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The Finance-Inequality Nexus in Portugal: An Empirical Study

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Masters (MSc) in Monetary and Financial Economics

PhD Ricardo Barradas, Assistant Professor,
[ISCAL-IPL]

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The Finance-Inequality Nexus in Portugal: An Empirical Study

Abstract

This paper conducts a time-series econometric analysis in order to assess the effect of finance on the distribution of income in Portugal between 1977 to 2016 using annual data. A battery of bank and market-based proxies are used to measure financial indicators (private credit, foreign direct investment, money supply, stock market capitalisation, financial value added and financial openness) to provide a holistic representation of the financial system in terms of depth, access, and efficiency (Svirydzenka, 2016). To ensure robustness, two different measures of the Gini coefficient are employed to proxy income inequality (gross and net). School enrolment (as a proxy for human capital), inflation, real GDP, government spending and trade openness were used as control variables. Additionally, the estimations were conducted using the Generalised Method of Moments (GMM) estimator to control for endogeneity. Linear and non-linear estimations were performed to test the different hypotheses available in literature concerning the relationship between finance and income inequality. Our results suggest that bank-based financial indicators have reduced income inequality while market-based financial indicators have worsened income distribution in Portugal. Additionally, financial liberalisation has increased income inequality in Portugal. The majority of our models support a concave relationship between finance and inequality in Portugal.

Keywords: Income inequality, financial system, financial liberalisation, Portugal, GMM estimator

JEL Classification: D31, G20

The Finance-Inequality Nexus in Portugal: An empirical study

Resumo

Este estudo pretende avaliar o efeito da financeirização na desigualdade de rendimentos em Portugal utilizando uma série temporal de dados anuais entre 1977 e 2016. Um conjunto de *proxies* financeiros foram utilizados para o efeito, nomeadamente, o crédito privado, o investimento directo estrangeiro, a oferta de Moeda, a capitalização bolsista, o valor acrescentado financeiro e o grau de abertura financeira, de modo a garantir uma representatividade adequada do Setor Financeiro em termos de profundidade, acesso e eficiência (Svirydzenka, 2016). Para efeitos de robustez, foram empregues duas medidas do coeficiente de Gini, mais especificamente, o coeficiente de Gini líquido e bruto. A taxa de escolarização (como *proxy* para o capital humano), a inflação, a taxa de crescimento real do PIB, a despesa pública e o grau de abertura comercial foram empregues como variáveis de controlo. As regressões foram estimadas utilizando o Método dos Momentos Generalizado (GMM) para controlar a endogeneidade. Foram estimados modelos lineares e não lineares de modo a testar as diferentes hipóteses disponíveis na literatura sobre a relação entre desigualdade de rendimentos e o desenvolvimento financeiro, nomeadamente, a hipótese linear (Positiva ou Negativa) e a hipótese não-linear (côncava ou convexa). Os resultados obtidos sugerem que o desenvolvimento financeiro bancário reduziu a desigualdade de rendimentos enquanto o desenvolvimento financeiro baseado nos mercados produziu o efeito oposto. Adicionalmente, a liberalização financeira gerou um efeito nefasto na distribuição de rendimentos em Portugal. A maioria dos modelos estimados apoiam a hipótese côncava.

Palavras-Chave: Desigualdade de rendimentos, desenvolvimento financeiro, liberalização financeira, Portugal, Greenwood-Jovanovic, GMM

Classificação JEL: D31, G20

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Glossary

AREAR - Annual Report on Exchange Arrangements and Exchange Restrictions

EEC – European Economic Community

FDI - Foreign Direct Investment

GDP – Gross Domestic Product

GMM - Generalised Method of Moments

IMF – International Monetary Fund

OECD - Organisation for Economic Co-operation and Development

SWIID – Standardised World Income Inequality Database

UTIP - University of Texas Inequality Project

1. Introduction

According to the General-Secretary of the Organisation for Economic Co-operation and Development (OECD), José Ángel Gurría Treviño, inequality can no longer be treated as an "afterthought". The negative social, economic, and political consequences of an uneven distribution of growth have been widely studied in economic literature. Consequently, policymakers are increasingly worried about income inequality. The OECD´s 2019 report "Under Pressure: The Squeezed Middle Class" highlights how middle-class households have seen their incomes grow timidly at best. The report highlights how changes in employment patterns caused by automation and technological change, and increased levels of indebtedness have increased the financial pressure felt by many middle-income households. Studying the relationship between the financial system and inequality could shed some light for policymakers when attempting to tackle the "squeeze" felt by middle-income households.

The financial crisis of 2007-2008 had an enormous impact on the real economy in terms of economic growth and unemployment. Consequently, the financial sector suffered a regulatory overhaul under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 and the implementation of the Basel III standards on capital and liquidity. Academics and politicians have increasingly been discussing the role of the financial sector in the modern economy. It is in this context that studying the finance-inequality nexus becomes an imperative.

The finance-inequality nexus has not been adequately studied for Portugal as econometric studies tend to focus on large cross-sectional data encompassing many economies[1]. Consequently, country-specific phenomena that could have serious policy implications are overlooked by literature[2]. The main contribution of this paper lies in its country-specific approach. The consequences of the large-scale privatisation, liberalisation, and deregulation of financial activities on income inequality that followed Portugal´s accession to the European Economic Community (EEC) in 1986 has hardly been focused upon by academia. Additionally, inequality was deepened by the economic slowdown that followed the sovereign debt crises (Rodrigues et al., 2016). Considering the country's consistently high levels of relative inequality on a European level (Rodrigues et al., 2016), the case for studying income

[1] Such as those of Baldacci et al. (2002), Das and Mohapatra (2003), Clarke et al. (2006), Beck et al. (2007), Roine, Vlachos and Waldenström (2009), Kappel (2010), Kunieda er al. (2011), Gimet and Lagoarde-Segot (2011), Tan and Law (2011), Atkinson and Morelli (2011), Mookerjee and Kalipioni (2011), Jauch and Watzka (2012), Hamori and Hashiguchi (2012), Agnello et al. (2012), Agnello and Sousa (2012), Jaumotte et al. (2013), Delis et al. (2014), Li and Yu (2014), Den and Cournede (2015), Jaumotee and Osuorio Buitron (2015), Honahan (2015), Furceri and Loungani (2015), Bumann and Lensink (2016), Naeur and Zhang, Christopoulos and McAdam (2016) and Haan and Sturm (2017).

[2] Bahmani-Oskooee and Zhang (2015) found that only 3 out of the 17 countries studied had a permanent effect on Income Inequality with increasing levels of Financial Development.

distribution in Portugal becomes even more convincing. However, Lagoa and Barradas (2021) discuss various direct and indirect channels by which financialisation could have affected inequality in Portugal between 1995 and 2008 (the years in which finance grew most according to the study). The authors found an overall decrease in income inequality but do not discard the idea that financialisation may have exercised a prejudicial role on income distribution. On the other hand, the study did not find a strong relationship between finance and inequality overall.

This paper conducts a time-series econometric analysis to study the effect of finance on income distribution in Portugal using annual data from 1977 to 2016. A battery of bank and market-based proxies are used to measure financial indicators (private credit, foreign direct investment, money supply, stock market capitalisation, financial value added and financial openness) to provide a holistic representation of the financial sector in terms of depth, access, and efficiency (Svirydzenka, 2016). To ensure robustness, two different measures of the Gini coefficient are employed to proxy income inequality. School enrolment (as a proxy for human capital), inflation, real GDP, government spending and trade openness are used as control variables. Additionally, the estimations were conducted using the Generalised Method of Moments (GMM) estimator to control for endogeneity. Linear and non-linear estimations were performed to test the different hypotheses available in literature concerning the relationship between finance and income inequality .

Our results suggest that bank-based financial indicators have reduced income inequality while market-based financial development has worsened income distribution. Moreover, financial liberalisation has increased income inequality in Portugal. The majority of our models support a concave relationship between finance and inequality.

The following section provides a detailed literature review on the finance-inequality nexus while Section 3 describes the data used for our estimations. Section 4 outlines the econometric methodology used and Section 5 presents and analyses the results of the estimations of our linear and non-linear models. Lastly, Section 6 outlines policy implications that could be drawn from our results.

2. Literature Review

This section aims to summarise the existing theoretical and empirical literature concerning the relationship between finance and income inequality. Past literature has reached a varied number conclusions regarding the Finance-Inequality nexus. We have identified studies that support the income-widening (linear and non-linear) and income-narrowing (linear and non-linear) hypotheses. Additionally, we have provided a summary of studies that presented mixed or inconclusive results.

2.1. Income-widening

2.1.1. Positive Linear Relationship

Galor and Zeira (1993) laid down the theoretical backbone of this trend in literature. Their seminal work highlighted the role of capital market imperfections in perpetuating income inequality. An individual lives for two periods in the Galor-Zeira model. In the first period, the individual may invest in human capital or work as an unskilled worker. The individual will only be able to invest in human capital if his/her bequest is large enough or if he/she is capable of borrowing from lenders under imperfect credit market conditions, under which the borrowing interest rate is higher than the lending interest rate. Only those who possess large initial bequests would be able to invest in human capital without incurring high borrowing costs. Unlike those with limited or no initial resources, wealthy individuals benefit from increased earnings in the second period and leave large inheritances/bequests to their offspring. The work concluded that unequal distributions of wealth and imperfect credit markets perpetuate income inequality from generation to generation. Banerjee and Newman (1993) also emphasise the role of capital market imperfections in prolonging income inequality as they define agents´ occupational decisions (working for a wage or becoming self-employed).

Rajan and Zingales (2003) highlight the importance of the quality of economic and political institutions in determining the effect of financial systems on income inequality[3]. According to the study, when political institutions are weak, financial system could enable established interests to gain privileged access to finance. Weak economic institutions could compromise the ability of financial intermediaries to channel financial resources towards productive economic activities. Under such conditions, richer segments of society are better positioned to offer collateral when seeking financial intermediation, hurting potential low-income borrowers. Chong and Gradstein (2007) suggest that the lack of an independent judicial system may also prevent poorer segments of society from prospering[4]. Law *et al*. (2014) confirm empirically the importance of institutional quality in determining the effect of the financial system on income inequality. Haan and Sturm (2017) find empirical evidence that political institutions condition the impact of financial liberalisation on income inequality.

[3] Furceri and Loungani (2015) corroborate this view empirically.
[4] The study presents a model in which institutional quality and income inequality dynamically reinforce each other.

Claessens and Perotti (2007) argue that financial regulation may be influenced by established interests when supervisory oversight by institutions is weak[5], [6]. The study also focused on how financial liberalisation could be detrimental to income inequality by facilitating capital flights for the well-off. Small elites benefit from financial liberalisation, but the risks[7] associated with such reforms end up being socialised. Even though richer segments of society bear the brunt of wealth losses caused by financial crises[8], poorer elements are far more likely to be negatively affected by economic recessions that follow[9].

Jaumotte *et al.* (2013) also highlight the role of foreign direct investment (FDI) in exacerbating income inequality. Inward flows of FDI deepen income inequality in both developing and developed countries while outward flows are particularly nefarious for the latter. As the recipients of FDI tend to be high-skill (and high-wage) sectors, inward FDI flows tend to widen the wage gap between low-skilled and high-skilled workers by increasing the demand for labour for the latter. In developed countries, outward FDI flows reduce employment opportunities in low-skilled sectors, worsening the distribution of income between the employed and unemployed.

Das and Mohapatra (2003) demonstrate that large-scale equity market liberalisations have benefitted limited segments of the population. Firms increase inequalities when they use operating cash flows to distribute dividends rather than reinvesting them in the real economy[10]. Aggarwal and Goodell (2009) also suggest that market-dominated (as opposed to bank-dominated) financial systems widen income inequality by allowing only relatively large firms to benefit from stock market development[11]. In addition, a limited number of rent-seeking individuals may also monopolise equity market gains. Denk *et al*. (2015) focus on the combined negative effects of indirect government subsidies aimed at

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[5] Christopoulos and McAdam (2017) finds that even though financial reforms do not stabilise income inequality, strong prudential policies (and strong redistributive systems) could help revert this effect.
[6] Roine *et al*. (2009) has point out that Rajan and Zingales (2003) and Cleassens and Perotti (2007) agree that *in principle* financial systems may reduce income inequality but this is not the case *in practice* due to the reasons discussed by each study respectively.
[7] Kaminsky and Reinhart (1999) demonstrate how the frequency of banking crises increase significantly after financial liberalisation.
[8] Roine *et al.* (2009) conclude that this phenomenon causes banking crises to reduce income inequality overall. On the other hand, Jaumotte and Osorio-Buitron (2015) suggest that banking crises do not affect income inequality significantly.
[9] Atkinson and Morelli (2011) argue that there are no such "hard and fast" rules. The authors outlined three channels through which financial crises may affect income groups differently, namely, bank failures/bankruptcies, falls in asset prices and/or interest rates; Policy responses; and economic recessions in the aftermath of financial crises.
[10] Jaumotte *et al*. (2015), Naceur and Zhang (2016) and Haan and Sturm (2017) also empirically show that financial liberalisation worsens income inequality. Agnello *et al*. (2012), Delis *et al*. (2014) and Li and Yu (2014) report the opposite phenomenon.
[11] On the other hand, Gimet and Lagoarde-Segot (2011) and Naceur and Zhang (2016) find that bank-based indicators are far more relavant in determing income inequality than market-based ones.

financial institutions, barriers in the financial sector labour market (characterised by excessive earnings) and competitive credit markets (with an under-priced level of credit risk) on income equality.

Jauch and Watzka (2012)´s empirical study finds a small but positive relationship between the financial system and income inequality in a broad unbalanced dataset of developed and developing countries. Gimet and Lagoarde-Segot (2011) and Denk and Cournède (2015) reach similar conclusions using smaller databases. Haan and Sturm (2017) corroborate the existence of a positive relationship between finance and income inequality and draw special attention to the role of high levels of financial development in exacerbating this effect[13].

2.1.2. Non-linear Convex

Tan and Law (2012)´s unorthodox work suggests that there is a non-linear and convex relationship between financial development and income inequality. The authors use two datasets to measure income inequality, namely The Standardised World Income Inequality Database (SWIID) and the University of Texas Inequality Project (UTIP) database. The study concludes that at an initial stage, increases in the level of financial development reduce overall income inequality. After a certain threshold of financial development is reached, the opposite effect takes place. It is important to note that the work does not provide any solid theoretical reasoning to sustain its empirical results. The authors highlight how the two databases lead to contradictory results regarding the role of different aspects of financial development in determining income inequality. The SWIID database by the World Bank shows that bank *and* stock market indicators are significant in explaining income inequality. When the inequality data from the University of Texas are employed, only bank indicators are significant. However, the widening effect on income inequality persists.

