Article:
Arestis, P and Phelps, P orcid.org/0000-0003-2564-3144 (2019) A Panel Analysis of Brazilian Regional Inequality. Environment and Planning A, 51 (7). pp. 1558-1585. ISSN 0308-518X

https://doi.org/10.1177/0308518X19842584

A Panel Analysis of Brazilian Regional Inequality

Abstract: A growing body of literature has concluded that financial liberalisation, in terms of the increased weight and influence of the financial-sector, has contributed in a significant way to increasing disparities in income, wealth and society since the 1980s, within advanced and emerging economies. Against a backdrop of financialisation, extreme inequality and evolving financial instability, this paper's primary contribution is to analyse the determinants of personal income inequality within one of the world's prominent emerging economies, Brazil. We pay particular attention to the magnitude, significance and scale of the determinants in a financialisation context, from which this paper's relative contributions emerge. Our empirical strategy utilises modern panel data techniques and different instrumental variables approaches for robustness. This paper's analysis provides a first step in the direction of identifying the main mechanisms through which the Brazilian model of financial liberalisation has affected income inequality at the sub-national scale; while providing an early indication of how inequality might evolve in the future. In conclusion, the revealed significant linkages between financialisation, local liquidity preferences, capital account liberalisation and social protection expenditure threaten more extreme inequality, both in Brazil's financial centre-space and beyond.

Keywords: inequality; regional; financialisation; panel data

JEL Classification: C23, D30, D31, E65

1. Introduction

There is a growing acknowledgement that financial liberalisation, in terms of the increased weight and influence of the financial sector, has contributed in a significant way to increasing disparities in income, wealth and society since the 1980s, both internationally and intra-nationally (Epstein, 2005; Stockhammer, 2017). A related concern is the evolving stagnation and fragility of many former industrialised economies, which is now becoming apparent in emerging economies too. Brazil is a particular case, where the country experienced a movement towards financial liberalisation in the 1980s and 1990s, driven by an axis of financial accumulation linked to public debt (Bruno et al., 2011).[1] At the same time, the country continues to suffer from very high and persistent income inequality, both in the financial-centre space and beyond, with the gap between the rich and the poor around five times that of OECD countries (Keeley, 2015). It is also the case that financial liberalisation enhances inequality in view of the financial sector being the main benefactor. Against a backdrop of financialisation, extreme inequality and evolving financial instability, this paper primarily contributes by investigating the magnitude, significance and scale of the determinants of Brazilian personal income inequality. In doing so, we explore this important issue from a financialisation perspective.

Inequality in Brazil was moderated in the 1990s and 2000s, after a period of rising inequality in the 1970s and 1980s; this was achieved by a combination of changes in market incomes and expanded redistribution (Atkinson, 2015, p. 80). Yet severe disparities and inequalities in

[1] This has coincided with substantial changes in the operations of the Brazilian financial-banking system. For example, between 1994 and 2007 the share of financial derivatives and fixed income securities in the banking portfolio increased from 26% to 44%; whereas the share of total bank credit decreased from 42% to 26% (BCB, 2018).

income prevail (Assouad et al., 2018). There are highly financialised states and districts, which are mainly located in the South, Southeast and Midwest macroregions, where income inequality and polarisation are among the highest in the country. This is puzzling according to mainstream models in economic and finance, which emphasise that financial development channels work to alleviate inequality (e.g. Beck et al., 2007). There are also poorer and underdeveloped states, mainly in the North & Northeast macroregions, which are characterised by extreme inequality, poverty and exclusion (Furtado, 1961; Amado, 1997; Azzoni, 1999). This is despite the earlier expansion of the welfare state and targeted social policies, which helped to reduce regional income disparities (Silveira-Neto and Azzoni, 2011, 2012; Arestis et al., 2017; Ribeiro et al., 2018). More recently, following years of capital account liberalisation and a rising deficit, Brazil has experienced a financial crisis of its own, and inequality has increased (World Bank, 2017).[2] This has coincided with a new wave of policies for fiscal consolidation and retrenchment aimed at shoring-up the country's finances (Góes and Karpowicz, 2017).

A broad literature has emerged on the determinants of income inequality, although it remains underappreciated from a financialisation perspective, which has its roots in heterodox economics, political economy and sociology (Epstein, 2005; Palley, 2007; Davis and Kim, 2015). Under this perspective, which contrasts sharply with model predictions in the mainstream of economics and finance, financialisation has encouraged a preference by the financial-banking system to hold more liquid and profitable financial assets and securities; often at the expense of longer-term economic and social objectives (Crocco et al., 2014). In both advanced and emerging economies, financial liberalisation has occurred alongside substantial trade and capital account liberalisation, which is thought to benefit first and foremost capital and financial capital, especially the financial sector; while exposing many others to a more uncertain and unstable outlook (Rodrik, 1997; Stockhammer, 2017; Arestis, 2016). At the same time, it has reduced the state's capacity to cushion the negative income shocks that tend to arise in a more integrated and financialised world; and imposed structural limits on the development process (Bruno et al., 2011). These mechanisms are particularly relevant for emerging economies like Brazil since finance is essential for economic growth and development. Yet it is uncertain empirically whether financial liberalisation has affected income inequality in Brazil; and how in relation to these mechanisms.

Identifying the determinants of personal income inequality is a complex task, in theory and practice. For one thing, financial development and financialisation are related through the financial liberalisation process; however, omission of one explanatory variable or another from the model – observed or unobserved – can generate an omitted-variables bias problem. Additionally, and at the same time, there are other, related factors that shape the distribution of income, such as local financial behaviour, capital account liberalisation, and policies for social protection. Essentially, there are inherent endogeneity and simultaneity-bias problems that complicate identification. Given these ambiguities and uncertainties, further empirical work is an essential next step, as the prominent drivers of income inequality remain underexplored in a financialisation context, from which this paper's relative contributions emerge.

This paper goes beyond antecedent studies as follows. First, most studies on the drivers of income inequality have been conducted at national and international levels; this is despite the

[2] The World Bank (2017) has estimated that the number of poor in Brazil was likely to increase by 2.5-3.6 million by 2017 in the aftermath of Brazil's financial crisis, while the Gini coefficient was to increase from 0.51 to 0.52-0.54.

uneven within-country development outcomes that cross-country studies can overlook, especially with regards to income inequality. Moreover, a puzzling characteristic of the socioeconomic structure in Brazil – like in other modern economies – is that some of the most financially developed parts are also the most unequal in the distribution of income; while Brazil remains one of the most unequal countries in the world. In this contribution, we compile a relatively extensive dataset to explore further the forces that drive inequality at the sub-national scale within Brazilian states and macroregions. Second, this paper explores empirically the mechanisms through which the Brazilian model of financial liberalisation affects inequality; while accounting for financialisation and its linkages with evolving liquidity preferences, capital account liberalisation and changes in social protection expenditure, which are significant in this emerging economy context.[3] To our knowledge, this empirical study is the first to explore the drivers of inequality in this way. Third, and as part of a relatively robust empirical strategy, this paper utilises a combination of static and dynamic panel data techniques to address endogeneity issues. The latter is particularly useful against a backdrop of persistent inequality; while it enables us to project forward the inequality implications. Further, the application of modern panel data techniques and alternative instrumental variables approaches helps address the identification issues in this financialisation context.

This study identifies several robust determinants of income inequality, including financialisation, which is significant across different spatial scales and alternative inequality/polarisation measures. Further, financialisation has – through its unfavourable linkages with local financial behaviours, international capital movements, and shifts in the social protection expenditure – disproportionately affected the poorest; while benefitting the richest, especially the financial sector. This is consistent with the theoretical prior in heterodox economics, political economy and other social sciences, that financial liberalisation affects the distribution of income in a spatially uneven way; while it adds explanation to the extreme income inequality that persists in some of Brazil's most advanced and financially developed states and districts. In conclusion, this paper attributes the most concerning aspects of Brazil's inequality experience to financialisation, along with its tendency to undermine economic and social progress beyond the financial centre-space.

The paper is organised as follows. Section 2 provides a short theoretical perspective. Section 3 sets out the empirical methodology. Section 4 provides a statistical summary of the data. Section 5 reviews the estimation results. Section 6 summarises and concludes.

2. A Short Theoretical Perspective

Income inequality drivers are multidimensional and may be discussed from different theoretical perspectives in the mainstream of economics and beyond. One major strand of research focuses on the inequality-finance nexus, which is very relevant for the development process. Moreover, there is now a broad literature devoted to exploring the channels through which finance affects income inequality, although the main nexus remains underexplored from a financialisation perspective, which has its roots in heterodox economics, political economy and sociology (e.g.

[3] There is a growing body of empirical literature on Brazilian within-country income inequality (Silveira-Neto and Azzoni, 2011, 2012; Góes and Karpowicz, 2017; Engbom and Moser, 2018; Assouad et al., 2018; Ribeiro et al., 2018). Probably the most closely related paper to ours is Góes and Karpowicz (op. cit.), which analyses across- and within-state income inequality over the period 2004-2014. However, these studies do not explore the financialisation phenomenon, which is the primary focus of this paper.

Epstein, 2005; Palley, 2007; Davis and Kim, 2015). This section provides a brief overview of the Brazilian liberalisation experience from a financialisation perspective.

