Income disparities and financial development: Evidence from a panel firm-level analysis

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Abstract: This paper explores the effects of financial development on income disparities when certain control parameters are taken into consideration. The dataset consists of 4,373 manufacturing and services firms across the globe over 2011-2020. Income inequality is captured by the gap between capital and labour earnings expressed by two ratios according to firms' total asset valuation and profitability. The explanatory variables are divided into four groups: the indicators of financial development, the ratios of firms' growth in the markets, their level of indebtedness and institutional regulation. The results suggest that financial development exerts a significant effect on the capital-to-labour earnings ratio according to the indicators taken into consideration. Excessive debt tends to worsen this gap, while institutional regulations promoting competition play a significant role in reducing income disparities. The robustness of the results is also checked when the constituent firms are categorised according to their size and their operating region.

Keywords: Income inequality, financial development, market capitalisation, firms, panel data.

JEL Classifications: C23, D22, E25, E44, O14.

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1. Introduction

The concept of income disparities has been gaining momentum over the last decades as government policies, market liberalisation and debt accumulation have significantly shaped income and wealth allocation across the population (Agnello and Sousa, 2014; Fleming and Measham, 2015). The dynamics of such distribution reflect the actions and decisions of individuals engaged in various transactions that affect their financial position. The nature of those decisions may have a long run effect on private consumption and potentially, on private investment according to the realisation of expectations. The role of institutions is also a crucial determinant to the dynamics of the financial system that affect the allocation of funds and assets across the market, thus influencing investment decisions and the capitalisation value of firms (Goyer and Hancké, 2005). Moreover, financialization has become a widespread concept across the literature focusing on the importance of investors, markets and financial forces on the global economic system and the constituent markets. Financial activity has expanded rapidly resulting in a significant increase in stock market capitalisation and the value of financial transactions.

There are several studies investigating the effects of financial development on the evolution of income inequality and particularly, on how financial activities shape the earnings gap across the income distribution (Liang, 2006; Agnello, et al., 2012; Hein, 2012; Daisaka et al., 2014; Christopoulos and McAdam, 2017). However, empirical evidence on the causal relationship between those two concepts is mixed depending on the model structure and the financial indicators employed in each study. For instance, Baiardi and Morana (2018) argue that financial deepening leads to increasing income inequality over the years, while Beck et al. (2007) support that financial globalisation has led to diminishing income disparities. Nevertheless, many of those studies are focused on country-based cross-sectional comparisons

by neglecting the micro-dynamics within markets that may shed light to a more accurate connection between financialization and income inequality.

To this end, this study aims to investigate the relationship between financial development and income disparities according to the insights of Greenwood and Jovanovic (1990) and Galor and Zeira (1993) under which financial development promotes higher capital returns, thus influences income inequality. The main aim is to identify whether firm decisions establish a causal link between those two concepts in the long run. A comprehensive list of financial indicators is taken into consideration to explore their effect on income disparities expressed as the gap between firms' fundamental values and labour compensation. The indicators reflect the rates of growth, market capitalisation, indebtedness, and the financial state of firms according to which their operational activities develop in certain markets, along with institutional regulations promoting competitive conduct[3].

Moreover, a firm-level panel dataset across global markets over 2011-2020 is utilised to study how financial development has affected the gap between entrepreneurial and labour earnings[4]. This is the most important contribution of the study as there are only a few papers focusing on a firm-level analysis to test this relationship (Lin and Tomaskovic-Devey, 2013; Alvarez, 2015; Cobb, 2016), thus adding significant value to the literature. Finally, the firms included in the sample are also studied according to their size and their operating region to bolster the validity and robustness of the empirical findings.

The paper is organised as follows: Section 2 provides the theoretical and empirical literature on financial development and income inequality; Section 3 presents the

[3] The indicators have been chosen and grouped according to Alvarez (2015) and Paramati and Nguyen (2019). Given that financial development can be reflected by several measures, in this study it is expressed as a firm's access to liquid funds and the valuation of their assets.

[4] The two-step system Generalised Method of Moments (GMM) estimation technique is employed given that the number of firms is very large, and the number of years is very small (Arellano and Bover, 1995).

methodological approach and data collection; Section 4 discusses the empirical findings; and section 5 offers a conclusion.

2. A literature review on financial development and income inequality

Financialization has rapidly evolved over the last decades around the globe, offering new opportunities to individuals and firms to engage in risk-taking activities and operate in competitive environments according to their preferences. However, when such forces envelop the global economic structure, income disparities become imminent as wealth and income are transferred amongst individuals (Milanovic, 2013). Such mechanics resulted in the study of the dynamics between financial development and income inequality providing mixed results across many economies.

The contribution of Greenwood and Jonavic (1990) is a leading proponent in this part of the literature by investigating the relationship between financial intermediation and income disparities. They argue that financial development increases income inequality in the early stages during which only a few groups across the income distribution benefit. It is expected that high-income individuals are the main beneficiaries by having access to asymmetric information, thus gaining an advantage over other participants. However, as financial development continues, more groups get access to funds and financial benefits, thus reducing income inequality in the long-run. Banerjee and Newman (1993) and Galor and Zeira (1993) also provide major theoretical insights on the financialization and inequality nexus supporting that more developed and resilient financial markets can reduce income disparities. This happens because as households get access to more credit, their decisions will be formed by taking economic optimality into consideration to increase their income in the long-run[5].

[5] Banarjee and Newman (1993) reach that conclusion by employing a model using household occupational choice as the main determinant of credit constraints. Galor and Zeira (1993) use human capital investment as a long-term determinant of credit availability by assuming that higher investment leads to higher occupational opportunities in the market.

Therefore, the main concern of these studies is whether individuals will form their choices according to the realisation of the best possible outcome.

As income disparities are captured by the capital-to-labour earnings ratio (K/L) in the current study, Garmaise (2008) shows that financially constrained firms tend to have a lower ratio as specialised employees are more productive and provide vital information to firms. This means that access to information significantly affects the gap between capital and labour earnings and thus, labour productivity is essential to its dynamics. However, Spaliara (2009) argues that the sensitivity of the K/L ratio depends on firm characteristics, namely financial indicators reflecting investment decisions and liquidity constraints. According to this rationale, firms with lower liquidity constraints experience a larger K/L ratio as they can exploit their power and increase the rate of capital earnings relative to labour compensation. Moreover, Cornille et al. (2019) support that credit constraints are strongly associated with the economic environment and the market conditions under which firms operate, thus affecting their employment decisions. Such firms foster employment adjustment at the extensive margin, and they use temporary layoff allowances for economic reasons. This means that labour compensation is significantly affected and the dynamics of the K/L ratio are shaped by firms' financial decisions.

To this end, several studies attempt to empirically investigate the relationship between financialization and income inequality. Liang (2006) and Clark et al. (2006) find a negative relationship between those measures by arguing that financial development allows more individuals to participate in financial transactions through a more robust financial system and public information. Hamori and Hashiguchi (2012) highlight the importance of financialization in reducing income disparities; however, they find that trade openness reduces the equalising effects of this process, thus having asymmetric effects on any attempt to reduce the gap between high and low-income groups. Agnello et al. (2012) also emphasise the importance of policy

intervention as lowering barriers to credit acquisition and improving reserve requirements in the securities markets reduce income inequality by enabling more individuals to access the financial markets.

On the other hand, Seven and Coskun (2016) argue that the development process of the banking system and the increasing valuation of stock markets benefit the aggregate economic structure as growth rates tend to rise. However, the effect on income disparities and particularly poverty, seems to be very weak, as low-income families do not experience any significant gains from financial development. Jauch and Watzka (2016) support this outcome by testing the robustness of increasing income disparities across 138 countries. They find that various indicators of financial development exert a positive effect on the Gini coefficient regardless of econometric specifications and assumptions made in their model. Daisaka et al. (2014) also argue that financial imperfection leads to imbalances by harming lenders and benefitting borrowers through lower capital rental rates. Although financial development promotes efficient allocation of capital resources, falling trading costs do not improve efficiency nor they have a significant effect on the income distribution.

De Haan and Sturm (2017) and De Haan et al. (2018) use the periods of banking crises as an indicator of financial intermediation along with the quality of political institutions. They imply that financial regulations, intervention, and supervision of the market highly influence the flow of income as information and knowledge are very crucial elements for decision making. When financial liberalization deepens, financial development increases income inequality unless political institutions intervene to reduce the effect of this outcome through various policy initiatives. Baiardi and Morana (2018) also complement the argument that political institutions significantly shape the dynamics of income inequality. They support that in the European Union (EU) area economic and income inequality tend to increase as financial development is growing; however, austerity policies and sovereign debt crises are important

contributors to this outcome. Households lose spending power and income is transferred towards lenders, thus widening the gap between high and low-income individuals. To this end, the intervention of political institutions is a major factor in sustaining and reducing income disparities across countries[6].

Moreover, there are studies that obtain mixed or inconclusive results of the effects of financial development on income inequality. Similar to Greenwood and Jonavic (1990), Nguyen et al. (2019) and Fu et al. (2021) find that financial development in emerging countries, and especially in China, is initially increasing income inequality; but as policies make market participants and households more robust to volatility, income disparities start to fall. Christopoulos and McAdam (2017) also support the argument that active policies can significantly reduce income inequality as the financial system develops through stronger safety nets and regulatory frameworks.

