

Financial Development and Income and Wealth Inequalities: Trade Globalization Matters

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Abstract

Income and wealth inequalities have been rising since the 1990s. Finance is a crucial factor in determining persistent inequality. However, both theoretical and empirical investigations have failed to reach consensus. This study argues that inconclusiveness can arise as the relationship between finance and inequality depends on the extent of trade openness. Thus, this study empirically investigates whether trade openness shapes the relationship between financial development and income and wealth inequalities. In a cross-country setting, financial development is found to reduce top income and wealth shares, but greater trade openness mitigates this effect. This finding holds for banking and stock market development. The findings imply that the government should tackle the potential negative impact of trade on financial development as financial development can be an effective instrument to fight against income and wealth inequalities.

JEL classification: O16; D63; F43

Keywords: Financial development; income inequality; wealth inequality; Trade openness

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1 Introduction

Rising income and wealth inequalities are the most challenging issues in countries around the world nowadays. Concerns arise because excessive inequality tilts institutions and reduces equal opportunities, damaging long-run economic growth. Therefore, understanding the determinants of inequality is important for policymaking. Among potential factors, finance is believed to play a crucial role in persistent inequality. Although there is a large body of literature that theoretically and empirically reveals the distributional impact of finance and the relevant mechanisms, whether financial development widens or narrows inequality remains controversial and unanswered (Demirguc-Kunt and Levine, 2009).

This study reexamines the effect of financial development on inequality and contributes to the literature in three dimensions. First, it focuses on the top income shares, rather than the Gini coefficient typical in the empirical literature, as the recent rise in inequality is due to the growing concentration of income at the top (Figure 1). The Gini coefficient measures the dispersion of income within a population and thus fails to reveal what happens to each income bracket and is less sensitive to inequality at the tail of the income (wealth) distribution. Second, this study experiments with top wealth shares, which are largely ignored in the literature. Compared to income, wealth can accumulate via saving and generate income, making it more concentrated.

Finally, and more importantly, we examine whether the effect of financial development on inequality depends on a third variable—trade openness. This is motivated by findings that trade openness determines not only financial development but also inequality. On the one hand, greater trade openness exposes firms to greater external shocks, thereby increasing the demand for financial development to provide insurance and risk diversification (Svaleryd and Vlachos, 2002; Feeney and Hillman, 2004; Hur et al., 2006). Greater trade openness also comes with huge investment opportunities and intensive foreign competition, which exposes incumbents to competitive pressure and weakens their incentive to block financial development, thereby supporting a deeper financial system (Rajan and Zingales, 2003). Crucially, however, the distributional character of this financial development shifts in open economies: the demand for trade finance, foreign exchange hedging, and international capital access originates primarily from large, export-oriented firms and high-income investors, orienting financial development toward elite users rather than broad-based

credit provision (Claessens and Perotti, 2007). As a result, trade openness alters not only the level of financial development but also who benefits from it, weakening or reversing its inequality-reducing effect.

On the other hand, according to the Heckscher–Ohlin model and the Stolper–Samuelson theorem, trade openness affects income inequality, and the effect depends on a country’s comparative advantage. Because capital and skilled labor are relatively abundant in advanced economies, income inequality and concentration at the top are expected to increase. In developing countries, unskilled labor, which is intensively used in local production, benefits from economic openness by increasing wages and income. Thus, income inequality is expected to decrease in developing countries. However, regarding the imports of capital goods, trade-induced (skilled-biased) technological transfers, and catch-up processes, greater trade flows may increase the skill intensity and relative demand for skilled labor increasing income inequality in developing countries (Feenstra and Hanson, 1996). These trade-induced shifts in factor returns compound the distributional bias of financial development: as trade openness widens the gap between skilled and unskilled labor, those positioned to benefit from trade are also better placed to access and exploit financial services, amplifying income concentration at the top.

To examine whether trade openness shapes the nexus between finance and inequality, we use the system generalized method of moments (GMM) estimator for dynamic panel data to solve the endogeneity problem. Using a panel of 103 developed and developing countries¹ from 1985 to 2020, this study finds that the distributional repercussion of financial development hinges on the extent of trade openness. Specifically, our main findings reveal that financial development reduces both income and wealth inequalities, and the effect moderates trade openness. It highlights the need for the government to address the potential negative effects of trade on financial development, ensuring that financial development remains a powerful tool to combat income and wealth inequalities. Additionally, there is a need for the government to take measures such as redistribution policies and institutional reforms to reduce the potential adverse effects of trade on income and wealth distribution to reap the growth benefits.

The rest of this paper is arranged as follows. Section 2 briefly reviews the theoretical argument and empirical literature. Section 3 describes the data, model

¹ The list of countries is in Appendix A.1

specifications, and associated estimation methods. The estimated results are presented in Section 4. Section 5 provides the conclusion.