Brazil adopted a strategy of financial liberalisation in the 1980s and 1990s, which initiated the process of structural change in the financial-banking system. An axis of financial accumulation emerged, predominantly involving financial derivatives and fixed income securities, which were tied to government debt with high interest rates by international comparison, reinforcing the trend towards capital account liberalisation (Bruno et al., 2011). At the same time, this regime of financial accumulation has encouraged a portfolio substitution away from longer-term lending to households and entrepreneurs, towards more liquid and profitable financial securities with relatively favourable risk-return characteristics (Crocco et al., 2014). The primary beneficiaries of Brazil's liberalisation experience are thought to be the financial sector and rentier class; and this at the expense of many others in society. This is consistent with the label of financialisation as a regime of financial accumulation, which is dominated by motives and actors within the financial sector (Van der Zwan, 2014). This is in sharp contrast to the prominent viewpoint in the mainstream of economics and finance, which asserts that financial liberalisation works through various mechanisms to alleviate income inequality among the poor (Beck et al., 2007).[4]

Economic and financial liberalisation occurred around the same time in Brazil, with substantial inflows of goods and capital, which facilitated a structural shift away from manufacturing towards the primary and financial sectors (e.g. Ribeiro et al., 2018). Heterodox economists and those in political economy do not dispute the imperfections and offshoring practices that are embedded within more contemporary theories of international trade (Feenstra and Hanson, 1996, versus Grossman and Rossi-Hansberg, 2008); but global integration exacerbates income inequality first and foremost because it increases the exit options of capital, both in advanced and emerging economies (Rodrik, 1997; Stockhammer, 2017).[5] This has mutually reinforcing effects on the relative bargaining positions of capital and financial capital over labour, which tends to increase primary and function measures of income inequality. Differently, under mainstream international integration theories, inequality implications arise due to market forces and relative factor abundances, rather than bargaining power and power relations (Stolper and Samuelson, 1941).[6]

Financial liberalisation has emerged in many countries alongside growing constraints in the national policy environment, which should protect and compensate society for the vulnerabilities that tend to arise in a more integrated and financialised world (Arestis, 2016;

---

[4] Though different theoretical predictions exist, there is a prevailing viewpoint in the mainstream that financial liberalisation reduces income inequality; for example, because it reduces informational asymmetries and credit enforcement costs, which may be especially binding on the poor (Beck et al., 2007). Others assert that financial liberalisation tends to reduce inequality; but only after a certain stage of economic development (Greenwood and Jovanovic, 1990). In similar spirit, financial liberalisation can affect inequality indirectly through investment in education; or by altering patterns in urban diffusion (e.g. D'Onofrio et al., 2017).

[5] Under the production-sharing hypothesis, for instance, low-skilled production may be shared in a complementary way across international trading networks, such that it reduces inequality both at home and abroad (Grossman and Rossi-Hansberg, 2008). Contrarily, according to the offshoring thesis, inequality may increase in both trading countries if the relocated low-skilled production is viewed as high-skilled in the external country (Feenstra and Hanson, 1996).

[6] The Stolper-Samuelson theorem asserts that the distribution of income is shaped by a country's relative factor abundance (Stolper and Samuelson, 1941). This theorem suggests a negative correlation between international trade integration and income inequality in developing states where the abundance of low-skilled labour is relatively high (e.g. Stockhammer, 2017).

Tridico, 2018). On the one hand, the Brazilian regime of financial accumulation has been supported by a rising government deficit, which has simultaneously reduced the scope for conventional monetary and fiscal policies to mitigate the vulnerabilities of financial capitalism; while imposing structural limits on economic development (Bruno et al., 2011). This has become apparent over more recent years, since the rising deficit has led to fiscal consolidation and a scaling back of social provision (Góes and Karpowicz, 2017). On the other hand, Brazilian policy-makers initially made a concerted effort to implement targeted incomes policies, such as the Bolsa Familia Programme (BFP), aimed at reducing inequality among the poor and impoverished (OECD, 2013).[7] See, for example, Silveira-Neto and Azzoni (2011, 2012) and Ribeiro et al. (2018). Yet it is unclear whether the Brazilian liberalisation regime has contributed to constraining the welfare state; or if it has encouraged greater social provision as a means of compensating society for the many vulnerabilities of financial capitalism.

Despite its relevance for emerging economies like Brazil where inequality, exclusion and underdevelopment prevail, it is uncertain empirically whether financialisation has affected the distribution of income; and how in relation to these mechanisms.

3. Empirical Methodology

3.1 Introduction

This paper's econometric methodology draws on a pluralistic approach and incorporates the key elements of the financialisation perspective, although it is not formally derived from a particular theoretical foundation. Our empirical approach relates to Stockhammer (2017), Góes and Karpowicz (2017) and D' Onofrio et al. (2017). But our empirical strategy differs significantly as follows. Stockhammer (op. cit.) primarily employs fixed effects estimation techniques to identify the drivers of labour's share of income at the international level rather than primary income inequality at the intra-national level. Góes and Karpowicz (op. cit.) is more relevant in that it focuses on Brazilian income inequality; but it does so at the national level using a fixed effects regression methodology, which is useful to an extent; but it only partially addresses endogeneity concerns, while providing limited insight into the short- and long-run drivers of inequality across Brazil. D' Onofrio et al. (op. cit.) employ instead static and dynamic fixed effects instrumental variables (IV) estimation techniques to explore the inequality drivers in Italy at the sub-national scale; however, these papers do not explore the financialisation issue, which is the focus of our paper. For robustness, our empirical strategy utilises both static and dynamic panel data estimation techniques and alternative instrumental variables approaches.

3.2 Econometric Models

In each model income inequality in state *i* and in period *t* is expressed in terms of a set of explanatory and control variables, which are discussed further below in relation to equations (1)-(3), where the dependent variable, $GINI_{i,t}$, corresponds to the coefficient of income inequality:

$$GINI_{i,t} = \alpha + \beta FIN_{i,t} + \gamma' X_{i,t} + \delta' Z_{i,t} + \varepsilon_{i,t} \quad (1)$$

[7] The Brazilian BFP was the largest income transfer programme of its kind upon its commencement in 2004 (OECD, 2013).

$$GINI_{i,t} = \alpha + \beta FIN_{i,t} + \gamma' X_{i,t} + \delta' Z_{i,t} + \mu_i + \tau_t + \varepsilon_{i,t} \quad (2)$$

$$GINI_{i,t} = \alpha + \rho GINI_{i,t-1} + \beta FIN_{i,t} + \gamma' X_{i,t} + \delta' Z_{i,t} + \mu_i + \tau_t + \varepsilon_{i,t} \quad (3)$$

Equation (1) refers to the pooled regression model, wherein income inequality responds to changes in financialisation, $FIN_{i,t}$, according to the coefficient, β. In this equation, a set of variables, $X_{i,t}$, with corresponding coefficient vector, γ, may themselves be influenced by financialisation. That is, $X_{i,t}$ may be considered as an endogenous regressor set. Thus, financialisation directly impacts on the distribution of income according to the coefficient, β; while it indirectly affects inequality through $X_{i,t}$, which reflects other influences thought to influence inequality under the Brazilian regime of financialisation. This includes local liquidity preferences; capital account liberalisation; global economic integration; and an index of social protection expenditure. A standard set of control variables, Z_{it}, is included in all models with coefficient vector, δ, to account for other factors that explain inequality. All variables are defined and described further in relation to their measurement in section 4. An independent and identically distributed error term, $\varepsilon_{i,t}$, captures residual variation and follows a normal distribution with a mean of zero and variance, σ^2.

Equation (2) is identical to equation (1), but it includes additionally a collection of fixed effects to control for unobserved spatial and dynamic heterogeneity across states and years, μ_i and τ_t, respectively. The dynamic setup in equation (3) is identical to equation (2), but a single lag of the dependent variable is also included on the right-hand side, thereby explicitly accounting for the temporal persistence of inequality. Unlike equations (1) and (2), inequality in equation (3) is driven by its own historic path as well as through changes in other explanatory variables. The greater is the persistence parameter, ρ, the greater is the degree of path-dependence. Essentially, as the persistence parameter increases, income inequality is explained to a greater extent in the short-run by its preceding level relative to the variation in the other explanatory variables.

3.3 Empirical Implementation

There are endogeneity issues, which complicate empirical implementation going forward. First, there may be observed or unobserved variables, which if omitted from the model, might cause significant estimation bias under a pooled framework. For example, traditional proxies for financial development and financialisation may be positively correlated through the financial liberalisation process; however, these variables may affect income inequality in qualitatively different ways (Beck et al., 2007, versus Arestis, 2016). Second, measurement error could in principle generate endogeneity bias; not least for variables like financialisation, which are still being defined and conceptualised in the literature (Van der Zwan, 2014). Third, simultaneity bias is a distinct possibility; especially as financialisation may affect income inequality through other variables in the model, such as local liquidity preferences, capital account liberalisation, and social protection expenditure. However, a practical issue with implementation is that there are different ways to address the endogeneity concerns empirically.

Various estimation techniques are employed as part of a robust empirical strategy. First, a set of control variables is included to address omitted-variables bias, as in equation (1), which we estimate using Pooled Ordinary Least Squares (POLS). Second, the regression model is augmented with control variables and fixed effects to capture unobserved or hard-to-measure influences using a two-way fixed effects estimator (LSDV), as in equation (2). Third, we employ different Generalised Method of Moments (GMM-IV) techniques. Because equations (1) and (2) only partially address endogeneity issues, we also use Hansen's (1982) two-step GMM-IV estimator (GMM-2S), which solves an objective function based on underlying moment conditions. For the dynamic model, Arellano and Bond (1991) proposed a first-difference GMM-IV estimator (GMM-FD), which employs past values of endogenous regressors and pre-determined variables as instruments.[8] Blundell and Bond (1998) subsequently developed a dynamic GMM-IV systems estimator (GMM-SYS), which employs variables in levels instrumented using past values of their differences, to exploit additional moment conditions. Two-step GMM-IV estimators are preferred over the one-step counterparts because they produce asymptotically more efficient estimates. Under the two-step approach, Windmeijer's (2005) robust standard errors are used to address the downward bias that typically arises in finite samples.

Because endogeneity issues are a particular concern here, for robustness we conduct an additional IV estimation using an instrument matrix that reflects the deep roots and geography of financialisation. In doing so, we take advantage of the fact that capital cities are usually important places of political and economic power, with socioeconomic structures that are conductive to the establishment of financial centres (Wojcik et al., 2018).[9] Therefore, we employ as an instrument a dummy variable, which takes a value of unity if a state contains a current or former national capital city; and zero otherwise.[10] A state's equatorial distance and its proximity to the prime meridian are used as other geographic instruments that have historically underpinned spatial patterns in financial-centre establishment, through natural resource endowment and proximity to major international financial markets (Beck et al., 2005). The consideration of different estimation techniques and alternative instrumental variables enhances the robustness of our empirical approach.