On the other hand, Park and Shin (2017) obtain a positive relationship between financialization and income inequality in emerging countries; however, as more individuals get access to education and the legal system is bolstered, households get more opportunities in the labour market. Therefore, the presence of a certain threshold in various economies affects the dynamics between income inequality and financial development significantly, shaped by policies promoting equal opportunities and participation in the markets (Kim and Lin, 2011).

Subsequently, such policies are implemented through regulatory frameworks that influence the dynamics of competition and innovation through various incentives. However, market intervention shall also tackle corruption which is a detrimental obstacle to the growth rate of firms and the private sector through its anti-competitive nature. Fisman and Svensson

[6] Rajan (2010) supports that widening income disparities is the result of increasing credit provision to households in the United States (US) economy. In the absence of political intervention to adopt redistributive taxation policies, access to credit by poor households leads to excessive debt accumulation. Therefore, the role of political institutions can significantly shape the dynamics of income inequality.

(2007) argue that corruption exerts a significant negative effect on sales' growth rate, thus constraining firms from innovating and expanding their production (Tanzi and Davoodi 1998; Gupta et al. 2002). Consequently, the gap between capital and labour earnings may increase as firms attempt to minimise losses through cutting costs and especially, labour. This happens because lower firm performance causes resources to flow towards rent-seeking activities as they tend to offer higher returns (Dal Bó and Rossi 2007).

Boudreaux et al. (2018) support that resources and human capital shift away from the education industry by providing disincentives for professional development in an environment where corruption flourishes. Boikos et al. (2023) argue that bribes affect investment decisions, performance, and firms' on-the-job training schemes directly as they are connected to development opportunities and access to funding. Lower rates of training tend to reduce the real annual growth rate of sales and decisions about innovation. Amin and Soh (2020) also support that financial constraints are of utmost importance because corruption exerts a larger negative effect on firms with higher constraints, thus preventing them from growing and expanding[7]. Therefore, regulatory authorities should address those problems and any behaviour promoting anti-competitive incentives that constraint market expansion.

3. Model formulation and data collection

The objective of this study is to investigate the effects of financial development on the dynamics of income inequality and whether, the earnings between capital and labour have been significantly shaped by financial indicators. The main research question aims to explore the relationship based on the insights of Greenwood and Jovanovic (1990) and Galor and Zeira (1993) under which financial development promotes higher capital returns, thus influencing

[7] Nevertheless, several studies argue that corruption may exert a positive effect on firm growth by catalysing slow and unresponsive bureaucracy processes, such as bypassing barriers to entry in highly regulated economies or by boosting individual plant growth (Vial and Hanoteau, 2010; Dreher and Gassebner, 2013).

income inequality. This approach allows to study the question of how financial indicators tend to affect the fundamental value of firms and their production decisions. The current analysis utilises annual firm-level data and attempts to extend the contribution of a limited number of studies focusing on the firm-level rather than the aggregate level of the economy (Lin and Tomaskovic-Devey, 2013; Alvarez, 2015; Cobb, 2016). This is one of the major advantages of the dataset because it takes into consideration the actions of individual firms within markets, thus improving the accuracy and robustness of the empirical results (Siegenthaler and Stucki, 2014). The list of countries and the number of firms in the sample are presented in Table 1.

[Table 1]

The empirical analysis comprises of three approaches. In the first approach, the empirical model studies the relationship between income disparities and financial development, when certain control parameters are included. The main model of the study is:

$$y_{i,t} - y_{i,t-1} = a_i + b_1 slr_{i,t} + b_2 inc_{i,t} + b_3 mcr_{i,t} + b_4 svr_{i,t} + b_5 lr_{i,t} + b_6 cfr_{i,t} + b_7 inv_{i,t} + b_8 dr_{i,t} + b_9 reg_{i,t} + u_{i,t} \quad (1)$$

where $y_{i,t}$ is the capital-to-labour earnings ratio for firm i at time t and a_i is a firm fixed effect. The regressors are categorised into four groups. The first group includes the indicators controlling for the growth values of firms: slr is the ratio of operating revenue over current liabilities and inc is the ratio of net income over total assets for firm i at time t. The second group is expressed by dr which is the rate of long-term debt over total assets and reflects the level of firms' indebtedness. The third group reflects the intervention of institutions through regulations to promote competitive conduct denoted by reg. The fourth group includes the indicators of financial development corresponding to mcr which is the ratio of market capitalisation over total assets and reflects the size of firms in the stock market according to expectations, svr which is the ratio of shareholders' funds to total assets, lr which is the ratio

of net current assets over current liabilities, cfr which is the ratio of cash flow over total assets and inv which is the ratio of investment expenditures over total assets. All variables are expressed in logarithms and the summary statistics are presented in table 2[8].

[Table 2]

On average, the K/L ratios show that capital earnings exceed labour compensation by at least 80%, whilst the ratio of total assets is significantly higher than the ratio of profitability-to-labour compensation. Operating revenue exceeds the value of liabilities, and market capitalisation and shareholders' funds are also growing faster than the value of total assets. The liquidity ratio depicts that the growth rate of current assets and liabilities is approximately the same, and the institutional quality index show that regulatory frameworks are moving towards market-friendly policies promoting competition. Finally, the parameters of net income, cash flow, investment, and debt lag behind total asset valuation, showing that on average, their growth rate is slower compared to the remaining variables of the model.

The empirical model follows the insights and formulation of Lin and Tomaskovic-Devey (2013) and Alvarez (2015) who argue that financial development cannot be explained without taking into consideration the fundamental values of firms, their access to credit and their liabilities. For this reason, the proxy variables of financial development reflect the firms' access to liquidity complemented by measures of their valuation. Several studies in the literature using country-level data employ Gross Domestic Product (GDP) as a common denominator across their indicators. This serves as a benchmark to measure the magnitude of certain parameters. In firm-level datasets however, the most accurate alternative is the value of total assets of each firm to avoid any bias associated with the size of firms. This approach

[8] As the variables are expressed in logarithms, the negative values show that the ratio is below 1. For the capital-to-labour ratios, this shows that labour compensation exceeds capital earnings over periods, while for the remaining ratios, it shows that the numerator is lower than the value of the denominator, that is total assets.

allows for heterogeneity across the sample given that a common measure of national GDP would remove firm-specific effects from the analysis[9].

The second section includes the size-based approach according to which the data set is categorised between big and medium/small-sized firms. Big firms are defined as those firms with a value of total assets higher than the average value of the sample; otherwise, they are treated as medium and small sized. This approach allows the investigation of the model's hypothesis across different sub-groups of the sample and whether, big firms appear to exert the same dynamics compared to medium and small sized firms in global markets. The robustness of the results is also checked when firms are divided according to the value of operating revenue. The third and last section includes the region-based approach under which the data sample is categorised into 10 regions according to the country each firm is registered[10]. This division provides additional insights about the market mechanics, how firms tend to behave and ultimately, whether the effects of financial development on income disparities persist across every region. Consequently, the structure of the empirical model aims to provide insights on how firms across the globe have shaped income disparities through their finances and whether, regional and size-oriented characteristics significantly contribute to such behaviour.

The dataset comprises of an unbalanced annual panel of 4,373 manufacturing and services firms across global markets over 2011-2020 obtained by the Bureau van Dijk Osiris and the World Bank databases[11]. Income disparities on a firm-level are treated as the gap

[9] Alvarez (2015) argues that firm-level data allow for the use of more accurate and sophisticated indicators compared to the ones used at the country or even industry level. Firm-level data models allow for heterogenous effects to be included in the sample, thus providing more robust and detailed estimates. Moreover, it removes any bias resulting from different sized firms in the sample which may also correct for heteroskedasticity (Orhangazi, 2008).

[10] The regions are Africa, Asia, East Europe, Middle East, North America, Oceania, Scandinavia, Central and South America, West Europe and G7.

[11] The dataset consists of firm-level balance sheets, profit and loss accounts and financial ratios of the constituent manufacturing and services firms. The Osiris database contains information on approximately 80,000 listed, and major unlisted/delisted companies across the globe. Detailed stock data, financial reports, and market research reports are included, providing an extensive and heterogeneous dataset. However, given that

between the earnings of capital and labour across the firms of the sample to allow the observation of the dynamics between operational indicators and labour compensation. The main parameter of that ratio is aol expressed as the ratio of total assets over labour compensation according to Alvarez (2015). It reflects the valuation of a firm's total assets and compares it to the sum of wages and salaries. This formulation reflects an initial approximation of the gap between the earnings of capital and labour because it is expected that as firms acquire more power in the market, the valuation of their total asset will increase. Ultimately, their size will also increase, thus strengthening their presence in the market (Leigh and Triggs, 2016)[12].

Moreover, an additional formulation of income disparities is considered to check whether financial development exerts the same effect on different indicators. The second indicator is eol and reflects the ratio of the sum of EBITDA (earnings before interest, taxes, depreciation, and amortisation) and labour compensation over labour compensation. This indicator is closely related to firms' profitability; however, there are some periods across the sample where the values of that ratio are negative and thus, they had to be removed[13].