2.2. Income-narrowing

2.2.1 Non-linear Concave

Greenwood and Jovanovic (1990) laid the theoretical foundation stone for the "concave tendency" in literature. Their model demonstrates that income inequality would rise at the initial stages of financial development but falls after a certain threshold is reached. The level of financial intermediation and the rate of economic growth were determined endogenously by the model. It was assumed that the savings rate of a wealthy individual was higher than that of a poor one. As the level of financial intermediation

[13] Bumann and Lensink (2016) report the opposite conclusion by stressing that financial liberalisation reduces income inequality if financial development is high. Kunieda *et al*. (2011) suggest an inverse relationship, i.e., economies that are highly exposed to international financial markets are unable to reduce income inequality through increases in the level of financial development. According to their model developed, national talented agents are not forced to borrow from less talented national agents when international financial integration is high, decreasing incomes for the latter.

increases, the rich would benefit from higher returns on capital as the cost of benefiting from financial intermediation would be very high (e.g., management fees). However, the economic growth that followed would provide the necessary means to establish costly financial structures and widen credit facilities. Consequently, poorer segments of society would eventually be able to pay for financial intermediation and benefit from it as well, mitigating income inequality. Aghion and Bolton (1997) also produce a model whereby capital accumulation widened income inequality at an initial stage but decreased it at a later stage through a "trickle-down" mechanism, producing a curve reminiscent of the Kuznets curve. Clarke *et al*. (2006) was able to corroborate the Greenwood-Jovanovic hypothesis empirically.

2.2.2. Linear Negative Relationship

Beck *et al*. (2007) use a wide cross-sectional sample of 52 countries between 1960 and 1999 to test whether financial development reduces income inequality. The study concludes that economies with high levels of financial intermediation benefit from lower levels of income inequality by focusing on the income growth rate of the poorest quintile. The authors include a squared term to control for non-linearities but the variable was not statistically significant. Kappel (2010)[14] use several indicators to measure the importance of finance on 78 countries between 1960 and 2006. The study highlights the role of credit *and* stock markets in reducing income inequality. However, the study concludes that enhanced loan markets play a more significant part in combating income inequality. Delis *et al*. (2014) also suggest that policies aimed at financial liberalisation reduce income inequality, but the effect did not seem to apply for market-based financial systems[15] and in economies with low levels of economic and institutional development. Similarly, the study does not find any evidence in favour of non-linearity either.

2.3. Inconclusive/Mixed Results

Kunnieda *et al*. (2011) state that internationally exposed domestic financial markets worsen income inequality. The opposite is true for economies with closed financial markets. A theoretical explanation of the empirical results is provided using an overlapping generations model. There are two forms of capital in this model, notably real capital and financial capital. The former could not be traded internationally due to its country-specific nature. In a closed economy, as financial development increases, real capital is exploited by talented agents but they are forced to borrow financial capital from less-talented agents at high interest rates, thereby reducing income inequality. In a small and open economy, talented agents can borrow financial capital from the world market at low interest rates, worsening the distribution of income between talented and less-talented agents. Naceur and Zhang

[14] The study´s findings clearly support the linear hypothesis.
[15] Security market liberalisations led to increases in income inequality.

(2016) empirically prove that the growth of financial development and financial liberalisation have opposite effects on income inequality.

Bahmani-Oskooee and Zhang (2015) assess the effect of finance on inequality in 17 economies. In the short term, more finance seems to reduce income inequality in 10 out of the 17 countries while the opposite is true for five. Additionally, the long term income inequality reductions only occur in three economies (Denmark, Kenya and Turkey). The study emphasises the importance of considering country-specific characteristics when studying the role of finance on income inequality[16] [17].

2.4. Conclusion

Literature reaches to different conclusions regarding the relationship between finance and income inequality (Table 1, Table 2 and Table 3 systematise the results obtained by different studies[18]). As most studies use large panel datasets, their conclusions tend to reflect the *average* effect the financial system may have on income inequality, ignoring country-specific phenomena. The conflicting conclusions found in literature could be explained by an aggregation bias associated with panel data (unlike time-series data).

It is in this context that we propose to study the finance-inequality nexus in Portugal. Additionally, it would be interesting to study whether the recent overall decrease in income inequality is related to the growth of the financial system over the past few years (see Figure 1) as this could allow us to draw serious policy implications that could further help reduce income inequality in Portugal.

[16] Agnello and Sousa (2012) also find diferences in the effect of banking crises on income inequality in OECD and non-OECD Countries. Kappel (2010) also emphasises the different nature of results between developed and developing economies.
[17] Li *et al*. (1998) also conclude that 90% of the total variance between cross-country Gini coefficients is explained by country-specific factors.
[18] We expanded further and improved the systemisation developed by Haan and Sturm (2017).

Table 1- Studies that report a positive relationship between finance and income inequality

Authors	**Year**	**Object of measurement**	**Sample**	**Dependent Variable**	**Finance Variables**	**Other independent variables**	**Methadology**
Galor and Zeira	1993	Financial Development	/	Distribution of Income	Investment in Human Capital under imperfect capital market conditions	N/A	Theoretical paper that seeks to establish the links between investment in Human Capital and the Distribution of Income under imperfect credit market conditions.
Banerjee and Newmann	1993	Financial Development	/	Economic Development	Occupational choices made by agents under imperfect capital market conditions and unequal initial wealth distributions.	N/A	This paper´s main focus is economic development. It also discusses how initial distributions of wealth determine future income patterns via occupational choices made by agents under imperfect capital market conditions.
Baldacci et al.	2002	Financial Crises	65 countries	Mean household income, Poverty headcount, Poverty gap, Poverty gap squared, Gini Coefficient, Income Share Quintiles	Various macro and microlevel indicators from various Financial Crises	GDP/capita growth, inflation and household socioeconomic and demographics indicators, among other factors	Cross sectional; Crisis-struck economies vs Control group (Differences-in-Differences Methodology), OLS
Claessens and Perotti	2007	Financial Development and Financial Liberalisation	N/A	N/A	N/A	N/A	Theoretical paper that interprets literature on Finance and Inequality. Focuses on how captured financial regulation can increase inequalities.
Gimet and Lagoarde-Segot	2011	Financial Development	1994–2002, 49 countries	Estimated household income inequality (EHII) (Proxies Income Ineuqlity using Gini Coefficient and Theil Index)	Various Banking and Capital size, robustness, efficiency, and international integration indicators. Banking Lending Rate-Deposit Rate (Spread), (Finance and Insurance Industry Exports/GDP), Liquid Reserves/Assets. Stock Market Capitalisation/GDP, turnover ratio, among others	GDP, GDP/capita, Trade openness (Exports+Imports/GDP), International Financial Integration ((Portfolio Equity + Stock of Direct Investment and Liabilities)/GDP)	Panel Data; Bayesian S-VAR
Tan and Law	2011	Financial Development	1991-2011, 35 developing countries	Gini Coefficient (SWIID and UTIP)	Private Sector Credit, Liquid Liabilities, Stock market capitalization, Total share value traded,	Income/capita, institutional quality, and inflation	Panel Data, GMM
Atkinson and Morelli	2011	Financial Crises	1911-2010, 25 countires	Poverty rate, income shares, Gini coefficient among others	Various Financial Crises	No attempt made to control for variables that might affect the distribution of Income due to the methodology chosen.	*Window Event Study* - Studies the variations in the distributional variables in a 5 year "window" in either side of the crisis date.
Jauch and Watzka	2012	Financial Development	Uneven dataset of up to 138 countries, 1960-1980 (annual and 5-year data)	Gross Gini; Net Gini	Private Credit/GDP, Bank Deposits/GDP	GDP/capita, (GDP/capita)^2, risk of expropriation, ethno-linguistic fractionalization, government spending, inflation, and the share of the modern sector	Cross-sectional and Panel Data; OLS, Fixed Effects Model, Fixed Country and Time Effects (using Dummies); ; 2SLS (two-stage Least Sqaures Esimtation), GMM
Fournier and Koske	2012	Financial Development	32 OECD countries,	Household Labour earnings dispersion	Share of workers in the Financial Intermediation sector	N/A	Cross-country analysis; UQR and CQR regressions
Jaumotte et al.	2013	Financial Liberalisation	51 countries, 1981-2003	Gini Coefficient	FDI flows; Capital Account Openness Index; Inward Portfolio Equity Stock/GDP; Inward Debt Stock/GDP	ICT Capital/Capital Stock (technological development), Average years of education in the population ages 15 and older (Access to Education), Population ages 15 and older/Total Population (Access to Education), Sectoral shares of employment; Private Sector Credit/GDP (Financial Development)	Panel Data ; Fixed Effects Model
Denk and Cournede	**2015**	Financial Development	33 OECD Countries, 1970-2011	Gini of disposal income	Value added of finance(GDP, intermediated credit/GDP, and stock market capitalisation/GDP	Gross fixed capital formation (Investment rate), Average years of schooling of the adult population (Proxy for Human Capital) and the growth rate of the working age population, Unemployment rate (Business-to-Business Cycle fluctuations)	OLS and include country and fixed effects
Jaumotte and Osuorio Buitron	2015	Financial Liberalisation	20 advanced countries; 1981–2010	Gross Gini; Net Gini	Level of index of Abiad et al	ICT in capital stock; Lagged income per capita; Income/capita * Export share of China; Ln (Financial Reform); Top tax; Union Density; Minimum wage; Bank crisis (dummy); Political preferences; Social Preference for Inequality, Share of Industry/Services, Higher education, Excess coverage of collective agreements; Unemployment benefits; Regular contracts and Temporary contracts	3SLS (3-stage Least Squares) with year and Fixed Country effects
Furceri and Loungani	2015	Financial Liberalisation	Unbalanced panel of 149 countries from 1970 to 2010	Gross Gini	Capital Account Liberalisation Episodes (Dummy)	GDP, GDP growth; (Log GDP/capita)^2; (Exports+Imports)/GDP (Change in trade openness); Change in the GDP's share of government spending; Change in the Share of industry and agriculture value added; Change in dependency ratios; Change in product, Labour and credit market regulations; and time fixed effects to control for shocks common to all countries; Current Account Reforms and Regulatory Reforms	Panel Data; OLS; Fixed Time and Country effects; Weighted Least Sqaures (WLS)
Haan and Sturm	2017	Financial Development	121 countries, 1975-2005	Gini coefficient based on households' income (five-year non-overlapping averages)	Private credit/GDP	General government final consumption expenditure (% of GDP); Log(GDP per capita - constant 2005 US$); Trade (% of GDP); Log(Population); Inflation, consumer prices (annual %); GDP growth (annual %); Agriculture, value added (% of GDP); Industry, value added (% of GDP); Total natural resources rents (% of GDP); Average of non-financial EFW-areas; Chinn-Ito index; Orientation of the Chief Executive Party is left-wing; Freedom in the World: Civil Liberties; Adjusted savings: education expenditure (% of GNI); School enrolment, primary (% gross); School enrolment, secondary (% gross); School enrolment, tertiary (% gross); Economic Globalization: Actual Flows; Economic Globalization: Restrictions; Social Globalisation; Political Globalisation; Ethnic Polarisation (EPR); Ethnic Fractionalisation; Life expectancy at birth, total (years); Net barter terms of trade index (2000=100); FDI, net inflows (% of GDP); Gross Fixed Capital Formation (%of GDP); Gross Fixed Capital formation (% of GDP); Start of Currency Crisis; Sovereign Debt Crisis (default date); Sovereign Debt Restructuring year. Also uses interation variables: Institutional Quality; Democratic Accountability (ICGR indicators).	Panel Data; Fixed Effects Models and Random Effects Model (GLS, G2SLS)
	2017	Financial Liberalisation	121 countries, 1975-2005	Gini coefficient based on households' income (five-year non-overlapping averages)	Sum of 6/7 Abiad et al. (2010) sub-indices on banking regulatory practices; Sum of 4 sub-indices (freedom to own foreign currency bank accounts, Percentage difference between the official and parallel exchange rate, capital movement controls and extent to which the banking industry is privately owned, the extent to which credit is supplied to the government sector and whether controls on interest rates interfere with the market in credit) from the economic freedom database		

Table 2- Studies that report a negative relationship between finance and income inequality