To explore the mechanisms through which financialisation affects income inequality, we include a set of conditioning variables in the model that are reputed to be part of the channels through which financialisation influences income inequality. This allows us to formally test the magnitude and significance of the empirical linkages between financialisation, liquidity preferences, capital account liberalisation, global economic integration and social protection expenditure. Our approach is in line with other studies on poverty and income inequality, although the main mechanisms remain underexplored in a financialisation context (e.g. Claessens and Feijen, 2007; D'Onofrio et al., 2017). Some caution is required given the simplicity of our modelling approach. Moreover, it is impossible to identify with certainty the causal channels of influence; however, our analysis is a first step in the direction of identifying the prominent mechanisms operational in Brazil.

---

[8] Following Roodman (2009), we constrain instrument lag depth to two and collapse the instrument set; this combination greatly reduces the problem of excessive instruments. The variables $GINI_{i,t}$, $FIN_{i,t}$ and the variable set $X_{i,t}$ are treated as endogenous under GMM-IV estimation.

[9] This hypothesis is not without support from our dataset. Highly financialised parts of the country, like Rio de Janeiro, have usually emerged from established principle cities. This reflects the deep roots of financialisation, which are tied to physical infrastructure, administrative systems and legal architecture. For example, strong administrative and legal environments provide formal mechanisms for the creation and enforcement of contracts within financial and banking industries.

[10] It could be argued that capital-city status has impacted on income inequality by promoting economic development; for example, if states with current or former capital cities contain growth-enhancing institutions. However, the connection with inequality is uncertain, and it is unlikely that capital-city status directly influences inequality over the time-span of this study.

4. Sample Selection

There are four levels of regional classification in Brazil, which correspond to different administrative units. There are five macroregions, which are the first-level territorial units; 26 federal states and a Federal District; there are also 137 mesoregions and 558 microregions. Though classifications are primarily territorial, the regional groupings retain broad similarities in terms of economic, social, political and geographical characteristics. The macroregions and associated federative units are as follows. (1) North: Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, and Tocantins; (2) Northeast: Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe; (3) Midwest: Goiás, Mato Grosso, Mato Grosso do Sul, and the Federal District; (4) Southeast: Espírito Santo, Minas Gerais, Rio de Janeiro and São Paulo; and (5) South: Paraná, Rio Grande do Sul and Santa Catarina. Data are mostly available at annual frequency over the period 2001-2015. Given the inevitable trade-off between model control and the number of observations, we have sought to include the most relevant explanatory variables according to existing literature, while keeping the sample size as large as possible.[11]

4.1 Variable Selection

This study employs as the main measure of inequality the Gini coefficient ($GINI_{i,t}$), which classifies Brazilian states according to their inequality in the distribution of income. It is calculated from Brazil's National Survey by Household Sample (PNAD) and measures the degree of inequality in the distribution of income among individuals in state *i* in year *t*. Data are scaled from 0-1, where larger values correspond to higher levels of inequality. Some comparison is also provided using alternative inequality and polarisation measures, including the Theil Index ($THEIL_{i,t}$) and P80/P20 ratio ($P80/P20_{i,t}$), i.e. the ratio of income earned by the top fifth of the population ranked by increasing income to that earned by the bottom fifth. Data are sourced from the Brazilian Institute of Geography and Statistics (IBGE).

On the explanatory side of the model, financialisation ($FIN_{,t}$) is measured in a given state-year by normalising the total securities and derivatives holdings of banks and financial intermediaries by nominal GDP (100s). We also explore the use of an alternative measure, normalising instead by the population (10,000s). These measures are very similar to others used in the regional financial systems literature like Crocco et al. (2014); however, we prefer to normalise by GDP and population, since financialisation is often discussed in the literature in relation to the growing weight of the financial sector (e.g. Epstein, 2005).[12] To control for financial development, we follow others such as D'Onofrio et al. (2017) by including the number of bank branches per 100,000 inhabitants ($BBN_{i,t}$). Data on bank branches and population are sourced from the Accounting Plan for Brazilian Financial Institutions (COSIF), which is available from the Central Bank of Brazil and the IBGE, respectively.

This paper considers four explanatory variables within vector $X_{i,t}$ in equations (1)-(3), which are emphasised as relevant drivers of income inequality and which may themselves be influenced by financialisation (e.g. Bruno et al., 2011). All variables are computed at the state level. Liquidity preference ($LPF_{i,t}$) is defined as the ratio of total demand deposits to total bank

[11] We note that numerous relatively time-invariant factors influence inequality, which are captured by the inclusion of state fixed effects.
[12] For example, Epstein (2005) defines financialisation as the growing weight of financial motives, financial actors and markets in the operation of modern economies, both internationally and intra-nationally.

credit. Data for demand deposits and bank credit are sourced from the Central Bank of Brazil. Capital account liberalisation ($CAP_{i,t}$) is defined as the ratio of foreign capital inflows to GDP. Data are sourced from the Central Bank of Brazil's Census of Foreign Capital (CFC) and are available over 5-year intervals. Global economic integration ($GLO_{i,t}$) is defined as the sum of total exports and imports with the international economy, normalised by nominal GDP. Data are sourced from the IBGE and Brazilian Ministry of Development, Industry and Trade (MDIC). A social protection expenditure index ($SPI_{i,t}$) is constructed, based on the total value of cash transfers via the BFP and total benefits to the elderly and disabled, normalised by nominal GDP. Data are sourced from the Institute for Applied Economic Research (IPEA).

Several variables are included within vector $Z_{i,t}$ in equations (1)-(3) to control for labour market conditions and policies, which are thought to be important drivers of Brazilian inequality (e.g. Engbom and Moser, 2018). As a general variable that reflects labour market conditions, we include the unemployment rate ($UNRATE_{i,t}$), scaled in percentage points. Data are sourced from the IBGE. Labour market informality ($LAB_{i,t}$) is defined as the share of the total labour force that is engaged in informal employment, scaled in percentage points. Data are sourced from the IPEA. Another relevant consideration is the substantial growth in the minimum wage since the early 2000s. Minimum wage growth ($MWAGE_{i,t}$) is defined as the annual change in the state monthly real minimum wage, scaled in percentage points.[13] Nominal wage data are sourced from the Inter-union Department of Statistics and Socioeconomic Studies (DIEESE), and are subsequently deflated using the consumer price index from the IBGE.

A number of other control variables are included to account for more traditional drivers of inequality (e.g. D'Onofrio et al., 2017). Economic development – which often co-exists with more progressive re-distributional policies (e.g. taxation) and stronger welfare systems – is proxied by the natural logarithm of real GDP-per-capita ($GDP_{i,t}$). GDP data are sourced from the IBGE. The degree of urban diffusion ($URB_{i,t}$) is defined as the percentage of the state population living in large municipalities (containing fewer than 15,000 inhabitants), where more concentrated urban environments encourage skill-biased change. Urbanisation data are sourced from the Brazilian Institute of Economic and Applied Research (IPEADATA). To capture further the conduits of skill-biased change, a measure of international technological diffusion ($TECH_{i,t}$) is included, based on the exports in high-tech goods and services, normalised by the total state exports.[14] Data on exports are sourced from the MDIC. A dummy variable is included to control for the Global Financial Crisis ($GFC_{i,t}$), which takes a value of unity for the years 2008 and 2009; and zero otherwise.

4.2 Summary Statistics

A statistical summary of the key variables is provided over the period 2001-2015, based on the average values across all Brazilian federative units and for states in the North & Northeast; Midwest; and South & Southeast macroregional groupings (Table A1, as in the Appendix).

Income inequality tends to be higher in the North & Northeast macroregions compared to the South & Southeast of Brazil. Standard deviations for the Gini coefficient in the North & Northeast (0.038) and South & Southeast (0.038) macroregions are small relative to the full sample standard deviation of 0.043. The same for most other key variables, including

---

[13] Both federal- and state-level minimum wages exist, where the latter is at least the level of the former and reflects the substantial variation in the costs of living across Brazil.

[14] We consider the Mercosur Common Nomenclature (MCN) codes 84-85, which correspond to high-technology exports.

financialisation, liquidity preference, global economic integration, and social protection expenditure; therefore, there are more similarities in the key variables within these macroregional groupings than differences. The Midwest is more extreme in the sense that it contains a number of highly financialised parts, including the Federal District, where inequality is extremely high. By comparison, states in the Midwest, South & Southeast macroregions are on average more financialised and globally integrated in terms of trade and capital account openness; whereas states in the North & Northeast macroregions are characterised by higher levels of liquidity preference, social protection expenditure and lower levels of GDP-per-capita. A more general characteristic that prevails within Brazilian states and macroregions is the significant persistence of inequality. For example, the first-order autocorrelation of the Gini coefficient is always statistically significant at the 1% level. This underlines the scale and persistence of income inequalities that are part of Brazil's evolving economic and social divide.

5. Empirical Results

Results are presented for the aggregated and disaggregated estimations. The former involves estimation across all states; whereas in the latter, estimations are conducted separately for Brazilians states in the North & Northeast, Midwest and South & Southeast macroregional groupings.

5.1 Aggregated Results

The estimation outcomes are summarised in Table 1. For the static models, pooled ordinary least squares (POLS), least squares dummy variables (LSDV), and two-step generalised method of moments (GMM-2S) estimations are presented in columns (1)-(6) in Panel A. For the dynamic model, Arellano and Bond's (1991) GMM-FD estimator is preferred over Blundell and Bond's (1998) GMM-SYS estimator since the underlying identification assumptions for the latter are typically rejected.[15] See columns (7)-(8) in Panel A. To explore the linkages between financialisation, liquidity preferences, capital account liberalisation, global economic integration, and social protection expenditure, 2SLS estimations are presented in columns (9)-(12) in Panel B.[16]

[15] Hansen's (1982) test reveals that the null hypothesis of instrument validity is not rejected at conventional significance levels. Dynamic IV estimations are also supported by first- and second-order autocorrelation tests as in Tables 1-5.

[16] Under 2SLS the financialisation instrument set includes: a dummy variable indicating whether a state contains a current or former national capital city ($IV\_CAP_{i,t}$); proximity to the equator according to latitude ($IV\_LAT_{i,t}$); and distance from the prime meridian ($IV\_GMT_{i,t}$). See also Table A2 (Appendix).

