Financial Systems and Income Inequality

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Abstract

This paper examines the impact of financial systems on income inequality. In the debate on 'real' effects of financial systems, economic growth has been analysed in detail, while potential welfare effects on income inequality have been widely neglected. Against the background of a trend towards more market-based and less bank-based systems, this paper examines differences between financial systems in terms of income inequality in the European Union. Based on causalities established in existing literature, it is argued that in a more market-based financial systems, stock markets are larger, offering a wider choice and higher yields for high income earners, who have higher shares of their portfolio in stocks, such that income inequality widens compared to a more bank-based financial system. This hypothesis is tested in a panel analysis with a sample of 27 European Union member states from 1995 to 2012. It is found that an increase in the market-based component of a financial system leads to slightly higher income inequality as measured by the Gini coefficient. However, the effect is small and not robust to alternative measurement by the S80/S20 ratio. Decomposing income growth by quintiles does not reveal any influence of changes in the market-based component on inequality. Instead, increases in the bank-based component negatively affect income growth across the income distribution. Yet, the indicative results show that the topic of types of financial systems influencing income inequality might be relevant and deserves attention from both academia and policy-makers. Assessment of the Capital Markets Union project, which introduces a structural reform towards a more market-based financial system in the European Union, should therefore take potential welfare impacts through the income distribution into account.

Contents

1 Introduction

Financial systems are the basis of modern economies by providing a structure for interaction between economic agents. As a matter of course, the type of structure determines central features of the economy. Traditionally distinguished in market-based and bank-based, financial systems establish the relevance of different kinds of financial institutions like banks and capital markets. In recent years, researchers increasingly discuss the 'real effects' of financial systems. On this note, a debate arose on the strong bank base in Europe, which is said to negatively impact economic growth and business cycles compared to economies dominated by capital markets (European Systemic Risk Board, 2014).

Comparative literature largely focuses on impacts concerning economic growth, investment and the corporate sector. Other welfare effects are scantly studied, yet, first evidence indicates that financial system can affect income inequality (Cournède et al., 2015). This paper therefore seeks to provide further insights on the relationship between financial structures and income inequality as contribution to the ongoing debate on 'real effects' of financial systems. It synthesises the main arguments commonly mentioned in the literature that form the theoretical basis for establishing a link between financial systems and income inequality. While most existing research deals with the demand for credit, this study emphasises factors influencing the supply of savings from households, which in the long-term impacts inequality in wealth. To this purpose, it connects the literature on financial systems with research on financial literacy and participation costs in markets. Furthermore, it generates indicative empirical evidence for the influence of the type of financial system on income inequality in the European Union in recent years.

Within the scope of a fixed effects model, the analysis finds that a 10% increase in the market-based component of a financial system raises statistically significantly the Gini coefficient on average by 0.14 Gini points, ceteris paribus. When income inequality is measured alternatively by the S80/S20 ratio, this small effect is statistically non-significant. Increases in the scale of the bank-based component do not significantly affect income inequality, but show a negative influence on income growth throughout the income distribution. Higher efficiency of capital markets has a small significant effect of increasing inequality and decreasing income growth of the bottom quintile. These results partly confirm the results of previous studies and demonstrate the importance of considering alternative inequality measures to test for robustness.

What is more, the impact of changes in the financial system is relevant for policy reforms. Following a world-wide trend of reform towards more market-based systems in the last decades, the European Commission presented in 2015 a plan for a Capital Markets Union (European - Commission, 2015a), which induces a structural change towards a more market-based system in the traditionally more bank-based European Union (EU). Findings of this paper confirm the European Commission's claim that the banking component of EU financial systems has reached a magnitude where further increases negatively affect income growth. However, the analysis shows that increases in capital market size and efficiency may fuel income inequality.

The paper is structured as follows: The first section develops the theoretic framework with a note on income inequality and the comparison of financial systems, a classification of the main channels identified linking financial systems and inequality and a review of relevant empirical studies. Subsequently, the model and data used to test the relationship between the financial system and income inequality are presented. A third section describes the key findings, which are put into context, both from an academic perspective and in relation to the current policy debate in a last section.

2 Towards a Theory of Financial Systems and Income Inequality

Income inequality is a complex issue. Numerous factors determine the distribution of income in an economy. It seems likely that the underlying set-up of economic structure — such as the financial system — is one such determining factor. However, the academic analysis of the link between financial systems and the real economy is based on many different approaches rather than one comprehensive theory. This section therefore explores the theoretic foundation for studying income inequality and for comparing financial systems, classifies previously established hypotheses and reviews empirical studies on the finance-inequality nexus.

2.1 A Note on Income Inequality

Economic growth is widely used as indicator for welfare effects. To measure welfare comprehensively, it is however necessary to consider additional indicators. For example, growth is not always equally distributed: "The benefits of economic growth have tended increasingly to go to a smaller segment of society. In the United States, for example, between 1975 and 2012 around 47% of total growth in pre-tax incomes went to the top 1%" (Keeley, 2015, p. 33). Often a benefit is attributed to income inequality as creating incentives, yet, there is evidence that it negatively impacts economic growth, social mobility and possibly health (Keeley, 2015, p.12, p. 103). Recent literature even links income inequality to financial instability and recessions (Cardaci and Saraceno, 2016).

Overall, income inequality in the world and in developed countries has first declined and then risen slowly in the 20th century (Keeley, 2015, p. 32). In OECD countries, the slow recovery from the economic crisis has, until end of 2016, not reduced income inequality and bottom incomes are still below pre-crisis level (OECD, 2016). The rise in inequality in many countries in recent decades coincided with global reforms (Christopoulos and McAdam, 2015, p. 3) and strong growth of the financial sector (Denk and Cournède, 2015, p. 7). A mere coexistence of increasing trends is certainly possible, but since the 'real effects' of financial systems have gained much prominence and inequality obviously impacts welfare, the relationship between the two concepts deserves attention.

Inequality can take numerous forms. From a societal and economic perspective, facets such as the inequality in opportunities are most certainly relevant. This paper deals with inequality in

monetary terms and in particular incomes, in contrast to inequality in wealth. Wealth matters and influences income, but income is in most cases a better indicator of household economic resources (Keeley, 2015, p. 18).

Different economic, social and political factors impact income inequality, such as globalisation, changes in societies and policies of deregulation, but some authors also mention "the emergence of a 'superstar' labour market, the growing use of stock options and performance pay and the 'financialisation' of economies (Keeley, 2015, p. 42). For example, rising income inequality in OECD countries in the last decades is attributed to skill-biased technological change, tax and so-cial reforms and financial development (Denk and Cazenave-Lacroutz, 2015, p. 5). To understand dynamics of income inequality, it is crucial to break down the concept in its components: "In all societies, income inequality can be decomposed into three terms: inequality in income from labor; inequality in the ownership of capital and the income to which it gives rise; and the interaction between these two terms" (Piketty, 2014, p. 238). Inequality in income from labour is largely in-fluenced by supply of and demand for different skills, by education and labour market institutions (Piketty, 2014, p. 243). But income arising from capital might be the dominating cause of re-cent income inequality developments: Globalisation has increased the ratio of skilled to unskilled wages and reduced rates of return on labour compared to capital, increasing the share of capital in total income and by a more unequal wealth distribution than income distribution hence also income inequality (Domanski et al., 2016, p. 47). For inequality from capital income, savings and investment behaviour, inheritance law and financial markets are determining factors (Piketty, 2014, p. 243).

Literature linking finance and inequality is still in its fledgling stages (Beck, 2011). Pre-condition for analysing possible effects of financial systems is that different types of systems can be clearly distinguished.

2.2 Financial Systems in Comparison

A financial system is defined as "all financial intermediaries and financial markets and their re-lations with respect to the flow of funds to and from households, governments, business firms, and foreigners, as well as the financial infrastructure" (De Haan et al., 2009, p. 5). It has the main function of reducing information and transaction costs and facilitating the trading, diversifi-cation, and management of risk (De Haan et al., 2009, p. 6). In general, financial systems allocate resources by transferring savings to borrowers, making intertemporal smoothing of consumption and risk sharing possible (Allen and Gale, 2001, p. 3-4). Different types of financial systems exist and are traditionally distinguished in two broad categories: Bank-based systems, where indirect finance dominates, and market-based systems, which rely more on financial markets, where direct trading of securities takes place (De Haan et al., 2009, p. 5-6). According to Allen and Gale (Allen and Gale, 2001, p. 4), the United States and the United Kingdom are the most market-based economies, Japan is situated in the middle field, France is rather bank-based and Germany can be considered the most extreme bank-based system. As a matter of course, exclusive bank-

or market-based systems are ideal types and in reality, economies always exhibit features of both types (De Haan et al., 2009, p. 21). In practice, systems are hence classified by the prevailing component.

To determine the relative size of market and bank components, different indicators are used. It is common to compare the weights of the stock market capitalisation and bank assets relative to Gross Domestic Products (GDP). Alternatively, portfolio allocations of economic agents can be considered. In the EU, households channel most of their savings in easily accessible deposits, while United States households invest more in assets with long maturity, such as shares, life insurances and pension funds (Véron and Wolff, 2015, p. 6). Statistics show that equity holdings constitute 45% of household assets in the United States, while in Germany and France cash and cash equivalents prevail (Allen and Gale, 2001, p. 75). End-2013, EU households held only 4% of assets in listed shares and bonds, 6% in investment funds, 20% in pension entitlements, 16% in life insurances and the lion's share of 30% in bank deposits (European Commission, 2015c, p. 29).

The type of system is not a static feature: It is constantly evolving with historic, legal, political and economic developments.[1] In the last decades, a trend became evident as more economies transit towards market-based systems (Allen and Gale, 2001, p. 5). In OECD countries both the size of the total financial sector and stock market capitalisation have increased significantly since the 1970s (Cournède et al., 2015, p. 7). With growing belief in the effectiveness of markets in resource allocation, structural reforms strengthening the market component have, for example, taken place in France, Japan and Latin America (Allen and Gale, 2001, p. 6). Despite this general trend towards a dominance of markets, significant cross-country differences in financial systems persist (International Monetary Fund, 2006, p. 111).

In the European Union, capital markets are underdeveloped relative to the general economic development and largely national with a significant home bias in investment (Véron and Wolff, 2015, p. 7-8). Although most European countries joined the worldwide trend of disintermediation (International Monetary Fund, 2006, p. 106), Europe's banking sector is still large both relative to the size of the economy and relative to other sources of intermediation (European Systemic Risk Board, 2014, p. 6). The general shift towards more market-based systems in the 1990s was larger in the United States while an observed shift back towards more banking in the 2000s was greater in Europe, such that the difference between the United States and Europe further increased in recent decades (European Systemic Risk Board, 2014, p. 6). In the last 5 years, banks in Europe — in particular the largest ones — have grown considerably (European Systemic Risk Board, 2014, p. 3). For example, in 2013, total assets of the EU banking sector reached on average 274% of GDP

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[1]For example, instability in the 18th century triggered the introduction of financial market regulation in the United Kingdom and France, which was removed again in the United Kingdom in the 19th century and stayed in force in France (Allen and Gale, 2001, p. 497). The United States followed the British model, while Germany, Japan and other European countries followed the French model (Allen and Gale, 2001, p. 497). For legal reasons, "capital markets are more developed in countries with a common law tradition" (European Commission, 2015c, p. 25). The various origins of the respective type of financial system have been widely discussed in academic literature and involve a separate debate going beyond the scope of this paper, which focuses on the effects of rather than determinants of financial systems.

with some countries having values of above 400% of GDP, while they equalled only 83% of GDP in the United States. Relevant determinants of the persisting dominance of banks in Europe are the public and political support for banks, inadequate prudential supervision and technological innovations (European Systemic Risk Board, 2014, p. 35). Despite common trends, financial systems within Europe still differ significantly in both the size of financial markets and the importance of bank and non-bank financial intermediaries (De Haan et al., 2009, p. 14).

