred to as the "finance-inequality" nexus.

The evidence suggests that economic-specific competences are a relevant dimension of access to financial markets that quantitative measures of financial market development do not capture, and provides insights on the theoretically ambiguous but so-far empirically well-established finance-inequality nexus. In a world where financial products became more complex and governments enact policies that increase financial market liberalization on the one hand, and demand decisions about the allocation of private savings to individuals on the other hand, access to finance without a proper understanding of basic economic concepts may not help the poor.

The paper considers other measures of human capital to show that it is not general schooling but economic literacy and, to a lower extent, the ability to perform mathematical computations that matters to inequality. This is consistent with the idea that to understand and exploit financial market's opportunities people need to acquire economic-specific competences (Lusardi and Mitchell 2014).

The analysis has strong normative implications. If aggregate income inequality does not decline in the availability of more complex and sophisticated financial instruments per se, but in the ability to understand and use them, for education policies to help reduce inequality financial markets deepening should be accompanied by an increase of economic competence among the population.

In future work, as new data will become available, it would be interesting to study the effect of economic literacy on a larger sample of countries at different stages of financial development, and to investigate the effect, if any, of the recent 2008 financial turmoil on the "economic literacy-inequality nexus" uncovered in this paper.

Acknowledgements I thank Tullio Jappelli, Maela Giofrè, Chiara Daniela Pronzato, Serena Trucchi, participants at the 7th Max Weber Fellows June Conference and at the CeRP Conference on "Financial Literacy, Saving and Retirement in Aging Society" for their helpful comments. The usual disclaimer applies.

Data Appendix

See Tables 8, 9, 10 and 11.

Inequality

Data on inequality are drawn from the UNU-WIDER World Income Inequality Database (version 2.0c, May 2008). This database updates the World Bank database

Table 8 Information, by country

Country	Obs.	Country	Obs.
Austria	3	Luxembourg	5
Belgium	7	Malaysia	2
Brazil	2	Mexico	5
Bulgaria	4	Netherlands	4
Czech Republic	4	New Zealand	4
Denmark	7	Norway	4
Finland	7	Philippines	3
France	7	Poland	5
Germany	4	Portugal	3
Greece	3	Romania	3
Hungary	7	Slovak Republic	4
India	5	Slovenia	4
Indonesia	3	Spain	6
Ireland	7	Sweden	4
Israel	5	Thailand	5
Italy	5	United Kingdom	7
Japan	2	United States	4

Table 9 Summary statistics, 1980–2007 cross-sectional analysis

Variable	Obs.	Mean	Std. Dev.	Min	Max
Growth of Gini	34	0.00	0.01	− 0.01	0.02
Financial development	34	0.70	0.37	0.11	1.71
Economic literacy	34	5.02	1.24	2.93	7.11
Trade openness	34	0.77	0.43	0.16	2.25
Inflation	34	0.28	0.91	0.01	5.28
GDP per capita growth	34	0.02	0.01	0.01	0.06
Dependency ratio	34	0.54	0.09	0.44	0.75
Population growth	34	0.02	0.06	− 0.15	0.06

This table shows descriptive statistics for the variables used in the cross-sectional analysis. They refer to the underlying average of the data (not to the transformations used in the regressions, namely the log of financial development, trade openness, and economic literacy)

by Deininger and Squire (1996) and includes new estimates from the Luxembourg Income Study and from the TransMONEE.

Finance

Financial development is the "Private Credit by Deposit Money Banks and Other Financial Institutions to GDP" from the World Bank "Financial Development and Structure Database" (Beck and Demirgüç-Kunt 2009).

Table 10 Summary statistics, panel analysis

Variable	Obs.	Mean	Std. Dev.	Min	Max
Growth of Gini	154	0.01	0.07	− 0.26	0.23
Financial development	154	0.69	0.40	0.08	1.78
Economic literacy	154	5.10	1.22	2.93	7.11
Trade openness	154	0.80	0.47	0.12	2.97
Inflation	154	0.20	1.10	0.00	13.29
GDP per capita growth	154	0.03	0.02	− 0.07	0.10
Dependency ratio	154	0.53	0.09	0.40	0.84
Population growth	154	0.00	0.00	− 0.01	0.01
Education in finance	154	5.93	1.21	3.93	8.02
Schooling	154	0.45	0.12	0.18	0.68
PISA score	132	4.90	0.36	3.70	5.49
Investor protection index	154	6.15	1.45	3.30	9.70

This table shows descriptive statistics for the variables used in the panel analysis. They refer to the underlying average of the data (not to the transformations used in the regressions, namely the log of financial development, trade openness, and economic literacy)

Table 11 Correlations between indicators of competence

	Economic literacy	Education in finance	Schooling	PISA score
Economic literacy	1			
Education in finance	0.86	1		
Schooling	0.30	0.15	1	
PISA score	0.63	0.50	0.50	1

Competence

The World Competitiveness Yearbook compiles indexes of economic competence on the basis of interviews with senior business leaders. The "economic literacy among the population" index ranges from 0 to 10, lower values indicating that the level of competence in economics subjects is low. It is available for 55 countries over the 1995–2008 period. The "education in finance" index ranges from 0 to 10, lower values indicating that the level of competence in financial subjects does not meet the needs of the enterprises. It is available for 55 countries over the 1999–2008 period. Data on "Schooling" are drawn from the "Education Attainment for Total Population, 1950–2010" database by Barro and Lee (2013), and refer to the percentage of people with secondary school attainment over the population aged 15 years-old or later. "PISA score" is the mean value of the PISA indicator that

assesses 15-year-old boys and girls' performance in mathematics in 2006, compiled by the OECD.