Authors	**Year**	**Object of measurement**	**Sample**	**Dependent Variable**	**Finance Variables**	**Other independent variables**	**Methodology**
Greenwood and Jovanovic	1990	Financial Development	/	Distribution of Income	Financial Intermediation	N/A	Theoretical paper that seeks to present a model that explains the distribution of Income via Financial Intermediation.
Aghion and Bolton	1997	Financial Development	/	Income Inequality	Capital Accumulation under imperfect credit market conditions	N/A	Theoretical paper that seeks to present a growth and income inequality model explained by capital accumulation under imperfect credit market conditions.
Li et al.	1998	Financial Development	49 countries, 1947-94 (5-year periods)	Net Gini + Gross Gini (household and individual indicators)	M2/GDP	Initial level of secondary Schooling, civil liberties, initial distribution of land. Sensitivity analysis: GDP/capita, Investment ratio, black market premium, terms of trade shocks, openness, arable area/capita	Panel Data; OLS, IV regression using lagged variables, ANOVA, LSDV
Das and Mohapatra	2003	Financial Liberalisation	11 countries that undertook capital account liberalization, 1986-1995	Income quintiles	Dummy variable for Capital Liberalisation	Regional GDP growth, Govt Spending, Secondary Enrolment, Private Credit, Gross Investment, Rule of Law, Terms of Trade, banking sector and domestic fundamentals, e.g domestic programs of stabilisation, privatisation policies and the easing of exchange rate restrictions, Country Fixed Effects	Panel Data: Countries that went through Capital Account Liberalisation vs Control Group that did not go through major reforms (Event-study model)
Galor and Moav	2004	Financial Deepening	N/A	Income Inequality	Capital Accumulation	N/A	Theoretical paper that presents the interplay between the accumulation of physical and human capital over time as the determinant of economic development and income inequality.
Clarke et al	2006	Financial Development	83 countries, 5-year averages, 1960-1995	Income quintiles and Gini Coefficient	Private credit/GDP, Bank Assets	Initial Log of Real GDP/capita, (Initial Real GDP/Capita)2 ,Inflation, Government Spending, Risk of expropriation, Ethnolinguistic fractionalisation, Government Spending, Inflation, Modern sector value added/GDP	Panel Data and Cross-sectional analysis; OLS, 2SLS; Instrumental variables (IV)
Beck et al.	2007	Financial Development	65 countries, 1960– 2005	Gini Growth	Private credit/GDP	Average years of schooling, Inflation, Government Spending/GDP, GDP/capita growth, Secondary School Enrolment, Government Consumption, Inflation, (Imports + Exports)/GDP	Panel Data; OLS, Instrumental Variables (IV)
Demirguc-Kunt and Levine	2009	Financial Development	/	/	/	/	Qualitative analysis of various previous studies on the Finance-Inequality nexus.
Kappel	2010	Financial Development	78 countries, 1960–2006	Gini Coefficient, Headcount ratio	Private Credit/GDP, Stock Market Capitalisation/GDP, Stock market total/GDP, Stock market turnover ratio/GDP, Adult pop. with access to an account with a financial intermediary (%)	Ethnic diversity, Land distribution (Land Gini Index), Government spending and School enrolment, Average years of schooling, Human Development Index (HDI)	Cross-sectional, Panel Data; OLS, 2SLS
Mookerjee and Kalipioni	2011	Financial Access	Developing and Developed countries	Gini	Number of bank branches/100,000	?	?
Agnello et al.	2012	Financial Liberalisation and Development	62 countries, 5-year non-overlapping windows, 1973–2005	Net Income Gini	Financial Reform Index, Credit controls, Credit ceilings, Directed Credit, Interest Rate controls, Security markets, Privitisation, International Capital Flows, Entry barriers, Banking Supervision	Income/capita, $(\text{Income/capita})^{2,}$ Size of Govt, Degree of openness.	Panel Data; OLS?[29]
Hamori and Hashiguchi	2012	Financial Development	126 countries, 1963–2002,	Estimated household income inequality	M2/GDP; Private Sector Credit/GDP	Trade/GDP, Log GDP/capita, Inflation, and Interaction variables	Panel Data; Fixed Effects Model and GMM
Delis et al.	2014	Financial Liberalisation	91 countries, 5-year period averages, 1973– 2005	Gini coefficient (SWIID); Theil index	Level of index of Abiad et al.	Log GDP/capita, Inflation, $(\text{Log GDP/capita})^2$, (Imports + Exports)/GDP, Central Govt Expenditure/GDP, Schooling (Barro-Lee indicator by the educational quality indicator “cognitive” developed by Hanushek and Woessmann (2009)), Bank deposits/Bank credit (Proxy for level of Liquidity), Banking Crisis as dummy, Political orientation of Govt, Overall Index of Freedom (that excludes Financial Freedom,Transparency indices of the International Country Risk Guide (ICRG) (Law and Order)	Cross-sectional, Panel Data; OLS, 2SLS, GMM
Li and Yu	2014	Financial Liberalisation	18 Asian countries, 1996–2005	Gross Gini	Level of index of Abiad et al.	Low secondary school enrolment dummy*FLI, Secondary School enrolment, Life expectancy, Government consumption/GDP, Institutional Quality, Inflation, Stock turnover, GDP/capita growth, Trade openness, Private credit/GDP, Crisis dummy, Terms of Trade	Panel Data; Fixed Effects Model, GMM
Bumann and Lensink	2016	Financial Liberalisation	1973-2008, 106 countries	Gross Gini	Capital account liberalisation (Chen-Ito index)	Inflation, Trade openness, Secondary school enrolment, Population growth and GDP/capital real growth, Size of Govt., Life expectancy, Financial Crises, Investment, Property Rights, Law and Order, Human Capital	Panel Data; GMM

29 According to Haan and Sturm (2016)

Table 3- Studies that report mixed or inconclusive results on the relationship between finance and income inequality

Authors	Year	Object of measurement	Sample	Dependent Variable	Finance Variables	Other independent variables	Methodology
Honohan	2005	Banking Crises	43 crises	Income Inequality	Banking Crises (as dummy variable)	Government size, income per capita, financial depth (Domestic credit provided by the banking sector as % of GDP) and unemployment rate	Theoretical paper that discusses the different channels by which banking crises affect income inequality. In the short-run, Banking crises reduce inequality but the economic effects that follow can hurt the poor greatly.
Roine, Vlachos and Waldenström	2009	Financial Development	1900-2000, 16 countries	Income Quintiles	Relative share of the Banking and Stock market sectors in the economy	GDP/capita, Trade openness, Population size and Govt. spending	Panel Data; FDGLS
		Banking Crises	1900-2000, 16 countries	Income Quintiles	Data indicators from Bordo et al. (2001) and Laeven and Valencia (2008) on Banking Crises	GDP/capita, Trade openness, Population size and Govt. spending	Panel Data; FDGLS
Kunieda et Al.	2011	Financial Development	Cross country (119 countries) and panel (120 countries) with 5-year average 1985– 2009	Gini Coefficient	Private Credit/GDP	Log Real GDP/capita, Average years of total schooling (Proxy for Human Capital), Democracy indicator, and Extent of political risk (ICRG), Inflation, Capital Controls, Trade Openness (Total assets +Total liabilities)/GDP (Lane-Milesi-Ferretti indicator)	Cross-sectional data; Instrumental Variables IV for Cross-sectional using legal origins as instrumental variables and GMM
Agnello and Sousa	2012	Banking Crises	1980–2006, 62 OECD and non-OECD countries	Gini	Banking Crises (as dummy variable)	Government size, income per capita, financial depth (Domestic credit provided by the banking sector as % of GDP) and unemployment rate	Panel Data; IV-GMM
Bahmani-Oskooee and Zhang	2015	Financial Development	17 countries	Log Gini	5 measures of FD (including private credit and bank credit)	Log GDP, Log CPI, Log Gov consumption, Log Trade	Time-series; ?
Naeur and Zhang	2016	Financial Development	143 countries; 1961-2011	Gini Coefficient and Poverty Gap Index	Various measures of financial development (access (Bank accounts/1,000 adults, Value traded of the top 10 trading companies/total value traded)., efficiency (net interest margin and the stock market turnover ratio), deepening (Bank credit/GDP, Stock Market total value traded/GDP), stability (Capital to risk-weighted assets, volatility of the stock price index))	Real GDP/capita, Govt. expenditures/GDP, Trade openness, and the Inflation rate	Panel Data; Instrumental Variables IV regressions
		Financial Liberalisation	143 countries; 1961-2011	Gini Coefficient and Poverty Gap Index	Index by Abiad et al. (2008)	Real GDP/capita, Govt. expenditures/GDP, Trade openness, and the Inflation rate	Panel Data; Instrumental Variables IV
Christopoulos and McAdam	2016	Financial Liberalisation	29 countries, 1975–2005	Net Gini Coefficient ; Gross Gini Coefficient	Level of index of Abiad et al. (2010)	/	Panel Data, Unit Root tests

3. Data

There are three important considerations concerning the selection and collection of data for the variables in this study. First, we attempt to use variables employed by previous studies (Tables 1, 2 and 3 provide a summary of all independent and dependent variables used in previous studies) increasing the comparability of our results with the existing empirical literature.

Second, bank-based (private credit, money supply and gross financial value added) and market-based (stock market capitalisation) variables were selected to provide a more holistic representation of the financial system. As highlighted by Kappel (2010), the increased complexity of financial intermediation in developed economies requires that various elements of what constitutes "finance" should be taken into account, such as stock market capitalisation. Note that foreign direct investment (FDI) and the Chinn-Ito index variables are both market and bank-based indicators. FDI can be directed at bank or market segments of the financial system and the Chinn-Ito index is calculated using both bank and market-based indicators (see footnote 39). We also use several proxies to allow for a better representation of the financial system in terms of depth, access, and efficiency (Svirydzenka, 2016).

Third, the lack of financial data for Portugal limited the number of observations and variables used in this study. Data for stock market capitalisation is only available after 1977 and the proxy for money supply is only available until 2016. Nonetheless, our dataset includes the main period of deregulation and liberalisation of the Portuguese financial system, notably the mid-1980s (Barradas, 2021).

In line with the vast majority of empirical studies concerning the finance-inequality nexus, the Gini coefficient is used to measure income inequality (see Table 1, Table 2 and Table 3). To ensure robustness, both post-tax, post-transfer and pre-tax, pre-transfer Gini coefficients are used as the dependent variable. A similar approach is taken by Li *et al*. (1998), Tan and Law (2011), Jauch and Watzka (2012) and Christopoulos and McAdam (2014).

Table 4 outlines the variables used in this study alongside their respective proxies and sources. Table 5 describes the different theoretical channels by which the control variables used in this study may affect income inequality. We have also attempted to provide empirical literature that has corroborated or disproved the outlined channels.

Table 4- Summary of our variables

Variable	Proxy	Source
Income inequality	Gross Gini coefficient (post-tax, post-transfer)[32]	SWIID
	Net Gini Coefficient (pre-tax, pre-transfer)	SWIID
Private credit[34]	Total credit to private non-financial sector, adjusted for breaks (% of GDP)	Fred St. Louis
International financial integration	Foreign direct investment, net inflows (% of GDP)	World Bank
Money supply[35]	Annual liquid liabilities[36], not seasonally adjusted (% of GDP)	Fred St. Louis
Equity market growth	Stock market capitalisation (% of GDP)[37]	Fred St. Louis
Financial specialisation	Gross value added of financial and insurance activities (% of total)[38]	PORDATA
Financial openness	Chinn-Ito index[39]	Chinn-Ito database
Human capital	School enrolment, tertiary (% gross)	PORDATA
Inflation[40]	Inflation, consumer prices (annual %)	World Bank
Economic growth	Real GDP growth (%)	World Bank
Government spending	Government expenditure (% of GDP)[41]	World Bank
Trade openness	Exports and imports (% of GDP)	World Bank

[32] Even though Furceri and Loungani (2015) mention that the Gini coefficient typically omits certain sources of income for richer segments of society, the quality of this indicator is generally recognised.

[34] Clarke *et al*. (2006), Beck *et al*. (2007) and Haan and Sturm (2017) emphasise that private credit is a more appropriate indicator than M2 over GDP to represent the development of the financial system as the latter includes the liabilities of central banks besides those of banks and other financial intermediaries. Additionally, it includes credit lent to the government and state-owned entities. Beck *et al*. (2007) also highlight the quality of this indicator. Jauch and Watzka (2012) underlines the quality of this indicator in measuring the accessibility of finance.

[35] Inui *et al*. (2017) describes the main channels through which money supply could affect income inequality using existing taxonomies provided CGKS (2012) and Nakajima (2015), namely the earnings heterogeneity channel (varied levels of labour unionisation, "stickiness" of nominal wages and labour market flexibility between economic sectors cause earnings to react differently to shocks in money supply), the jobs channel (expansionist (restrictive) monetary policies create (eliminate) jobs, affecting average wages), the income composition channel (expansionist monetary policies could increase capital incomes (held by wealthier segments of society) more than labour incomes which could lead to an increase in income inequality), the portfolio channel (expansionist monetary policy increases the value of equity assets (generally held by richer segments of society) and reduces the real value of cash (the poor tend to hold a greater proportion of their savings in cash), increasing inequality; and the inflation channel (monetary policy has a direct impact on inflation (Table 5).

[36] Could also be read as an indicator of the ability of the banking system to mobilise funds or as measure of the relative weight of the banking sector to the economy.

[37] High levels of capitalisation imply better risk diversification and a greater ability to raise capital. It can also be seen as an indicator of market liquidity (Kappel (2010).

[38] This indicator is also important to highlight the sectoral changes in the Portuguese economy. Kuznets (1955) suggests that income distribution can be determined by an economy´s sectoral structure, as also highlight by Clarke *et al*. (2006).

[39] Calculated using binary dummy variables by using data from IMF's annual reports on exchange arrangements and exchange restrictions (AREAER) on the presence of multiple exchange rates, restrictions on current and capital account transactions and of a requirement to surrender any export proceeds. As highlighted by Bumann and Lensink (2016), this measure is particularly useful as it encapsulates both the depth and extensity of capital account controls.

[40] Inflation may also be seen as an important indicator of macroeconomic stability, as highlighted by Jauch and Watzka (2012).

[41] Ideally, we would have liked to obtain a measure of that would encompass local and national spending.

Table 5- Control variables and their relationships with income distribution

Control Variable	Channel through which income inequality is affected
School enrolment, tertiary (% gross)	Human capital affects income distribution by influencing labour market forces, economic growth, and average life expectancy. Theoretically, increased investment in schooling will allow individuals to profit from higher earnings from jobs that require a greater amount of skill. Income inequality is shown to have a positive relationship with educational inequality and a negative relationship with the level of education (Becker and Chiswick, 1966; Mincer, 1974; Ahluwalia, 1976). On the other hand, Ram (1984) finds that schooling inequality only has a negative effect on income inequality marginally. Schultz (1960) argues that investment in human capital has a greater role in determining economic development than the accumulation of physical capital. Grossman (1972) highlights how education can help increase the quality of life and lifespan of an individual. According to this study, the depreciation of a human´s initial (inherited) stock of health over time can be delayed by investments in health. Increased levels of education allow individuals to increase the efficiency by which such investments are made.
Inflation, consumer prices (annual %)	Variations in spending patterns between households cause increases in inflation to affect lower-income households more severely (inflation inequality). Apart from spending, Heer and Süssmuth (2003) provide a description of the channels by which inflation affects income distribution. These include the differential indexation of earnings across income groups (e.g., wealthier households can benefit from inflation-indexed assets more easily compared to lower-income households as they have far greater access to financial markets), disparities in the allocation of subsidised loans, the tax income bracket effect, and the Tanzi effect on public revenues. The dominant view is that there is a positive relationship between inflation and income inequality (Adelman and Fuwa, 1992; Schultz, 1969; and Haslag and Taylor, 1993). On the other hand, Jäntti (1994) and Mocan (1999) find that inflation has a progressive effect on income distribution. It is important to note that certain studies condition the effect that inflation may have on the initial level of inflation (Galli and Hoeven, 2001) or the level of financial development (Bulir and Gulde, 1995). In such cases, the relationship between both variables is non-monotonic.
Real GDP growth (%)[42]	There are several models that describe different transmission mechanisms by which economic growth can affect income distribution. Mdingi and Ho (2021) mention the level of economic development, the level of technological development, the socio-political unrest, the savings rate, the imperfection of credit markets, the political economy, the quality of institutions and the fertility rate. Kuznets described a non-monotonic relationship ("inverted U hypothesis") between economic growth and income distribution caused by shifts in labour from less to more developed sectors. Galor and Tsiddon (1997), Helpman (1997) and Aghion *et al*. (1998) describe how technological change increases the demand for high-skilled labour causing wage inequality between low-skilled and high-skilled sectors. Krueger (1993) corroborates this view. However, in the later stages of technological development, shifts in labour towards high-skill, technologically intensive and high-wage sectors eventually decrease wage disparities. High levels of income inequality can provoke socio-political unrest, which in turn hampers economic growth (Venieris and Gupta, 1986; Benhabib and Rustichini, 1996; Barro, 2000). On the other hand, these studies argue that such disruptions could force politicians to favour policies aimed at income redistribution, fostering economic growth. However, such policies may also discourage innovation and investment, deepening inequalities in the long term. Rent-seeking activities and corruption could also rise. Certain models reveal that if the average income is greater than the income of the median voter, voters tend to support redistributive policies which could reduce income inequality (Perotti, 1993; Alesina and Rodrik, 1994; and Barro, 2000). Theory suggests that increased savings lead to capital accumulation and long-term economic growth, lessening income inequality. However, Shin (2012) demonstrates that this process eventually reduces the marginal propensity of the rich to save, which results in a moderation of economic growth. Certain studies argue that high institutional quality improves economic growth (Acemoglu *et al*., 2005; and Weil, 2008) while the opposite aggravates income inequality. Large fertility differentials between low- and high-income families further increases income inequality as the former invest comparatively less in their offspring's human capital.
Government spending (% of GDP)	Government expenditures can influence income distribution by determining the level of economic growth and by playing a redistributive role. Governmental welfare expenditure on health and education may benefit low-income households directly while public works may decrease the level of unemployment, reducing income inequality (Stack, 1978). If government spending on transfers (Milanovic, 1994) or indirect subsidies (Rhee *et al*., 2014) is not well targeted, there may be little or no redistributive effect. Chu *et al*. (2000) and Bastagli *et al*. ((2012), (2015)) argue that "first-round" government transfers may increase household disposable income and reduce income inequality, but "second-round" transfers may reinforce or offset the effect. Kappel (2010) shows that government expenditure leads to reductions in income inequality in high-income economies.
Trade openness (% of GDP)	According to the Riccardian model, countries should produce and export the good they have a comparative advantage in. Under such production and export patterns, domestic and foreign consumers would face the same ratio of prices resulting in a harmonisation of wage levels worldwide. In the Heckscher-Ohlin model, countries export the good that intensively uses the factor it is abundant in and import the one in which they are not. Labour-intensive countries would see the price of their (labour-intensive) goods rise while capital-intensive countries would experience the opposite with their (capital-intensive) goods. Wages in the labour-intensive countries would rise and income inequality would decrease (factor price equalisation theorem). Stolper-Samuelson adds that trade would increase the wages of unskilled labour too. Gourdon *et al*. (2008) corroborate the factor price equalisation theorem empirically. On the other hand, Hanson and Harrison (1999) and Galiani and Sanguinatti (2003) find that trade openness has a positive relationship with income inequality in certain Latin American countries.