In the public debate as well as in academia, it is increasingly argued that in Europe a threshold of banking sector size, until which increasing scale contributes to growth, has been exceeded (European Systemic Risk Board, 2014, p. 42). Instead, the large banking sector is said to cause imbalances, such as over-investment in housing and increased systemic risk (European Systemic Risk Board, 2014, p. 42). Moving towards a more market-based financial system is welcomed by most economists for reasons of risk-sharing, consumption smoothing and liquidity for investment (Véron and Wolff, 2015, p. 2). Nevertheless, there is a lack of an acknowledged model for the financial sector as consensus basis for quantifying economic benefits of bigger capital markets (Véron, 2014, p. 4).

Comparing financial systems is a complicated endeavour and it is hard to choose a superior type, since different systems have both advantages and disadvantages (Allen and Gale, 2001, p. 21). "Any comparison of financial markets and financial institutions involves complex trade-offs", such as between growth and stability (Allen and Gale, 2001, p. 9). According to Allen and Gale (2001, p. 22), market-based systems offer competition, efficiency, public information and external control, while bank-based systems provide insurance, stability, private information but eliminated free riding and autonomy. Hence, different dimensions for comparison can be chosen.

The effect on economic growth has been explored in detail (Cournède et al., 2015). Most literature concludes that financial development, but not the difference between bank-based and market-based systems, can explain variation in economic growth (Beck, 2011). Theory predicts ambiguous effects of financial development on growth (Beck, 2011). Evidence is mixed (De Haan et al., 2009, p. 29) and shows that there is a certain threshold, after which financial markets have negative effects on growth (Keeley, 2015, p. 58). It is often found that financial development is beneficial if the financial sector is small, but "there can be too much finance" when financial sectors are already well developed, causing slower growth and higher vulnerability to crises (Cournède et al., 2015, p. 7). Yet, recent studies find that in the long-term, it makes a difference how finance is composed, because household credit through bank-lending can have a negative impact on growth in contrast to business credit from capital markets (Cournède et al., 2015, p. 7). Ultimately, there is no valid conclusion from research on which financial structure is best for growth (European Commission, 2015c, p. 18).[2]

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[2]Reviews of the finance-growth literature can be found in European Commission (2015c, p. 20), Demirguc-Kunt and Levine (2009), Beck (2011), Cournède et al. (2015) and European Systemic Risk Board (2014).

Bank-Based Financial Systems

Advantages	Disadvantages
• Provide better insurance for investors • *Ensure higher stability of the financial system* • Protect private information and eliminate free riding	• Only contribute to growth until a certain threshold in the size of the banking sector is reached • *Lead to slower recovery after a shock* • A large banking sector causes systemic imbalances, such as over-investment in housing and increased systemic risk • *Household credit through bank-lending has a negative impact on growth in contrast to business credit from capital markets*

Market-Based Financial Systems

Advantages	Disadvantages
• Enable greater risk-sharing • Provide more liquidity for investment and consumption • Lead to higher competition and efficiency • Enable better consumption smoothing over the economic cycle • Provide more public information, meaning higher transparency and greater external control • *Absorb shocks to the system*	• Expose households to a greater extent to swings in asset prices • *Contribute to growth only until a certain threshold* • *Provide less systemic stability* • Allow free riding based on public information

The table is based on arguments set out in Allen and Gale (2001), European Systemic Risk Board (2014), International Monetary Fund (2006), European Commission (2015c) and Cournède et al. (2015). *Italics* indicate controversial arguments.

Table 1: Advantages and Disadvantages of Bank-Based and Market-Based Financial Systems.

Other effects of finance, which are commonly considered, are investment and the level of credit provided. Higher liquidity, transparency and risk sharing in market-based systems "can increase the pool of savings to which domestic households and firms have access, potentially supporting a higher level of consumption and investment" (International Monetary Fund, 2006, p. 123). Another aspect that garnered significant traction during the last financial crisis is the impact of financial systems over the business cycle: Policy-makers often argue that capital markets absorb shocks, while reliance on banks slows growth and recovery (European Commission, 2015c, p.

11). Academic studies find that market-based systems allow for better consumption smoothing over the economic cycle and provide more liquidity and transparency, but have the drawback that households are more vulnerable to swings in asset prices (International Monetary Fund, 2006, p. 106, 124).

Literature on the impact of finance on inequality is largely limited to the aspect of financial development rather than types of financial systems (Beck, 2011). The following section sets out how existing approaches and findings can be connected to establish a finance-inequality nexus.

2.3 The Finance-Inequality Nexus

Financial systems can be considered in three dimensions: first, the demand for funding of different economic agents, like corporations, households and government, second, the intermediation and third, the supply of funds from asset owners, i.e. savers and investors (Véron and Wolff, 2015, p. 3). Since this paper focuses on the aspect of income inequality, the perspective of households is taken, which plays a central role in two dimensions: Households demand credit from banks and markets and supply savings to the financial system. Intermediation is relevant to some extent in its role as employer, because financial companies pay wages that are often higher compared to other sectors, affecting income inequality in a direct way. Here, emphasis is placed on supply channels that establish a link through saving patterns.

Demand-Side Channels

The demand for credit is the most frequently discussed factor to link financial systems and income inequality. Various studies analyse the effect of credit expansion on inequality, such that a focus is put on financial development without differentiation between different types of financial systems. The idea is that "credit availability shapes the opportunity to undertake financial and human capital investments" (Denk and Cazenave-Lacroutz, 2015, p. 6). Therefore, financial expansion benefits the poor if it enables credits for high-return investments, such as education, by increasing employment (Cournède et al., 2015, p. 23). However, this factor is most likely less relevant in advanced economies (Cournède et al., 2015, p. 23), where all households can attain a certain degree of education and investment through a higher level of income, redistribution and public goods.

Quite the contrary, in developed financial systems, an effect of credit supply in the opposite direction is more probable: The seminal paper by Greenwood and Jovanovic (1990) proposes a U-shaped relationship, where financial development first decreases and then increases inequality. This is explained by the distribution of credit being more unequal than the distribution of income, such that benefits of credit, like consumption smoothing and investment opportunities, accrue disproportionately to high-income households and increase top incomes (Denk and Cazenave-Lacroutz, 2015, Christopoulos and McAdam, 2015, Keeley, 2015, Cournède et al., 2015). Nevertheless, existing studies reject that lending rate differentiation plays a role for inequality (Denk and Cazenave-Lacroutz, 2015, p. 6). Finally, besides direct effects on household credit availabil-

ity, indirect effects through business credit that generates employment are possible (Beck, 2011). Reverse causality, i.e. higher inequality causing more credit availability, is theoretically possible, but to date no evidence is found for such an effect (Cournède et al., 2015, Denk and Cournède, 2015).

Overall, credits are a recurring theme in the finance-inequality literature. Notwithstanding, there is no consensus on the existence, direction and significance of the effect, nor have demand-side studies shown different effects of market-based and bank-based financial systems. OECD data reject the existence of a transmission channel of credit availability impacting inequality through financial crises and consumption smoothing, while instead a direct effect of high financial sector wages is evident (Denk and Cournède, 2015, p. 8). Tanndal and Waldenström (2016) argue that the high profitability of the financial sector and the resulting high wages are the most likely explanation for strong increases in top incomes when financial markets are deregulated. This direct channel could be relevant, because in Europe, financial sector employees "account for 1 in 5 of the top 1% of earners even though, overall, they account for only 1 in 25 of the total workforce" (Keeley, 2015, p. 58). Financial sector wages can partly explain top income growth (Cournède et al., 2015, p. 7, p. 28), but since this paper considers the entire income distribution, the following supply-side factors need to be considered.

Supply-Side Channels

Supply-side factors could potentially have larger effects: With total financial assets amounting to almost 220% of GDP in the European Union, "households are the traditional ultimate supplier of funds in the economy" (European Commission, 2015c, p. 29). This observation holds when netting with credit demand and even reflects an increasing trend. With more than 140% of GDP in 2014, households are the biggest net provider of funding, contrary to non-financial corporations and governments, which are net borrowers (European Systemic Risk Board, 2014, p. 38).

A major supply-side factor that can link finance to incomes is saving rates. By definition, income inequality is the sum of inequality from labour income and inequality from capital income (Piketty, 2014, p. 242). It is important to take the latter into consideration, because "inequality with respect to capital is always greater than inequality with respect to labor" (Piketty, 2014, p. 244). "In the euro area, 50% of households below or just at the median level hold only 12% of the net wealth, while the top decile holds 50% of net wealth" (Arrondel et al., 2014, p. 7). And apart from labour earnings and social benefits, "wealth can, in itself, generate income, and so as wealth inequalities widen, they, in turn, fuel income inequalities" (Keeley, 2015, p. 21). Milanovic (2016, p. 23) also finds that "the way the rising share of capital income gets transmitted into greater inter-personal inequality varies between different social systems in function of the underlying asset distribution". First, saving rates and rates of return can increase with initial capital endowment as argued by Piketty (2014, p. 26, p. 430-431), because higher income earners can afford financial advisers, benefit from economies of scale and accept higher risks and patience. "Since 2010, high equity returns have been the main driver of faster growth of net wealth at the top of the distribution"

(Domanski et al., 2016, p. 55). A 'snowball effect' could be the reason for increasingly dispersed income and wealth in advanced economies, because richer people save more, such that higher income inequality triggers higher inequality in wealth and wealth concentration in turn increases income inequality (Domanski et al., 2016, p. 45-47). Milanovic (2016) confirms that capital-rich and overall-income are indeed closely associated.

A variation of this argument allows a differentiation of effects on income inequality through the supply of savings by type of financial system. Piketty (2014)'s observation that high income earners save more and own more capital can be linked with two additional stylised facts: First, it is an established fact that risky assets, such as stocks, have higher returns than safe assets (Guiso et al., 2003, p. 127). Second, ownership of risky assets like stocks is positively correlated with wealth and education (Arrondel et al., 2014). Combining these two observations leads to the core hypothesis of this paper: In more market-based financial systems, stock markets are larger, offering a wider choice and higher yields for high income earners, who have higher shares of their portfolio in stocks, such that income inequality widens compared to a more bank-based financial system. By combining different arguments and facts presented in literature, this hypothesis further develops the proposition of Denk and Cazenave-Lacroutz (2015, p. 6) that upper income households profit more from stock market expansion because stock market wealth is on average four times as unequally distributed as household disposable income.

Indeed, portfolio composition is found to be influenced by economic factors. Riskier assets are held by wealthier households, which diversify more than less wealthy households, whose income depends more on the business cycle (European Commission, 2015c, p. 63). Large investors are offered better conditions and are motivated to invest by peer effects (Guiso et al., 2003). Comparing asset classes in the euro area, participation is highest for deposits, which are held by almost all households, but the intensive margin for these safe assets is low (Arrondel et al., 2014, p. 11). In contrast, few households hold risky financial assets, and participation increases with wealth (Arrondel et al., 2014, p. 11). Studying a Swedish data set, Bach et al. (2016, p. 2) confirm that "richer households earn higher long-run returns primarily because they expose their portfolio to systematic risk much more than the rest of the population" and in addition have some asset-specific informational advantage. Domanski et al. (2016, p. 58-60) find that rising values of households' bond portfolios have not been associated with significant changes in wealth inequality, but rising equity prices may have increased it. Returns to stocks have varied more widely than in other asset classes, causing that "since 2010, high equity returns have been the main driver of faster growth of net wealth at the top of the distribution" (Domanski et al., 2016, p. 55).