Table 1. Aggregated Estimation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Panel A								Panel B				
	POLS	POLS	LSDV	LSDV	GMM-2S	GMM-2S	GMM-FD	GMM-FD	2SLS	2SLS	2SLS	2SLS	Partial
	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$LPF_{i,t}$	$GLO_{i,t}$	$CAP_{i,t}$	$SPI_{i,t}$	R^2
$L.GINI_{i,t}$	-	-	-	-	-	-	0.644***	0.639***	-	-	-	-	-
							(0.046)	(0.067)					
$BBN_{i,t}$	-0.002***	-0.002***	-0.002***	-0.002**	-0.002**	-0.002**	-0.001**	-0.001**	-	-	-	-	0.013
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)					
$FIN_{i,t}$	0.048***	0.077***	0.032***	0.047***	0.036***	0.044***	0.015***	0.018***	0.142***	0.086**	0.080**	-0.004***	0.082
	(0.008)	(0.012)	(0.005)	(0.008)	(0.006)	(0.010)	(0.002)	(0.004)	(0.044)	(0.036)	(0.037)	(0.001)	
$LPF_{i,t}$	0.001***	0.001***	0.003***	0.003***	0.003***	0.003***	0.002***	0.003***	-	-	-	-	0.043
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
$GLO_{i,t}$	0.052***	0.053***	0.024**	0.025**	0.032*	0.033*	0.012*	0.013*	-	-	-	-	0.029
	(0.015)	(0.015)	(0.012)	(0.012)	(0.018)	(0.019)	(0.007)	(0.008)					
$CAP_{i,t}$	0.067***	0.064***	0.058***	0.058***	0.052***	0.051***	0.021***	0.021***	-	-	-	-	0.076
	(0.011)	(0.010)	(0.013)	(0.013)	(0.015)	(0.015)	(0.006)	(0.006)					
$SPI_{i,t}$	-1.717***	-1.760***	-1.412***	-1.454***	-1.470***	-1.511***	-0.606***	-0.612***					0.049
	(0.438)	(0.432)	(0.480)	(0.467)	(0.541)	(0.540)	(0.192)	(0.190)					
$TECH_{i,t}$	0.045***	0.046***	0.028	0.029	0.031	0.032	0.013	0.013	-	-	-	-	0.026
	(0.015)	(0.015)	(0.028)	(0.028)	(0.033)	(0.033)	(0.009)	(0.013)					
$URB_{i,t}$	-0.020	-0.011	-0.018	-0.018	-0.019	-0.018	-0.009	-0.005					0.003
	(0.021)	(0.020)	(0.016)	(0.017)	(0.018)	(0.019)	(0.008)	(0.007)					
$GDP_{i,t}$	-0.023**	-0.022**	-0.015	-0.015	-0.018	-0.017	-0.006	-0.007	-	-	-	-	0.011
	(0.011)	(0.011)	(0.012)	(0.012)	(0.014)	(0.014)	(0.005)	(0.005)					
$UNRATE_{i,t}$	0.003***	0.003***	0.001	0.001	0.001	0.000	0.001	0.000	-	-	-	-	0.024
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)					
$LAB_{i,t}$	0.001***	0.001***	0.003***	0.003***	0.003***	0.003***	0.001**	0.001**	-	-	-	-	0.032
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)					
$MWAGE_{i,t}$	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	-0.001**	-0.000**	-0.000**	-	-	-	-	0.040
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
$GFC_{i,t}$	0.010***	0.010***	0.009***	0.009***	0.009***	0.009***	0.003***	0.003***	0.034	0.032	0.009	-0.000	0.021
	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.046)	(0.031)	(0.020)	(0.001)	
State FE	NO	NO	YES***	YES***	YES***	YES***	-	-	NO	NO	NO	NO	-
Time FE	NO	NO	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES	YES***	YES***	-
HT_LSDV	-	-	[0.000]	[0.000]	-	-	-	-	-	-	-	-	-
HT_GMM-2S	-	-	-	-	[0.000]	[0.000]	-	-	-	-	-	-	-
HT_GMM-FD	-	-	-	-	-	-	[0.000]	[0.000]	-	-	-	-	-

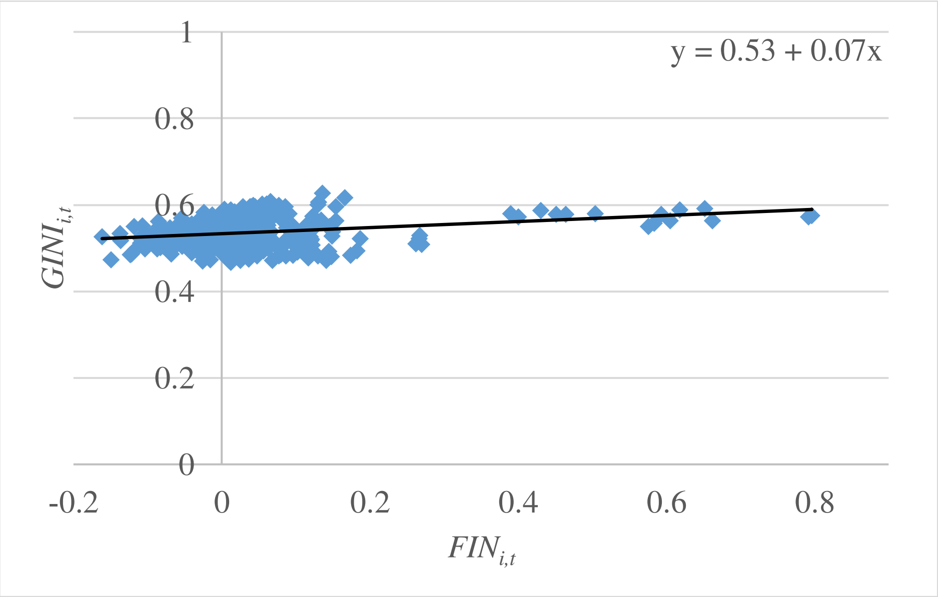
JP	-	-	-	-	[0.748]	[0.789]	[0.912]	[0.810]	[0.168]	[0.131]	[0.185]	[0.162]	-
AR(1)	-	-	-	-	-	-	[0.001]	[0.000]	-	-	-	-	-
AR(2)	-	-	-	-	-	-	[0.677]	[0.578]	-	-	-	-	-
Observations	379	379	379	379	350	350	379	379	379	405	405	405	-

Source: Authors' own computations.

Notes: In odd and even columns (1)-(8) the financialisation variable is normalised by GDP and population, respectively. In columns (9)-(12) the financialisation variable is normalised by GDP. The constant terms are omitted for brevity. HT corresponds to the p-values from Hausman's (1978) endogeneity-bias test. JP is the p-value for Hansen's (1982) instrument validity test. AR(1) and AR(2) correspond to the p-values for first- and second-order tests for autocorrelation under GMM-FD. Standard errors (in parentheses) are robust to heteroscedasticity and autocorrelation, with Windmeijer's (2005) finite-sample correction employed under GMM-IV. Significance is indicated by: * (10%), ** (5%), *** (1%).

Panel A of Table 1 reveals that financialisation – in terms of the share of total securities and derivative holdings of banks and financial intermediaries – has significantly increased the Gini coefficient under static (POLS, LDSV, GMM-2S) and dynamic (GMM-FD) estimations. All point estimates are positively signed and highly significant; while the outcome is robust across both GDP and population measures of financialisation. The empirical association is illustrated by the conditional correlation plot in Figure 1, which reveals a positive (conditional) correlation between income inequality and financialisation after partialling-out other influences.[17] This supports the financialisation perspective, whereby financial liberalisation has benefitted first and foremost the financial sector; often at the expense of many others in society (Epstein, 2005; Palley, 2007; Davis and Kim, 2015). Economically, a 1% increase in financialisation using the GDP (population) measure increases the Gini coefficient by 0.03-0.04 (0.04-0.05) across the different fixed effects/IV estimations. The relevant partial-R^2 statistic is also large relative to most other explanatory variables, which underlines the relative contribution of financialisation to Brazilian personal income inequality.[18]

Figure 1. *Partial Correlation Plot of Gini Coefficient and Financialisation*



Source: Authors' own computations.
Notes: Plot corresponds to residuals from OLS regressions of $GINI_{i,t}$ and $FIN_{i,t}$ variables on all other control variables.

Several other influences are thought to affect income inequality alongside financialisation, including liquidity preferences, capital account liberalisation, global economic integration, and social protection expenditure. Liquidity preferences are positively associated with higher inequality, and usually significantly so. For instance, column (8) implies that a unit increase in the liquidity preference variable increases the Gini coefficient by approximately 0.003

[17] The partial correlation plot is obtained as follows. First, we regress $GINI_{i,t}$ on all the control variables excluding $FIN_{i,t}$ and store the residuals. Second, we regress $FIN_{i,t}$ (population measure) on all the other control variables, and store the residuals. Third we plot these residuals in Figure 1.
[18] Partial-R^2 statistics are obtained from the baseline set of observed variables, including the Gini coefficient and all explanatory variables, where the financialisation variable is normalised by GDP.

immediately; and by around 0.008 in the long-run.[19] In effect, a shock to financial behaviour can have long-lasting effects on inequality. This is consistent with heterodox (Post-Keynesian) liquidity preference theory (e.g. Chick and Dow, 1988), whereby liquidity preference reinforces financial agents' expectations to extend less credit to households and entrepreneurs in more unstable macroeconomic environments; but this reinforces spatial imbalances in credit availability, with uneven consequences for economic development (Crocco et al., 2014). By comparison, banking structure seems less significant as a determinant than its behavioural counterpart; however, the estimated sign is consistent with the expectation that financial development alleviates income inequality (D'Onofrio et al., 2017).