[42] For further reading on this section, refer to Mdingi and Ho (2021)

Table 6 and Table 7 provide a descriptive statistical analysis of the variables and correlations between them. Plots for each of the variables used in this study have been exhibited in Figure 1.

Table 6- Descriptive statistical analysis of the variables

	Gross Gini	Net Gini	Private Credit	FDI	Money Supply	Stock Market Capitalisation	Financial Value Added	Chinn-Ito Index	School enrolment	Inflation	Real GDP growth	Government Expenditure	Trade Openness
Mean	0.336	0.519	1.425	0.025	0.855	0.227	0.138	0.983	0.448	0.086	0.024	0.258	0.629
Median	0.336	0.520	1.310	0.017	0.842	0.252	0.135	2.206	0.561	0.039	0.021	0.260	0.626
Maximum	0.342	0.525	2.301	0.100	1.015	0.551	0.181	2.334	0.753	0.310	0.079	0.290	0.805
Minimum	0.330	0.508	0.788	0.003	0.583	0.003	0.097	-1.219	0.089	-0.008	-0.041	0.192	0.405
Std. Dev.	0.003	0.005	0.486	0.023	0.105	0.173	0.027	1.590	0.234	0.087	0.028	0.022	0.091
Skewness	0.010	-0.527	0.370	1.248	-0.455	0.184	0.159	-0.473	-0.311	1.030	-0.028	-0.971	-0.117
Kurtosis	3.532	2.210	1.730	4.053	2.752	1.935	1.856	1.380	1.517	2.913	2.746	3.854	3.459
Jarque-Bera	0.473	2.893	3.600	12.228	1.481	2.114	2.348	5.861	4.309	7.085	0.112	7.496	0.442
Probability	0.789	0.235	0.165	0.002	0.477	0.348	0.309	0.053	0.116	0.029	0.945	0.024	0.802
Observations	40	40	40	40	40	40	40	40	40	40	40	40	40

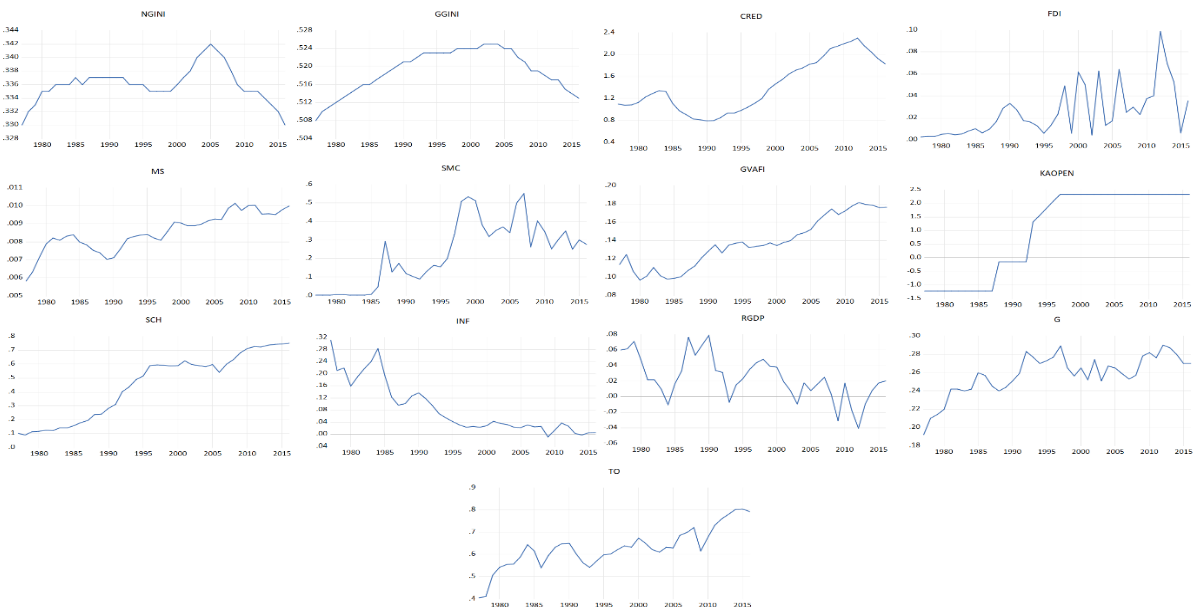
Table 7- Variable correlations matrix

	GGINI	NGINI	CRED	FDI	MS	SMC	GVAFI	KAOPEN	SCH	INF	RGDP	G	TO
GGINI	1												
NGINI	0.707***	1											
CRED	0.064	0.036	1										
FDI	0.117	0.281*	0.536***	1									
MS	0.216	0.352**	0.847***	0.468***	1								
SMC	0.331**	0.640***	0.554***	0.544***	0.655***	1							
GVAFI	0.010	0.257	0.814***	0.609***	0.883***	0.656***	1						
KAOPEN	0.201	0.622***	0.658***	0.556***	0.778***	0.842***	0.846***	1					
SCH	0.085	0.502***	0.725***	0-587***	0.836***	0.786***	0.905***	0.968***	1				
INF	-0.246	-0.633***	-0.540***	-0.514***	-0.747***	-0.812***	-0.788***	-0.912***	-0.917***	1			
RGDP	-0.178	-0.170	-0.697***	-0.402**	-0-714***	-0.224	-0.538***	-0.479***	-0.535***	0.366**	1		
G	0.196	0.568***	0.416***	0.452***	0.688***	0.502***	0.620***	0-707***	0.774***	-0.783***	-0.562***	1	
TO	0.062	0.232	0.670***	0.607***	0.790***	0.560***	0.737***	0.653***	0.748***	-0.668***	-0.448***	0.648***	1

*** indicates statistical significance at the 1% level, ** indicates statistical significance at the 5% level and * indicates statistical significance at the 10% level

The Gini coefficient (gross and net) has a positive relationship with all independent variables, with exception of real GDP growth and inflation. This seems to suggest that finance has widened income inequalities in Portugal. Note that net Gini show higher correlation values with the financial variables when compared to gross Gini. Jauch and Watzka (2012) obtain similar results. The authors explain that financial development may encourage risk-taking, leading to an increase in gross Gini. On the other hand, it may enable risk-sharing among households, reducing the Gini coefficient in net levels. However, our correlation matrix suggests that both indicators are worsened by increases in financial development.

Figure 1- Plots of the variables



4. Methodology

The following regressions were estimated using annual data for each of the financial variables from 1977 to 2016 to study the relationship between finance and inequality:

$$\mathbf{INE_t = \beta_0 + \beta_1 INE_{t-1} + \beta_2 X_t + \beta_3 F_t + u_t} \quad (1)$$

$$\mathbf{INE_t = \beta_0 + \beta_1 INE_{t-1} + \beta_2 X_t + \beta_3 FS_t + \beta_4 F_t^2 + u_t} \quad (2)$$

where:

- $\mathbf{INE_t}$ is the measure for income inequality (gross Gini coefficient (post-tax, post-transfer) or net Gini coefficient (pre-rax, pre-transfer)) at time t.
- $\mathbf{INE_{t-1}}$ is the measure for income inequality at time t-1 (lagged variable of the measure for income inequality).
- $\mathbf{X_t}$ is the set of control variables (school enrolment, inflation, real GDP growth, government spending and trade openness).
- $\mathbf{F_t}$ is a financial variable (private credit, FDI, money supply, stock market capitalisation/, financial value added and financial openness).
- $\mathbf{u_t}$ is the residual term.

Besides linear regressions (Equation 1), regressions with the squared term of each financial variable were also estimated[45] (Equation 2) to test for non-linearity in the relationship between finance and income inequality (using the same set of control variables). To ensure robustness, Equation (1) and (2) estimates were performed using both gross and net Gini as the measure for income inequality. In total, 24 regressions[46] were estimated.

Coefficient estimates of the non-quadratic models (Equation 2) were used to determine the turning point (F*) of each model by calculating the maximum (for concave curves) and minimum (for convex curves):

$$\mathbf{(\beta_3 F_t + \beta_4 F_t^2)^1 = 0 \Leftrightarrow \beta_3 Ft + 2\beta_4 F^*_t = 0 \Leftrightarrow FS^*_t = \frac{-\beta 3}{2\beta 4}} \quad (3)$$

A lagged variable of the Gini coefficient was introduced to control for the persistent nature of income inequality[47]. Piketty (2000) provides an exhaustive theoretical overview of the various causes of persistence in income inequality, namely family transmission of wealth, family transmission of ability, imperfect capital market, local (geographical) segregation, and self-fulfilling beliefs. By

[45] All estimates will be made using Eviews software (version 11).
[46] 2 regression types (linear and non-linear) * 6 finance variables * 2 types of inequality variables (net and gross Gini coefficients).
[47] Furceri and Loungani (2015) emphasise that the determinants of income inequality in the short term are usually serially correlated. Adding a lagged income inequality variable to the regression would help control for several factors that may influence income inequality.

including a lagged variable in our model, we took a similar approach to Roine *et al*. (2009), Agnello and Sousa (2011), Tan and Law (2011), Jauch and Watzka (2012) and Furceri and Loungani (2015). Kappel (2010) also recognises that income inequality is time-persistent.

$\beta_1 \ldots \beta_5$ are the coefficient parameters for their respective variables. If β_3 were (not) to be statistically significant then finance (does not) affect income inequality in Portugal. If β_3 were to be > 0 (< 0) and statistically significant then the income-widening[49] (income-narrowing) hypothesis would be supported. If β_0 and β_4 were (not) to be statistically significant then finance and income inequality would (not) share a non-linear relationship. If β_4 were to be >0 (<0) and statistically significant (alongside β_0) then finance and income inequality would share a convex (concave) relationship. In other words, the Greenwood-Jovanovic hypothesis would not (would) be supported.

Considering that literature does not rule out the possibility of endogeneity or reverse causality between variables[50], the GMM (Generalised Method of Moments) popularised by Hansen (1982) was employed to estimate the equations. GMM addresses potential endogeneity bias by using the lags of the regressors as instruments (which should be greater or equal to the number of independent variables). GMM estimators are understood to be consistent, asymptotically normal, and efficient. It combines observed data with the information in population moment conditions to estimate the unknown parameters of a model (Zsohar, 2012). The Newey-West estimator was employed to overcome any autocorrelation and heteroskedasticity in the error terms of the models. Additionally, the Barlett Kernel N-Step Iterative procedure was applied for estimating the weighting matrix. The validity of the instruments will be analysed using Hansen's J-test for overidentification of restrictions. A rejection of the null hypothesis would invalidate the chosen instruments as they would be considered to be correlated with the error term. Five lags of the finance and control variables were instrumented.

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[49] Also known as the Galor and Zeira (1993) and Banerjee and Newman (1993) hypothesis.

[50] Das and Mohapatra (2002) recognise that the problem of endogeneity could put into question the robustness of some of their results. Demirguc-Kent and Levine (2009) highlight the need to develop a conceptual framework concerning the endogeneity between finance and inequality. Atkinson and Morelli (2011) recognise that income inequality and financial crisis could be mutually reinforcing. Jauch and Watzka (2012) refers to Rajan (2010) by highlighting how increases in credit lent to US households occurred as a consequence of rising income inequality. Denk and Cournede (2015) also contemplate the possibility of a reverse causality between income inequality and intermediated credit as does Furceri and Loungani (2015) by performing Granger Causality tests. Naceur and Zhang (2016) suggests that lower poverty levels may stimulate financial development and economic growth (which could in turn determine income distribution). Additionally, Baldacci *et al*. (2002), Clarke *et al*. (2006), Beck *et al.* (2007) and Kappel (2010), Gimet and Lagoarde-Segot (2011), Tan and Law (2011) Agnello and Sousa (2012), Jauch and Watzka (2012), Jaumotte *et al*. (2013), Hamori and Hashiguchi (2014), Delis *et al*. (2014), Li and Yu (2014), Kunieda *et al*. (2014), Haan and Sturm (2015), Bumann and Lensink (2016) and Naeur and Zhang (2016) employ methodologies intended to control endogeneity (differences-in differences, 2SLS, Bayesian S-VAR, GMM, IV, time lags, among others).

5. Results

In this Section we provide the results of our estimates. Table 8 shows our estimates for the linear models while Table 9 exhibits our estimates for the non-linear models.