A second dimension of supply-side channels can be derived from the research on participation costs and financial literacy. An important difference between bank-based and market-based financial systems is the risk exposure of households, which either hold securities in the market or fixed claims on financial institutions (Allen and Gale, 2001, p. 8). For example, the better legal protection of bank deposits compared to riskier market assets, which are more highly exposed to business cycles, plays an important role (European Commission, 2015c, p. 63). Households can simply have a preference for safety and predictability (European Commission, 2015c, p. 63), but

an "uncertainty premium may be an important obstacle to participation in markets" (Allen and Gale, 2001, p. 448).

If households invest directly in markets or indirectly through intermediaries depends on preferences, need for liquidity for transactions, rate of returns, risk aversion and entrepreneurial culture, but also transaction costs and informational barriers (European Systemic Risk Board, 2014, p. 45). In contrast to other markets, participation costs in financial markets are crucial, since financial decisions are very complex (Allen and Gale, 2001, p. 499). "It is a truism that markets provide information, but it is less often remarked that in order to make use of the information provided by markets, economic agents need to have a great deal of information to start with" (Allen and Gale, 2001, p. 448). Indeed, "prices will not tell this [naive] investor the difference between an interest rate future and a convertible bond. This is information that he must acquire before he trades, perhaps at considerable cost" (Allen and Gale, 2001, p. 449). Given the complexity of financial decisions, some households make mistakes, such as non-participation in risky asset markets and under-diversification of risky portfolios (Campbell, 2006, p. 2, p. 39). In a seminal paper, Campbell (2006, p. 39) also finds that poorer and less educated households are more likely to make such mistakes.

The prediction from standard financial theory, that all participants should participate in all gambles with a positive expected return to some extent disregards fixed costs of participation, which keeps low-wealth households from investing (Campbell, 2006, p. 12). High transactions and information costs can exceed the expected returns of assets (European Commission, 2015c, p. 63). Even sophisticated investors are uncertain about actual values of some assets, but naive investors are most likely unable to predict outcomes of the wide choice of securities available on capital markets (Allen and Gale, 2001, p. 448), whereas bank accounts are very simple to use (Allen and Gale, 2001, p. 442). In the euro area, stock market participation in direct and indirect stock holdings is on average less than 10% in the bottom half of the income distribution and more than 25% in the top 20% (Denk and Cazenave-Lacroutz, 2015, p. 22). Stock market wealth is even more unequal than stock market participation: "Relative to their disposable income, the top 20% have four times as much stock market wealth as the bottom 20%" (Denk and Cazenave-Lacroutz, 2015, p. 22). Intertemporal portfolio models confirm that fixed costs can explain demand for assets increasing in income in the presence of entry or participation costs (Arrondel et al., 2014, p. 19). Such fixed participation costs can be time and money necessary to invest in the stock market as well as psychological factors (Campbell, 2006, p. 16). For example, wealthier households can afford to hire financial advisers, whose cost is not covered by lower scale saving of poorer households (European Commission, 2015c, p. 64).

Inversely, some authors put forth the idea that intermediaries reduce participation costs by providing information and investing on behalf of the customer (De Haan et al., 2009, p. 24). When a bank-based financial system is transformed to a more market-based system, it can hence be expected that due to a lack of information households will refrain from investing in the market or make investment mistakes when faced with increasingly complex decisions (Allen and Gale, 2001, p. 446). It is highly likely that this effect concerns lower income households proportionally more

than high income households.

Upon consolidating the arguments outlined in this section, the hypothesis can be derived that a higher market component of the financial system can increase income inequality, to a limited extent through demand effects and to some extent through direct wage impact and to a larger extent through supply channels.

2.4 Empirical Studies

Since the literature linking finance and inequality is only beginning to develop (Beck, 2011), there are only few papers, which compare bank-based and marked-based financial systems in terms of income inequality. This section contains a literature review, which is not exhaustive, instead it presents key results and methodology from selected studies, classified by the dimension of data sets.

Firstly, cross-section analyses are useful to derive systematic differences between countries at a given point of time and can be based on precise household survey data at micro-level, but are limited by the disregard of intertemporal changes. Beck et al. (2004) conduct a broad cross-country comparison of the effect of finance in terms of private credit on income growth of the bottom quintile and the Gini coefficient with data on 52 developing and developed economies averaged over the period from 1960 to 1999. They find a positive effect of financial development on poverty alleviation and reduction of income inequality (Beck et al., 2004, p. 5). This evidence for the existence of a demand channel through credit reducing inequality, is not confirmed in research based on more advanced economies: Denk and Cazenave-Lacroutz (2015) regress household income and income quintiles on financial depth measured by household credit relative to GDP and intermediated credit using data from the Eurosystem Household Finance and Consumption Survey. In contrast to Beck et al. (2004), they do not find a pro-poor channel working through intermediated credit expansion (Denk and Cazenave-Lacroutz, 2015, p. 8).

Guiso et al. (2003) consider six European countries and the United States in 1998 using a probit model for participation in the stock market and portfolio shares of stocks based on classical portfolio theory with participation costs. They find that stock market participation is higher when entry costs, such as trading costs, management fees and information costs, are lower (Guiso et al., 2003, p. 127). Furthermore, stock market participation increases with income, wealth and education (Guiso et al., 2003, p. 145, p. 158) because of participation costs, which for the poor cannot be offset by the utility loss when staying out the stock market (Guiso et al., 2003, p. 128). The confirmation of the supply-side hypothesis of costly markets also holds in a more recent study: Arrondel et al. (2014) derive stylised facts for asset participation, i.e. the extensive margin, and levels of asset holdings, i.e. the intensive margin, using probit and tobit regressions based on the first wave of the Eurosystem Household Finance and Consumption Survey, which covers 15 euro area countries. They find that ownership of risky assets is positively correlated with wealth and both extensive and intensive margin for risky assets are increasing in education (Arrondel et al.,

2014, p. 14).[3]

Secondly, time series data are rarely used in the field, since comparisons of financial systems are usually comparisons between countries. Nevertheless, two recent studies on financial reforms using time series data are worth noting. Christopoulos and McAdam (2015) run panel unit root tests for developed and emerging economies from 1970s until 2005 disentangling the trend of an aggregate index of financial reforms and the Gini coefficient analogous to the literature for conditional β convergence in economic growth. Their evidence from covariance stationary tests is mixed: Income inequality and financial reform measures both have a unit root, but financial reform covariates makes the series stationary to an extent varying by measure of reform and inequality with a negative impact on the gross Gini coefficient and a positive impact on the net Gini coefficient (Christopoulos and McAdam, 2015, p. 21). If financial deregulation leads to more market-based financial systems, the impact of such a structural change is thus not clear and depends on the system of redistribution, which determines the difference between gross and net Gini coefficient.

Studies that only focus on top incomes are not discussed here in detail, but a recent publication draws attention to new possibilities in methodology: Tanndal and Waldenström (2016) apply a novel method of synthetic control groups to simulate counterfactual time series for Japan and the United Kingdom. They find that financial deregulation strongly increases top incomes and attribute this effect to high financial sector wages (Tanndal and Waldenström, 2016).

Thirdly, panel data allow for the comparison between different countries over time, but are rather rarely used due to limited data availability. Household surveys are usually not covering longer periods, such that macro data has to be used for panel studies. The methodology is typically analogous to the models used in the finance-growth literature. In a seminal paper, Greenwood and Jovanovic (1990) predicted a non-linear relationship between financial development and income inequality, where the effect on the income distribution varies with the level of economic development with benefits for all at higher levels of development. Clarke et al. (2006) conduct a noteworthy panel analysis from 1960 to 1995 testing this theory of a U-shaped relationship between financial development and inequality using a sample of both developing and developed countries. Linking development in private credit and bank assets to the Gini coefficient they cannot confirm the theory and find that financial development reduces inequality at all levels of development (Clarke et al., 2006). As in Beck et al. (2004), a demand channel reducing inequality through credit availability is confirmed, but no difference between bank-based and market-based systems and in-depth analysis of higher levels of development is made. Moradi et al. (2016) differentiate countries by development status and find that the Gini coefficient increases for developing but decreases for developed countries with a larger market-based component in the financial system. However, the study is based on a small sample and measures the type of financial system with a dummy variable, which cannot account for the reality of mixed systems. De Haan and Sturm (2016) assess in addi-

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[3]The authors argue that this could be due to a permanent income effect if education increases expected wage earnings, or a background risk effect if higher education is linked to lower unemployment risk, or financial literacy, because risky assets are information intensive (Arrondel et al., 2014, p. 15, p. 20). The discussion of effects of education and the role of financial literacy goes beyond the scope of this paper. Nevertheless, such findings have to be mentioned, since they provide a possible explanation for a potential supply-side effect.

tion to financial development the impact of financial liberalization and financial crises on income inequality based on a panel of 121 countries from 1975 to 2005. They find that all three finance variables increase the gross Gini coefficient and the impact of financial liberalization on inequality to be conditioned by the level of financial development and the quality of political institutions (De Haan and Sturm, 2016).

Two recent OECD studies consider both growth and inequality. Cournède et al. (2015) study effects of intermediated credit and stock market capitalisation for OECD countries and a European subset, controlling for country and time fixed effects and financial crises. They find a negative impact of intermediated credit and a positive impact of stock market capitalisation on both average household disposable income growth and GDP growth (Cournède et al., 2015, p. 31). Their conclusions on inequality are based on the analysis by Denk and Cournède (2015) who study panel data of OECD countries over the past three decades employing a novel empirical methodology combining inequality and growth. Denk and Cournède (2015) measure financial size in three alternative specifications by the value added of finance, intermediated credit and stock market capitalisation. As dependent variables, they consider income inequality as measured by the Gini coefficient and income growth at different levels of income both in a direct estimation and indirectly through a simulation exercise. They find that across countries more finance — both on average and as country trend — is linked to higher income inequality, when measured in intermediated credit as well as when taken as stock market capitalisation, but not in value added of finance. Simulations confirm that more finance, especially measured as intermediated credit, but less in stock market capitalisation, had a negative impact of income growth in low- and middle-income households. Using the direct approach, more finance is found to bring higher income growth for the upper end of the distribution compared to middle- and low-income shares. To check if the causality is linked to rising wealth, they include the labour share. This does not change the results, but due to a small sample size the coefficients become non-significant. (Denk and Cournède, 2015)

This research hence confirms the existence of both demand and supply channels linking more credit and bigger capital markets to higher income inequality: "High-income households are the primary beneficiaries of expanding intermediated credit and stock market capitalisation, as their income growth tends to rise the most" (Denk and Cournède, 2015, p. 32).

Overall, first research showed the positive effect on inequality that decreasing credit constraints will benefit the poor at least in developing countries (Beck, 2011). More recent papers considering developed countries and contrasting credit expansion and capital market size show that finance can raise income inequality through both demand and supply channels by increasing top income growth. This paper therefore introduces a statistical model to test this relationship between characteristics of the financial system and inequality in income for countries with developed financial systems, building on Denk and Cournède (2015).

3   A Panel Model Linking Financial Systems and Income Inequality

Based on the theoretical considerations and previous studies, this section sets out the technical foundation for the empirical analysis in terms of methodology and data.

3.1   Model

This paper proposes a model to empirically estimate the effect of the type of financial system on income inequality analogous to models commonly used in the finance-growth literature, based on the paper by Denk and Cournède (2015). The model of Denk and Cournède (2015) is slightly varied and extended by adding alternative and additional finance and inequality measures to better capture the difference in types of financial systems.