The indicators reflecting the growth values of firms are slr and inc. The first ratio is expressed as operating revenue over current liabilities and captures the net position of a firm's balance sheet over a period. As this ratio increases, the intrinsic value of firms will be expected to increase, thus significantly affecting the gap between profitability and labour compensation (Lin and Tomaskovic-Devey, 2013). This outcome can also be observed by the second

only large companies are obliged to report, information about turnover, assets and employment of medium and small firms may not be available.

[12] The main assumption behind this indicator is that income inequality is calculated as the gap between two groups: entrepreneurs and consumers. This happens because the top shares of the income distribution consist of capital owners and thus, of entrepreneurs whose returns are captured by operating surplus. However, the main limitation is its omission to reflect different sub-groups amongst employees who are also part of the top percentages of the income distribution (such as managers).

[13] Alternative indicators could be the top 1% and 5% shares of the income distribution (Atkinson and Morelli, 2010). However, as this study is focused on a firm-level analysis, the firm-valuation measures-to-labour compensation ratios are more accurate as the main interest lies on the gap between the earnings of capital owners and workers.

indicator expressed as net income over total assets. This indicator attempts to capture firms' behaviour according to their earnings and how they proceed with pricing and production decisions (Cobb, 2016). However, this outcome highly depends on the degree of competitive conduct, the size of firms and whether they decide to exert their power in the market.

The following indicator is the mcr ratio corresponding to market capitalisation over total assets and reflects the size of firms in the stock markets. This indicator has been employed by several studies to measure the effect of market size on income disparities and whether, larger firms tend to boost their profitability through lower rates of wages and salaries (Seven and Coskun, 2016; Nguyen et al., 2019). This is an alternative measure based on investors' expectations about the future value of firms and their performance in the market. It complements the insights of the former growth indicators and aims to investigate the dynamics of income disparities according to the fundamental values and the expectations of firms' operational activities.

Furthermore, the dr ratio is used as an indicator of indebtedness which significantly affects expectations and thus, the future earnings of firms. It is expected that as corporate debt increases, there will be a significant effect on income inequality because entrepreneurial decisions will be adjusted accordingly by influencing the production process (Berisha et al., 2018; Amountzias, 2019). Finally, the reg indicator is used as a proxy of institutional quality, reflecting the actions of the regulatory authorities to tackle anti-competitive conduct through market-friendly regulations and promote private sector development (Hancer and Hauteclocque, 2010; Koske et al., 2015; Berry et al., 2019)[14].

[14] According to Koske et al. (2015), market reforms and regulatory frameworks promoting competitive conduct are essential to market growth and development as illicit practices are prevented and firms can innovate and invest in their production process. To this end, market power exploitation is limited, and markup ratios should not reflect oligopolistic power, thus preventing the erection of barriers to competition.

The last group of indicators consists of the proxies of financial development corresponding to the ratios of net current assets over current liabilities, and shareholders' funds, cash flow and investment over total assets. The main aim of those indicators is to evaluate whether access to credit, investment decisions and liquidity constraints in general significantly shape the dynamics of the earnings gap between entrepreneurs and consumers. Several studies use credit-oriented measures to capture the effects of liquidity constraints in their samples along with indicators of turnover or stock market valuation (Spaliara, 2009; Jauch and Watzka, 2016; Chiu and Lee, 2019; Shi et al., 2022). Milberg and Winkler (2010) also argue that higher investment volume in financial assets tends to reduce real investment as entrepreneurs face stagnant profitability in the production sector but more profitable opportunities in the financial markets (Krippner, 2005). For this reason, liquidity indicators capturing firms' cash flow, shareholders' funds and investment decisions are expected to provide significant and robust results of the financial aspect of firms under a micro-econometric approach.

Given that the dataset consists of firm level observations over 2011-2020, the scaled LaGrange Multiplier (LM) and Cross-Dependence (CD) tests developed by Pesaran (2004) are employed to test whether the residual terms of the cross sections suffer from contemporaneous correlation[15]. Subsequently, the constituent panel series of the model are tested for stationarity. The unit root tests presented by Im, Pesaran and Shin (2003) and Pesaran (2007) are employed to identify the order of integration of the panel series when cross section dependency is taken into consideration[16].

[15] The test uses the average value of all pair-wise correlation coefficients of the Ordinary Lease Squares (OLS) residuals obtained by the Augmented Dickey-Fuller (ADF) regression for all panel series in equation (1). The null hypothesis suggests the absence of cross section dependency, meaning that a pooled least squares estimator will suffice, if no additional issues emerge in the dataset. The alternative hypothesis suggests the presence of contemporaneous correlation under which a fixed or random effects model could be estimated (Baltagi, 2008).
[16] The tests developed by Pesaran (2007) use the cross section ADF tests (CADF) where the initial ADF regression is augmented by the cross-section average values of lagged levels and first order differences. If at least one of the series is found to be first order integrated, the presence of cointegration must be tested and conclude whether a long-run relationship persists in the model.

The estimation technique employed in this study is the two-step system Generalised Method of Moments (GMM) (Hansen, 1982; Arellano and Bover, 1995; Blundell and Bond, 1998). The system GMM estimator is the best alternative given the small number of time periods and the large number of firms in the sample under which unobserved firm-specific and time-invariant industry-specific effects are removed (Roodman, 2009). Moreover, the instrument list of the regressors can include first-differences of the instruments, allowing the process to be dynamic by taking into consideration any fixed firm-level effects where variations over the period can be used to identify the underlying parameters[17]. The validity of the instruments is checked when the Hansen test of overidentifying restrictions is used. Finally, the correct specification of the model is assessed when the error term $u_{i,t}$ is checked for being serially correlated by employing the test presented by Arellano and Bond (1991).

Consequently, the long run effects of financial development will be tested on the dynamics of income inequality and investigate whether firms with specific market characteristics tend to significantly affect income disparities through their financial and production decisions.

4. Results and Discussion

The empirical process is conducted under the assumption that income disparities between labour and capital earnings across different economies are evident and thus, a firm-level analysis will attempt to depict any relationship with financial development. The diagnostic tests aim to identify the presence of contemporaneous correlation across the firms of the sample, as well as the order of integration of each variable to check for the presence of unit roots in the panel series.

[17] Beck et al. (2007) also argue that dynamic panel models control for unobserved individual-specific effects and do not exploit the dimension of time series data (De Haan and Sturm, 2017). Moreover, they can identify any idiosyncratic disturbances that may have individual-specific dynamics of serial correlation and heteroskedasticity.

[Table 3]

[Table 4]

Table 3 presents the results of Pesaran's (2004) scaled LM and CD tests for cross section dependence across the sample. Every panel series included in equation (1) is found to be subject to contemporaneous correlation, suggesting that the pooled ordinary least squares (OLS) estimation technique will not provide robust results and thus, additional formulations must be made. Table 4 includes the unit root tests developed by Im, Pesaran and Shin (2003) and Pesaran (2007). Those tests check the presence of unit roots in the panel series of the model; however, the CIPS and the truncated CIPS tests are more accurate as they allow the inclusion of cross section parameters to take into consideration the presence of contemporaneous correlation. The results significantly reject the null hypothesis of unit roots in the panel series suggesting the presence of a long-run relationship. To this end, equation (1) is estimated by using the system Generalised Method of Moments (GMM) estimation technique to take into consideration the presence of such problems, including endogeneity, and provide robust results across the three sections of the process.

[Table 5]

[Table 6]

Equation (1) is run for each one of the income disparities indicators. The main scope of this approach is to study whether the underlying proxies of financial development exert different effects on the capital-to-labour earnings ratios according to firms' total asset valuation and profitability. Table 5 shows that the gap between the earnings of capital and labour is procyclical when firms are more profitable; however, this effect is reversed when income

disparities are captured by the value of total assets[18]. This outcome suggests that as the fundamental value of firms grows, the increasing rate of capital earnings exceeds the one of labour, thus widening their gap (Rubin and Segal, 2015; Fang et al., 2015). On the other hand, when a long-run and more sustainable indicator is considered, income inequality becomes counter-cyclical (Agyemang, 2015). This shows that growth fluctuations and volatility strongly depend on the measure of income inequality and depict how the dynamics of various indicators may provide different results.

It can be argued that according to the formulation of equation (1), some variables are expected to be endogenous as there may be simultaneous causation running between the K/L ratios and the regressors. For instance, the liquidity ratio might be endogenous since, ceteris paribus, an increase in firms' profitability may lead to the purchase of additional assets or the reduction of net liabilities. The solvency ratio may also be influenced by profitability and firms' decisions to expand their total assets may cause shareholders to view it as a positive signal and thus, they might increase their investment. To this end, the variables of net income, liquidity, solvency, investment, and market capitalisation ratios are assumed to be endogenous, and the instrument list consists of their lagged values with up to four lags in the underlying regressions.

Table 6 presents the results of the first approach of the empirical process. The analysis attempts to show how increasing dependence on earnings through financial channels affects the gap between labour compensation and capital earnings. When the net income ratio of firms increases, income inequality tends to increase, thus complementing the arguments made by Alvarez (2015) that dependence on corporate profits reduces the wage share of firms. However, the revenue-to-liabilities ratio exerts a negative effect on the capital-to-labour earnings ratio, suggesting that higher net sales have a stabilising effect on inequality. This may

[18] Gordón and Resosudarmo (2019) support that the growth rate of manufacturing and services industries exert a procyclical effect on income inequality, while the one of the agricultural industry has a negative effect.

reflect the fact that production costs are not accounted for in this ratio, and fixed assets are not usually subject to many changes at least in the short run.