Table 8- GMM estimates of the five linear models (Equation 1)

Variable	Dependent Variable = Gross Gini Coefficient						Dependent Variable = Net Gini Coefficient					
	Credit (cred)	**FDI (fdi)**	**Money Supply (ms)**	**Stock Market Capitalisation (smc)**	**Gross Financial Value Added (gvafi)**	**Chinn-Ito Index (kaopen)**	**Credit (cred)**	**FDI (fdi)**	**Money Supply (ms)**	**Stock Market Capitalisation (smc)**	**Gross Financial Value Added (gvafi)**	**Chinn-Ito Index (kaopen)**
β_0 (Constant)	0.007** (0.003) [1.918]	0.027*** (0.003) [9.705]	0.019*** (0.004) [5.671]	0.009*** (0.002) [4.436]	0.0009 (0.002) [0.4158]	0.043*** (0.003) [14.998]	0.020* (0.009) [2.143]	0.024* (0.012) [2.014]	0.011© (0.007) [1.675]	0.025*** (0.009) [2.886]	-0.027*** (0.009) [-2.966]	0.028*** (0.010) [2.824]
$Gini_{t-1}$	0.989*** (0.006) [159.002]	0.954*** (0.005) [193.810]	0.974*** (0.007) [132.958]	0.981*** (0.003) [295.480]	0.999*** (0.004) [273.034]	0.917*** (0.005) [177.490]	0.964*** (0.026) [37.035]	0.955*** (0.035) [27.084]	1.012*** (0.020) [50.452]	0.940*** (0.026) [36.249]	1.098*** (0.025) [43.093]	0.933*** (0.028) [33.916]
Financial Variable (cred/fdi/ms/smc/gvafi/kaopen)	-0.0004*** (0.00008) [-5.117]	0.011*** (0.0004) [26.484]	-0.005*** (0.039) [-11.572]	0.001*** (0.00008) [7.405]	-0.018*** (0.0008) [-21.745]	0.0006*** (0.00005) [12.046]	0.0002 (0.0001) [1.128]	0.153*** (0.002)] [8.620	-0.008*** (0.048) [-17.650]	0.002*** (0.0003) [7.614]	-0.053*** (0.004) [-13.496]	0.0005*** (0.0001) [3.814]
School Enrolment	0.001*** (0.0004) [3.084]	0.002*** (0.0002) [9.089]	0.003*** (0.0003) [9.852]	0.0007** (0.0003) [2.557]	0.001*** (0.0001) [7.492]	-0.003*** (0.0005) [-5.858]	0.003*** (0.0004) [7.636]	0.003*** (0.0003) [10.211]	0.006*** (0.0006) [10.556]	0.001** (0.0005) [2.165]	0.005*** (0.0006) [8.368]	-0.002* (0.001) [-1.704]
Inflation	0.007*** (0.0010) [7.607]	0.009*** (0.0003) [31.137]	0.008*** (0.0009) [9.303]	0.008*** (0.0003) [27.968]	0.005*** (0.0003) [13.270]	0.008*** (0.0006) [12.361]	0.005*** (0.0006) [8.796]	0.007*** (0.0009) [7.840]	0.007*** (0.001) [6.165]	0.007*** (0.002) [4.298]	-0.0003 (0.001) [-0.200]	0.004*** (0.002) [2.695]
Real GDP growth	0.010*** (0.001) [7.893]	0.017*** (0.0005) [33.386]	0.009*** (0.001) [7.314]	0.014*** (0.0004) [32.395]	0.010*** (0.0007) [14.416]	0.015*** (0.0005) [29.709]	0.006*** (0.0007) [8.608]	0.007*** (0.002) [4.595]	-0.005*** (0.0013) [-3.504]	0.002 (0.001) [1.455]	-0.0003** (0.001) [-2.212]	0.002** (0.001) [1.885]
Government Spending	0.005*** (0.0009) [5.329]	0.004*** (0.0007) [6.318]	-0.0009 (0.002) [-0.539]	0.011*** (0.001) [9.649]	0.009*** (0.001) [8.135]	0.014*** (0.002) [8.879]	-0.019*** (0.002) [-7.952]	-0.022*** (0.001) [-17.996]	-0.031*** (0.002) [-15.294]	-0.009*** (0.003) [-3.349]	-0.010*** (0.002) [-4.154]	-0.012*** (0.003) [-3.899]
Trade Openness	-0.004*** (0.0004) [-11.336]	-0.009*** (0.0004) [-23.023]	-0.005*** (0.0005) [-11.312]	-0.006*** (0.0004) [-14.146]	-0.002*** (0.0003) [-7.387]	-0.006*** (0.0004) [-14.903]	-0.007*** (0.0007) [-10.309]	-0.009*** (0.0004) [-22.687]	-0.005*** (0.0004) [-12.008]	-0.006*** (0.0003) [-17.979]	0.002*** (0.0006) [4.283]	-0.005*** (0.001) [-4.013]
R-Squared	0.973985	0.976504	0.975426	0.973712	0.975168	0.975148	0.876845	0.889978	0.889891	0.883513	0.898173	0.881354
Adjusted R-Squared	0.966982	0.970178	0.968810	0.966634	0.968483	0.968457	0.843688	0.860357	0.860246	0.852151	0.870758	0.849411
J-Statistic	8.784512	8.985797	8.716778	8.933950	8.573767	9.099894	9.000369	9.150810	9.020325	9.060036	9.076908	8.907430
J-Statistic (p-value)	0.999352	0.999206	0.999396	0.999577	0.999481	0.999112	0.999195	0.999066	0.999178	0.999146	0.999508	0.999588

Standard errors in (), t-statistics in [], *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level and * indicates statistical significance at 10% level

Table 9- GMM estimates of the five quadratic models (Equation 2)

Variable	Dependent Variable = Gross Gini Coefficient						Dependent Variable = Net Gini Coefficient					
	Credit (cred)	**FDI (fdi)**	**Money Supply (ms)**	**Stock Market Capitalisation (smc)**	**Gross Financial Value Added (gvafi)**	**Chinn-Ito Index (kaopen)**	**Credit (cred)**	**FDI (fdi)**	**Money Supply (ms)**	**Stock Market Capitalisation (smc)**	**Gross Financial Value Added (gvafi)**	**Chinn-Ito Index (kaopen)**
β_0 (Constant)	0.005 (0.004) [1.263]	0.028*** (0.005) [6.073]	0.009* (0.005) [1.843]	0.011*** (0.001) [7.876]	0.026*** (0.009) [2.763]	0.048*** (0.005) [10.202]	0.009 (0.013) [0.722]	0.013 (0.011) [1.182]	-0.044*** (0.013) [-3.509]	0.022*** (0.006) [4.011]	-0.034*** (0.010) [-3.375]	0.026** (0.105) [2.448]
$Gini_{t-1}$	0.989*** (0.007) [135.136]	0.954*** (0.008) [121.874]	0.966*** (0.010) [100.634]	0.974*** (0.002) [398.900]	0.924*** (0.021) [45.076]	0.910*** (0.009) [103.112]	0.978*** (0.037) [26.764]	0.989*** (0.033) [29.689]	1.050*** (0.033) [-31.390]	0.935*** (0.166) [56.291]	1.052*** (0.023) [45.120]	0.938*** (0.295) [31.787]
Financial Variable (Cred/fdi/ms/smc/gvafi/kaopen)	0.0006*** (0.0002) [3.816]	-0.009*** (0.003) [-3.432]	0.038*** (0.399) [-6.898]	0.0089*** (0.0005) [19.408]	0.176*** (0.026) [6.845]	0.0007*** (0.0001) [6.148]	0.004*** (0.0008) [4.604]	-0.023*** (0.006) [-3.545]	0.084*** (1.030) [8.195]	0.018*** (0.002) [10.849]	0.218*** (0.032) [6.889]	0.0004** (0.0002) [1.853]
Financial Variable^2 ($Cred^2/fdi^2/ms^2/smc^2/gvafi^2/kaopen^2$)	-0.0003*** (0.00004) [-7.583]	0.244*** (0.0368) [6.628]	-0.018*** (24.473) [-7.512]	-0.012*** (0.0009) [-13.495]	-0.699*** (0.093) [-7.486]	-0.00006*** 0.00001) [-3.951]	-0.001*** (0.0003) [-4.596]	0.455*** (0.097) [4.678]	-0.053*** (58.700) [-9.07]	-0.023*** (0.002) [-9.930]	-0.971*** (0.120) [-8.077]	0.0002*** (0.00005) [3.532]
School Enrolment	0.0007** (0.0003) [2.490]	0.0028*** (0.0004) [6.553]	0.002*** (0.0004) [5.332]	0.0004*** (0.0002) [2.743]	-0.0007 (0.0005) [-1.376]	0.003*** (0.0006) [-4.507]	0.0007 (0.0009) [0.792]	0.005*** (0.0008) [6.546]	0.004*** (0.0005) [9.592]	0.0005 (0.0005) [0.897]	0.0002 (0.00058) [0.305]	-0.003** (0.001) [-2.009]
Inflation	0.006*** (0.0003) [9-559]	0.010*** (0.0009) [11.105]	0.006*** (0.0008) [8.042]	0.013*** (0.0004) [29.808]	0.002 (0.001) [1.516]	0.008*** (0.0009) [9.065]	0.002 (0.002) [1.219]	0.009*** (0.002) [5.531]	0.005*** (0.0010) [4.761]	0.016*** (0.002) [8.466]	-0.004** (0.002) [-2.369]	0.004*** (0.001) [3.703]
Real GDP growth	0.010*** (0.001) [8.35]	0.020*** (0.001) [20.024]	0.010*** (0.001) [8.775]	0.013*** (0.0004) [30.436]	0.001 (0.002) [0.698]	0.015*** (0.002) [27.157]	0.004** (0.002) [2.325]	0.013*** (0.003) [4.370]	-0.0006 (0.002) [-0.342]	-0.0004 (0.002) [-0.262]	-0.018*** (0.003) [-6.355]	0.004** (0.002) [1.778]
Government Spending	0.008*** (0.001) [7.710]	0.001 (0.002) [0.616]	-0.002 (0.002) [-0.801]	0.015*** (0.0008) [19.377]	0.009*** (0.002) [3.952]	0.012*** (0.002) [6.160]	-0.008** (0.003) [-2.524]	-0.026*** (0.003) [-9.915]	-0.029*** (0.002) [-18.067]	-0.002 (0.002) [-0.941]	-0.003 (0.002) [-1.467]	-0.007** (0.004) [-1.867]
Trade Openness	-0.004*** (0.0005) [-7.350]	-0.009*** (0.0007) [-14.486]	-0.004*** (0.0006) [-6.753]	-0.006*** (0.0002) [-27.594]	0.001*** (0.001) [0.934]	-0.006*** (0.0004) [-14.451]	-0.005*** (0.001) [-4.689]	-0.010*** (0.0008) [-12.208]	-0.0002 (0.0009) [-0.165]	-0.007*** (0.0006) [-11.851]	0.011*** (0.001) [7.922]	-0.005*** (0.001) [-4.628]
Turning Point (FS*)	1.000 (N7A)	0.01844 (1989)	0.749 (1980)	0.37083 (1998)	0.12589 (1990)	0.0583 (1993)	2.000 (N/A)	0.02527 (N/A)	0.792 (1981)	0.39130 (1998)	0.11226 (1990)	-1.000 (1988)
Supports Greenwood-Jovanovic	No	No- Concave	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No- Concave
R-Squared	0.974191	0.978000	0.976424	0.976459	0.977500	0.975386	0.882695	0.901229	0.907227	0.905624	0.914007	0.884904
Adjusted R-Squared	0.965932	0.970961	0.968880	0.968926	0.970300	0.967510	0.845038	0.869623	0.877539	0.875424	0.886489	0.848073
J-Statistic	8.764406	8.776988	8.560434	8.467286	8.405669	9.096051	8.907504	9.046385	9.101931	9.141201	8.821185	8.926284
J-Statistic (p-value)	0.999366	0.999357	0.999085	0.999746	0.999567	0.999115	0.999266	0.998534	0.999495	0.999075	0.999625	0.998691

Standard errors in (), t-statistics in [], *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level and * indicates statistical significance at 10% level

The following section describes the key takeaways from our results:

(a) Our models describe the evolution of inequality in Portugal reasonably well as evidenced by the high R-squared and adjusted R-squared values.

(b) The lagged Gini coefficient denotes a positive relationship with the Gini coefficient.

This result is in line with those obtained by Roine et al. (2009), Tan and Law (2011), Agnello and Sousa (2011), Jauch and Watzka (2012) and Furceri and Loungani (2015) who also find that income inequality is persistent in nature.

(c) Private credit, money supply and gross financial value added exert a negative influence on inequality in Portugal. On the other hand, stock market capitalisation and financial openness impacts inequality positively.

i. Bank-based indicators (private credit, gross financial value added and money supply) influence income inequality negatively while our market-based indicator (stock market capitalisation) influences income inequality positively.

Our results are in line with Aggarwal and Goodell (2009). Increases in the value of equity could have worsened income inequality as a spillover effect to increases in wealth inequality as suggested by Denk and Cournede (2015) by referring to Piketty (2014). However, the estimations for the non-linear model for stock market capitalisation clearly support the Greenwood-Jovanovic hypothesis. The model`s turning point of 0.37 was reached by 1998. The increasing numbers of shareholders between 1977 to 2016 could help explain this phenomenon. At the initial stages of equity market development, a limited segment of society could have benefited from equity market gains. But as the number of shareholders increased, the benefits of such gains would have become more widespread leading to an attenuation of income inequalities. However, it is worth noting that the number of shareholders in Portugal is still fairly limited. It is still worth noting that the overall effect of stock market capitalisation on income distribution between 1977 to 2016 seems to be prejudicial. On the other hand, market-based financial development should no longer be a cause for concern for Portuguese policy makers as the threshold (1998) has already been surpassed.

ii. Even though private credit (a strongly bank-based indicator) has a negative relationship with inequality, the coefficients associated with this variable are rather small. The positive but timid effect of private credit on income inequality might be explained by the disproportionately large amount of credit lent to the top 20% of households (Denk and Cournede, 2015) instead of economically productive activities that could help reduce income inequality.

iii. Financial liberalisation (proxied by FDI and the Chinn-Ito Index) have increased income inequality in Portugal.

The coefficient for the squared FDI variable is positive, supporting the "convex hypothesis" presented by Tan and Law (2011). The turning point of the regression (0.0184) was surpassed in 1989. At the early stages (until 1989), the largest recipients of FDI flows in Portugal tended to be low-skilled manufacturing sectors. This could have led to the increase in the average wage level of the general workforce which was mainly constituted of low-skilled workers (decreasing inequality). At later stages (post-1989), the explanation provided by Jaumotte et al. could apply as FDI flows were re-directed towards non-manufacturing sectors. Indeed, inward flows of FDI in developed countries tend to be directed towards high-skill (and high-wage) sectors. Consequently, such flows widen the wage gap between workers in low-skill and high-skill sectors by increasing the demand for labour in the latter. Even though the manufacturing sector still constituted a significant recipient of foreign investment in Portugal after 1989, the sector`s productivity levels were considerably lower. However, our results do not support Kunieda et al. (2011)`s view that economies that are highly exposed to international financial markets are unable to reduce income inequality through financial development. Our results are more in line with those obtained by Bumann and Lensink (2016) as the majority of our models support the income-narrowing hypothesis despite increases in FDI levels.