In essence, the analysis consists of two separate statistical models, which together allow to draw robust conclusions of the effect of financial systems on income inequality. The first model examines the effect of a finance variable on an income inequality measure. It tests the null hypothesis that the structure of the financial system — i.e. market-based in contrast to bank-based — has an impact on inequality and is specified as follows:

$$inequality_{i,t} = \beta_0 + \beta_1 finance_{i,t} + \beta_2 education_{i,t}$$
$$+ \beta_3 tradeopenness_{i,t} + \beta_4 unemployment_{i,t} + v_{i,t} \qquad \text{MODEL 1}$$

Where *i* indicates the country, *t* the year, $v_{i,t}$ is an error term and *inequality* an income inequality measure. While Denk and Cournède (2015) use the Gini coefficient only, the present study tests in addition an alternative measure for robustness. The Gini coefficient is a widely used and recognised inequality measure, but it has several drawbacks, especially with respect to capturing poverty (Keeley, 2015, p. 19). Therefore, the S80/S20 ratio, another common inequality measure, which emphasises the discrepancy of top to bottom incomes, is used. According to Denk and Cournède (2015, p. 29), the model controls for the level of education, trade openness and the unemployment rate. This avoids an omitted variable bias, since these three factors are commonly stated to influence income inequality and might be correlated with the explanatory variables. *finance* captures characteristics of the financial system. As in Denk and Cournède (2015), the stock market capitalisation is used to measure the importance of capital markets. Further, Denk and Cournède (2015) use intermediated credit and the value added of finance as alternative measures, which capture the size of the financial sector in general. Since this paper seeks to differentiate types of financial systems rather than levels of financial development, different alternative specifications are chosen for the finance variable: Total bank assets as percentage of GDP are taken as proxy for the relevance of banks in a financial system, as commonly used in comparisons of types of financial systems, for example in Allen and Gale (2001). The stock market turnover ratio is taken as complementary measure of competitiveness induced in more market-based financial systems. After considering each variable separately as alternative specifications in separate estimations, they are considered

together in the same regression. This latter model is preferred since rather than measuring the financial sector in different ways, the idea is to measure different aspects of the financial system as a whole. The analysis hence assumes that the financial sector as a whole is a weighted sum of the bank component and the stock market component:

$$financialsector_{i,t} = \alpha_1 stockmarketfinance_{i,t} + \alpha_2 bankfinance_{i,t}$$

<div align="right">ASSUMPTION 1</div>

Where $\alpha_1 + \alpha_2 = 1$. This assumption disregards, however, that the financial system has a third component: finance intermediated by funds, such as pension funds, insurance companies and other investment funds. This element of finance is increasingly important, yet hard to measure and data on this component are scarce. The analysis is therefore, as common in the literature, based on the assumption above, where bank finance is approximated by the deposit bank assets and stock market finance by the stock market capitalisation. A possible influence of finance through funds will be contained in the error term: $\alpha_1 + \alpha_2 + u_{i,t} = 1$ with $u_{i,t}$ being a component of $v_{i,t}$. With the additional proposition that in market-based systems competition, and hence the stock market turnover ratio, is higher, the indicator characterising the financial system in model 1 becomes

$$finance_{i,t} = \gamma_1 stockmarketfinance_{i,t} + \gamma_2 bankfinance_{i,t}$$
$$+ \gamma_3 stockmarketturnover \qquad \text{ASSUMPTION 2}$$

Nevertheless, it is desirable to interpret each element separately in size and direction of effect, such that model 1 is spelled out

$$inequality_{i,t} = \beta_0 + \gamma_1 stockmarketfinance_{i,t} + \gamma_2 bankfinance_{i,t}$$
$$+ \gamma_3 stockmarketturnover + \beta_2 education_{i,t}$$
$$+ \beta_3 tradeopenness_{i,t} + \beta_4 unemployment_{i,t} + v_{i,t} \qquad \text{MODEL 1}$$

The previously discussed economic theory predicted ambiguous effects, but proposed that a positive supply channel, i.e. increasing inequality, prevails. Theory hence forms the expectation that γ_1 is positive for the stock market capitalisation, γ_2 negative for bank assets and γ_3 positive for the stock market turnover ratio. In addition, β_2 is expected to be negative with education reducing inequality, β_3 positive — trade openness increasing inequality — and β_4 positive, i.e. higher unemployment leading to higher inequality. Theory does not postulate a priori expectations about the magnitude of the effects, but the financial system is considered in addition to the well established influences of education, trade openness and unemployment, such that the coefficients of the latter are expected to exceed that of the former.

This first model already permits conclusions about the impact of financial systems on income inequality. However, the novel approach of Denk and Cournède (2015) combines this model with an analysis of income growth by decile to generate valid, robust and more specific evidence. The Gini coefficient has the limitation of weighting changes in different sections of the income distribution

identically, such that decomposing income changes in different subgroups of the income distribution gives additional insights. Denk and Cournède (2015, p. 32-33) use a simulation technique as first choice approach due to data limitations. Data used in this analysis permits the use of their second choice, a direct estimation of income growth for each decile. Here, income quintiles instead of deciles are used due to data availability and the finance variables are specified identically as in the first model:

$$
\begin{aligned}
incomegrowth_{i,t}^{q} =& \beta_0^q + \gamma_1^q stockmarketfinance_{i,t} + \gamma_2^q bankfinance_{i,t} \\
&+ \gamma_3^q stockmarketturnover + \beta_2^q education_{i,t} \\
&+ \beta_3^q populationgrowth_{i,t} + \beta_4^q investment_{i,t} + v_{i,t}^q \qquad \text{MODEL 2}
\end{aligned}
$$

Where, again, i indicates the country, t the year and $v_{i,t}$ is an error term. $incomegrowth_{i,t}^q$ is the income growth of the respective quintile and *stockmarketfinance*, *bankfinance* and *stockmarketturnover* the components of the financial structure as outlined above. For this income growth regression, it is controlled as established in Denk and Cournède (2015) for the investment rate as in gross fixed capital formation, the level of education and the population growth rate.

As result of the second model, it is expected according to the supply channel hypotheses that stock market capitalisation and stock market turnover ratio increase income growth in the upper quintile (positive γ_1^q) and decrease it in the bottom quintiles (negative γ_1^q), and inversely for bank assets (γ_2^q). Education, population and investment supposedly positively impact income growth over the whole income distribution (positive β_2^q, β_3^q and β_4^q).

To specify a valid statistical model for income inequality and the financial system based on this theoretical model and data presented below, regressions are first estimated by ordinary least squares (OLS), i.e. pooled regression, followed by random effects models and then against fixed effects models. Validity of OLS is tested with the Breusch-Pagan Lagrange Multiplier Test. Consistency of random effects is checked with a test for over-identifying restrictions (*xtoverid*), since heterogeneity and serial correlation consistent standard errors are used, which limit the validity of the Hausman test. Subsequently, it is tested if time fixed effects or first differences need to be introduced. At each step, statistically non-significant variables are gradually dropped if a model is found to be well-specified. Between different well-specified models it is then chosen by comparison of information criteria.

3.2 Data

Apart from the variation in specification of the income inequality and finance variables, the analysis at hand differs from the study by Denk and Cournède (2015) in terms of data used to estimate the model. A sample of European Union countries based on World Bank (2016) and Eurostat data is chosen here. The time period considered is shorter but has a higher frequency of observations, such that results are more robust and direct estimation instead of simulation can be employed.

The data set is an unbalanced, short, wide, fixed panel containing observations for 24 years from

1989 to 2012 for 29 countries and was compiled using two sources: data on the financial system and population growth from the World Bank (2016) and data on income inequality, education, trade openness, unemployment and investment from Eurostat. The countries are the EU 27 (European Union members except for Croatia) plus the United States and an aggregate for the world[4]. Three different sub-samples are used for the model specifications explained above: Two different sub-samples for model 1 with the Gini coefficient and the S80/S20 ratio respectively and a third sub-sample for model 2. The total sample for analysis comprising the three sub-samples covers the EU 27 over 18 years from 1995 to 2012. A description of the data set and each sub-sample is provided in table 2.

	T	Years	N	Countries	Observations
Data Set	24	1989-2012	29	EU 27, United States, World Aggregate	696
All Samples	18	1995-2012	27	EU 27	301
Sample 1: Model 1 with Gini Coefficient	18	1995-2012	27	EU 27	301
Sample 2: Model 1 with S80/S20	14	1997, 1999-2001, 2003-2012	18	Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, United Kingdom	166
Sample 3: Model 2	14	1997 1999-2001 2003-2012	18	Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, United Kingdom	166

Table 2: Descriptive Statistics of the Data Set and Sub-Samples. Data Source: Eurostat, World Bank.

Three finance variables characterise the financial system: First, the stock market capitalisation to GDP measures the total value of all listed shares as a percentage of GDP and is hence an indicator of the capital market size. Second, deposit money banks' assets to GDP are a proxy for the importance of intermediation through banks in the financial system. Third, the stock market

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[4]For the United States and the world, data are only available for the finance variables, such that they are only used for a comparison of financial systems.

turnover ratio is the total value of shares traded during the period divided by the average market capitalisation and is used as a proxy of efficiency and competitiveness in financial markets.

Two inequality measures are used: The Gini coefficient of equalised disposable income on a scale from 0 to 100, where 100 indicates maximal inequality, and the S80/S20 ratio, which is calculated as ratio of the top to the bottom quintile share of national equalised income in euro. Income growth per quintile is calculated from quintile shares of disposable income and gross disposable income of households in million euro in current prices.

As proxy of educational level in a country the percentage of upper secondary, post-secondary non-tertiary and tertiary education of the total population aged 15 to 64 years is used. As measure of the degree of trade openness, the sum of exports and imports of goods and services is divided by GDP, at market prices in million euro respectively. Other control variables are the annual average and seasonally not adjusted unemployment rate, the investment rate as gross fixed capital formation as percentage of GDP and population growth calculated from population numbers provided by the World Bank (2016).

	Observations	Mean	Standard Deviation	Minimum	Maximum
Stock Market Capitalization	301	56.688	43.507	2.245	255.656
Bank Assets	301	113.762	55.896	10.847	334.541
Stock Market Turnover Ratio	301	66.101	54.897	0.14	259.475
Gini Coefficient	301	29.383	4.114	20	38.9
S80/S20	266	4.743	1.092	3	7.804
Income Growth First Quintile	142	0.033	0.065	-0.198	0.206
Income Growth Second Quintile	142	0.034	0.054	-0.142	0.19
Income Growth Third Quintile	142	0.035	0.052	-0.152	0.182
Income Growth Fourth Quintile	142	0.034	0.05	-0.16	0.167
Income Growth Fifth Quintile	142	0.029	0.05	-0.186	0.168
Education	301	64.192	15.041	19.3	85
Trade Openness	301	106.144	64.502	42.268	348.393
Unemployment	301	8.435	3.854	1.9	24.8
Population Growth	301	0.003	0.007	-0.02	0.029
Investment	301	22.954	3.894	12.6	38.4

Table 3: Pooled Summary Statistics of the Variables Used. Data Source: Eurostat, World Bank.

Stock market capitalisation has an overall mean of 56.688% of GDP in the EU 27 from 1995 to 2012, ranging from 2.245% as overall minimum to 255.656% with a high standard variation, which is mainly due to country differences and to a lesser extent to variance over time. Comparing histograms of 2000 and 2012 in Figure 1 shows that there has been a recent shift towards a lower degree of stock market capitalisation in several countries.[5] This shift can be due to stricter financial market regulations and increasing market scepticism after the financial crisis.