Table 1 provides an indication of the globalisation forces in operation. For example, a 1% increase in international capital inflows as a share of GDP increases the Gini coefficient by 0.005-0.006 under fixed effects/IV estimations. This supports the thesis that Brazil's liberalisation strategy has created opportunities for global finance; while encouraging short-term movements in international capital, exchange rate volatility and job destruction (Arestis, 2016). By comparison, a 1% increase in global economic integration as a share of GDP increases the Gini coefficient by 0.002-0.003 points, which is consistent with theories of offshoring rather than production-sharing (Feenstra and Hanson, 1996, versus Grossman and Rossi-Hansberg, 2008). This also corroborates the political economy of globalisation viewpoint that global integration has increased the exit options of capital, thereby weakening the relative bargaining position of labour, both in advanced and emerging economies (Rodrik, 1997; Stockhammer, 2017). However, capital account liberalisation is a relatively powerful driver of Brazilian inequality, with a higher partial-R^2 statistic. By comparison, the technical integration channel is relatively weak and insignificant (after inclusion of time effects), even though the estimates are qualitatively consistent with the skill-biased change hypothesis (Card and DiNardo, 2002).

Under the Brazilian regime of financial liberalisation, strong national institutions and policies are required to protect the weakest against the powers of capital and financial capital. According to Table 1, social protection expenditure is among the most prominent determinants of inequality, which corroborates the viewpoint of the OECD (2013). The implication of our estimation is that a 1% increase in social expenditure as a share of GDP significantly reduces the Gini coefficient by 0.01-0.02 points. Our finding is stronger and more significant than Góes and Karpowicz's (2017) fixed effects results, perhaps because economic and social policies like the BFP generate changes in the distribution of income, which are not fully captured under the static model. Furthermore, real minimum wage growth significantly reduces inequality, at least in formalised labour markets.[20] Economically, a 10% increase in the real minimum wage reduces the Gini coefficient by 0.006-0.008 points, which corroborates the relevant finding of Engbom and Moser (2018). This reveals the strong potential for targeted incomes policies to compensate for the vulnerabilities and inequalities that prevail in a more liberalised and globally integrated world.

The 2SLS estimation output in Table 1 sheds further light on the significant financialisation mechanisms at work (Panel B). Financialisation positively correlates with financial agents' preference to hold more liquid assets, which corroborates the viewpoint that financial

---

[19] The short-run inequality effects under the dynamic GMM-FD setup correspond to coefficient γ; whereas the long-run effects correspond to $\gamma/(1-\rho)$, as in equation (3).

[20] We note that the informality of Brazilian labour markets is a significant driver inequality. According to the estimates in Table 1, a 10% decrease in the share of informal sector reduces the Gini coefficient by 0.01-0.03 points.

liberalisation has encouraged a short-term banking strategy over longer-term economic and social objectives, such as productive investment or inclusive growth (Crocco et al., 2014). Financialisation positively correlates with global economic integration and capital account liberalisation, which suggests that financial liberalisation stimulates international mobilisation of goods and capital. Financialisation negatively correlates with social protection expenditure, which indicates that the Brazilian regime of financial accumulation has placed significant constraints on the social policy model. Even though the nature of Brazilian financialisation is rather particular, on this evidence its unfavourable distributional consequences for society are qualitatively comparable to many other countries around the world (see, e.g. Tridico, 2018, for OECD countries).

In evaluation, the fixed effects are usually highly significant when included in the model. As such, there are important unobservable influences, which, if unaccounted for under POLS, may generate omitted-variables bias. Hausman's (1978) test always rejects the null hypothesis of no endogeneity-bias; therefore, although the qualitative implications of POLS, LSDV and GMM-IV estimations are usually quite similar, the pooled and fixed effect estimations generate quantitatively different outcomes.[21] Furthermore, the LSDV estimator is helpful to an extent in addressing endogeneity issues; however, the IV approaches are preferred because they provide a more general solution to the endogeneity problem.

5.2 Additional Results

Several additional checks are undertaken for robustness (Table 2). First, cross-sectional estimation is conducted on a yearly basis; estimates are then averaged across years from 2001 to 2015, and reported in columns (1)-(2). Serial correlation is corrected following Peterson (2009) by multiplying the standard errors by $\{[1+\Phi]/[1-\Phi]\}\sigma^2/T^{1/2}$, where Φ is the autocorrelation of the temporal coefficient estimate with its one period lag; σ^2 corresponds to the variance of the temporal coefficient estimate; and T is the time-dimension. Second, quantile regression is conducted in columns (3)-(4), which assigns less weight to extreme (outlier) observations and reduces parameter instability problems during crises.[22] Third, we utilise Bruno's (2005) bias-corrected least squares dummy variables estimator in columns (5)-(6).[23] This dynamic alternative to LSDV effectively acts as an additional robustness check on LSDV and GMM-FD estimations, which is worthwhile given the unbalanced nature of the panel and its limited dimensions. Fourth, to check sensitivity to alternative inequality/polarisation measures, we use instead the Theil Index and the P80/P20 quintile ratio in columns (7)-(10), which are increasing in the extent of inequality and correlated with coefficients of 0.9 (Gini vs Theil), 0.9 (Gini vs P80/P20) and 0.8 (Theil vs P80/P20). The results from these checks underline the robustness of financialisation as a determinant; while liquidity preferences, capital account liberalisation and social protection expenditure retain their signs and significance under all the panel fixed effects estimations.

[21] Hausman's (1978) test operates under the null hypothesis that pooled and fixed effects estimations are both consistent; but only the latter is consistent under the alternative hypothesis. We also tested dynamically-specified POLS and LSDV versus GMM-FD, since only the latter is a consistent dynamic estimator, and obtain the same outcome.

[22] The objective of quantile regression is to minimise the sum of absolute residuals instead of the sum of squared residual as in OLS regression (Koenker and Hallock, 2001).

[23] Standard errors are computed from 200 bootstrap repetitions.

Table 2. Robustness

	Cross-Sectional		Quantile Regression		Bias-Corrected LSDV		Alternative Inequality/Polarisation GMM-FD			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L.GINI$_{i,t}$	-	-	-	-	0.567***	0.564***	-	-	-	-
					(0.049)	(0.053)				
L.THEIL$_{i,t}$	-	-	-	-	-	-	0.342***	0.331***	-	-
							(0.100)	(0.105)		
L.P80/P20$_{i,t}$	-	-	-	-	-	-	-	-	0.611***	0.623***
									(0.067)	(0.086)
FIN$_{i,t}$	0.014***	0.030***	0.023***	0.039***	0.019***	0.031***	0.056***	0.125***	0.027***	0.061***
	(0.005)	(0.011)	(0.000)	(0.000)	(0.006)	(0.011)	(0.022)	(0.042)	(0.009)	(0.020)
LPF$_{i,t}$	-	-	0.003***	0.003***	0.002***	0.002***	0.003***	0.003***	0.001***	0.001***
			(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
GLO$_{i,t}$	-	-	0.018***	0.020***	0.022	0.024	0.082	0.080	0.024	0.023
			(0.000)	(0.000)	(0.021)	(0.022)	(0.061)	(0.065)	(0.018)	(0.019)
CAP$_{i,t}$	-	-	0.045***	0.042***	0.038***	0.040***	0.046***	0.048***	0.023***	0.023***
			(0.000)	(0.000)	(0.010)	(0.012)	(0.016)	(0.015)	(0.008)	(0.009)
SPI$_{i,t}$	-	-	-1.610***	-1.641***	-1.008***	-1.012***	-1.353***	-1.320***	-0.926***	-0.940***
			(0.000)	(0.000)	(0.350)	(0.362)	(0.403)	(0.416)	(0.276)	(0.314)
State FE	-	-	YES***	YES***	-	-	-	-	-	-
Time FE	-	-	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES***
JP	-	-	-	-	-	-	[0.814]	[0.726]	[0.884]	[0.819]
AR(1)	-	-	-	-	-	-	[0.000]	[0.000]	[0.008]	[0.012]
AR(2)	-	-	-	-	-	-	[0.684]	[0.547]	[0.758]	[0.780]
Observations	27	27	379	379	353	353	327	327	327	327

Source: Authors' own computations.
Notes: In odd and even columns the financialisation variable is normalised by GDP and population, respectively. Only the key estimates are reported for brevity. Standard errors in columns (1)-(2) are corrected for serial correlation by multiplying by $\{[1+\Phi]/[1-\Phi]\}\sigma^2/T^{1/2}$. Standard errors (in parentheses) are robust to heteroscedasticity and autocorrelation, with Windmeijer's (2005) finite-sample correction employed under GMM-FD. Significance is indicated by: *** (1%).

5.3 Disaggregated Results

In this section, fixed effects IV estimations are presented for the Brazilians states within the North & Northeast (Table 3), Midwest (Table 4) and South & Southeast macroregions (Table 5). For robustness and comparison, results are reported using the Gini coefficient and Theil Index. The main results are reported in Panel A under static GMM-2S and dynamic GMM-FD techniques; additionally in Panel B, we explore further the financialisation mechanisms under 2SLS estimation.

The financialisation effect is generally unfavourable and significant at the disaggregated level (Tables 3-5). Interestingly, the financialisation effects are stronger and more significant outside of Brazil's financial core, especially in the North & Northeast macroregions, which are characterised by greater volatility and macroeconomic uncertainty. This may reflect the local financial-banking system's preference to hold more liquid financial assets as part of a defensive banking strategy that is encouraged under the Brazilian regime of financialisation (Crocco et al., 2014). Added to which, short-term movements in global finance tend to benefit the financial sector; while exposing many others to exchange rate volatility, uncertainty and job destruction (Arestis, 2016). This argument is reinforced by the finding that the northernmost states were affected more significantly by the GFC. Additionally, financial liberalisation and financialisation have placed significant constraints on the social policy model, most notably outside of Brazil's centralised financial districts (Bruno et al., 2011); and this despite the significance of targeted social policies such as the BFP, which has been among the most important forces in the direction of more even development in the poorest parts of Brazil (Silveira-Neto and Azzoni, 2011).[24] These findings are more in line with the financialisation perspective than the traditional financial liberalisation thesis, which asserts that financial liberalisation reduces income inequality because it benefits first and foremost the poorest (Arestis, 2016, versus Beck et al., 2007). This adds more sub-national evidence to the current debate on the inequality-finance nexus (De Haan and Sturm, 2017, and the literature therein).

[24] In particular, states in the North & Northeast of Brazil – which contain many more low-income households than the Midwest, South & Southeast macroregions, both in absolute and relative terms – have benefitted most from the BFP (Table 3 versus Table 4).