Our results also indicate that financial openness (proxied by the Chinn-Ito index) also aggravated income inequality in Portugal. However, the quadratic models show contradictory results. The models using gross Gini coefficient supports the Greenwood-Jovanoic hypothesis whilst net Gini model does not. Overall, our results resonate with those of Das and Mohapatra (2003), Claessens and Perotti (2007) and Jaumotte et al. (2013) as they also conclude that financial liberalisation is prejudicial for income distribution.

(d) The majority of the non-linear models support the Greenwood-Jovanovic hypothesis. In other words, income inequality increases at the initial stages of financial development. However, after a certain threshold is reached, the opposite effect is observed.

(e) Inflation has a exacerbates income inequality while trade openness and government spending promote a more equal distribution of income (as predicted by traditional literature – see table 5). It is worth noting that government spending shares a negative and significant relationship with net Gini but not gross Gini. Surprisingly, school enrolment and real GDP growth are detrimental to income equality.

Agnello and Sousa (2011) and Hamori and Hashiguchi (2012) obtain similar results for the relationship between income per capita and the Gini coefficient in OECD countries. Even though this result goes against traditional literature, our results may be explained by the theoretical model proposed by Kumhof and Rancière (2010), whereby higher levels of wealth inequality aggravate income inequality in developed countries (Agnello and Sousa, 2011). Jauch and Watzka (2012) conclude that after a certain threshold is reached, economic growth worsens income equality. The authors suggest that Kuznets` "inverted U-curve" may be outdated as it focused on 19th and 20th century industrial economies that were governed by different economic dynamics.

School enrolment seems to exacerbate income inequality in Portugal. Denk and Cournede (2015) obtain a similar result and justify it by referring to Abdullah et al. (2014). The study find that the majority of empirical studies reported a positive relationship between education and income inequality. However, no theoretical explanation is provided. Barradas (2020) suggests that the absorption of highly qualified workers by the Portuguese tertiary sector (which suffers from lower levels of productivity) may have hindered economic growth. A similar effect might have been felt in the distribution of income.

6. Conclusion

We conducted time-series econometric analysis in order to assess the effect of finance on the distribution of income in Portugal between 1977 and 2016 using annual data. A range of bank and market-based proxies were used to measure financial indicators (private credit, foreign direct investment, money supply, stock market capitalisation, financial value added and the Chinn-Ito index) to provide a holistic representation of the financial system. The estimations were conducted using the Generalised Method of Moments (GMM) estimator to control for endogeneity. Our aim was to apply a country-specific approach and understand the effect of increasing levels of finance in Portugal.

Our results suggest that bank-based financial indicators have reduced income inequality while market-based financial indicators have worsened income distribution in Portugal. Similarly, financial liberalisation has increased income inequality in Portugal. Increases in human capital, inflation and real GDP seem to exacerbate income inequality while trade openness and government have the opposite effect. The majority of our models support a concave relationship between finance and inequality in Portugal. In other words, the results support the Greenwood-Jovanovic hypothesis.

Our study should allow Portuguese policymakers to draw significant conclusions. Considering our results suggest that income inequality is persistent in nature, Portuguese decision-makers should feel encouraged to develop measures that reduce this indicator as they would have a lasting effect. The positive but timid effect of private credit on income inequality might be explained by the disproportionately large amount of credit lent to high earners. Consequently, Portuguese policymakers should make sure that credit is directed towards productive economic activities and ensure strong oversight mechanisms to avoid the risks associated with a privileged access to finance by a small segment of the population, as highlighted by Rajan and Zingales (2003). Well-targeted government credit lines aimed at low-income entrepreneurs could be one way of achieving this objective. The results of our FDI and Chinn-Ito Index models should caution policymakers in pursuing policies that further integrate the Portuguese financial system with world markets. As suggested by Furceri and Loungani (2015), focus should be given to institutional development as this could reverse the prejudicial effect exerted by financial liberalisation. Importantly, our results also indicate that public expenditure is an important tool that could be employed to formulate policies aimed at reducing income inequality. Considering the detrimental effect of financial liberalisation on income inequality and the significance of government spending in determining net Gini, policymakers should contemplate whether developing progressive redistributive mechanisms could help alleviate the negative effects of liberalisation on income inequality, as suggested by Christopoulos and McAdam (2016).

The lack of finance data for Portugal was one of the most notable challenges in conducting this study. Many empirical studies use 5-year averages of the Gini coefficient to overcome the "white noise" effect in series data. However, the lack of data for our finance variables meant that doing so would drastically decrease the number of observations (despite the availability of large datasets on income inequality in Portugal). The shortage of data did not allow for a wider and more diverse battery of finance variables that could have increased the robustness of our results.

Future studies on the finance-inequality nexus in Portugal could give greater focus on the link between financial liberalisation and financial crises[57] and its effect on income inequality using data on systemic banking crises provided by Laeven and Valencia (2013). On the other hand, finding data on market-based financial crises (for example the securities market) could prove to be challenging. Our unorthodox result concerning the relationship between i) economic growth and income inequality and ii) human capital and income inequality could also be explored in future studies. Additionally, micro-level data that would allow for a more differentiated and accurate analysis of the role of the distribution of credit (e.g., distribution of credit between households and firms/ industries) on income inequality. If possible, a similar approach could be taken as Roine *et al*. (2009) by analysing the role of diverse forms of public spending on different income quintiles. Future research could focus upon the role of the quality

[57] It would also be important to study the role of different types of Financial Crises (Currency vs Banking and Short-term vs Long-term) on income inequality.

of political and economic institutions in determining the effect of financial development on income inequality (in line with the work developed by Rajan and Zingales, 2003; Claessens and Perotti, 2007; Law et al., 2014; and Haan and Sturm, 2017) considering the increasing scrutiny faced by Portugal´s supervisory institutions (particularly the Bank of Portugal).

Additionally, comparable studies concerning the role of financial liberalisation could be conducted for small-to-medium sized European countries as policy implications could be drawn at a European level. Our results suggest that the role of financial development and financial liberalisation are not static but vary over time (most of our models support the Greenwood-Jovanovic hypothesis); the effects of the changing dynamics between both facets of finance on income inequality should be explored further (as done by Kunnieda *et al*. (2011) and Naceur and Zhang (2016) using panel data).

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8. <u>Appendix</u>

A. Dataset

Year	NGINI	GGINI	CRED	FDI	MS	SMC	GVAFI	KAOPEN	SCH	INF	RGDP	G	TO
1977	0.33	0.508	1.096	0.002701308	0.582769	0.003633943	0.113748309	-1.218540192	0.102	0.310167491	0.0602	0.192	0.40528073
1978	0.332	0.51	1.08	0.002809718	0.633839	0.002597539	0.124675325	-1.218540192	0.089	0.210387724	0.0617	0.21	0.411304102
1979	0.333	0.511	1.081	0.002941238	0.71389	0.003311069	0.106420074	-1.218540192	0.114	0.218992248	0.071	0.214	0.507332856
1980	0.335	0.512	1.134	0.004771044	0.788992	0.00565227	0.096574691	-1.218540192	0.117	0.158674804	0.0476	0.22	0.542352501
1981	0.335	0.513	1.227	0.005456581	0.822712	0.004878464	0.101027907	-1.218540192	0.124	0.190404107	0.0217	0.242	0.5557614
1982	0.336	0.514	1.291	0.004718102	0.810196	0.003023478	0.110560048	-1.218540192	0.122	0.216792837	0.0216	0.242	0.557622044
1983	0.336	0.515	1.341	0.005390594	0.831579	0.003389177	0.101618348	-1.218540192	0.14	0.240027624	0.0097	0.24	0.589276386
1984	0.336	0.516	1.329	0.007860327	0.841121	0.003108894	0.097842414	-1.218540192	0.141	0.283846389	-0.0104	0.242	0.644120957
1985	0.337	0.516	1.109	0.010106138	0.799392	0.007866998	0.098374056	-1.218540192	0.158	0.1946141	0.0164	0.26	0.615163984
1986	0.336	0.517	0.976	0.006146488	0.78497	0.047250675	0.100255488	-1.218540192	0.178	0.123313335	0.0332	0.257	0.540200663
1987	0.337	0.518	0.899	0.009668753	0.75337	0.292782137	0.107223457	-1.218540192	0.195	0.096348319	0.0763	0.245	0.595758533
1988	0.337	0.519	0.824	0.016355429	0.739851	0.127585817	0.112144275	-0.148388088	0.237	0.101016321	0.0534	0.24	0.63199382
1989	0.337	0.52	0.81	0.028664369	0.703007	0.174941807	0.120989249	-0.148388088	0.24	0.126863036	0.0665	0.244	0.648688964
1990	0.337	0.521	0.788	0.033157901	0.711363	0.119553786	0.128464692	-0.148388088	0.282	0.136305706	0.0786	0.251	0.650555926
1991	0.337	0.521	0.796	0.027438702	0.761496	0.104257366	0.135230917	-0.148388088	0.31	0.118494842	0.0337	0.259	0.603666002
1992	0.337	0.522	0.854	0.017412325	0.817815	0.090585649	0.126463631	-0.148388088	0.401	0.095592603	0.0313	0.283	0.563072776
1993	0.336	0.523	0.936	0.016144454	0.829104	0.130545968	0.135044783	1.311490417	0.437	0.067837799	-0.0069	0.277	0.541752327
1994	0.336	0.523	0.936	0.012736807	0.837736	0.163104139	0.136814862	1.567014098	0.491	0.054204402	0.0149	0.27	0.5717736
1995	0.336	0.523	0.98	0.005795467	0.842885	0.155423874	0.137991603	1.82253778	0.515	0.042228161	0.0231	0.273	0.599144722
1996	0.335	0.523	1.046	0.012814537	0.821601	0.199630042	0.131979034	2.078061342	0.588	0.030689773	0.035	0.277	0.60209805
1997	0.335	0.523	1.12	0.023164721	0.810313	0.332888681	0.133478	2.333585024	0.594	0.02336863	0.044	0.289	0.623049515
1998	0.335	0.524	1.201	0.048983527	0.859336	0.507913393	0.134638871	2.333585024	0.591	0.025727523	0.0481	0.265	0.638308989
1999	0.335	0.524	1.367	0.005812738	0.910609	0.534796833	0.137266359	2.333585024	0.586	0.023400949	0.0391	0.256	0.633143298
2000	0.336	0.524	1.468	0.061639235	0.904511	0.512892618	0.134408741	2.333585024	0.588	0.028530304	0.0382	0.265	0.67452998
2001	0.337	0.524	1.547	0.050319683	0.889263	0.381384638	0.137749353	2.333585024	0.625	0.043699033	0.0194	0.252	0.650919552
2002	0.338	0.525	1.651	0.004382162	0.890203	0.319369396	0.13988767	2.333585024	0.597	0.036003466	0.0077	0.274	0.623082594
2003	0.34	0.525	1.718	0.062808107	0.89798	0.353536229	0.146176086	2.333585024	0.589	0.032189909	-0.0093	0.251	0.611389475
2004	0.341	0.525	1.76	0.013146604	0.916776	0.371574391	0.148268652	2.333585024	0.58	0.02365362	0.0179	0.267	0.632045937
2005	0.342	0.524	1.825	0.017080492	0.926557	0.339655582	0.152236924	2.333585024	0.598	0.022771639	0.0078	0.265	0.629445046
2006	0.341	0.524	1.85	0.064217058	0.924578	0.49950366	0.161283514	2.333585024	0.542	0.031076655	0.0163	0.259	0.685470531
2007	0.34	0.522	1.974	0.025041102	0.988259	0.550556217	0.168448931	2.333585024	0.6	0.024539653	0.0251	0.253	0.699461176
2008	0.338	0.521	2.111	0.029804578	1.01451	0.262540082	0.174654933	2.333585024	0.632	0.025885066	0.0032	0.257	0.720757429
2009	0.336	0.519	2.15	0.02292077	0.974513	0.403145428	0.168430019	2.333585024	0.681	-0.0083553	-0.0312	0.278	0.614926935
2010	0.335	0.519	2.202	0.037694978	1.00274	0.344696431	0.172304628	2.333585024	0.714	0.014025729	0.0174	0.282	0.677832955
2011	0.335	0.518	2.243	0.040119233	1.00339	0.25200404	0.177918772	2.333585024	0.725	0.03653011	-0.017	0.276	0.73099544
2012	0.335	0.517	2.301	0.098948904	0.954521	0.302996983	0.181453223	2.333585024	0.723	0.027733385	-0.0406	0.29	0.760508389
2013	0.334	0.517	2.158	0.069555397	0.955794	0.349772824	0.179280291	2.333585024	0.736	0.002744167	-0.0092	0.287	0.781144346
2014	0.333	0.515	2.053	0.052465198	0.951823	0.251633944	0.178641328	2.333585024	0.743	-0.002781534	0.0079	0.28	0.802823079
2015	0.332	0.514	1.927	0.00637193	0.978683	0.300215849	0.17610705	2.333585024	0.746	0.004879386	0.0179	0.27	0.804908944
2016	0.33	0.513	1.835	0.035653459	0.999617	0.277552609	0.176534462	2.333585024	0.753	0.006073971	0.0202	0.27	0.792742296

B. Eviews output of the statistical analysis of variables:

	NGINI	GGINI	CRED	FDI	MS	SMC	GVAFI	KAOPEN	SCH	INF	RGDP	G	TO
Mean	0.335975	0.519050	1.424850	0.025081	0.854542	0.227294	0.137565	0.982623	0.448100	0.085962	0.024038	0.258100	0.629110
Median	0.336000	0.519500	1.310000	0.016718	0.842003	0.251819	0.135138	2.205823	0.561000	0.039379	0.020900	0.259500	0.626264
Maximum	0.342000	0.525000	2.301000	0.098949	1.014510	0.550556	0.181453	2.333585	0.753000	0.310167	0.078600	0.290000	0.804909
Minimum	0.330000	0.508000	0.788000	0.002701	0.582769	0.002598	0.096575	-1.218540	0.089000	-0.008355	-0.040600	0.192000	0.405281
Std. Dev.	0.002626	0.004723	0.485992	0.023063	0.105165	0.172782	0.027184	1.589624	0.234383	0.086634	0.028052	0.022124	0.090663
Skewness	0.010285	-0.527149	0.369967	1.247884	-0.454753	0.183593	0.158903	-0.472524	-0.311148	1.029950	-0.027559	-0.970637	-0.116766
Kurtosis	3.532232	2.209976	1.730261	4.052651	2.752484	1.935423	1.856320	1.380129	1.517418	2.912820	2.746475	3.854006	3.459095
Jarque-Bera	0.472824	2.892803	3.599568	12.22823	1.480777	2.113582	2.348342	5.861832	4.308839	7.084650	0.112188	7.496455	0.442175
Probability	0.789455	0.235416	0.165335	0.002211	0.476929	0.347569	0.309075	0.053348	0.115970	0.028946	0.945450	0.023559	0.801646
Sum	13.43900	20.76200	56.99400	1.003220	34.18166	9.091753	5.502611	39.30492	17.92400	3.438498	0.961500	10.32400	25.16441
Sum Sq. Dev.	0.000269	0.000870	9.211333	0.020745	0.431327	1.164293	0.028820	98.54932	2.142478	0.292715	0.030690	0.019090	0.320569
Observations	40	40	40	40	40	40	40	40	40	40	40	40	40