Deposit bank assets in the EU 27 from 1995 to 2012 is on average 113.762% of GDP, ranging with a very high standard deviation from an overall minimum of 10.847% to an overall maximum of

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[5]The years for comparison were chosen in order to have a similar number of observations.

Changes in Stock Market Capitalization

Stock Market Capitalization in 2000
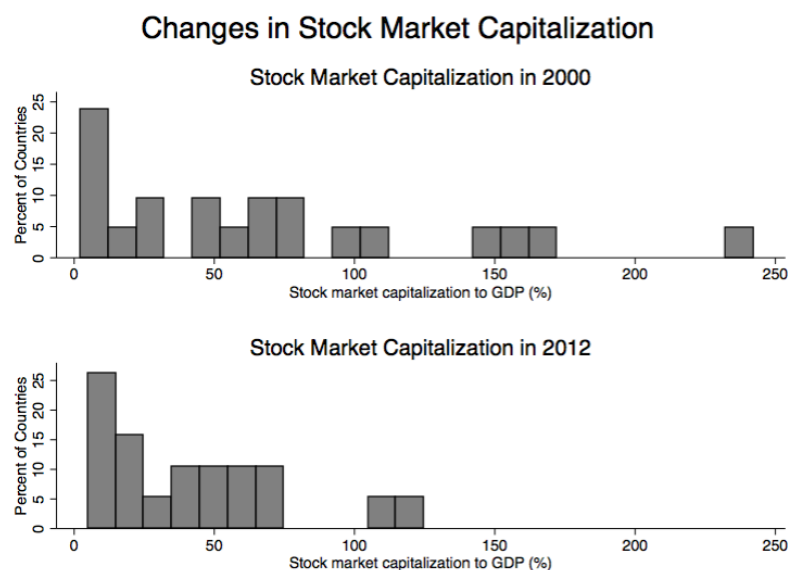

Stock Market Capitalization in 2012

Figure 1: Stock Market Capitalisation in the EU in 2000 and 2012. Data Source: World Bank.

334.541%. The weight in the economy of banks is hence on average in the European Union much higher than that of capital markets, with variations largely due to differences between countries. Figure 2 shows a shift towards the middle of the distribution with a trend of convergence towards a medium value of bank assets to GDP from 2000 to 2012.

Changes in Deposit Bank Assets

Deposit Bank Assets in 2000
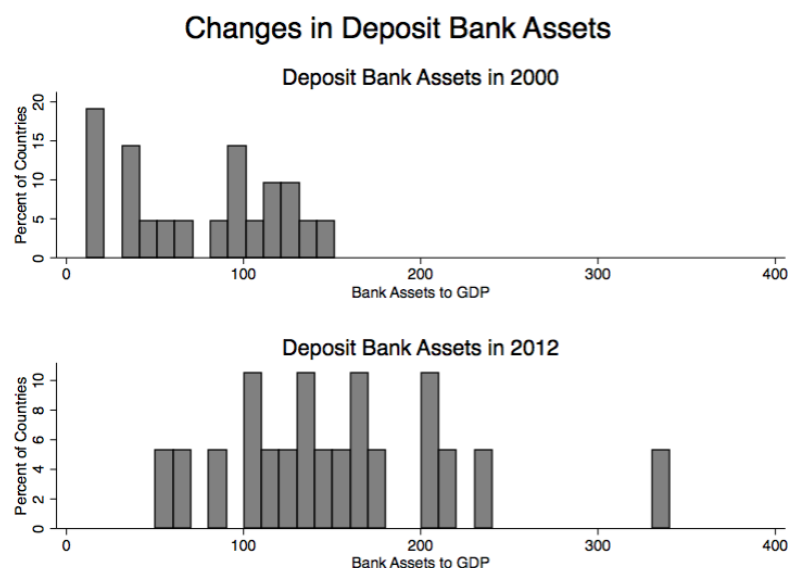

Deposit Bank Assets in 2012

Figure 2: Deposit Bank Assets in the EU in 2000 and 2012. Data Source: World Bank.

The stock market turnover ratio has an overall EU 27 mean of 66.101% of traded value of shares to market capitalisation over the period from 1995 to 2012, ranging from only 0.14% to 259.474%. This high variation both between and within countries of this efficiency indicator is due to a spike around the financial crisis. Speculation and high risk taking fuelled returns on stock markets.

Globally, bank-based systems prevail: the world average stock market capitalisation from 1989 to 2012 is 27.241% of GDP, average deposit bank assets 36.789% of GDP. One extreme case of a market-based system are the United States, where stock market capitalisation from 1989 to 2012 is on average 105.147% of GDP, bank assets 57.459% of GDP. That means, the financial sector of the country is very large compared to world averages and capital markets prevail. Compared to the United States, most European countries have a more bank-based financial system. However, the degree of stock market capitalisation also varies between EU countries. The bar chart in Figure 3 shows averages of selected countries over the period from 1995 to 2012. The comparison demonstrates that the United States and the United Kingdom have a traditionally market-based system, while Germany has a typically more bank-based financial system.
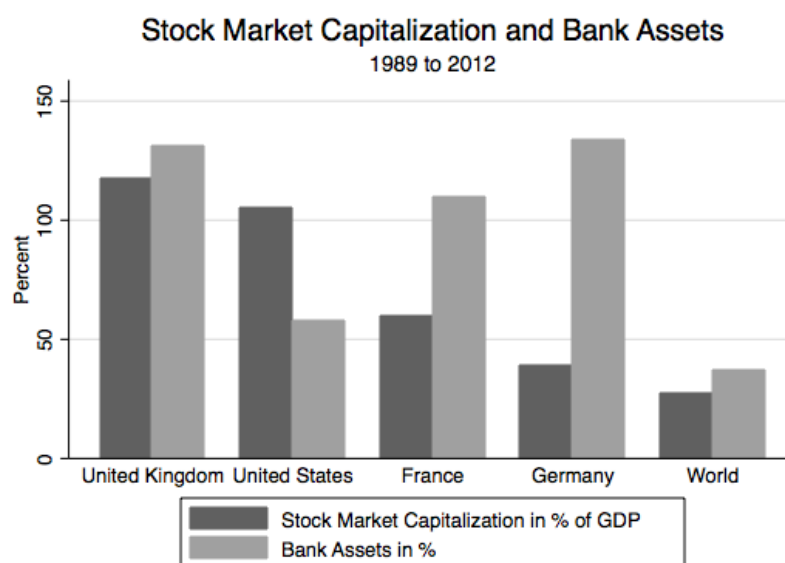

Figure 3: Cross-country Comparison of Market and Bank Relevance. Data Source: World Bank.

Considering the EU 27 over the same period, high intra-EU variation is visible with several countries having a large bank-based component of the financial system (Figure 4).

The Gini coefficient has an overall mean of 29.383 over the EU 27 and the time span from 1995 to 2012. With little variation *within* countries, income inequality is quite persistent and the standard variation of 4.114 Gini points can be largely accounted to differences *between* countries. The kernel density function in Figure 5 demonstrates that from 2000 to 2012, the spread of Gini coefficients between countries has narrowed. While in some countries, inequality decreased, it increased in others, leading to an overall shift to the middle of the distribution.

The alternative inequality measure, S80/S20 ratio, is for the EU 27 from 1995 to 2012 on average 4.664, i.e. the top 20% earn on average nearly five times as much as the bottom 20%, with values ranging from 3.245 to 7.804 and a larger variation between than within countries. The bar chart in Figure 6 shows that a higher S80/S20 ratio is mostly, but not always translated in a higher Gini coefficient. This is due to the fact that the Gini coefficient attaches equal weights to changes in each
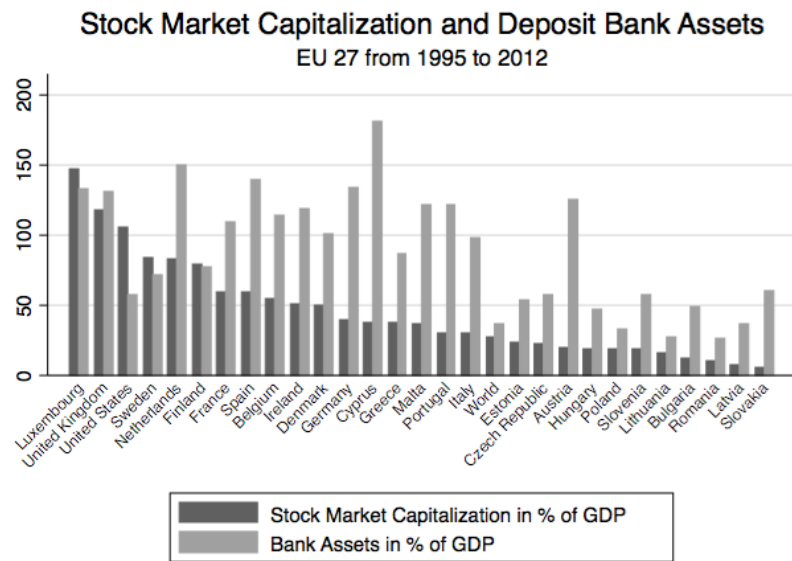
Stock Market Capitalization and Deposit Bank Assets
EU 27 from 1995 to 2012

Figure 4: Market and Bank Relevance in the EU 27. Data Source: World Bank.

Change in the Distribution of the Gini Coefficient
Between EU Countries (Kernel Function)

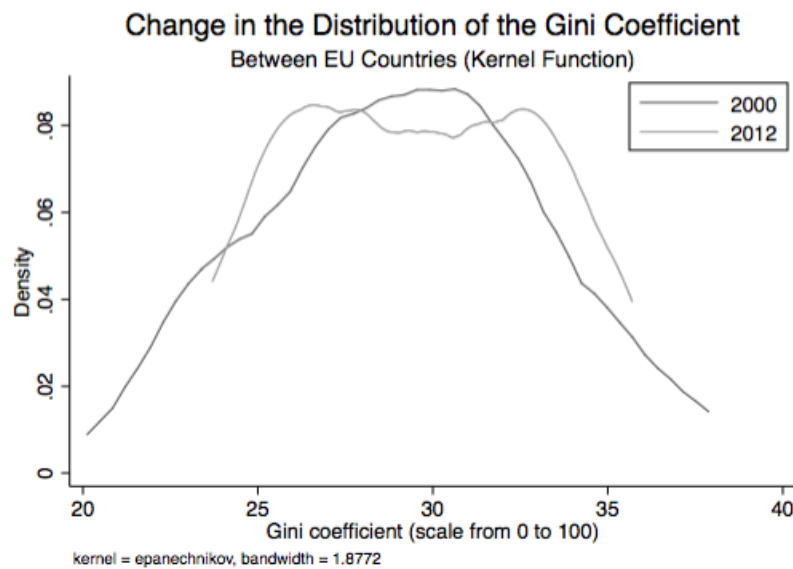kernel = epanechnikov, bandwidth = 1.8772

Figure 5: Kernel Density Function of the Gini Coefficient. Data Source: Eurostat.

part of the distribution, while the S80/S20 ratio measures the discrepancy between top and bottom incomes. Income inequality appears to be lowest in the Nordic countries, the Czech Republic and Slovenia and highest in Romania, Portugal and Greece. Reasons for this are manifold, such as for example social systems, educational levels and employment conditions.