Table 3. Disaggregated Estimation – North + Northeast

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Panel A								Panel B				
	GMM-2S	GMM-2S	GMM-FD	GMM-FD	GMM-FD	GMM-FD	GMM-FD	GMM-FD	2SLS	2SLS	2SLS	2SLS	Partial R^2
	$GINI_{i,t}$	$THEIL_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$THEIL_{i,t}$	$LPF_{i,t}$	$GLO_{i,t}$	$CAP_{i,t}$	$SPI_{i,t}$	
$L.GINI_{i,t}$ / $L.THEIL$	-	-	0.438***	0.420***	0.423***	0.463***	0.433***	0.416***	-	-	-	-	-
			(0.076)	(0.073)	(0.069)	(0.071)	(0.075)	(0.070)					
$BBN_{i,t}$	-0.003	-0.007	-0.002	-0.001	-0.001	-0.003	-0.002	-0.004	-	-	-	-	0.011
	(0.004)	(0.011)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.006)					
$FIN_{i.t}$	0.117***	0.119***	0.076***	0.078***	0.079***	0.069***	0.057**	0.062**	0.196***	0.064**	0.092***	-0.008***	0.074
	(0.035)	(0.042)	(0.022)	(0.023)	(0.024)	(0.023)	(0.028)	(0.030)	(0.044)	(0.031)	(0.033)	(0.003)	
$LPF_{i,t}$	0.018***	0.017***	0.013***	-	-	-	0.012***	0.010***	-	-	-	-	0.062
	(0.004)	(0.004)	(0.003)				(0.003)	(0.003)					
$GLO_{i,t}$	0.112**	0.106**	-	0.067**	-	-	0.057*	0.055*	-	-	-	-	0.029
	(0.056)	(0.050)		(0.030)			(0.033)	(0.030)					
$CAP_{i,t}$	0.055**	0.062**	-	-	0.036***	-	0.035**	0.038**	-	-	-	-	0.040
	(0.027)	(0.030)			(0.017)		(0.017)	(0.018)					
$SPI_{i,t}$	-2.551***	-2.148***	-	-	-	-1.309***	-1.388***	-1.293***	-	-	-	-	0.054
	(0.746)	(0.699)				(0.416)	(0.440)	(0.411)					
$TECH_{i,t}$	0.019	0.041	0.016	0.017	0.018	0.015	0.006	0.030	-	-	-	-	0.005
	(0.040)	(0.067)	(0.024)	(0.025)	(0.025)	(0.021)	(0.028)	(0.044)					
$URB_{i,t}$	-0.151	-0.189	-0.105	-0.098	-0.076	-0.125	-0.089	-0.124	-	-	-	-	0.003
	(0.214)	(0.265)	(0.113)	(0.113)	(0.116)	(0.127)	(0.137)	(0.101)					
$GDP_{i,t}$	0.026	0.100	0.011	0.008	0.001	0.007	0.006	0.044	-	-	-	-	0.007
	(0.019)	(0.076)	(0.016)	(0.015)	(0.014)	(0.013)	(0.015)	(0.045)					
$UNRATE_{i,t}$	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	-	-	-	-	0.002
	(0.001)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)					
$LAB_{i,t}$	0.003***	0.030***	0.002**	0.002***	0.002**	0.003***	0.002**	0.002**	-	-	-	-	0.030
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)					
$MWAGE_{i,t}$	-0.002**	-0.002**	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001**	-	-	-	-	0.041
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
$GFC_{i,t}$	0.010**	0.014**	0.006**	0.007**	0.007**	0.008***	0.009***	0.010***	0.014	-0.012	-0.024	0.002	0.026
	(0.004)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.026)	(0.020)	(0.019)	(0.002)	
State FE	YES***	YES***	-	-	-	-	-	-	NO	NO	NO	NO	-
Time FE	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES	YES	YES***	YES***	-
JP	[0.234]	[0.313]	[0.223]	[0.206]	[0.226]	[0.241]	[0.145]	[0.187]	[0.262]	[0.178]	[0.164]	[0.326]	-
AR(1)	-	-	[0.002]	[0.002]	[0.002]	[0.003]	[0.002]	[0.005]	-	-	-	-	-
AR(2)	-	-	[0.315]	[0.347]	[0.321]	[0.403]	[0.431]	[0.400]	-	-	-	-	-
Observations	196	181	214	214	214	214	214	199	214	240	240	240	-

Source: Authors' own computations.

Notes: The constant terms are omitted for brevity. The financialisation variable is normalised by GDP. JP is the p-value for Hansen's (1982) instrument validity test. AR(1) and AR(2) correspond to the p-values for first- and second-order tests for autocorrelation under GMM-FD. Standard errors (in parentheses) are robust to heteroscedasticity and autocorrelation, with Windmeijer's (2005) finite-sample correction employed under GMM-IV. Significance is indicated by: * (10%), ** (5%), *** (1%).

Table 4. Disaggregated Estimation – Midwest

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Panel A								Panel B				
	GMM-2S	GMM-2S	GMM-FD	GMM-FD	GMM-FD	GMM-FD	GMM-FD	GMM-FD	2SLS	2SLS	2SLS	2SLS	Partial-
	$GINI_{i,t}$	$THEIL_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$THEIL_{i,t}$	$LPF_{i,t}$	$GLO_{i,t}$	$CAP_{i,t}$	$SPI_{i,t}$	R^2
$L.GINI_{i,t}$ / $L.THEIL$	-	-	0.251**	0.253**	0.254**	0.218***	0.229***	0.230**	-	-	-	-	-
			(0.098)	(0.120)	(0.127)	(0.069)	(0.079)	(0.109)					
$BBN_{i,t}$	-0.003	-0.003	-0.001	-0.001	-0.000	-0.004	-0.002	-0.002	-	-	-	-	0.008
	(0.006)	(0.003)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)					
$FIN_{i,t}$	0.015**	0.018**	0.017***	0.018***	0.017***	0.016***	0.011**	0.014**	0.078***	0.071**	0.088**	-0.003**	0.066
	(0.007)	(0.009)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.007)	(0.025)	(0.034)	(0.043)	(0.002)	
$LPF_{i,t}$	0.003**	0.004**	0.003**	-	-	-	0.003**	0.003**	-	-	-	-	0.034
	(0.002)	(0.002)	(0.002)				(0.002)	(0.002)					
$GLO_{i,t}$	0.052**	0.050*	-	0.032**	-	-	0.045**	0.043*	-	-	-	-	0.042
	(0.025)	(0.028)		(0.015)			(0.022)	(0.024)					
$CAP_{i,t}$	0.042**	0.037***	-	-	0.035**	-	0.034**	0.032***	-	-	-	-	0.058
	(0.019)	(0.013)			(0.017)		(0.016)	(0.009)					
$SPI_{i,t}$	-1.052	-1.232	-	-	-	-0.560	-0.861	-0.980	-	-	-	-	0.014
	(1.386)	(1.392)				(0.811)	(1.009)	(1.142)					
$TECH_{i,t}$	0.120	0.085	0.092	0.076	0.099	0.108	0.112	0.069	-	-	-	-	0.027
	(0.093)	(0.086)	(0.073)	(0.070)	(0.075)	(0.077)	(0.085)	(0.080)					
$URB_{i,t}$	-0.052	-0.055	-0.036	-0.037	-0.032	-0.038	-0.033	-0.051	-	-	-	-	0.015
	(0.041)	(0.044)	(0.033)	(0.032)	(0.030)	(0.035)	(0.033)	(0.039)					
$GDP_{i,t}$	-0.009	-0.012	-0.007	-0.007	-0.004	-0.007	-0.008	-0.008	-	-	-	-	0.021
	(0.018)	(0.020)	(0.016)	(0.012)	(0.012)	(0.008)	(0.010)	(0.012)					
$UNRATE_{i,t}$	0.004	0.023	0.004*	0.004*	0.004*	0.004*	0.003	0.015	-	-	-	-	0.026
	(0.004)	(0.019)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.011)					
$LAB_{i,t}$	0.004**	0.004**	0.003***	0.003***	0.003**	0.003***	0.003**	0.003**	-	-	-	-	0.027
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)					
$MWAGE_{i,t}$	-0.001**	-0.001**	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	-0.001**	-	-	-	-	0.038
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
$GFC_{i,t}$	0.012	0.009	0.004	0.004	0.003	0.000	0.011	0.015	0.242	-0.030	-0.024	0.001	0.014
	(0.010)	(0.034)	(0.005)	(0.006)	(0.008)	(0.004)	(0.006)	(0.020)	(0.340)	(0.036)	(0.023)	(0.004)	
State FE	YES***	YES***	-	-	-	-	-	-	NO	NO	NO	NO	-
Time FE	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES*	YES***	YES***	-
JP	[0.634]	[0.654]	[0.252]	[0.279]	[0.284]	[0.334]	[0.233]	[0.375]	[0.126]	[0.135]	[0.147]	[0.216]	-
AR(1)	-	-	[0.016]	[0.016]	[0.017]	[0.023]	[0.038]	[0.043]	-	-	-	-	-
AR(2)	-	-	[0.899]	[0.917]	[0.914]	[0.819]	[0.571]	[0.595]	-	-	-	-	-
Observations	56	52	60	60	60	60	60	56	60	60	60	60	-

Source and *Notes:* See Table 3.