This outcome is also supported by the ratio of market capitalisation depicting the value of firms in the stock markets set by the expectations of investors. The effect on the asset-based inequality indicator is significantly negative and inelastic, thus implying that as the size of firms grows in the stock market, income disparities tend to fall. This argument complements the findings of Paramati and Nguyen (2019) and Nguyen et al. (2019) who argue that higher market capitalisation values lead to lower income inequality gaps. This happens because firms increase their investment to satisfy investors' expectations. As a result, they invest in human capital to improve future operational activities, to expand their production and ultimately, they aim to boost demand for their products and services. Nevertheless, this outcome suggests that the intrinsic and expected value of firms do not always exert the same effect on income disparities which may depend on the realisation of expectations. As investors cause stock prices to move, firms attempt to satisfy their expectations (Frydman and Stillwagon, 2016). When those expectations are realised and fulfilled, firms may pursue more intensive profit-making strategies to increase their revenue and cash flow overall before investors lose interest and cause the value of market capitalisation to fall[19].

Subsequently, the proxy of indebtedness exerts a positive effect on the capital-to-labour earnings ratios. This means that as firms become more exposed to debt as a ratio to total assets, the gap between capital and labour earnings tends to increase (Amountzias, 2019; Nolan et al. 2019). Consequently, firms become more exposed to debt, and it is expected that additional funds will be used to either improve their fundamental values in the short-run or invest in

[19] According to Lee et al. (2015), the degree of investors' risk aversion may also affect the strategies of firms. Higher risk aversion may moderate the effect of expectations which may cause the market valuation of firms to fall. Under this rationale, firms may be willing to use the temporary boost in their market value to increase their cash flow or reduce their debt.

activities that will result in higher long-run returns. The estimates suggest that firms with higher indebtedness focus on acquiring more profits to improve their future economic outlook, thus relatively slowing down the growth rate of labour compensation.

According to those estimates, the indicators of financial development provide various results depending on the measurement of income inequality and particularly, on the parameter capturing capital earnings. This approach bolsters the robustness of the empirical process and follows the insights of Ouyang and Li (2018) who argue that by including only a single proxy of financial development in the model, biased and misleading results would be generated. To this end, the inclusion of four proxies of financial development complements this intuition and delivers significant conclusions. The solvency ratio which is expressed as the value of shareholders' funds to total assets exerts a positive effect on the total assets-based inequality indicator, but a negative effect on the profitability-based indicator. This means that as firms obtain more funds from shareholders, total asset valuation increases at a higher rate than labour compensation. This outcome may suggest that stock markets and investors' funding play a significant role in shaping income disparities. Nguyen et al. (2019) argue that as the stock market expands, government receives increase through tax revenue which can be used to fund programs by promoting additional employment opportunities. Consequently, labour compensation is growing faster compared to profit rates which may take some time to adjust to such changes. On the other hand, as investment in total assets is a long-run indicator compared to profitability, the rate of increase is higher because changes in labour compensation are realised and thus, they are included in firms' decisions to boost their total assets.

The liquidity ratio exerts a positive effect on both indicators, showing that as current assets grow faster than liabilities, the gap between capital and labour earnings tends to increase in the long run, contradicting the findings of several studies, (Agnello et al., 2012; Hamori and Hashiguchi, 2012; Christopoulos and McAdam, 2017). This means that as the financial position

of firms becomes stronger, they tend to increase their profit rates and invest in assets without necessarily compensating for any lags in wages and salaries. Therefore, firms with lower liquidity constraints tend to increase the capital-to-labour earnings ratio (Spaliara, 2009). Given this finding, it can be argued that the stock markets and the banking sector play an important role in the long-term reduction of income disparities through credit provision to firms, allowing them to expand their business activities.

Moreover, the cash flow ratio has a positive effect on the profitability-based inequality indicator, showing that additional liquidity mainly boosts the growth rate of profits more than that of labour compensation; but in the long-run, it causes labour compensation to grow faster than total asset valuation. The ratio of investment to total assets has a negative and highly inelastic effect on income disparities. This outcome complements the narrative that as firms utilise sources of funding and invest in the development of their operations, income disparities tend to slowly fall, and employment opportunities are created by closing the gap between entrepreneurial earnings and salaries. The degree of indebtedness appears to significantly increase income disparities as firms are focused on their operating revenue and profitability to boost their production and long-run perspectives. Finally, regulatory actions in favour of the development of the private sector and the promotion of competitive conduct cause the capital-to-labour earnings ratio to fall. This finding suggests that institutional quality contributes towards an equalising effect between those factors and therefore, it prevents anti-competitive practices through which consumer surplus exploitation is not significantly evident (Agnello et al., 2012; Hamori and Hashiguchi, 2012).

[Table 7a]

[Table 7b]

[Table 8a]

[Table 8b]

The main finding of the paper supports that financial development mainly causes the gap between capital earnings and labour compensation to fall in the long run; however, as alternative indicators are considered, the results may vary. Different proxies of financial development have different effects on income disparities. An important point raised by this study is the formulation of the capital-to-labour earnings and the nature of its measurement. For this reason, the second approach of the paper divides the sample into two categories: big firms and medium-small sized firms.

The scope of this division is to investigate whether financial development affects firms differently according to the valuation of their total assets. Big firms are identified as those with total asset valuation above the average value of the sample, and as medium and small sized otherwise. The results are presented in tables 7a and 7b and they do not depict any major differences between the two groups. Every parameter appears to exert the same effect on the indicators of income inequality when they are significant, except from the cashflow ratio. Big sized firms tend to increase the gap between their profitability and the wage rate when they become less liquidity constrained, suggesting that such funds are mainly used to boost the growth rate of the firms.

On the other hand, medium and small sized firms tend to close that gap as their liquidity ratio increases. This implies that they allocate more funds to labour compensation causing its growth rate to exceed the one of their profitability. Moreover, big-sized firms tend to exert more inelastic values on average and thus, less sensitivity on the K/L ratio, compared to the medium and small-sized firms. This outcome validates the importance of financial reserves and the ability of firms to shape the K/L ratio according to the value of their assets and their power in the market. The remaining estimates do not significantly depart from the main narrative that

the net income ratio tends to increase income disparities, while market capitalisation and the revenue-to-liabilities ratio tend to close the gap between capital and labour earnings. Shareholders' funds exert a different effect according to the formulation of the K/L ratio as it appears to increase the growth rate of labour earnings relative to profitability, but in the long run, the growth rate of total assets valuation exceeds the one of labour compensation. The robustness of the results is also checked when firms are divided between the two groups when revenue valuation is considered. Tables 8a and 8b present the estimates and they report very similar results, thus validating that the size of firms does not significantly affect their decisions in shaping the capital-to-labour earnings ratio through financial development.

[Figure 1]

[Table 9]

[Table 10]

[Table 11]

The third and last approach corresponds to the regional division of firms according to the area they are operating in. The scope of this approach is to identify the dynamics of firms operating in different regions and whether, their financial indicators exert the same effect on income disparities. The results are presented in tables 9 and 10 and they do not significantly depart from the insights obtained by the previous approaches; however, the significance of the estimates is weak across the regions[20]. Figure 1 captures the dynamics between the capital-to-labour earnings ratio and the valuation of firms, complementing the empirical findings. Market capitalisation has been increasing over the years across many regions, and the K/L ratio has been steadily falling. This confirms the main argument of the study that financial development

[20] The main weakness of this approach is the unbalanced number of firms across the underlying regions. There are many insignificant values obtained across regions with a small number of firms, such as Africa, Oceania, and East Europe, resulting from this limitation.

has been mainly contributing towards lower income disparities[21]. With few exceptions, it can be concluded that regional markets across the globe tend to exert similar effects on income disparities according to the parameter taken into consideration. Table 11 depicts the short-run causations running among the variables of the model which support the significance of the long-run estimates across the firms of the sample[22].

To this end, the findings of this study establish the importance of the financial sector in the dynamics of income disparities by complementing the findings of the existing literature (Kim and Lin, 2011; Jauch and Watzka, 2016; Nguyen et al., 2019). The stock market tends to reduce income inequality as investors' actions and decisions in general significantly shape the capitalisation value of firms. The indicators of financial development mostly reduce the gap between capital earnings and labour compensation; however, different financial indicators do not always exert the same effect. According to those results, it can be argued that stock markets and the banking sector significantly affect the dynamics of income inequality by providing funding to firms, by helping them to establish their operational activities and by creating employment opportunities. On the other hand, when firms increase their indebtedness, they are focused on generating more profits to cover their liabilities, thus widening the gap between capital and labour earnings. Finally, institutional intervention in markets promoting competitive conduct reduces income disparities, showing that a market environment with low degrees of imperfect competition significantly boosts the growth rate of labour compensation compared to capital earnings.

5. Conclusion and policy implications

[21] The regions of Middle East and Oceania are the only exceptions to this outcome, as higher market capitalisation is followed by increasing income disparities.
[22] The findings are obtained by using Granger's causality test (1969) to identify short-run causation through the implementation of *F*-statistics across the parameters of equation (1).