Figure 7 reveals that when decomposing growth of gross disposable income by quintiles, average income growth of the bottom quintile over the EU 27 from 1999 to 2012 slightly exceeds growth of the top quintile's income. However, variation is much higher in the bottom quintile. Overall, all average growth rates are rather low, which is supposedly due to the financial crisis.
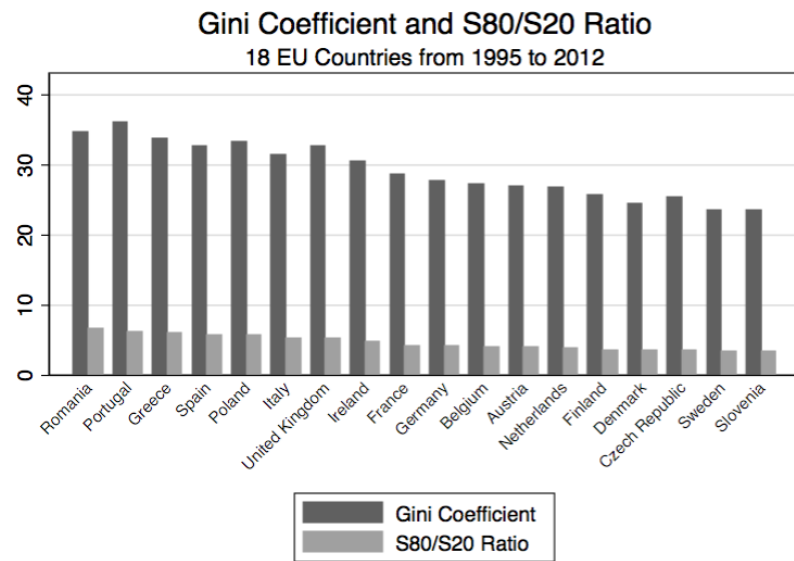
Figure 6: The S80/S20 Ratio in Comparison with the Gini Coefficient. Data Source: Eurostat.
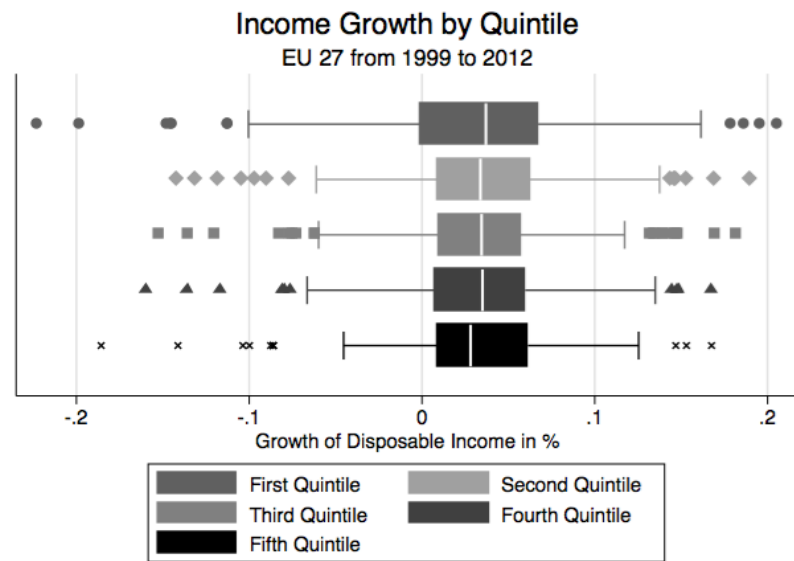

Figure 7: Growth of Disposable Income by Quintiles in the EU 27. Data Source: Eurostat.

A first visual impression shows no obvious correlation between the Gini coefficient and stock market capitalisation, as shown in the scatter plot in Figure 8. There is a small negative correlation with a correlation coefficient of -0.141 statistically significant at 10% level, however, two countries with outliers of exceptionally low income inequality, Sweden and Finland, pull the fitted line down. Once those two countries are excluded, the relationship becomes weakly positive, but then, the fitted line is pulled up by the United Kingdom's observations with high inequality and high stock market capitalisation. This reveals that there are obviously big differences between countries, such as in social systems, homogeneity of population and economic conditions.
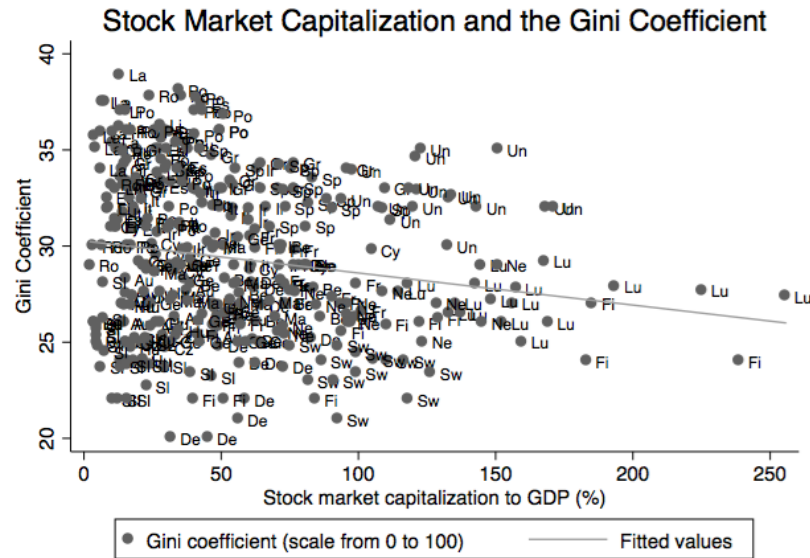
Figure 8: Correlation of Stock Market Size and Income Inequality. Data Source: Eurostat, World Bank.

While the descriptive statistics and graphs hint to possible relationships, different effects and factors have to be disentangled in regression analysis in order to draw valid conclusions.

4 Empirical Findings

This section presents the estimation results of the multivariate regression analysis applied to test the previously developed hypotheses, on the basis of the aforementioned model and data. To specify a valid statistical model, regressions are first estimated by ordinary least squares (OLS), i.e. pooled regression, followed by random effects models, which are tested against fixed effects models. Subsequently, it is tested if time fixed effects or first differences need to be introduced. At each step, statistically non-significant variables are gradually dropped if a model is found to be well-specified. Comparison of information criteria ultimately leads to a choice between different well-specified models.

As explained above, two main models are estimated: First, a model is specified to measure the impact of the characteristics of the financial system on an income inequality measure (model 1). This model is estimated for robustness for the Gini coefficient (model 1A – 1D) and the S80/S20 ratio (model 1E) respectively. The second model explains the impact of the type of financial system on income growth by quintile (model 2A-2E).

4.1 Model 1: Inequality Measures

To compare the results to the study by Denk and Cournède (2015), the model 1 is first estimated for the Gini coefficient for each finance variable as single explanatory variable (model 1A–1C) and subsequently with all three finance variables together (model 1D) according to their proceeding. Subsequently, this latter and preferred specification of the three variables taken together is tested for robustness with the S80/S20 ratio as alternative dependent variable (model 1E).

First, for the analysis of the Gini coefficient a sub-sample of the EU 27 for the 18 years from 1995 to 2012 is used according to missing values in the variables needed and contains 301 observations in total[6]. Estimation results are presented in table 4. Results for each finance variable individually (model 1A–1C) are similar to the outcomes of the model where they are taken together (model 1D) in terms of direction, size, and significance of the coefficients. All models prove to be best estimated including country- and time fixed effects. The use of the banking crises dummy added by Denk and Cournède (2015) was discarded due to too many missing values, but the time fixed effects can capture time-dependent influence of the major double-dip financial and euro crisis in Europe of 2008 and 2011.

For stock market capitalisation alone (model 1A), the best performing model in terms of joint significance, R^2 and information criteria is an estimation with country- and time-fixed effects and education and unemployment rate as control variables. Trade openness is excluded due to non-significant coefficients. In this model, stock market capitalisation has a small positive weakly statistically significant impact on the Gini coefficient. When stock market capitalisation increases over time within countries by 10% of GDP, the Gini coefficient rises on average ceteris paribus by 0.11 points on its scale from 0 to 100. This effect is statistically significant at the 1% level. Considering bank assets as the only explanatory variable of the financial system, the coefficient of bank assets stays statistically non-significant in all well-specified models. The best performing model, model 1B, contains only the unemployment rate as additional control variable. It does not have a significant effect, but dropping it reduces the quality of the model according to the information criteria. Most variation in the Gini coefficient is hence explained by time and country effects. The coefficient of the stock market turnover ratio, when considered in a separate regression (model 1C), is positive and statistically significant at the 1% level, but small: A 10 percentage point increase in the stock market turnover ratio over time within countries causes on average ceteris paribus a 0.07 point increase in the Gini coefficient. The impact of the control variables education and unemployment is again statistically non-significant.

The model comprising all three financial system characteristics as explanatory variables delivers similar results. The best performing model (model 1D) contains country and time fixed effects and the control variables education and unemployment, but the coefficients of the two latter are statistically not significant. Similar to the previous individual models, this comprehensive model explains 88.3% of the variation in the Gini coefficient. Again, the coefficient for bank assets is pos-

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[6]Analysis of the missing values does not reveal any pattern, such that regressions of the unbalanced panel are likely to be consistent.

itive, but small and statistically non-significant. Significant at the 1% level, stock market turnover ratio and stock market capitalisation have a small positive effect. For an increase in stock market capitalisation by 10 percentage points over time within countries, the Gini coefficient increases on average ceteris paribus by 0.14 points. When the stock market turnover ratio increases by 10 percentage points, the Gini coefficient is over time within countries on average ceteris paribus 0.09 points higher. The high R^2 is highly likely to be caused by prevailing time and country effects on income inequality.

	Gini Coefficient as Dependent Variable			
	(1A)	(1B)	(1C)	(1D)
Stock Market Capitalization	0.011**			0.014***
	(0.00)			(0.00)
Bank Assets		0.003		0.004
		(0.01)		(0.01)
Stock Market Turnover Ratio			0.007**	0.009***
			(0.00)	(0.00)
Education	-0.073		-0.082	-0.087
	(0.08)		(0.07)	(0.07)
Unemployment	-0.098	-0.114	-0.096	-0.098
	(0.09)	(0.11)	(0.10)	(0.11)
Trade Openness				
Constant	32.217***	27.310***	32.802***	32.620***
	(5.13)	(1.11)	(4.68)	(4.75)
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	301	301	301	301
F-Statistics	3.94***	4.39***	11.31***	27.48***
R^2	0.880	0.876	0.880	0.883

* $p<0.10$, ** $p<0.05$, *** $p<0.01$ The numbers in brackets are standard errors.

All reported estimations include country- and time-fixed effects.

Table 4: Model 1 for the Gini Coefficient. Data Source: Eurostat, World Bank.

Second, substituting the Gini coefficient by another inequality measure, the S80/S20 ratio, only partly confirms these results. Results of the best performing model that includes all three finance variables (model 1E) are shown in table 5. Again, country fixed effects are included, but introducing time fixed effects does not improve the model. Just as for the Gini coefficient, trade

openness has to be dropped and unemployment and education do not have statistically significant coefficients. Likewise, an increase in the stock market turnover ratio has a small positive impact on income inequality significant at the 1% level. When this efficiency measure increases by 10 percentage points, the S80/S20 ratio increases by 0.03 points. Given the different scale, the co-efficient is not directly comparable in size to Gini point-increases. Here, it indicates the increase in the multiple of bottom incomes that gives the top incomes. The coefficient of bank assets is again non-significant, small, but now negative. The coefficient of the stock market capitalisation does not only turn statistically non-significant, but also changes direction, and reduced income in-equality as measured by the S80/S20 ratio. The R^2 of the regression is slightly higher with 92.3% of variation in the S80/S20 ratio explained. Since no time effects are included and the variables considered have a small or non-significant influence, most of the variation in the S80/S20 ratio is highly likely due to country differences. However, comparability is limited to some extent by a change in the sub-sample used, which differs by the number of observations available for the dependent variable. In the case of the S80/S20 ratio, 18 EU countries over the time period from 1997 to 2012 with a total of 166 observations in the regression are included (see table 2).