C. Eviews Output of the correlations between variables:

	GGINI	NGINI	CRED	FDI	MS	SMC	GVAFI	KAOPEN	SCH	INF	RGDP	G	TO
GGINI	1	0.70712952...	0.06370279...	0.11740155...	0.21569297...	0.33066191...	0.00997061...	0.20067683...	0.08469243...	-0.2460588...	-0.1781911...	0.19642792...	0.06186552...
NGINI	0.70712952...	1	0.03624307...	0.28086218...	0.35247335...	0.63951472...	0.25688641...	0.62228348...	0.50176657...	-0.6331253...	-0.1704646...	0.56804192...	0.23247535...
CRED	0.06370279...	0.03624307...	1	0.53593035...	0.84735157...	0.55400431...	0.81442659...	0.65791550...	0.72474130...	-0.5398985...	-0.6969195...	0.41587080...	0.66950669...
FDI	0.11740155...	0.28086218...	0.53593035...	1	0.46822242...	0.54440619...	0.60858189...	0.55615016...	0.58741796...	-0.5136006...	-0.4024979...	0.45161781...	0.60662911...
MS	0.21569297...	0.35247335...	0.84735157...	0.46822242...	1	0.65518108...	0.78343787...	0.77847935...	0.83594529...	-0.7471170...	-0.7138988...	0.68799154...	0.78955141...
SMC	0.33066191...	0.63951472...	0.55400431...	0.54440619...	0.65518108...	1	0.65554478...	0.84222157...	0.78571094...	-0.8123722...	-0.2238562...	0.50151622...	0.55970332...
GVAFI	0.00997061...	0.25688641...	0.81442659...	0.60858189...	0.78343787...	0.65554478...	1	0.84566243...	0.90511585...	-0.7884326...	-0.5384702...	0.62040606...	0.73668477...
KAOPEN	0.20067683...	0.62228348...	0.65791550...	0.55615016...	0.77847935...	0.84222157...	0.84566243...	1	0.96847150...	-0.9122682...	-0.4789779...	0.70707022...	0.65285823...
SCH	0.08469243...	0.50176657...	0.72474130...	0.58741796...	0.83594529...	0.78571094...	0.90511585...	0.96847150...	1	-0.9169531...	-0.5346472...	0.77419592...	0.74784180...
INF	-0.2460588...	-0.6331253...	-0.5398985...	-0.5136006...	-0.7471170...	-0.8123722...	-0.7884326...	-0.9122682...	-0.9169531...	1	0.36580533...	-0.7834186...	-0.6678015...
RGDP	-0.1781911...	-0.1704646...	-0.6969195...	-0.4024979...	-0.7138988...	-0.2238562...	-0.5384702...	-0.4789779...	-0.5346472...	0.36580533...	1	-0.5621435...	-0.4483666...
G	0.19642792...	0.56804192...	0.41587080...	0.45161781...	0.68799154...	0.50151622...	0.62040606...	0.70707022...	0.77419592...	-0.7834186...	-0.5621435...	1	0.64761452...
TO	0.06186552...	0.23247535...	0.66950669...	0.60662911...	0.78955141...	0.55970332...	0.73668477...	0.65285823...	0.74784180...	-0.6678015...	-0.4483666...	0.64761452...	1

D. GMM Linear Model Estimation Eviews Outputs (Dependent Variable= Gross Gini Coefficient):

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Method: Generalized Method of Moments
Date: 08/13/21 Time: 15:50
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) CRED(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) CRED(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) CRED(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) CRED(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) CRED(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006716	0.003503	1.917545	0.0662
GGINI(-1)	0.988846	0.006219	158.9972	0.0000
CRED	-0.000395	7.72E-05	-5.116842	0.0000
SCH	0.001235	0.000401	3.080573	0.0048
INF	0.007239	0.000952	7.601811	0.0000
RGDP	0.010312	0.001307	7.890157	0.0000
G	0.004988	0.000936	5.328115	0.0000
TO	-0.004541	0.000401	-11.32782	0.0000

R-squared	0.973985	Mean dependent var	0.520412
Adjusted R-squared	0.966982	S.D. dependent var	0.003594
S.E. of regression	0.000653	Sum squared resid	1.11E-05
Durbin-Watson stat	2.293208	J-statistic	8.784512
Instrument rank	34	Prob(J-statistic)	0.999352

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 21:06
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) FDI(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) FDI(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) FDI(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) FDI(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) FDI(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.026620	0.002743	9.705087	0.0000
GGINI(-1)	0.953541	0.004920	193.8094	0.0000
FDI	0.011205	0.000423	26.48386	0.0000
SCH	0.001976	0.000217	9.089062	0.0000
INF	0.008773	0.000282	31.13740	0.0000
RGDP	0.017236	0.000516	33.38587	0.0000
G	0.004351	0.000689	6.318116	0.0000
TO	-0.008957	0.000389	-23.02297	0.0000

R-squared	0.976504	Mean dependent var	0.520412
Adjusted R-squared	0.970178	S.D. dependent var	0.003594
S.E. of regression	0.000621	Sum squared resid	1.00E-05
Durbin-Watson stat	2.498540	J-statistic	8.985797
Instrument rank	34	Prob(J-statistic)	0.999206

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 10/04/21 Time: 20:46
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) MS(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) MS(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) MS(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) MS(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) MS(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GGINI(-1)	0.973591	0.007322	132.9622	0.0000
C	0.019411	0.004380	4.431257	0.0002
MS	-0.004564	0.000394	-11.57200	0.0000
SCH	0.002873	0.000292	9.851641	0.0000
INF	0.007985	0.000858	9.302976	0.0000
RGDP	0.008724	0.001193	7.313592	0.0000
G	-0.000923	0.001713	-0.538924	0.5945
TO	-0.005486	0.000485	-11.31245	0.0000

R-squared	0.975426	Mean dependent var	0.520412
Adjusted R-squared	0.968810	S.D. dependent var	0.003594
S.E. of regression	0.000635	Sum squared resid	1.05E-05
Durbin-Watson stat	2.580752	J-statistic	8.716877
Instrument rank	34	Prob(J-statistic)	0.999396

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 21:13
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) SMC(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SMC(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SMC(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SMC(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SMC(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008980	0.002024	4.436009	0.0001
GGINI(-1)	0.981747	0.003323	295.4796	0.0000
SMC	0.000600	8.10E-05	7.404925	0.0000
SCH	0.000651	0.000255	2.556853	0.0167
INF	0.008085	0.000289	27.96832	0.0000
RGDP	0.013898	0.000429	32.39508	0.0000
G	0.011006	0.001141	9.649152	0.0000
TO	-0.005671	0.000401	-14.14586	0.0000

R-squared	0.973712	Mean dependent var	0.520412
Adjusted R-squared	0.966634	S.D. dependent var	0.003594
S.E. of regression	0.000656	Sum squared resid	1.12E-05
Durbin-Watson stat	2.244073	J-statistic	8.933950
Instrument rank	35	Prob(J-statistic)	0.999577

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 21:16
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) GVAFI(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) GVAFI(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) GVAFI(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) GVAFI(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) GVAFI(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000907	0.002182	0.415798	0.6810
GGINI(-1)	0.999449	0.003661	273.0337	0.0000
GVAFI	-0.018436	0.000848	-21.74501	0.0000
SCH	0.000989	0.000132	7.492357	0.0000
INF	0.004545	0.000343	13.27018	0.0000
RGDP	0.009715	0.000674	14.41636	0.0000
G	0.009404	0.001156	8.134922	0.0000
TO	-0.002284	0.000309	-7.386750	0.0000

R-squared	0.975168	Mean dependent var	0.520412
Adjusted R-squared	0.968483	S.D. dependent var	0.003594
S.E. of regression	0.000638	Sum squared resid	1.06E-05
Durbin-Watson stat	2.397191	J-statistic	8.573767
Instrument rank	34	Prob(J-statistic)	0.999481

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 21:21
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) KAOPEN(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) KAOPEN(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) KAOPEN(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) KAOPEN(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) KAOPEN(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.043213	0.002881	14.99791	0.0000
GGINI(-1)	0.917102	0.005167	177.4901	0.0000
KAOPEN	0.000653	5.42E-05	12.04585	0.0000
SCH	-0.003101	0.000529	-5.857563	0.0000
INF	0.007680	0.000621	12.36068	0.0000
RGDP	0.014996	0.000505	29.70873	0.0000
G	0.014009	0.001578	8.878979	0.0000
TO	-0.005992	0.000402	-14.90343	0.0000

R-squared	0.975148	Mean dependent var	0.520412
Adjusted R-squared	0.968457	S.D. dependent var	0.003594
S.E. of regression	0.000638	Sum squared resid	1.06E-05
Durbin-Watson stat	2.066561	J-statistic	9.099894
Instrument rank	34	Prob(J-statistic)	0.999112

E. GMM Quadratic Model Estimation Eviews Outputs (Dependent Variable= Gross Gini Coefficient)

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 23:17
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) CRED(-5)^2 CRED(-5) CRED(-4)^2 CRED(-4) CRED(-3)^2 CRED(-3) CRED(-2)^2 CRED(-2) CRED(-1)^2 CRED(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005126	0.004057	1.263443	0.2181
GGINI(-1)	0.989162	0.007320	135.1363	0.0000
CRED	0.000605	0.000158	3.816102	0.0008
CRED^2	-0.000335	4.41E-05	-7.583435	0.0000
SCH	0.000653	0.000262	2.489957	0.0198
INF	0.006296	0.000659	9.559098	0.0000
RGDP	0.009783	0.001172	8.348986	0.0000
G	0.007762	0.001007	7.710053	0.0000
TO	-0.003941	0.000536	-7.350353	0.0000

R-squared	0.974191	Mean dependent var	0.520412
Adjusted R-squared	0.965932	S.D. dependent var	0.003594
S.E. of regression	0.000663	Sum squared resid	1.10E-05
Durbin-Watson stat	2.288494	J-statistic	8.764406
Instrument rank	35	Prob(J-statistic)	0.999366

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 23:18
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) FDI(-5)^2 FDI(-5) FDI(-4)^2 FDI(-4) FDI(-3)^2 FDI(-3) FDI(-2)^2 FDI(-2) FDI(-1)^2 FDI(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.027589	0.004543	6.073319	0.0000
GGINI(-1)	0.953510	0.007824	121.8741	0.0000
FDI	-0.008847	0.002578	-3.431947	0.0021
FDI^2	0.243589	0.036751	6.628132	0.0000
SCH	0.002760	0.000421	6.553060	0.0000
INF	0.009573	0.000862	11.10532	0.0000
RGDP	0.019995	0.000999	20.02410	0.0000
G	0.001004	0.001628	0.616436	0.5432
TO	-0.009440	0.000652	-14.48594	0.0000

R-squared	0.978000	Mean dependent var	0.520412
Adjusted R-squared	0.970961	S.D. dependent var	0.003594
S.E. of regression	0.000612	Sum squared resid	9.38E-06
Durbin-Watson stat	2.652800	J-statistic	8.776988
Instrument rank	35	Prob(J-statistic)	0.999357

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 10/04/21 Time: 20:57
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) MS(-5) MS(-5)^2 SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) MS(-4) MS(-4)^2 SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) MS(-3) MS(-3)^2 SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) MS(-2) MS(-2)^2 SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) MS(-1) MS(-1)^2 SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009488	0.005148	1.842857	0.0772
GGINI(-1)	0.965942	0.009598	100.6397	0.0000
MS	0.027521	0.003990	6.897764	0.0000
MS^2	-0.018384	0.002447	-7.512021	0.0000
SCH	0.002212	0.000415	5.331805	0.0000
INF	0.006459	0.000803	8.042452	0.0000
RGDP	0.009729	0.001109	8.774710	0.0000
G	-0.001955	0.002441	-0.800650	0.4309
TO	-0.004365	0.000646	-6.752700	0.0000

R-squared	0.976424	Mean dependent var	0.520412
Adjusted R-squared	0.968880	S.D. dependent var	0.003594
S.E. of regression	0.000634	Sum squared resid	1.00E-05
Durbin-Watson stat	2.647645	J-statistic	8.560430
Instrument rank	34	Prob(J-statistic)	0.999085

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 23:21
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) SMC(-5)^2 SMC(-5) SMC(-4)^2 SMC(-4) SMC(-3)^2 SMC(-3) SMC(-2)^2 SMC(-2) SMC(-1)^2 SMC(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011260	0.001430	7.875834	0.0000
GGINI(-1)	0.973911	0.002441	398.9003	0.0000
SMC	0.008896	0.000458	19.40800	0.0000
SMC^2	-0.011580	0.000858	-13.49548	0.0000
SCH	0.000444	0.000162	2.743265	0.0111
INF	0.013267	0.000445	29.80785	0.0000
RGDP	0.013156	0.000432	30.43597	0.0000
G	0.014523	0.000750	19.37684	0.0000
TO	-0.006356	0.000230	-27.59357	0.0000

R-squared	0.976459	Mean dependent var	0.520412
Adjusted R-squared	0.968926	S.D. dependent var	0.003594
S.E. of regression	0.000634	Sum squared resid	1.00E-05
Durbin-Watson stat	2.504896	J-statistic	8.467286
Instrument rank	36	Prob(J-statistic)	0.999746

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 23:23
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) GVAFI(-5)^2 GVAFI(-5) GVAFI(-4)^2 GVAFI(-4) GVAFI(-3)^2 GVAFI(-3) GVAFI(-2)^2 GVAFI(-2) GVAFI(-1)^2 GVAFI(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.026103	0.009446	2.763499	0.0106
GGINI(-1)	0.924512	0.020510	45.07646	0.0000
GVAFI	0.175744	0.025675	6.844858	0.0000
GVAFI^2	-0.698879	0.093354	-7.486296	0.0000
SCH	-0.000678	0.000492	-1.376437	0.1809
INF	0.001906	0.001257	1.516453	0.1419
RGDP	0.001100	0.001575	0.698484	0.4913
G	0.008884	0.002248	3.951608	0.0006
TO	0.000940	0.001007	0.933503	0.3595

R-squared	0.977500	Mean dependent var	0.520412
Adjusted R-squared	0.970300	S.D. dependent var	0.003594
S.E. of regression	0.000619	Sum squared resid	9.59E-06
Durbin-Watson stat	2.608944	J-statistic	8.405669
Instrument rank	35	Prob(J-statistic)	0.999567