The current study investigates the effects of financial development on the dynamics of income inequality across 4,373 manufacturing and services firms over 2011-2020. Income disparities are measured by the ratio of total assets over labour compensation reflecting the gap between the earnings of capital and labour. Moreover, an additional ratio is included based on the profitability of firms to check whether, there are different effects emerging according to the parameters measuring capital earnings. The indicators of financial development capture the degree of liquidity available to firms through funding provision by the financial sector and the control parameters correspond to the growth rate, the market capitalisation value of firms, their level of indebtedness, and the degree of market regulation.

The results suggest that financial development mainly reduces the gap between capital and labour earnings which is in line with several studies across the literature (Clark et al., 2006; Hamori and Hashiguchi, 2012; Christopoulos and McAdam, 2017). However, some financial indicators tend to increase income disparities depending on whether it is measured according to total asset valuation or profitability (Seven and Coskun, 2016; De Haan and Sturm, 2017; Shi et al., 2022). This outcome is in line with the suggestion of Alvarez (2015) who argues that different income inequality indicators may provide contradicting results according to their formulation and the presence of various problems, such as endogeneity. Therefore, the main argument produced by this study is that the measurement of income inequality and financial development is important for the investigation of their dynamics as parameters with different characteristics may not always point to the same outcome.

Given those findings, it can be argued that the role of the stock markets and the financial sector is imminent in the dynamics of income inequality as funding and investment decisions significantly shape the gap between capital and labour earnings. As a result, policy makers should emphasize on the importance of credit provision so that firms can efficiently fund their operational activities. This can be achieved by aiming to improve income distribution through

regulations that do not allow firms to exploit their market power but instead, invest in the production process and provide more employment opportunities to individuals as they expand their activities (Paramati and Nguyen, 2019).

For this reason, the stock market is a crucial contributor to this process, by providing additional resources, by shaping the capitalisation value of firms and thus, it must be the centre of such policies as it needs to expand in many countries. If such growth is achieved and additional funding flows towards firms, income disparities will be fall, and more firms will be able to compete under better conditions in both local and global markets. Therefore, policy makers should aim to introduce more flexible regulations or relax current restrictions by allowing more firms to have access to credit and shape their future operational strategies. However, they must also be effectively supervising and monitoring markets to prevent any exploitation of market power that will reduce the degree of competition and ultimately, the degree of consumer surplus exploitation.

The relevance and the nature of the income inequality and financial development dynamics require additional investigation as alternative measures can be used to check the robustness of that relationship. The current study concludes that firm profitability accrues from financial channels and higher access to credit tends to have a mixed effect on income disparities depending on the structure of its formulation. To this end, the current model can be applied to different datasets and particularly, to firm-level panel data within certain economies. As the current dataset suffers from an unbalanced number of firms across regions, a more balanced sample could take into consideration any problems emerging from this issue. Consequently, alternative approaches could improve the validity and robustness of the outcome of this study through which income inequality departs from the traditional approach of the capital-to-labour earnings. Such approaches could focus on the institutional quality of firms or the degree of

bargaining power within industries rather than labour compensation measures that may provide a better understanding of the dynamics of income disparities.

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Table 1: List of countries and number of firms.

Country	No. of firms	Country	No. of firms	Country	No. of firms	Country	No. of firms
United Arab Emirates	12	Estonia	2	Sri Lanka	54	Portugal	22
Argentina	1	Egypt	5	Lithuania	3	Qatar	4
Austria	35	Spain	30	Luxembourg	12	Romania	1
Australia	74	Finland	59	Latvia	2	Serbia	3
Bangladesh	9	France	202	Morocco	21	Russian Federation	16
Belgium	26	United Kingdom	214	Monaco	1	Saudi Arabia	33
Bulgaria	6	Greece	29	Republic of North Macedonia	1	Sweden	199
Bahrain	3	Hong Kong	48	Malta	2	Singapore	132
Bermuda	94	Croatia	27	Mauritius	2	Slovenia	4
Brazil	9	Hungary	4	Malawi	1	Slovakia	1
Botswana	1	Indonesia	151	Malaysia	291	Thailand	15
Canada	75	Ireland	9	Nigeria	7	Tunisia	14
Switzerland	87	Israel	32	Netherlands	32	Turkey	69
Côte d'Ivoire	1	India	832	Norway	72	Taiwan	28
Chile	4	Islamic Republic of Iran	19	New Zealand	12	United Republic of Tanzania	1
China	534	Iceland	7	Oman	5	Uganda	1
Curaçao	1	Italy	64	Panama	3	United States of America	104
Cyprus	3	Jordan	17	Papua New Guinea	1	Virgin Islands	3
Czechia	3	Kenya	5	Philippines	41	South Africa	1
Germany	245	Republic of Korea	1	Pakistan	86	Zambia	1
Denmark	36	Kuwait	7	Poland	49	Portugal	22
Algeria	1	Cayman Islands	129	State of Palestine	5	Qatar	4

Notes: Data was obtained from the *Osiris* database.

Table 2: Summary statistics.

Variables	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Income inequality (profitability based) index	42,599	0.80	0.81	-5.79	10.37
Income inequality (asset based) index	43,537	2.55	1.18	-2.42	12.79
Operating revenue over liabilities ratio	43,729	0.86	0.75	-6.36	4.90
Net income ratio	38,908	-3.37	1.12	-12.28	3.21
Market capitalisation ratio	43,730	0.76	1.02	-7.16	3.86
Solvency ratio	42,848	3.71	0.55	-4.60	4.58
Liquidity ratio	43,727	-0.04	0.69	-4.60	4.18
Cash flow ratio	38,546	-2.75	0.84	-10.18	3.21
Investment ratio	43,730	-0.72	0.52	-8.93	-0.14
Debt ratio	43,143	-2.41	1.48	-12.24	0.45
Regulation index	42,450	0.79	0.86	-1.52	2.25

Note: The values were obtained from the *Osiris* database.

Table 3: Pesaran's cross-section dependence tests.

Variables	Scaled LM test		CD test	
	1	2	1	2
Income inequality (profitability based) index	1044.26** [0.00]	597.91** [0.00]	49.17** [0.00]	13.41** [0.00]
Income inequality (asset based) index	1932.51** [0.00]	1176.05** [0.00]	62.55** [0.00]	64.12** [0.00]
Operating sales over liabilities ratio	1046.36** [0.00]	376.24** [0.00]	59.68** [0.00]	10.97** [0.00]
Net income ratio	866.70** [0.00]	761.99** [0.00]	141.77** [0.00]	100.09** [0.00]
Market capitalisation ratio	959.41** [0.00]	348.80** [0.00]	219.32** [0.00]	188.13** [0.00]
Solvency ratio	756.22** [0.00]	498.26** [0.00]	104.29** [0.00]	82.88** [0.00]
Liquidity ratio	1173.51** [0.00]	304.55** [0.00]	11.73** [0.00]	12.39** [0.00]
Cash flow ratio	798.48** [0.00]	697.80** [0.00]	60.99** [0.00]	21.56** [0.00]
Investment ratio	1166.37** [0.00]	333.90** [0.00]	65.17** [0.00]	62.04** [0.00]
Debt ratio	1174.18** [0.00]	363.52** [0.00]	62.18** [0.00]	83.88** [0.00]
Regulation index	29.22** [0.00]	30.31** [0.00]	12.95** [0.00]	13.49** [0.00]

Notes: The results are based on Pesaran's (2004) LM and CD tests. The null hypothesis assumes the absence of cross-sectional dependence in the series. Two regressions are estimated for each panel series including one and two lags respectively. The values in brackets are p-values.

** Rejection of the null hypothesis at the 1% level of significance.

Table 4: Unit root tests.

Variables	IPS	CIPS	CIPS*
Income inequality (profitability based) index	-62.62** [0.00]	-30.74** [0.00]	-51.26** [0.00]
Income inequality (asset based) index	-105.49** [0.00]	-21.26** [0.00]	-29.50** [0.00]
Operating revenue over liabilities ratio	-49.92** [0.00]	-17.34** [0.00]	-36.26** [0.00]
Net income ratio	-27.14** [0.00]	-24.78** [0.00]	-60.10** [0.00]
Market capitalisation ratio	-29.83** [0.00]	-23.81** [0.00]	-29.48** [0.00]
Solvency ratio	-58.32** [0.00]	-14.57** [0.00]	-22.81** [0.00]
Liquidity ratio	-42.51** [0.00]	-24.35** [0.00]	-38.20** [0.00]
Cash flow ratio	-28.72** [0.00]	-25.13** [0.00]	-64.09** [0.00]
Investment ratio	-39.87** [0.00]	-29.13** [0.00]	-30.46** [0.00]
Debt ratio	-41.92** [0.00]	-35.66** [0.00]	-51.49** [0.00]
Regulation index	-8.37** [0.00]	-12.88** [0.00]	-15.23** [0.00]

Notes: IPS is the Im, Pesaran and Shin (2003), CIPS is the cross-section Im, Pesaran and Shin and CIPS* is the truncated cross-section Im, Pesaran and Shin unit root test (Pesaran, 2007). The values are *t*-statistic values. Δ denotes first differences. The tests are conducted including an intercept only. Rejection of the null hypothesis suggests stationarity in at least one industry of the panel. The IPS results are reported at lag *k*=3. The critical values for the CIPS test are -2.28 at 1% and -2.10 at 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 5: Estimates of cyclicality across the sample.