	S80/S20 as Dependent Variable
	(1E)
Stock Market Capitalization	-0.003 (0.00)
Bank Assets	-0.003 (0.00)
Stock Market Turnover Ratio	0.003*** (0.00)
Education	0.006 (0.02)
Unemployment	0.029 (0.02)
Trade Openness	
Constant	3.606*** (1.21)
Country Fixed Effects	Yes
Time Fixed Effects	No
N	166
F-Statistics	10.75***
R^2	0.923

* $p<0.10$, ** $p<0.05$, *** $p<0.01$ The numbers in brackets are standard errors.

The estimation includes country-fixed effects.

Table 5: Model 1 for the S80/S20 Ratio. Data Source: Eurostat, World Bank.

4.2 Model 2: Income Growth by Quintile

Likewise, estimations for Model 2 are based on a third sub-sample, which includes different de-pendent and independent variables. The sub-sample covers 18 EU countries from 1995 to 2012 with a total of 166 observations. Estimations by quintile are presented in table 6. All estimations include country-fixed effects and all except the bottom quintile regression include time-fixed ef-

fects. Education and population growth remain statistically non-significant and are dropped in the final parsimonious model as determined by information criteria. The investment rate influences income growth at all levels with an impact of between on average ceteris paribus 0.006 and 0.009 percentage points for a 1 percentage point increase in the investment rate, significant at the 1% level.For all but the bottom quintile, stock market capitalisation has a very small, negligible, positive impact on income growth that does not become statistically significant in any estimation. For the bottom quintile (model 2A) the sign is negative, yet, the coefficient is near zero and statistically non-significant. The size of bank assets to GDP has a small negative impact on income growth across the whole income distribution, which is statistically significant at the 1% level. A 10 percentage point increase in bank assets reduces income growth on average ceteris paribus across time within countries by 0.01 percentage points. For the top quintile (model 2E) this effect is slightly smaller.Only the effect of the stock market turnover ratio varies more clearly by quintile, albeit within a small range. At the bottom and middle of the distribution, the stock market turnover ratio has a statistically significant small negative effect on income growth, whereas a very small positive effect in the top quintile is statistically non-significant.

	(2A)	(2B)	(2C)	(2D)	(2E)
	Income Growth by Quintile as Dependent Variable				
	First	Second	Third	Fourth	Fifth
Stock Market Capitalization	-0.000	0.000	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Bank Assets	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Stock Market Turnover	-0.001**	-0.000*	-0.000*	-0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Investment	0.009***	0.007***	0.006***	0.006***	0.007***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education					
Population Growth					
Constant	-0.127	-0.048	-0.008	-0.011	-0.075
	(0.09)	(0.06)	(0.06)	(0.05)	(0.04)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	No	No	No	No
N	142	142	142	142	142
F-Statistics		32.28***	44.08***	55.19***	49.12***
R^2	0.602	0.540	0.568	0.574	0.579

* $p<0.10$, ** $p<0.05$, *** $p<0.01$ The numbers in brackets are standard errors.

Reported estimations include country-fixed effects and models 2B–2D include time-fixed effects.

Table 6: Model 2 for Income Growth by Quintile. Data Source: Eurostat, World Bank.

The share of variation in income growth explained by the estimation is similar for all quintiles and highest for the regression for the bottom quintile, because it includes time fixed effects.[7]

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[7]In pooled OLS, stock market capitalisation has a small positive effect throughout the income distribution, but a

5 The Findings in Context

This section appraises the findings from the regression analysis in the academic context and reflects on implications for policy purposes against the background of the European Commission's Capital Markets Union plan.

5.1 Academic Perspective

Estimation results presented in the preceding section do not entirely confirm the expectations formulated in part two. The results do not predict clear sizeable effects of changes in the type of financial system on income inequality. Indeed, growing size of capital markets as measured by stock market capitalisation raises income inequality in terms of the Gini coefficient, as expected by the established hypotheses. It may indicate the existence of a supply channel through participation costs in markets and a direct impact through high sector wages. In line with expectations, higher efficiency of capital markets slightly increases income inequality as indicated by the Gini coefficient. The effect of the importance of the bank-component of the financial system and capital market size only show small effects on income inequality, which are not robust to alternative measurement. Alternative specification of inequality with the S80/S20 ratio further decreases the small coefficients of the finance variables and the statistical significance of bank assets and stock market capitalisation proves not robust. Increasing size of capital markets hence does not significantly influence the ratio of the top incomes to bottom incomes.

While theory predicts bigger stock market size to decrease the growth of bottom incomes and increases that of top incomes, there is no significant impact of the stock market capitalisation on the income growth of any quintile. Higher efficiency of the stock market decreases income growth of the four bottom quintiles, but the effect is very small and not decreasing in income. Contrary to theoretical expectations, increasing size of the bank component has a small negative effect on growth throughout the income distribution.

The small magnitude of effects found in the preceding analysis is in line with the results from Denk and Cournède (2015). The estimates for the stock market capitalisation in the Gini coefficient regression of the present analysis is comparable to their outcomes. However, they also find a significant negative effect of intermediated credit, which is sometimes considered as a proxy for the relevance of banks. The proxy in this analysis, bank assets, does not have statistically significant coefficients. This difference underlines the importance of disentangling demand for credit and supply of savings to deposits. Denk and Cournède (2015, p. 12) also point to the limitation of their study of using time and country fixed effects, which equivalently applies to the present analysis as explained below. Accordingly, their estimates for the control variables are rarely significant as well (Denk and Cournède, 2015, p. 13). For the income growth regressions, most coefficients

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panel effect is present, yet the effect does not become significant when employing panel methods. Random effects shows a small positive effect of the stock market capitalisation and a small negative effect of the bank assets on income growth throughout the income distribution as well, but testing weakly rejects the use of random effects.

are not statistically significant in their analysis either (Denk and Cournède, 2015, p. 33). Yet, they find an impact of stock market capitalisation on income inequality through income growth (Denk and Cournède, 2015, p. 33). Results for intermediated credit are similar to the findings of bank assets on income growth: Intermediated credit is found to have a negative effect on disposable income growth for all except for the top decile (Denk and Cournède, 2015, p. 30). As a matter of course, their decomposition of income growth by decile is more precise than that by quintile in the present analysis. It is highly plausible to conclude that, especially at the top end of the distribution, differentiation in smaller units matters. Once more comprehensive data is made available, a decomposition of the top 20% of the income distribution used in this analysis in top 10% and in even smaller units could reveal more specific links between the financial system and income inequality.

From a theoretical perspective, it is surprising that the "standard drivers of income inequality identified in the economic literature and previous OECD studies [...] [i.e.] unemployment, education and trade openness" (Cournède et al., 2015, p. 29) are here not found to have a significant effect on income inequality. Likewise for the income growth estimations, education and population growth did not have a significant influence despite being acknowledged in literature as relevant determinants[8]. On that account, the methodology should be re-considered. Given that the theoretical basis has some interest in time-invariant factors, i.e. the *initial* financial system and not only *changes* in the system, random effects estimation would be preferred. Since testing rejected such a specification, fixed effects estimation had to be employed. This rejection is, however, not specific to the data used here. Instead, it is a general issue of country-level panel data. It is difficult, if not impossible, to capture all country-specific time-invariant characteristics that are correlated with the explanatory variable in the control variables. In the case of the type of financial system, this could be for example the welfare system or a general scepticism towards markets or preferences. As the study by Christopoulos and McAdam (2015) shows, there is a difference in impact of financial reforms on gross and net Gini coefficients, indicating that the welfare system matters indeed. Moreover, as mentioned above, the third component of the financial system, i.e. non-bank intermediation through funds like pension funds or other investment funds, plays a role as well. Such additional determinants should be integrated in the model to avoid an omitted variable bias as soon as suitable data is available. The general issue of country-level data could possibly be solved in future studies by specifying more advanced versions of random effects estimation based on recent econometric literature, such as correlated random effects or multi-level models.

The negative impact of the banking component on income growth for all quintiles is in line with the opinion of the European Systemic Risk Board (2014, p. 42) that in Europe a threshold, until which banking size contributes to growth, has been trespassed. Considering a sample with more variation to contrast European countries with, for example by including the United States, could confirm this more clearly. However, the lack of availability and comparability of data, especially on income inequality, makes broader studies a difficult endeavour.

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[8]See Cournède et al. (2015, p. 19) for references to the primary literature which explains these determinants.

Overall, regressions for the Gini coefficient point to the existence of supply channels and direct factors that lead to increasing income inequality when the market component of the financial system is increased. Since estimates did not prove robust to the S80/S20 ratio as alternative inequality specification, it would be interesting for future research to test robustness by specifying other income inequality measures. Again, this largely relies on the availability of data. Data on inequality measures are in general incomplete across time and countries (Domanski et al., 2016), but especially for this topic a longer time series of household surveys, which for now only exist for single years, would allow new insights.

In sum, the analysis finds that time effects and particularly country differences explain a large part of the variation in income inequality. While the effect of stock market growth seems to be small, it still is significant for the Gini coefficient. Overall, the results are neither definitive nor complete, but indicative in revealing possible trends and methodological challenges. In a literature review Demirguc-Kunt and Levine (2009, p. 48) argued in 2009 that there is a lack of research on the impact of financial sector policies on inequality. Yet, this statement was not followed by many new studies. Nevertheless, the topic is of increasing importance for the real economy with new reforms being proposed for the financial sector.

5.2 Policy Implications

In the last two years, the predominance of bank finance and desirability of bigger capital markets has been a widely discussed issue at European level. Since the announcement of Commission President Juncker in his political guidelines, the project of the Capital Markets Union (CMU) has been on the rise. Juncker (2014) proposed as part of his Agenda for Jobs, Growth, Fairness and Democratic Change to improve the financing of the economy by developing and integrating capital markets and reducing bank funding. The idea was also put forward in the five presidents' report that foresees a financial union, which includes a Capital Markets Union as immediate short-term step for risk-sharing and as shock absorber (Juncker et al., 2015). Consequently, the European Commission published in 2015 a green paper (European Commission, 2015b) and an action plan (European Commission, 2015a) defining concrete objectives and policy instruments. The green paper declares:

> "The direction we need to take is clear: to build a single market for capital from the bottom up, identifying barriers and knocking them down one by one, creating a sense of momentum and helping to spark a growing sense of confidence in investing in Europe's future. The free flow of capital was one of the fundamental principles on which the EU was built. More than fifty years on from the Treaty of Rome, let us seize this opportunity to turn that vision into reality." (European Commission, 2015b, p. 3)

One year later, the Commission called in a communication to "step up implementation and accelerate reform" (European Commission, 2016, p. 2) and confirmed the project in a recent consultation for a mid-term review as 'flagship priority' (European Commission, 2017, p. 3). According to

Véron and Wolff (2015, p. 3), the CMU is part of a 'historical continuity' of European capital-market building from the Treaty of Rome including freedom of movement of capital in 1957, the elimination of restrictions on capital movements in 1988, the Financial Services Action Plan of 1999 and the Economic and Monetary Union to the creation of European Supervisory Authorities in 2011 and the Larosière Report of February 2009. Most economists consider the CMU a 'logical' next step after the banking union (Véron, 2014, p. 2).