Table 5. Disaggregated Estimation – South + Southeast

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Panel A								Panel B				
	GMM-2S	GMM-2S	GMM-FD	GMM-FD	GMM-FD	GMM-FD	GMM-FD	GMM-FD	2SLS	2SLS	2SLS	2SLS	Partial-R^2
	$GINI_{i,t}$	$THEIL_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$GINI_{i,t}$	$THEIL_{i,t}$	$LPF_{i,t}$	$GLO_{i,t}$	$CAP_{i,t}$	$SPI_{i,t}$	
$L.GINI_{i,t}$ / $L.THEIL$	-	-	0.451***	0.418***	0.465***	0.467***	0.373***	0.339***	-	-	-	-	-
			(0.078)	(0.057)	(0.076)	(0.075)	(0.086)	(0.106)					
$BBN_{i,t}$	-0.003***	-0.004**	-0.003***	-0.003***	-0.003***	-0.003***	-0.003**	-0.003**	-	-	-	-	0.026
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)					
$FIN_{i,t}$	0.045***	0.052***	0.029***	0.028***	0.028***	0.030***	0.027**	0.032**	0.045***	0.122***	0.160***	-0.001**	0.066
	(0.016)	(0.017)	(0.009)	(0.009)	(0.008)	(0.009)	(0.011)	(0.013)	(0.009)	(0.040)	(0.045)	(0.001)	
$LPF_{i,t}$	0.003**	0.004**	0.002***	-	-	-	0.002**	0.003**	-	-	-	-	0.031
	(0.001)	(0.002)	(0.000)				(0.001)	(0.002)					
$GLO_{i,t}$	0.021	0.027	-	0.025	-	-	0.017	0.020	-	-	-	-	0.022
	(0.029)	(0.026)		(0.021)			(0.023)	(0.022)					
$CAP_{i,t}$	0.019**	0.018**	-	-	0.011**	-	0.010**	0.012**	-	-	-	-	0.045
	(0.009)	(0.009)			(0.005)		(0.005)	(0.006)					
$SPI_{i,t}$	-0.624	-0.644	-	-	-	-0.430	-0.394	-0.438	-	-	-	-	0.015
	(1.269)	(1.371)				(0.688)	(0.742)	(0.773)					
$TECH_{i,t}$	0.052	0.056	0.038	0.038	0.039	0.037	0.034	0.042	-	-	-	-	0.058
	(0.045)	(0.053)	(0.033)	(0.033)	(0.034)	(0.037)	(0.038)	(0.044)					
$URB_{i,t}$	-0.055***	-0.045**	-0.037***	-0.036***	-0.030***	-0.029***	-0.027**	-0.031**	-	-	-	-	0.030
	(0.018)	(0.022)	(0.009)	(0.009)	(0.008)	(0.008)	(0.013)	(0.014)					
$GDP_{i,t}$	-0.003	-0.014	-0.008	-0.006	-0.007	-0.009	-0.004	-0.010	-	-	-	-	0.009
	(0.018)	(0.021)	(0.012)	(0.011)	(0.012)	(0.014)	(0.015)	(0.018)					
$UNRATE_{i,t}$	0.003**	0.012**	0.003***	0.003***	0.003***	0.002***	0.002**	0.008**	-	-	-	-	0.014
	(0.001)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)					
$LAB_{i,t}$	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002*	0.002*	-	-	-	-	0.030
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)					
$MWAGE_{i,t}$	-0.001***	-0.002**	-0.001***	-0.001***	-0.001***	-0.000***	-0.001**	-0.001**	-	-	-	-	0.028
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)					
$GFC_{i,t}$	0.004	0.002	0.001	0.002	0.001	0.001	0.002	0.002	0.001	-0.017	-0.064	0.001	0.006
	(0.003)	(0.008)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.005)	(0.014)	(0.033)	(0.076)	(0.004)	
State FE	YES***	YES***	-	-	-	-	-	-	NO	NO	NO	NO	-
Time FE	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES***	YES**	YES***	YES***	-
JP	[0.610]	[0.585]	[0.363]	[0.351]	[0.352]	[0.364]	[0.168]	[0.172]	[0.103]	[0.126]	[0.165]	[0.170]	-
AR(1)	-	-	[0.007]	[0.002]	[0.003]	[0.009]	[0.009]	[0.006]	-	-	-	-	-
AR(2)	-	-	[0.344]	[0.169]	[0.331]	[0.596]	[0.474]	[0.580]	-	-	-	-	-
Observations	98	91	105	105	105	105	105	98	105	105	105	105	-

Source and *Notes:* See Table 3.

5.4 Simulations

To explore further the inequality implications of our estimations, we conduct several simple simulations. First, we compute the model-implied change in the Gini coefficient that each state would realise if it had 5%, 10% and 20% of the value of the financialisation variable (as a share of GDP) as in the Federal District, which is the most financialised of Brazil's 27 federative units. The 95% confidence interval for the change is computed in three simulations using the sub-national estimates in Tables 3-5. First, the change is computed according to the financialisation estimate for coefficient β in Panel A (Simulation 1). Second, the total inequality change from financialisation arising (indirectly) through the liquidity preference, global economic integration, capital account liberalisation and social protection expenditure variables, is computed according to the estimates for coefficient γ in Panel A and 2SLS estimates in Panel B (Simulation 2). Third, the overall change in inequality is computed as the sum of direct and indirect financialisation effects (Simulation 3). The results are summarised below.[25] The economic implications are that, for instance, the Gini coefficient in Maranhão in the Northeast would increase by up to 0.069 directly (Simulation 1); up to 0.035 through other variables in the model (Simulation 2); and by as much as 0.104 overall (Simulation 3). By comparison, the respective upper bound increases in the Gini coefficient for Mato Grosso in the Midwest are 0.010, 0.019, and 0.029; whereas for Santa Catarina in the South, the increases are 0.026, 0.013 and 0.040. Spatially uneven inequality outcomes arise for three main reasons. First, financialisation increases by more in absolute terms in states where it starts out at a lower base level. Second, financialisation's marginal effects (both direct and indirect) tend to be larger outside of Brazil's financial core (e.g. Table 3 versus Table 4). For example, the relatively sizeable inequality increases in the northernmost states reflects the larger reductions in social provision experienced under Simulations 2 and 3 (Figure A1 in the Appendix). Third, the estimates are less precise (with larger standard errors) in the North & Northeast macroregions. However, even moderate increases in financialisation generate sizeable increases in inequality. Especially so in Brazil's northernmost states, both in absolute terms and relative to state standard deviations in the Gini coefficient.

6. Summary and Conclusions

Against a backdrop of financialisation, extreme inequality and evolving financial instability, this paper's primary contribution is to analyse the determinants of personal income inequality in Brazil. In doing so, we utilise modern static and dynamic panel data techniques as part of a robust empirical strategy, which generates new results and insights from a financialisation perspective. In this contribution we explore further the different mechanisms through which the Brazilian model of financial liberalisation has affected income inequality within one of the world's prominent emerging economies.

This paper's analysis takes a first step in the direction of identifying the channels through which financial liberalisation and financialisation affect income inequality; while providing an early indication of how inequality might evolve in the future. Our empirical analysis indicates that Brazil's regime of financialisation has undermined rather than strengthened its position as a leading emerging economy, at least in relation to the distribution of income. This reflects the unfavourable linkages between income inequality, financialisation, liquidity preferences, capital account liberalisation and social protection expenditure. Perhaps most significantly, the

[25] To conserve space we summarise only the main simulation results here; however, the full set of simulation outcomes is available from the authors' as a supplementary item.

Brazilian regime of financial accumulation has generated tensions in the social policy model, which threatens more extreme inequality, especially outside of its centralised financial district.

This paper's findings highlight the need to rethink the policy response in a more globally integrated and financialised world, where financial systems cannot by themselves be relied upon to facilitate more sustainable growth and even development. A major task for policy-makers is to design and implement policies that incentivise a longer-term perspective within financial systems, both internationally and intra-nationally. Our results highlight the importance of moderating short-term international capital flows; while placing checks on financial behaviour such that the local banking system better supports longer-term economic and social objectives. Our results also point to expansion of the targeted incomes policies and transfers that have been among the most significant forces in the direction of more even development.

References

Amado, A. (1997). *Disparate regional development in Brazil*. Aldershot: Ashgate.

Arellano, M. and Bond, S. (1991). "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", *Review of Economic Studies*, 58(2), 277-297.

Arestis, P. (2016). "Financial liberalisation, the finance-growth nexus, financial crises and policy implications". In Arestis, P. and Sawyer, M. C. (Eds.), *Financial liberalisation: past, present and future,* Basingstoke: Palgrave Macmillan.

Arestis, P., Baltar, C. T. and Prates, D. M. (2017). *The Brazilian economy since the Great Financial Crisis of 2007/2008*, London: Palgrave Macmillan.

Arestis, P. and Sawyer, M. C. (2005). *Financial liberalization: beyond orthodox concerns*, Basingstoke: Palgrave Macmillan.

Assouad, L., Chancel, L. and Morgan, M. (2018). "Extreme inequality: evidence from Brazil, India, the Middle East and South Africa", *American Economic Association (Papers and Proceedings)*, 108(1), 119-123.

Atkinson, A. B. (2015). *Inequality: what can be done?*, Cambridge, MA: Harvard University Press.

Azzoni, C. (1999). "Personal income distribution within states and income inequality between states in Brazil: 1960, 70, 80 and 91". In Geoffrey, H., Michael, S., Moss, M. and Yoshio, K. (Eds.), *Understanding and interpreting economic structure*, Berlin: Springer.

BCB. (2018). Central Bank of Brazil Database on Financial Institutions. Available at: https://www3.bcb.gov.br/ifdata/.

Beck, T., Crivelli, J. and Summerhill, W. (2005). "State bank transformation in Brazil - choices and consequences", *Journal of Banking & Finance*, 29(8-9), 2223-2257.

Beck, T., Demirgüç-Kunt, A. and Levine, R. (2007). "Finance, inequality and the poor", *Journal of Economic Growth*, 12(1), 27-49.

Blundell, R. and Bond, S. (1998). "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, 87(1), 115-143.

Bruno, G. (2005). "Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models", *Economics Letters*, 87(3), 361-366.

Bruno, M., Diawara, H., Araujo, E., Reis, A. C. and Rubens, M. (2011). "Finance-led growth regime in Brazil: theoretical status, empirical evidence and macroeconomic consequences", *Revista de Economia Política*, 31(5), 730-750.

Card, D. and DiNardo, J. (2002). "Skill-biased technological change and rising wage inequality: some problems and puzzles", *Journal of Labor Economics*, 20(4), 733-783.

Chick, V. and Dow, S. (1988). "Post-Keynesian perspective on the relation between banking and regional development". In Arestis P. (Ed.), *Post-keynesian monetary economics: new approaches to financial modelling*, Aldershot: Elgar.

Claessens, S. and Feijen, E., (2007). "Financial sector development and the millennium development goals", Working Paper Number 89, World Bank, Washington, D.C.