Variables	$Total\ assets\ to\ labour\ compensation\ ratio$	$Profitability\ to\ labour\ compensation\ ratio$
$growth$	-0.008* (-2.20)	0.022** (3.90)
$AR(1)$	-4.66** [0.00]	-4.69** [0.00]
$AR(2)$	1.39 [0.16]	0.88 [0.67]
$Hansen's\ test$	1.99 [0.85]	17.45 [0.10]
$Significance\ of\ regional\ dummies$	2.20* [0.01]	2.69** [0.00]
$Significance\ of\ time\ dummies$	8.44** [0.00]	64.13** [0.00]
$F-stat$	6848.5** [0.00]	3982.1** [0.00]
$No.of\ observations$	20,218	19,730

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 6: Long run estimates of equation (1).

Variables	*Total assets to labour compensation ratio*	*Profitability to labour compensation ratio*
Operating revenue over liabilities ratio	-0.286** (-10.63)	-0.160** (-8.34)
Net income ratio	0.119** (3.24)	0.032* (3.26)
Market capitalisation ratio	-0.30** (-3.63)	0.013 (1.90)
Solvency ratio	0.131* (2.38)	-0.174** (-2.61)
Liquidity ratio	0.145** (3.86)	0.111** (4.51)
Cash flow ratio	-0.222** (-4.41)	0.156** (7.94)
Investment ratio	-0.26 (-1.75)	-0.015* (-2.09)
Debt ratio	0.049** (7.88)	0.034** (5.27)
Regulation index	-0.073** (-5.28)	-0.118** (-8.87)
$AR(1)$	-9.39** [0.00]	-10.46** [0.00]
$AR(2)$	1.93 [0.05]	1.75 [0.24]
Hansen's test	38.15 [0.33]	30.24 [0.21]
Significance of regional dummies	6.04** [0.00]	21.41** [0.00]
Significance of time dummies	9.59** [0.00]	24.86** [0.00]
$F-stat$	7433.52** [0.00]	764.32** [0.00]
No. of observations	28,593	28,415

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 7a: Estimates of big sized firms according to total asset valuation.

Variables	*Total assets to labour compensation ratio*	*Profitability to labour compensation ratio*
Operating revenue over liabilities ratio	-0.272** (-5.23)	-0.127** (-3.53)
Net income ratio	0.009 (0.39)	0.021 (1.05)
Market capitalisation ratio	-0.019 (-0.86)	0.002 (0.12)
Solvency ratio	0.074 (0.47)	0.055 (0.40)
Liquidity ratio	0.209** (3.38)	0.117* (2.17)
Cash flow ratio	-0.088* (1.97)	0.141** (3.02)
Investment ratio	-0.054 (-1.85)	-0.006 (-0.25)
Debt ratio	0.069** (3.38)	0.074** (4.84)
Regulation index	-0.018 (-0.63)	-0.085** (-2.96)
$AR(1)$	-4.08** [0.00]	-3.95** [0.00]
$AR(2)$	-0.88 [0.37]	-1.02 [0.48]
Hansen's test	52.66 [0.17]	59.81 [0.27]
Significance of regional dummies	1.84 [0.06]	3.50** [0.00]
Significance of time dummies	1.77 [0.07]	3.43** [0.00]
$F-stat$	5616.5** [0.00]	250.74** [0.00]
No. of observations	4,699	4,686

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 7b: Estimates of medium and small sized firms according to total asset valuation.

Variables	*Total assets to labour compensation ratio*	*Profitability to labour compensation ratio*
Operating revenue over liabilities ratio	-0.264** (-9.58)	-0.125** (-6.07)
Net income ratio	0.094* (2.50)	0.043** (4.09)
Market capitalisation ratio	-0.021* (-2.53)	0.22** (3.14)
Solvency ratio	0.115* (2.33)	0.100** (3.80)
Liquidity ratio	0.121** (3.36)	-0.231** (-3.69)
Cash flow ratio	-0.194** (-3.73)	-0.123** (-5.88)
Investment ratio	-0.017 (-1.21)	-0.014 (-1.85)
Debt ratio	0.037** (6.67)	0.019** (3.28)
Regulation index	-0.084** (-5.23)	-0.125** (-9.33)
$AR(1)$	-9.21** [0.00]	-5.25** [0.00]
$AR(2)$	1.63 [0.10]	1.35 [0.21]
Hansen's test	36.61 [0.39]	25.70 [0.42]
Significance of regional dummies	4.54** [0.00]	17.19** [0.00]
Significance of time dummies	10.63** [0.00]	24.58** [0.00]
$F-stat$	6185.31** [0.00]	644.48** [0.00]
No. of observations	23,894	23,729

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 8a: Estimates of big sized firms according to operating revenue.

Variables	*Total assets to labour compensation ratio*	*Profitability to labour compensation ratio*
Operating revenue over liabilities ratio	-0.219** (-5.67)	-0.131** (-3.96)
Net income ratio	-0.028 (-0.42)	-0.028 (-0.47)
Market capitalisation ratio	-0.029 (-1.28)	-0.003 (-0.18)
Solvency ratio	0.229* (2.06)	0.170 (1.52)
Liquidity ratio	0.134 (1.51)	0.042 (0.47)
Cash flow ratio	-0.067 (-0.87)	0.196** (2.80)
Investment ratio	0.033 (1.03)	0.059 (1.90)
Debt ratio	0.079** (5.17)	0.070** (5.43)
Regulation index	-0.056* (-2.10)	-0.090** (-3.64)
$AR(1)$	-4.04** [0.00]	-4.00** [0.00]
$AR(2)$	1.82 [0.10]	1.90 [0.05]
Hansen's test	30.07 [0.87]	45.10 [0.63]
Significance of regional dummies	3.60** [0.00]	4.44** [0.00]
Significance of time dummies	1.78 [0.08]	2.70** [0.00]
$F-stat$	4973.0** [0.00]	2661.1** [0.00]
No. of observations	4,792	4,783

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 8b: Estimates of medium and small sized firms according to operating revenue.

Variables	*Total assets to labour compensation ratio*	*Profitability to labour compensation ratio*
Operating revenue over liabilities ratio	-0.163** (-5.10)	-0.151** (-7.29)
Net income ratio	0.011** (2.67)	0.046** (4.09)
Market capitalisation ratio	-0.016* (-2.03)	0.016* (2.24)
Solvency ratio	0.072 (1.41)	-0.236** (-3.43)
Liquidity ratio	0.053 (1.53)	-0.111** (-4.14)
Cash flow ratio	0.206** (3.33)	-0.125** (-5.77)
Investment ratio	-0.003 (-0.17)	-0.016* (-2.00)
Debt ratio	0.024** (4.16)	0.023** (3.65)
Regulation index	-0.035* (-2.16)	-0.114** (-8.87)
$AR(1)$	-9.15** [0.00]	-10.26** [0.00]
$AR(2)$	1.87 [0.06]	1.94 [0.05]
Hansen's test	42.10 [0.19]	46.37 [0.23]
Significance of regional dummies	1.54 [0.12]	16.86** [0.00]
Significance of time dummies	9.75** [0.00]	24.51** [0.00]
$F-stat$	7469.4** [0.00]	637.80** [0.00]
No. of observations	23,819	23,650

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 9: Regional results for the total asset-based indicator.