Equation: UNTITLED Workfile: UNTITLED::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: GGINI
Method: Generalized Method of Moments
Date: 08/14/21 Time: 23:24
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GGINI(-6) GGINI(-5) GGINI(-4) GGINI(-3) GGINI(-2) KAOPEN(-5)^2 KAOPEN(-5) KAOPEN(-4)^2 KAOPEN(-4) KAOPEN(-3)^2 KAOPEN(-3) KAOPEN(-2)^2 KAOPEN(-2) KAOPEN(-1)^2 KAOPEN(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.047758	0.004681	10.20166	0.0000
GGINI(-1)	0.909595	0.008821	103.1119	0.0000
KAOPEN	0.000743	0.000121	6.148097	0.0000
KAOPEN^2	-6.40E-05	1.62E-05	-3.951234	0.0006
SCH	-0.002888	0.000641	-4.507121	0.0001
INF	0.007850	0.000866	9.064530	0.0000
RGDP	0.014522	0.000535	27.15726	0.0000
G	0.012095	0.001964	6.159794	0.0000
TO	-0.006180	0.000400	-15.45106	0.0000

R-squared	0.975386	Mean dependent var	0.520412
Adjusted R-squared	0.967510	S.D. dependent var	0.003594
S.E. of regression	0.000648	Sum squared resid	1.05E-05
Durbin-Watson stat	2.073691	J-statistic	9.096051
Instrument rank	35	Prob(J-statistic)	0.999115

F. GMM Quadratic Model Estimation Eviews Outputs (Dependent Variable= Net Gini Coefficient)

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/15/21 Time: 20:45
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) CRED(-5)^2 CRED(-5) CRED(-4)^2 CRED(-4) CRED(-3)^2 CRED(-3) CRED(-2)^2 CRED(-2) CRED(-1)^2 CRED(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009381	0.012990	0.722194	0.4769
NGINI(-1)	0.978125	0.036547	26.76378	0.0000
CRED	0.003667	0.000797	4.604237	0.0001
CRED^2	-0.001190	0.000259	-4.595617	0.0001
SCH	0.000685	0.000865	0.792113	0.4357
INF	0.002138	0.001754	1.218854	0.2343
RGDP	0.004105	0.001765	2.325005	0.0285
G	-0.008466	0.003354	-2.523787	0.0183
TO	-0.004652	0.000992	-4.688824	0.0001

R-squared	0.882605	Mean dependent var	0.336412
Adjusted R-squared	0.845038	S.D. dependent var	0.002463
S.E. of regression	0.000970	Sum squared resid	2.35E-05
Durbin-Watson stat	1.209337	J-statistic	8.907504
Instrument rank	35	Prob(J-statistic)	0.999266

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/15/21 Time: 21:20
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) FDI(-5)^2 FDI(-5) FDI(-4)^2 FDI(-4) FDI(-3)^2 FDI(-3) FDI(-2)^2 FDI(-2) FDI(-1)^2 FDI(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.013440	0.011372	1.181860	0.2484
NGINI(-1)	0.988565	0.033298	29.68881	0.0000
FDI	-0.023007	0.006490	-3.544991	0.0016
FDI^2	0.454857	0.097237	4.677798	0.0001
SCH	0.005034	0.000769	6.545937	0.0000
INF	0.009217	0.001666	5.530997	0.0000
RGDP	0.013438	0.003075	4.370248	0.0002
G	-0.025858	0.002608	-9.915060	0.0000
TO	-0.009606	0.000787	-12.20840	0.0000

R-squared	0.901229	Mean dependent var	0.336412
Adjusted R-squared	0.869623	S.D. dependent var	0.002463
S.E. of regression	0.000889	Sum squared resid	1.98E-05
Durbin-Watson stat	1.601273	J-statistic	9.046385
Instrument rank	34	Prob(J-statistic)	0.998534

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/15/21 Time: 21:59
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) SMC(-5)^2 SMC(-5) SMC(-4)^2 SMC(-4) SMC(-3)^2 SMC(-3) SMC(-2)^2 SMC(-2) SMC(-1)^2 SMC(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.022631	0.005643	4.010732	0.0005
NGINI(-1)	0.935136	0.016612	56.29142	0.0000
SMC	0.018490	0.001704	10.84885	0.0000
SMC^2	-0.022686	0.002285	-9.929598	0.0000
SCH	0.000486	0.000541	0.897230	0.3782
INF	0.016311	0.001927	8.466320	0.0000
RGDP	-0.000444	0.001696	-0.262104	0.7954
G	-0.002158	0.002293	-0.941040	0.3557
TO	-0.006810	0.000575	-11.85135	0.0000

R-squared	0.905624	Mean dependent var	0.336412
Adjusted R-squared	0.875424	S.D. dependent var	0.002463
S.E. of regression	0.000869	Sum squared resid	1.89E-05
Durbin-Watson stat	1.425685	J-statistic	9.141201
Instrument rank	35	Prob(J-statistic)	0.999075

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 10/04/21 Time: 21:06
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) MS(-5) MS(-5)^2 SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) MS(-4) MS(-4)^2 SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) MS(-3) MS(-3)^2 SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) MS(-2) MS(-2)^2 SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) MS(-1) MS(-1)^2 SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.044327	0.012632	-3.509148	0.0017
NGINI(-1)	1.049690	0.033441	31.38953	0.0000
MS	0.084398	0.010299	8.194561	0.0000
MS^2	-0.053265	0.005870	-9.074095	0.0000
SCH	0.004489	0.000468	9.591663	0.0000
INF	0.004723	0.000992	4.761426	0.0001
RGDP	-0.000555	0.001622	-0.342128	0.7351
G	-0.028967	0.001603	-18.06678	0.0000
TO	-0.000156	0.000945	-0.164628	0.8706

R-squared	0.907227	Mean dependent var	0.336412
Adjusted R-squared	0.877539	S.D. dependent var	0.002463
S.E. of regression	0.000862	Sum squared resid	1.86E-05
Durbin-Watson stat	1.635242	J-statistic	9.101931
Instrument rank	35	Prob(J-statistic)	0.999110

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/15/21 Time: 22:40
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) GVAFI(-5)^2 GVAFI(-5) GVAFI(-4)^2 GVAFI(-4) GVAFI(-3)^2 GVAFI(-3) GVAFI(-2)^2 GVAFI(-2) GVAFI(-1)^2 GVAFI(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.034331	0.010172	-3.375114	0.0024
NGINI(-1)	1.051948	0.023314	45.11995	0.0000
GVAFI	0.218294	0.031689	6.888719	0.0000
GVAFI^2	-0.970928	0.120214	-8.076681	0.0000
SCH	0.000175	0.000575	0.304966	0.7629
INF	-0.003677	0.001552	-2.369328	0.0259
RGDP	-0.018270	0.002875	-6.354736	0.0000
G	-0.003061	0.002086	-1.467208	0.1548
TO	0.011097	0.001401	7.922143	0.0000

R-squared	0.914007	Mean dependent var	0.336412
Adjusted R-squared	0.886489	S.D. dependent var	0.002463
S.E. of regression	0.000830	Sum squared resid	1.72E-05
Durbin-Watson stat	1.671644	J-statistic	8.821185
Instrument rank	36	Prob(J-statistic)	0.999625

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/15/21 Time: 22:43
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) KAOPEN(-5)^2 KAOPEN(-5) KAOPEN(-4)^2 KAOPEN(-4) KAOPEN(-3)^2 KAOPEN(-3) KAOPEN(-2)^2 KAOPEN(-2) KAOPEN(-1)^2 KAOPEN(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.025710	0.010500	2.448463	0.0217
NGINI(-1)	0.937737	0.029500	31.78734	0.0000
KAOPEN	0.000362	0.000195	1.852994	0.0757
KAOPEN^2	0.000166	4.69E-05	3.531885	0.0016
SCH	-0.002675	0.001332	-2.008526	0.0555
INF	0.003700	0.000999	3.702980	0.0011
RGDP	0.004409	0.002479	1.778384	0.0875
G	-0.007414	0.003970	-1.867349	0.0736
TO	-0.004665	0.001008	-4.628025	0.0001

R-squared	0.884904	Mean dependent var	0.336412
Adjusted R-squared	0.848073	S.D. dependent var	0.002463
S.E. of regression	0.000960	Sum squared resid	2.30E-05
Durbin-Watson stat	1.222400	J-statistic	8.926284
Instrument rank	34	Prob(J-statistic)	0.998691

G. GMM Linear Model Estimation Eviews Outputs (Dependent Variable= Net Gini Coefficient)

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/15/21 Time: 23:54
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) KAOPEN(-5) KAOPEN(-4) KAOPEN(-3) KAOPEN(-2) KAOPEN(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.019591	0.009143	2.142744	0.0417
NGINI(-1)	0.963942	0.026028	37.03508	0.0000
CRED	0.000159	0.000141	1.127911	0.2697
SCH	0.002683	0.000351	7.636263	0.0000
INF	0.005097	0.000579	8.795882	0.0000
RGDP	0.005685	0.000660	8.608478	0.0000
G	-0.019125	0.002405	-7.951645	0.0000
TO	-0.007045	0.000683	-10.30873	0.0000

R-squared	0.876845	Mean dependent var	0.336412
Adjusted R-squared	0.843688	S.D. dependent var	0.002463
S.E. of regression	0.000974	Sum squared resid	2.47E-05
Durbin-Watson stat	1.169567	J-statistic	9.000369
Instrument rank	34	Prob(J-statistic)	0.999195

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/16/21 Time: 00:22
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) FDI(-5) FDI(-4) FDI(-3) FDI(-2) FDI(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.024036	0.011933	2.014332	0.0544
NGINI(-1)	0.955074	0.035263	27.08395	0.0000
FDI	0.015316	0.001777	8.619333	0.0000
SCH	0.003312	0.000324	10.21079	0.0000
INF	0.006722	0.000857	7.839705	0.0000
RGDP	0.006993	0.001522	4.595385	0.0001
G	-0.022011	0.001223	-17.99598	0.0000
TO	-0.009118	0.000402	-22.68651	0.0000

R-squared	0.889978	Mean dependent var	0.336412
Adjusted R-squared	0.860357	S.D. dependent var	0.002463
S.E. of regression	0.000920	Sum squared resid	2.20E-05
Durbin-Watson stat	1.440808	J-statistic	9.150810
Instrument rank	34	Prob(J-statistic)	0.999066

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 10/04/21 Time: 20:50
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) MS(-5) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) MS(-4) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) MS(-3) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) MS(-2) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) MS(-1) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011022	0.006581	1.674999	0.1059
NGINI(-1)	1.011825	0.020055	50.45191	0.0000
MS	-0.008435	0.000478	-17.64989	0.0000
SCH	0.006368	0.000603	10.55565	0.0000
INF	0.007325	0.001188	6.164696	0.0000
RGDP	-0.004393	0.001254	-3.503915	0.0017
G	-0.030880	0.002019	-15.29424	0.0000
TO	-0.004924	0.000410	-12.00876	0.0000

R-squared	0.889891	Mean dependent var	0.336412
Adjusted R-squared	0.860246	S.D. dependent var	0.002463
S.E. of regression	0.000921	Sum squared resid	2.20E-05
Durbin-Watson stat	1.458751	J-statistic	9.020325
Instrument rank	34	Prob(J-statistic)	0.999178

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/16/21 Time: 01:08
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) SMC(-5) SMC(-4) SMC(-3) SMC(-2) SMC(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.024823	0.008602	2.885826	0.0078
NGINI(-1)	0.939744	0.025925	36.24883	0.0000
SMC	0.002366	0.000311	7.614438	0.0000
SCH	0.001174	0.000542	2.164519	0.0398
INF	0.006549	0.001524	4.297993	0.0002
RGDP	0.001625	0.001117	1.455423	0.1575
G	-0.009221	0.002753	-3.349464	0.0025
TO	-0.006057	0.000337	-17.97868	0.0000

R-squared	0.883513	Mean dependent var	0.336412
Adjusted R-squared	0.852151	S.D. dependent var	0.002463
S.E. of regression	0.000947	Sum squared resid	2.33E-05
Durbin-Watson stat	1.163994	J-statistic	9.060036
Instrument rank	34	Prob(J-statistic)	0.999146

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/16/21 Time: 01:20
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) GVAFI(-5) GVAFI(-4) GVAFI(-3) GVAFI(-2) GVAFI(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.026975	0.009094	-2.966300	0.0064
NGINI(-1)	1.098303	0.025487	43.09312	0.0000
GVAFI	-0.053192	0.003941	-13.49579	0.0000
SCH	0.004698	0.000561	8.368494	0.0000
INF	-0.000278	0.001395	-0.199557	0.8434
RGDP	-0.003048	0.001378	-2.212416	0.0359
G	-0.009758	0.002349	-4.154073	0.0003
TO	0.002415	0.000564	4.282674	0.0002

R-squared	0.898173	Mean dependent var	0.336412
Adjusted R-squared	0.870758	S.D. dependent var	0.002463
S.E. of regression	0.000886	Sum squared resid	2.04E-05
Durbin-Watson stat	1.419089	J-statistic	9.076908
Instrument rank	35	Prob(J-statistic)	0.999508

Equation: UNTITLED Workfile: UNTITLED::Untitled\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: NGINI
Method: Generalized Method of Moments
Date: 08/16/21 Time: 01:22
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: NGINI(-6) NGINI(-5) NGINI(-4) NGINI(-3) NGINI(-2) KAOPEN(-5) KAOPEN(-4) KAOPEN(-3) KAOPEN(-2) KAOPEN(-1) SCH(-5) INF(-5) RGDP(-5) G(-5) TO(-5) SCH(-4) INF(-4) RGDP(-4) G(-4) TO(-4) SCH(-3) INF(-3) RGDP(-3) G(-3) TO(-3) SCH(-2) INF(-2) RGDP(-2) G(-2) TO(-2) SCH(-1) INF(-1) RGDP(-1) G(-1) TO(-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.028438	0.010070	2.824047	0.0090
NGINI(-1)	0.933336	0.027519	33.91608	0.0000
KAOPEN	0.000526	0.000138	3.814233	0.0008
SCH	-0.001878	0.001102	-1.703526	0.1004
INF	0.004191	0.001555	2.695044	0.0122
RGDP	0.002271	0.001205	1.885010	0.0707
G	-0.012143	0.003114	-3.899359	0.0006
TO	-0.004651	0.001159	-4.012667	0.0005

R-squared	0.881354	Mean dependent var	0.336412
Adjusted R-squared	0.849411	S.D. dependent var	0.002463
S.E. of regression	0.000956	Sum squared resid	2.38E-05
Durbin-Watson stat	1.250460	J-statistic	8.907430
Instrument rank	35	Prob(J-statistic)	0.999588