The Capital Markets Union plan (European Commission, 2015a) comprises a vast variety of topics and measures concerning funding for business, long-term investment in infrastructure, investment of retail and institutional investors, bank lending and the reduction of cross-boarder barriers. Besides being a collection of smaller measures and an integration project, the CMU is introducing a structural reform of the financial system of the EU member states. The underlying economic rationale of the project is both cyclical and structural (Véron, 2014, p. 2), but the "CMU should be designed and thought of as structural and long-term transformation of financial intermediation in the EU" (Véron and Wolff, 2015, p. 7). In particular, the idea is to transform the bank-based system of EU member states in a more market-based system: "The CMU will broaden the sources of financing in Europe towards non-bank financing by giving a stronger role to capital markets" (European Commission, 2015c, p. 14).

Such a structural change has consequences for welfare, i.e. for economic growth, but possibly as well for the distribution of income. One of the four priority areas listed in the action plan is to increase investment of and choice for retail and institutional investors (European Commission, 2015a). More concretely, it seeks to increase the amount of household savings flowing in capital markets, which are now held as bank deposits (European Commission, 2015b, p. 3). This is based on the belief that bigger capital markets provide better returns for savers (European Commission, 2015a, p. 3) and "more competition, greater choice and lower costs for investors" (European Commission, 2015b, p. 9). However, the European Commission (2015a, p. 18) also acknowledges that buyers must build knowledge or experience to compare products and currently "lack confidence in capital markets" (European Commission, 2017, p. 13). Nowadays, "deposits in the EU enjoy the extraordinary privilege of a high deposit insurance guarantee. By contrast, other forms of financial investment have much more limited protection if any, and are often opaque and difficult to understand" (Véron and Wolff, 2015, p. 9). As argued in this paper, it is possible that this knowledge and experience is increasing in income, whereas poor households are more likely to make investment mistakes, such that the CMU reform could possibly lead to higher levels of income inequality. The empirical analysis confirmed that increases in stock market capitalisation and efficiency may raise the Gini coefficient, but the effects found in the present analysis are too small to infer concrete policy conclusions. The same holds for the negative effect of increasing importance of banks on income growth throughout the income distribution found in this paper: It may indicate that the banking sector is indeed too large in Europe, but the small size of the effect makes it negligible for deriving practical consequences. As discussed in the previous section, more evidence on the impact of initial levels of banking size and capital market size on income inequality are necessary to draw further conclusions.

In the end, structural reform of the financial system is a political choice. This becomes evident from the terminology chosen, since what some call *capital markets* is named *shadow banking* by others, conveying a negative connotation (Véron and Wolff, 2015, p. 2). From an academic perspective, "markets and intermediaries have both advantages and disadvantages, and the choice of whether to favour one or the other is bound to depend on the specific parameters of each economy. Ultimately the choice of structure also depends on what is desired" (Allen and Gale, 2001, p. 501). Already the choice of an inequality measure depends on normative suppositions to the extent that it determines how changes in the distribution are weighted and if absolute size of total income matters. Analyses of the Gini coefficient, income growth, top incomes and poverty are therefore complementary and policy-makers need to be aware that different welfare measures are not substitutes, but measure different concepts.

Some literature argues that banks and stock markets are complementary to some extent, with intermediaries tackling market imperfections and ensuring the functioning of markets, which in turn increase competition for corporate control, and by adding to the choice of financing instruments (De Haan et al., 2009, p. 23-24). The balance between bank-based, market-based — and also non-bank intermediation — components that is optimal for welfare has yet to be found. Therefore, policy makers should be aware of potential consequences, especially for long-term projects, and should further evaluate the welfare impact of their proposals on a multi-dimensional scale beyond economic growth.

6   Conclusion

Statistics show that income inequality has been rising in recent decades while financial structure has shifted from more bank-based to more market-based systems at the same time (Keeley, 2015). This paper established a theoretical link between financial systems and income inequality, distinguishing demand channels and supply channels. Based on the hypothesis that top earners invest proportionally more in higher-return capital markets, while lower income earners save more in lower-return bank deposits and are less well informed about investing in markets, it is argued that supply factors prevail and cause a negative relationship between capital market size and equality in income.

An empirical analysis of inequality measures and income growth by quintile in European Union countries partly confirms this proposition. A small positive, statistically significant impact of an increase in stock market capitalisation on the Gini coefficient is found. In addition, rises in stock market efficiency increase the Gini coefficient and the S80/S20 ratio and decrease income growth of the bottom quintile. However, effects are found to be small and increases in bank assets to GDP have no impact on the Gini coefficient and the S80/S20 ratio and a negative impact on income growth throughout the whole income distribution. In sum, the results suggest that a higher market efficiency is negative for equality in income, bigger capital markets are negative or neutral depending on the inequality measure and a bigger banking component is neutral for equality but

decreasing overall income growth.

The findings demonstrate that econometric estimations of the income distribution are not necessarily robust to different inequality measures, such that analyses of the Gini coefficient should always be complemented with consideration of alternative measures. A few issues might limit the inference of the estimations: First, the methodology only accounts for changes, not initial levels of the size of capital markets, banking and market efficiency, whereas country differences account for a big part of variance in income inequality. Second, shifts in non-bank intermediation as third component of the financial system are omitted due to a lack of data. Finally, the time period under consideration comprises a major financial crisis, which even when controlling for time effects may differ from the basic mechanisms of linking financial system and real economy. Future research should address these challenges and based on the conclusions, indicative empirical results and lessons learned from this paper fit more robust estimations and establish valid findings as grounds for policy decisions.

All in all, this paper concludes that depending on the measures chosen, changes in capital market size and efficiency can impact income inequality and increases in the size of the banking sector can reduce income growth. Whereas the validity of the concrete results may be challenged, this paper most certainly makes clear that the topic of types of financial systems influencing income inequality is relevant and deserves attention from both academia and policy-makers. Structural reform such as the Capital Markets Union in the EU need to be evaluated with comprehensive assessment of impacts on the real economy, comprising other welfare measures than economic growth only. As Commission President Juncker emphasised in his opening statement in the European Parliament: "The economy must serve the people. This means that internal market provisions cannot be valued more highly than social provisions" (Juncker, 2014). Ultimately, the type of financial system as in size of banking sector and capital markets should be promoted that creates welfare throughout the income distribution and provides liquidity and equal opportunities to businesses, governments and households. For as much as the financial and euro crisis fuelled Euroscepticism, as much might the creation of equally distributed and sustainable growth in an internal market with a resilient and transparent financial system generate new support for European integration.

References

Allen, F. and Gale, D. (2001). *Comparing Financial Systems*. The MIT Press.

Arrondel, L., Bartiloro, L., Fessler, P., Lindner, P., Mathä, T. Y., Rampazzi, C., Savignac, F., Schmidt, T., Schürz, M., and Vermeulen, P. (2014). How Do Households Allocate Their Assets? Stylised Facts from the Eurosystem Household Finance and Consumption Survey. *European Central Bank Working Paper Series*, (1722).

Bach, L., E., C. L., and Sodini, P. (2016). Rich Pickings? Risk, Return, and Skill in the Portfolios of the Wealthy. *HEC Paris Research Paper*, (FIN-2016-1126).

Beck, T. (2011). The Role of Finance in Economic Development: Benefits, Risks, and Politics. *European Banking Center Discussion Paper*, (038).

Beck, T., Demirguc-Kunt, A., and Levine, R. (2004). Finance, Inequality, and Poverty: Cross-Country Evidence. *NBER Working Paper Series*, (10979).

Campbell, J. (2006). Household Finance. *NBER Working Paper Series*, (12149).

Cardaci, A. and Saraceno, F. (2016). Inequality, Financialisation and Credit Booms: a Model of Two Crises. *LUISS School of European Political Economy Working Paper*, (2/2016).

Christopoulos, D. and McAdam, P. (2015). Do Financial Reforms Help Stabilize Inequality? *European Central Bank Working Paper Series*, 1780.

Clarke, G. R. G., Xu, L. C., and Zou, H. (2006). Finance and Income Inequality: What Do the Data Tell Us? *Southern Economics Journal*, 72(3):578–596.

Cournède, B., Denk, O., and Hoeller, P. (2015). Finance and Inclusive Growth. *OECD Economic Policy Paper Series*, 14.

De Haan, J., Oosterloo, S., and Schoenmaker, D. (2009). *European Financial Markets and Institutions*. Cambridge University Press.

De Haan, J. and Sturm, J.-E. (2016). Finance and Income Inequality: A Review and New Evidence. *De Nederlandsche Bank Working Paper*, (530).

Demirguc-Kunt, A. and Levine, R. (2009). Finance and Inequality: Theory and Evidence. Working Paper 15275, National Bureau of Economic Research.

Denk, O. and Cazenave-Lacroutz, A. (2015). Household Finance and Income Inequality in the Euro Area. *OECD Economics Department Working Papers*, 1226.

Denk, O. and Cournède, B. (2015). Finance and Income Inequality in OECD Countries. *OECD Economics*, (1224). http://dx.doi.org/10.1787/5js04v5jm2hl-en.

Domanski, D., Scatigna, M., and Zabai, A. (2016). Wealth Inequality and Monetary Policy. *BIS Quarterly Review*, pages 45–64.

European Commission (2015a). Action Plan on Building a Capital Markets Union. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM(2015) 468 final, European Union.

European Commission (2015b). Building a Capital Markets Union. Green Paper COM(2015) 63 final, European Union.

European Commission (2015c). Economic Analysis Accompanying the Document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Action Plan on Building a Capital Markets Union. Commission Staff Working Document SWD(2015) 183 final, European Union.

European Commission (2015d). European Financial Stability and Integration Review. Commission Staff Working Document SWD(2015) 98 final, European Union.

European Commission (2016). Capital Markets Union - Accelerating Reform. Communication COM(2016) 601, European Union.

European Commission (2017). Consultation Document Capital Markets Union Mid-Term Review 2017. Consultation, European Union.

European Systemic Risk Board (2014). Is Europe Overbanked? Reports of the Advisory Scientific Committee 4, European Systemic Risk Board.

Greenwood, J. and Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy*, 98(5):1076–1107.

Guiso, L., Haliassos, M., and Jappelli, T. (2003). Household Stockholding in Europe: Where Do We Stand and Where Do We Go? *Economic Policy*, page 123–170.

International Monetary Fund (2006). World Economic Outlook. Financial Systems and Economic Cycles. Technical report, International Monetary Fund.

Juncker, J.-C. (2014). A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change. Political Guidelines for the next European Commission and Opening Statement in the European Parliament Plenary Session. Technical report, European Union.

Juncker, J.-C., Tusk, D., Dijsselbloem, J., Draghi, M., and Schulz, M. (2015). Completing Europe's Economic and Monetary Union. Five presidents' report, European Union.

Keeley, B. (2015). Income Inequality. The Gap between Rich and Poor. OECD Insights, OECD.

Milanovic, B. (2016). Increasing Capital Income Share and its Effect on Personal Income Inequality. *Luxembourg Income Study Working Paper*, (663).

Moradi, Z. S., Mirzaeenejad, M., and Geraeenejad, G. (2016). Effect of Bank-Based or Market-Based Financial Systems on Income Distribution in Selected Countries. *Procedia Economics and Finance*, (36).

OECD (2016). Inequality Update November 2016. Oecd update, OECD.

Piketty, T. (2014). *Capital in the Twenty-First Century*. The Belknap Press of Harvard University Press.

Tanndal, J. and Waldenström, D. (2016). Does Financial Deregulation Boost Top Income? Evidence from the Big Bang. *CEPR Discussion Paper*, (11094).

Véron, N. (2014). Defining Europe's Capital Markets Union. *Bruegel Policy Contribution*, 12.

Véron, N. and Wolff, G. (2015). Capital Markets Union: A Vision for the Long Term. *Bruegel Policy Contribution*, 5.

World Bank (2016). Global Financial Development Database. Retrieved on 28/01/2016 from http://data.worldbank.org/data-catalog/global-financial-development.