Variables	*Africa*	*Asia*	*East Europe*	*Middle East*	*North America*	*Oceania*	*Scandinavia*	*Central and South America*	*West Europe*	*G7*
Operating revenue over liabilities ratio	-0.187** (-2.84)	-0.622** (-11.07)	-0.282* (-2.43)	-0.468* (-2.31)	-0.248* (-2.15)	-0.287** (-2.86)	-0.707** (-4.01)	-0.274** (-3.60)	-0.472** (-9.34)	-0.296** (-5.49)
Net income ratio	0.160 (1.59)	-0.092 (-1.05)	0.066 (0.64)	-0.003 (-0.01)	-0.020 (-0.26)	-0.033 (-0.59)	0.010 (0.11)	0.205* (1.97)	0.028 (0.49)	0.092 (1.84)
Market capitalisation ratio	0.010 (0.33)	-0.028 (-1.50)	-0.088 (-1.02)	-0.007 (-0.11)	0.070 (0.71)	0.019 (0.46)	-0.095 (-1.61)	-0.064 (-1.80)	-0.061** (-3.65)	-0.047* (-2.01)
Solvency ratio	0.264 (0.21)	-0.456** (-2.84)	-0.209 (-1.10)	-0.050 (-0.18)	0.231 (1.23)	-0.182 (-0.94)	0.886 (1.84)	0.005 (0.02)	0.281** (3.53)	0.290** (2.90)
Liquidity ratio	-0.053 (0.38)	0.586** (3.65)	0.091 (0.75)	0.521* (2.01)	0.293* (1.96)	0.306* (2.11)	0.449* (1.98)	0.315 (1.63)	0.238** (3.58)	0.180* (2.44)
Cash flow ratio	-0.290 (-1.82)	0.022 (0.19)	-0.093 (0.51)	-0.117 (-0.24)	-0.042 (-0.32)	0.038 (0.37)	0.010 (0.07)	-0.321* (-2.21)	-0.080 (-1.05)	-0.147* (-2.13)
Investment ratio	0.054 (0.85)	-0.048 (-0.94)	-0.027 (-0.42)	0.009 (0.11)	-0.040 (-0.63)	-0.203* (-1.96)	-0.021 (-0.42)	-0.043 (-0.46)	-0.027 (-1.04)	-0.067 (-1.83)
Debt ratio	0.066* (2.08)	0.045** (3.66)	0.033 (0.93)	0.166** (3.25)	0.077 (1.72)	-0.015 (-0.49)	0.099* (2.23)	0.074** (3.17)	0.071** (6.71)	0.086** (5.14)
Regulation index	-0.001 (0.10)	-1.58** (-9.13)	-0.031 (-0.33)	-0.002 (-0.05)	0.229 (0.86)	-0.146 (-0.45)	-0.119 (-0.65)	0.376 (1.15)	0.506 (1.83)	-0.047 (-0.77)
$AR(1)$	-2.78** [0.00]	-6.44** [0.00]	-2.20** [0.00]	-2.95** [0.00]	-2.66** [0.00]	-2.43* [0.01]	-2.26* [0.02]	-2.62** [0.00]	-6.15** [0.00]	-4.12** [0.00]
$AR(2)$	-1.10 [0.27]	-1.95 [0.05]	-0.94 [0.34]	0.33 [0.74]	1.01 [1.31]	0.95 [0.34]	0.33 [0.74]	1.12 [0.26]	0.40 [0.68]	1.03 [0.30]
Hansen's test	14.70 [0.94]	33.83 [0.11]	43.91 [0.34]	37.65 [0.62]	31.55 [0.72]	32.59 [0.58]	36.96 [0.60]	21.86 [0.93]	29.33 [0.89]	45.42 [0.25]

$Significance\ of\ time\ dummies$	1.38 [0.22]	14.98** [0.00]	0.59 [0.80]	1.36 [0.21]	1.41 [0.20]	1.82 [0.09]	1.11 [0.35]	4.58** [0.00]	0.78 [0.61]	2.70** [0.00]
$F-stat$	632.23** [0.00]	1711.3** [0.00]	66.13** [0.00]	68.71** [0.00]	165.35** [0.00]	335.35** [0.00]	116.66** [0.00]	829.44** [0.00]	1722.7** [0.00]	1110.4** [0.00]
$No.of\ observations$	421	16,983	798	931	878	600	1,214	1,658	9,100	5,923

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Table 10: Regional results for the profitability-based indicator.

Variables	*Africa*	*Asia*	*East Europe*	*Middle East*	*North America*	*Oceania*	*Scandinavia*	*Central and South America*	*West Europe*	*G7*
Operating revenue over liabilities ratio	-0.143 (-1.01)	-0.102** (-358)	-0.064 (-0.78)	-0.062 (-0.59)	0.080 (0.65)	-0.140* (-2.42)	-0.407** (-3.63)	-0.126 (-2.01)	-0.305** (-8.41)	-0.080 (-1.84)
Net income ratio	0.111 (1.29)	0.151** (3.27)	-0.011 (-0.54)	0.057 (0.47)	0.245* (2.08)	0.081 {0.47)	0.005 (0.07)	0.161 (1.07)	0.011 (0.22)	0.019 (1.20)
Market capitalisation ratio	0.062* (2.07)	-0.031** (-2.83)	-0.009 (-0.32)	0.008 (0.19)	-0.006 (-0.07)	0.007 (0.09)	0.022 (0.56)	0.001 (0.04)	-0.009 (-0.59)	0.049* (2.36)
Solvency ratio	0.167 (1.90)	-0.053 (-0.73)	- 0.305** (-2.78)	-0.039 (-0.21)	0.075 (0.57)	0.136 (1.26)	0.816** (2.65)	-0.443 (-1.62)	0.192* (2.28)	-0.109 (-1.06)
Liquidity ratio	0.001 (0.01)	-0.034 (-0.67)	0.082 (0.94)	0.105 (0.66)	-0.136 (-0.70)	0.002 (0.06)	0.158 (1.05)	0.382 (1.87)	0.231** (3.07)	0.088 (1.66)
Cash flow ratio	-0.054 (-0.42)	-0.014 (-0.23)	0.284** (4.47)	0.070 (0.37)	-0.187 (-1.07)	0.068 (0.37)	0.183 (1.77)	0.056 (0.31)	0.164* (2.24)	0.111** (2.94)
Investment ratio	-0.006 (-0.09)	-0.006 (-0.29)	-0.004 (-0.19)	0.057 (1.01)	0.098 (1.49)	-0.005 (-0.24)	0.051 (1.02)	-0.258* (-2.11)	-0.094** (-4.08)	0.025 (1.54)
Debt ratio	0.041 (1.88)	0.035** (4.86)	-0.001 (-0.01)	0.074* (2.37)	0.068 (1.68)	0.039 (1.25)	0.094** (4.00)	0.048* (2.18)	0.056** (5.74)	0.049** (3.39)
Regulation index	-0.001 (-0.05)	-1.021** (-2.84)	-0.003 (-0.01)	-0.002 (-0.01)	0.010 (0.24)	-0.132 (-0.33)	-0.026 (-0.13)	0.102 (0.43)	0.223 (0.96)	-0.012 (-0.21)
$AR(1)$	-2.37* [0.01]	-1.54 [0.12]	-3.39** [0.00]	-3.17** [0.00]	-3.11** [0.00]	-3.04** [0.00]	-3.03** [0.00]	-2.90** [0.00]	-6.84** [0.00]	-4.82** [0.00]
$AR(2)$	-1.03 [0.30]	0.78 [0.43]	1.87 [0.06]	0.67 [0.50]	0.81 [0.41]	1.15 [0.21]	-0.14 [0.89]	1.52 [0.12]	1.22 [0.22]	-1.08 [0.39]
Hansen's test	35.21 [0.76]	19.20 [0.74]	58.26 [0.32]	44.61 [0.65]	44.42 [0.33]	4.11 [0.90]	34.18 [0.95]	46.06 [0.27]	18.85 [0.59]	58.95 [0.11]

$Significance\ of\ time\ dummies$	2.25* [0.03]	7.53** [0.00]	1.24 [0.28]	3.09** [0.00]	0.97 [0.46]	1.20 [0.30]	1.55 [0.13]	4.31** [0.00]	3.47** [0.00]	2.90** [0.00]
$F-stat$	53.64** [0.00]	704.32** [0.00]	65.06** [0.00]	90.46** [0.00]	39.59** [0.00]	68.01** [0.00]	17.09** [0.00]	89.15** [0.00]	251.29** [0.00]	120.11** [0.00]
$No.of\ observations$	418	15,015	795	923	871	594	1,348	1,621	9,070	5,894

Notes: The system GMM estimator is obtained using the panel dynamic technique according to Hansen (1982) and Arellano and Bover (1995). The instruments list in the GMM system consists of the lagged values of the endogenous explanatory variables up to four lags. The numbers in parentheses are *t*-statistics. The numbers in brackets are *p*-values.

* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

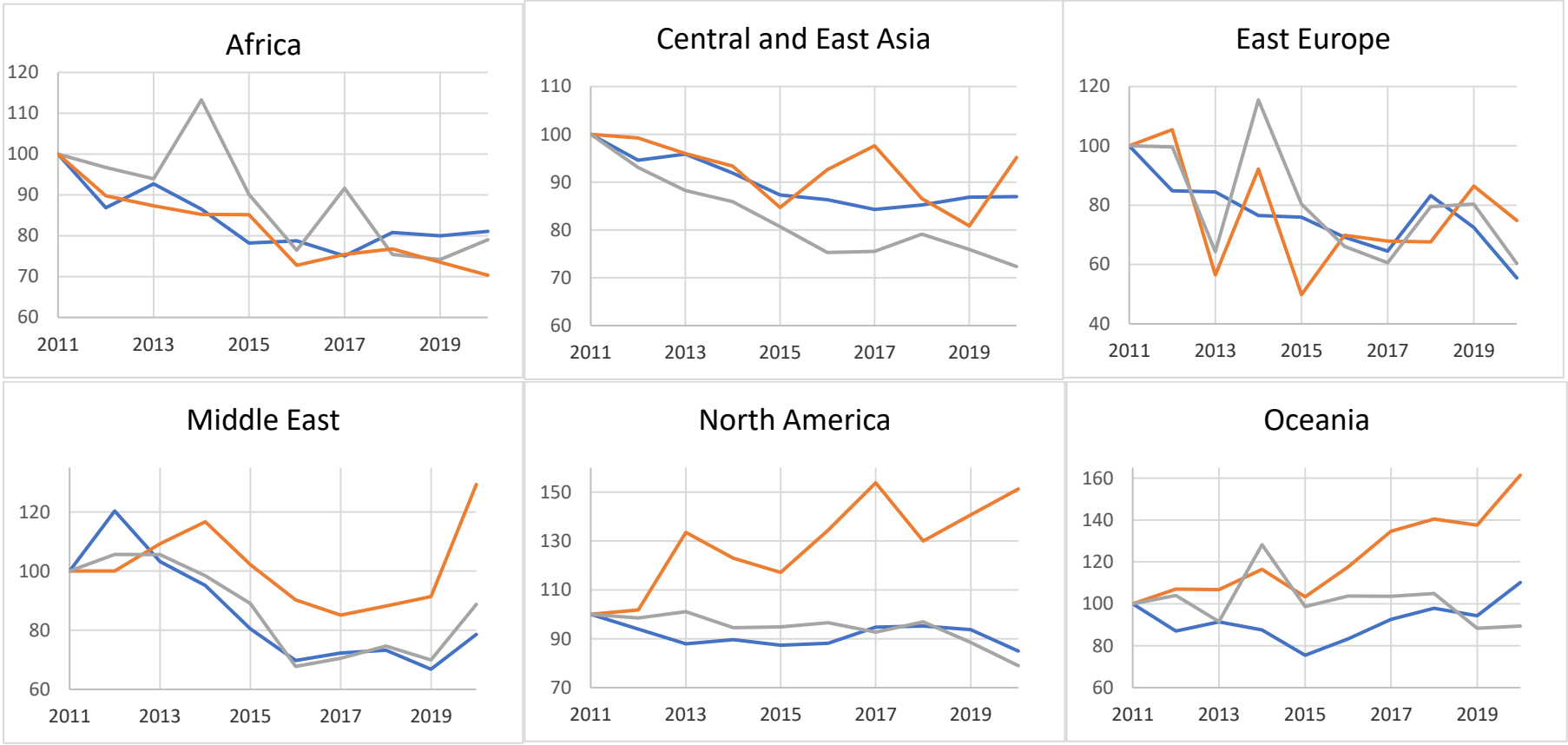
Table 11: Granger's short-run causality test.