Crocco, M., Faria-Silva, F., Paulo-Rezende, L. and Rodríguez-Fuentes, C. (2014). "Banks and regional development: an empirical analysis on the determinants of credit availability in Brazilian regions", *Regional Studies*, 48(5), 883-895.

D'Onofrio, A., Minetti, R. and Murro, P. (2017). "Banking development, socioeconomic structure and income inequality", *Journal of Economic Behavior & Organisation*, In Press.

Davis, G. and Kim, S. (2015). "Financialization of the economy", *Annual Review of Sociology*, 41(1), 203-221.

De Haan, J. and Sturm, J.-E. (2017). "Finance and income inequality: a review and new evidence", *European Journal of Political Economy*, 50(C), 171-195.

Engbom, N. and Moser, C. (2018). "Earnings inequality and the minimum wage: evidence from Brazil", Working Paper Number 7, Federal Reserve Bank of Minneapolis, Opportunity and Inclusive Growth Institute, Minneapolis.

Epstein, G. A. (2005). "Introduction: financialization and the world economy". In Epstein, G. A. (Ed.), *Financialisation and the world economy*, Cheltenham: Edward Elgar.

Feenstra, R. and Hanson, G. (1996). "Foreign investment, outsourcing and relative wages". In Feenstra, R., Grossman, G. and Irwin, D. (Eds.), *The political economy of trade policy: papers in honor of Jagdish Bhagwati*, Cambridge, MA: MIT Press.

Furtado, C. (1961). *Desenvolvimento e subdesenvolvimento*. Rio de Janeiro: Fundo de Cultura.

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

Grossman G. and Rossi-Hansberg, E. (2008). "Trading tasks: a simple theory of offshoring", *American Economic Review*, 98(5), 1978-1997.

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators", *Econometrica*, 50(4), 1029-1054.

Hausman, J. (1978). "Specification tests in econometrics", *Econometrica,* 41(6), 1251-1071.

Keeley, B. (2015). *Income inequality: the gap between rich and poor*. *OECD Insights*, Paris: OECD Publishing.

Kleibergen, F. and Paap, R. (2006). "Generalized reduced rank tests using the singular value decomposition", *Journal of Econometrics*, 133(1), 97-126.

Koenker, R. and Hallock, K. (2001). "Quantile regression", *Journal of Economic Perspectives*, 15(4), 143-56.

Lin, K.-H. and Tomaskovic-Devey, D. (2013). "Financialisation and US Income Inequality, 1970-2008", *American Journal of Sociology*, 118(5), 1284-1329.

OECD (2013). *OECD territorial reviews: Brazil 2013,* Paris: OECD Publishing.

Palley, T. (2007). "Financialization: what it is and why it matters", Working Paper Number 153, Political Economy Research Institute, University of Massachusetts at Amherst, Massachusetts.

Petersen, M. (2009). "Estimating standard errors in finance panel data sets: comparing approaches", *Review of Financial Studies*, 22(1), 435-480.

Ribeiro, L. C. D. S., Domingues, E., Perobelli, F. and Hewings, G. (2018). "Structuring investment and regional inequalities in the Brazilian northeast", *Regional Studies*, 52(5), 727-739.

Rodrik, D. (1997). *Has globalization gone too far?,* Washington, DC: Institute of International Economics.

Roodman, D. (2009). "How to do xtabond2: an introduction to difference and system GMM in Stata", *Stata Journal*, 9(1), 86-136

Silveira-Neto, R. and Azzoni, C. (2011). "Non-spatial government policies and regional income inequality in Brazil", *Regional Studies*, 45(4), 453-461.

Silveira-Neto, R. and Azzoni, C. (2012). "Social policy as regional policy: market and nonmarket factors determining regional inequality", *Journal of Regional Science*, 52(3), 433-450.

Stockhammer, E. (2017). “Determinants of the wage share: a panel analysis of advanced and developing economies”, *British Journal of Industrial Relations*, 55(1), 3-33.

Stolper, W. and Samuelson, P. (1941). “Protection and real wages”, *Review of Economic Studies*, 9(1), 58-73.

Tridico, P. (2018). “The determinants of income inequality in OECD countries”, *Cambridge Journal of Economics*, 42(4), 1009-1042.

Van der Zwan, N. (2014). “State of the art: making sense of financialisation”. *Socio-Economic Review*, 12(1), 99-129.

Windmeijer, F. (2005). “A finite sample correction for the variance of linear efficient two-step GMM estimators”, *Journal of Econometrics*, 126(1), 25-51.

Wojcik, D., Knight, E. and Pazitka, V. (2018). “What turns cities in international financial centres? Analysis of cross-border investment banking 2000-2014”, *Journal of Economic Geography*, 18(1), 1-33.

World Bank. (2017). “Safeguarding against a reversal in social gains during the economic crisis in Brazil”, World Bank Group, Washington, D.C.

Table A1. Summary Statistics

	$GINI_{i,t}$		$FIN_{i,t}$		$LPF_{i,t}$		$GLO_{i,t}$		$CAP_{i,t}$		$SPI_{i,t}$		$GDP_{i,t}$		Autocorrelation
	μ	σ	μ	σ	μ	σ	μ	σ	μ	σ	μ	σ	μ	σ	ρ
Brazil	0.535	0.043	0.158	0.390	0.295	0.132	0.159	0.129	0.116	0.159	0.009	0.005	9332.103	3962.724	0.801***
North + Northeast	0.544	0.038	0.040	0.077	0.348	0.122	0.115	0.122	0.074	0.089	0.012	0.004	6997.181	1753.153	0.747***
Midwest	0.539	0.051	0.439	0.571	0.302	0.103	0.180	0.126	0.077	0.071	0.005	0.003	13248.000	5285.411	0.869***
South + Southeast	0.509	0.038	0.265	0.338	0.216	0.061	0.249	0.092	0.234	0.241	0.003	0.001	12431.414	2638.849	0.912***

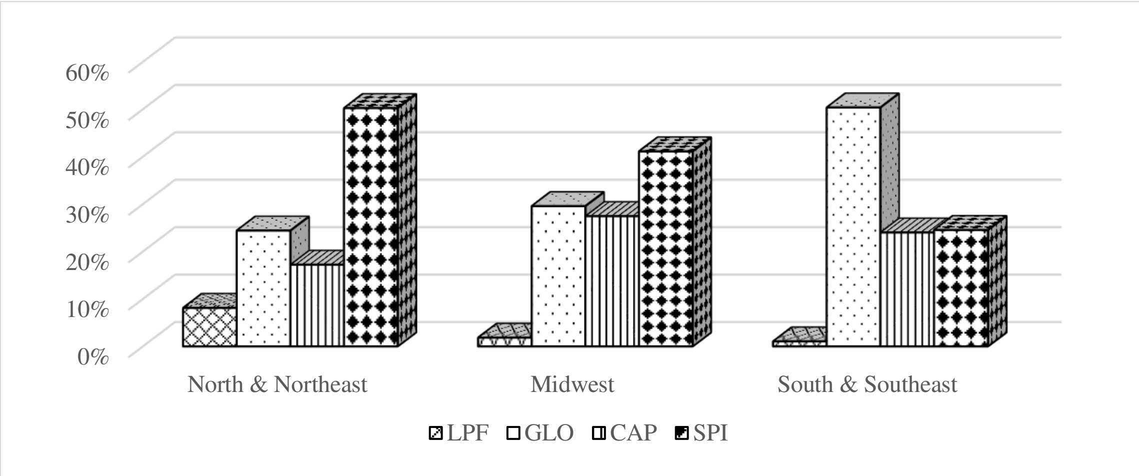
Source: Authors' own computations.
Notes: Sample mean (μ), standard deviation (σ) and first-order autocorrelation of the Gini coefficient (ρ). The financialisation variable is normalised by GDP. Significance is indicated by: *** (1%).

Table A2. 2SLS Estimation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel A		Panel B							
	$GINI_{i,t}$	$GINI_{i,t}$	$LPF_{i,t}$	$LPF_{i,t}$	$GLO_{i,t}$	$GLO_{i,t}$	$CAP_{i,t}$	$CAP_{i,t}$	$SPI_{i,t}$	$SPI_{i,t}$
Second Stage										
$FIN_{i,t}$	0.074***	0.157***	0.142***	0.145***	0.086**	0.167**	0.080**	0.193**	-0.004***	-0.011***
	(0.010)	(0.022)	(0.044)	(0.051)	(0.036)	(0.078)	(0.037)	(0.081)	(0.001)	(0.003)
First Stage										
$IV\_CAP_{i,t}$	0.581***	0.265***	0.581***	0.265***	0.581***	0.265***	0.581***	0.265***	0.581***	0.265***
	(0.128)	(0.059)	(0.128)	(0.059)	(0.128)	(0.059)	(0.128)	(0.059)	(0.128)	(0.059)
$IV\_LAT_{i,t}$	0.003***	0.001**	0.003***	0.001**	0.003***	0.001**	0.003***	0.001**	0.003***	0.001**
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
$IV\_GMT_{i,t}$	0.029***	0.004***	0.029***	0.004***	0.029***	0.004***	0.029***	0.004***	0.029***	0.004***
	(0.005)	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)
Time FE	YES***	YES***	YES***	YES***	YES	YES	YES***	YES***	YES***	YES***
JP	[0.912]	[0.825]	[0.168]	[0.129]	[0.131]	[0.106]	[0.185]	[0.141]	[0.162]	[0.130]
KP	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	405	405	379	379	405	405	405	405	405	405

Source: Authors' own computations.
Notes: In odd and even columns the financialisation variable is normalised by GDP and population, respectively. Time FE indicates whether time fixed effects are included, along with their joint statistical significance in the second stage. JP is the p-value for Hansen's (1982) instrument validity test. KP is the p-value for Kleibergen-Paap's (2006) under-identification test for weak instruments. Standard errors (in parentheses) are robust to heteroscedasticity and autocorrelation. Significance is indicated by: ** (5%), *** (1%).

Figure A1. Financialisation Channels by Macroeconomic Grouping



Source: Authors' own computations.
Notes: Breakdown of inequality changes from $X_{i,t}$ variables by macroregional grouping.