Control variables

"Trade openness" is the ratio of export plus imports to GDP by the Penn World Tables (issue: June 3, 2011). "Inflation" is the annual percentage growth of the GDP deflator from the World Bank's World Development Indicators online (issue: April 17, 2012). "GDP per capita growth" is the annual growth rate of GDP per capita from the IMF online database. "Population growth" is the annual growth of population, computed using data from the Penn World Tables, Version 6.3 (Heston et al. 2009). "Dependency ratio" measures the number of people aged below 15 and above 65 as a percentage of the total population, and is drawn from the World Bank's World Development Indicators.

Instrumental variables

Investor protection is measured by the "strength of investor protection index" compiled by the Doing Business Project. It includes information on the extent of disclosure, the extent of director liability, and ease of shareholder suits indices, and ranges from 0 to 10, a higher value indicating stronger investor protection. Dummy variables for "legal origin" define five legal-origin groups as in La Porta et al. (1999): English Common Law; French Commercial Code; German Commercial Code; Scandinavian Commercial Code; Social/Communist Laws.

References

Banerjee, A., & Newman, A. (1993). Occupational choice and the process of development. *Journal of Political Economy, 101*(2), 274–298.

Barro, R., & Lee, J. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics, 104,* 184–198.

Baum, C. F., Schaffer, M. E., & Stillman, S. (2007). Enhanced routines for instrumental variables/GMM estimation and testing. Boston College Economics Working Paper 667.

Beck, T., & Demirgüç-Kunt, A. (2009). financial institutions and markets across countries and over time: Data and analysis. World Bank Policy Research Working Paper 4943.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth, 12,* 27–49.

Bertola, G., & Lo Prete, A. (2009). Openness, financial markets, and policies: Cross-country and dynamic patterns. *Annals of Economics and Statistics, 95*(96), 167–182.

Caliendo, F., & Findley, T. (2013). Time inconsistency and retirement planning. *Economics Letters, 121*(1), 30–34.

Claessens, S., & Perotti, E. (2007). Finance and inequality: Channels and evidence. *Journal of Comparative Economics, 35,* 748–773.

Clarke, G., Xu, L., & Zou, H. (2006). Finance and income inequality: What do the data tell us? *Southern Economic Journal, 72*(3), 578–596.

Deiniger, K., & Squire, L. (1996). A new data set measuring income inequality. *The World Bank Economic Review, 10*(3), 565–591.

Deiniger, K., & Squire, L. (1998). New ways of looking at old issues: Inequality and growth. *Journal of Development Economics, 57*(2), 259–287.
Demirgüç-Kunt, A., & Levine, R. (2009). Finance and inequality: Theory and evidence. *Annual Review of Financial Economics, 1,* 287–318.
Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth, 7,* 195–225.
Eichengreen, B. (2015). The next financial crisis. *Economia Politica, 32*(1), 53–66.
Fornero, E., & Lo Prete, A. (2017). Voting in the aftermath of a pension reform: The role of financial literacy. CeRP Working Paper 171/17.
Galor, O., & Moav, O. (2004). From physical to human capital accumulation: inequality and the process of development. *Review of Economic Studies, 71*(4), 1001–1026
Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *Review of Economic Studies, 60,* 35–52.
Greenwood, J., & Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy, 98,* 1076–1107.
Guiso, L., & Jappelli, T. (2008). Financial literacy and portfolio diversification. CSEF Working Paper 212.
Heston, A., Summers, R., & Aten, B. (2009). Penn World Table Version 6.3. Compiled by the Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, August 2009.
Honohan, P. (2009). Household financial assets in the process of development. In J. B. Davies (Ed.), *Personal wealth from a global perspective, part 3* (pp. 271–292). Oxford: Oxford University Press.
Jappelli, T. (2010). Economic literacy: An international comparison. *Economic Journal, 120,* F429–F451.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal determinants of external finance. *Journal of Finance, 52*(3), 1131–1150.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The quality of government. *The Journal of Law, Economics, and Organization, 15*(1), 222–279.
Li, H., Squire, L., & Zou, H. (1998). Explaining international and intertemporal variations in income inequality. *Economic Journal, 108,* 26–43.
Lo Prete, A. (2013). Economic literacy, inequality, and financial development. *Economics Letters, 118,* 74–76.
Lusardi, A., Michaud, P., & Mitchell, O. (2017). Optimal financial knowledge and wealth inequality. *Journal of Political Economy, 125*(2), 431–477.
Lusardi, A., & Mitchell, O. (2007). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics, 54*(1), 205–224.
Lusardi, A., & Mitchell, O. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature, 52*(1), 5–44.
Pagano, M., & Volpin, P. (2005). The political economy of corporate governance. *American Economic Review, 95*(4), 1005–1030.
Paukert, F. (1973). Income distribution at different levels of development: A survey of evidence. *International Labor Review, 108,* 97–125.
Rajan, R. G., & Zingales, L. (2003). The great reversals: The politics of financial development in the twentieth century. *Journal of Financial Economics, 69,* 5–50.
Summers, R., Kravis, I., & Heston, A. (1984). Changes in the world income distribution. *Journal of Policy Modeling, 6,* 237–269.
Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics, 101,* 449–472.