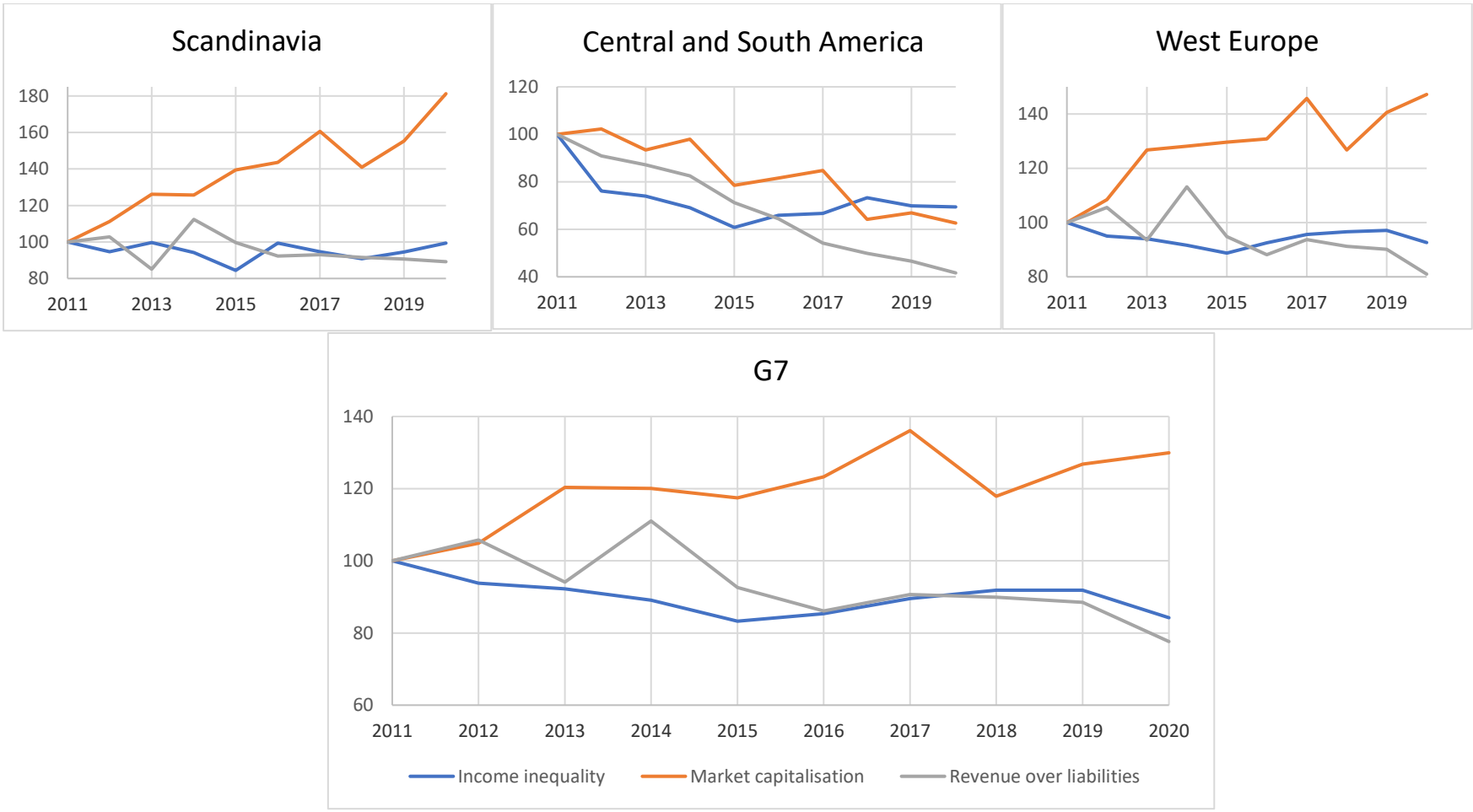
Dependent variables	aol	eol	slr	inc	mcr	svr	lr	cfr	inv	dr	reg
aol	-	-	25.05** [0.00]	29.95** [0.00]	5.92 [0.05]	10.74** [0.00]	8.39* [0.01]	3.05 [0.21]	8.03* [0.01]	16.36** [0.00]	0.61 [0.73]
eol	-	-	1.78 [0.40]	48.23** [0.00]	73.50** [0.00]	26.97** [0.00]	0.62 [0.73]	76.78** [0.00]	2.65 [0.26]	15.45** [0.00]	1.26 [0.53]
slr	18.47** [0.00]	7.74* [0.02]	-	30.65** [0.00]	10.28** [0.00]	14.07** [0.00]	149.39** [0.00]	15.29** [0.00]	9.92** [0.00]	121.58** [0.00]	1.38 [0.49]
inc	77.13** [0.00]	111.51** [0.00]	7.07* [0.02]	-	531.29** [0.00]	5.64 [0.05]	8.71* [0.01]	47.51** [0.00]	1.00 [0.60]	32.24** [0.00]	7.98* [0.01]
mcr	22.71** [0.00]	9.00* [0.01]	35.69** [0.00]	10.10** [0.00]	-	0.69 [0.70]	23.04** [0.00]	48.04** [0.00]	13.56** [0.00]	10.81** [0.00]	16.85** [0.00]
svr	17.04** [0.00]	12.90** [0.00]	2.64 [0.26]	11.52** [0.00]	31.01** [0.00]	-	3.09 [0.21]	39.81** [0.00]	5.86 [0.05]	18.49** [0.00]	10.71** [0.00]
lr	28.83** [0.000]	26.20** [0.00]	143.29** [0.00]	3.63 [0.16]	8.42* [0.01]	139.28** [0.00]	-	9.08* [0.01]	1.73 [0.41]	101.06** [0.00]	1.13 [0.56]
cfr	152.78** [0.00]	129.39** [0.00]	37.14** [0.00]	496.7** [0.00]	473.5** 0.00]	23.20** [0.00]	27.86** [0.00]	-	1.80 [0.40]	2.70 [0.25]	4.67 [0.09]
inv	14.48** [0.00]	5.76 [0.05]	67.48** [0.00]	0.21 [0.89]	12.33 [0.00]	6.17* [0.04]	111.44** [0.00]	2.85 [0.23]	-	9.23** [0.00]	2.85 [0.23]
dr	1.69 [0.42]	0.06 [0.96]	25.66** [0.00]	5.91 [0.05]	9.45** [0.00]	44.03** [0.00]	35.00** [0.00]	7.78* [0.02]	0.01 [0.99]	-	8.44* [0.01]
reg	2.83 [0.24]	2.34 [0.31]	2.35 [0.30]	0.55 [0.75]	12.02** [0.00]	8.98* [0.01]	3.17 [0.20]	2.85 [0.23]	2.10 [0.34]	2.02 [0.36]	-

Notes: aol is the ratio of total assets over labour compensation, eol is the ratio of the sum of EBITDA and labour compensation over labour compensation, slr is the ratio of operating revenue over current liabilities, inc is the net ratio of income over total assets, mcr is the ratio of market capitalisation over total assets, svr is the ratio of shareholders' funds to total assets, lr is the ratio of net current assets over current liabilities, cfr is the ratio of cash flow over total assets, inv is the ratio of investment expenditures over total assets, dr is the rate of long-term debt over total assets, and reg is a proxy of regulatory intervention promoting market-friendly policies.
* Rejection of the null hypothesis at the 5% level of significance.

** Rejection of the null hypothesis at the 1% level of significance.

Figure 1: Regional values of income inequality and firm size.





Note: The values were obtained from the *Osiris* database.