2 Review of the Theoretical and Empirical Literature

2.1 Financial development and inequality

In theory, two linear hypotheses explain the relationship between financial development and inequality—the inequality-widening hypothesis and the inequality-reducing hypothesis. Galor and Zeira (1993) and Banerjee and Newman (1993) proposed that as financial development progresses, inequality decreases linearly. As the financial sector advances, poor or low-income households, which were previously excluded from access to financial systems such as loans, gain increased access to the financial system, obtaining loans and accessing more financial services (Beck et al., 2007; Clarke et al., 2006), which give them opportunities to receive more education or start new businesses. In addition, in the Aghion and Bolton (1997) model of growth and income inequality with imperfect capital markets, the advantages of economic growth naturally extend to everyone, enhancing the efficiency of capital distribution and boosting overall economic growth. As a result, income inequality decreases. Studies such as Beck et al. (2007), Clarke et al. (2006), Zhang and Ben Naceur (2019), and Jung and Vijverberg (2019) support the linear inequality-narrowing influence of financial development.

The inequality-widening hypothesis states that financial development might benefit the rich, who can offer collateral and are more likely to repay loans (Rajan and Zingales 2003). Thus, the wealthy can more easily access finance through financial markets and have more opportunities to increase their incomes. When the institutional quality in society is weak, low-income households who do not enjoy this benefit might find it difficult to obtain loans even when the financial markets are well-developed (Rajan and Zingales, 1996), thereby worsening income inequality. Some empirical studies, such as those by Gimet and Lagoarde-Segot (2011), Sehrawat and Giri (2015), Jauch and Watzka (2016), Seven and Coskun (2016), Altunbas and Thornton (2019), and De Haan and Sturm (2017), have found that more finance increases income inequality.

A nonlinearity in the finance–income inequality relationship exists. The issue of whether all social classes benefit equally from financial development was first considered and theoretically investigated in the model proposed by Greenwood and

Jovanovic (1990), which predicts an inverted U-shaped relationship between financial development and income inequality. Specifically, at the early stage of economic development, high entry costs to the financial system and imperfect financial regulation cause only a few wealthy individuals to access the financial system, so the income gap widens. However, with economic growth, the cost of accessing the financial sector can be afforded by more people who can benefit from the financial market. Financial development contributes to economic growth and affects income inequality by improving the allocation of resources and stimulating the accumulation of human and physical capital and technological innovation (Becker and Tomes, 1979; Galor and Zeira, 1993; Banerjee and Newman, 1993). However, the latter positive effects might manifest once a critical financial deepening threshold is passed and coincide with the transition from an unsophisticated to a modern financial system (Greenwood and Jovanovic, 1990; Townsend and Ueda, 2006; Rajan and Zingales, 2003; Aghion and Howitt, 1997). Some empirical results have found a nonlinear relationship between financial development and inequality, such as Tan and Law (2012), Park and Shin (2017), Kim and Lin (2011), Nikoloski (2013), Chen and Kinkyo (2016), Chiu and Lee (2019), and Gravina and Lanzafame (2021).

Several studies have sought to propose and identify new estimates related to wealth data and inequality. Over time, accumulated disparities can result in a more uneven distribution of wealth or income, as the wealthy might increase their private capital via various mechanisms. This accumulation may contribute to rising inequality. In an increasingly financialized world, the reliance on financial instruments in the process of household asset accumulation can further exacerbate existing wealth inequality among social groups (Yu and Cui, 2021). Wealthier families may have privileged access to better financial services or higher yield assets due to greater financial development. Rajan (2010) and Kay (2015) highlighted the growth of hedge funds, family offices, and other alternative investment vehicles, typically available only to the wealthy, implying that such effects may already be evident.

Moreover, financial markets have grown more complex, offering households a wider array of instruments for saving and investing. The shift toward greater individual responsibility means that financial decisions made early in life can have long-term impacts. For instance, young workers who allocate their pension contributions to equities rather than money market funds may experience significantly different accumulation outcomes. In this evolving landscape, investing in financial knowledge

can greatly affect retirement security by shaping people's ability to save and invest effectively. When financial literacy influences life cycle wealth accumulation, individuals with similar starting points can end up with vastly different retirement wealth. Understanding this mechanism can help explain the persistence of wealth inequality.

Some researchers have produced new estimates of wealth inequality. Kuhn et al. (2017) found that stock price booms contributed to increasing wealth inequality in the US from 1949 to 2016. Roman et al. (2017) discovered that although wealth inequality is positively linked to stock market development, it is not related to banking sector growth. Hasan et al. (2020) used the instrumental variable Bayesian model averaging and found that while financial depth increases wealth inequality, improved financial access and efficiency reduce it. Evidence collected indicates that wealth inequality has risen in many countries over the past few decades (Piketty and Zucman, 2014; Zucman, 2019).

2.3 Trade openness and income inequality

According to the Heckscher–Ohlin model and the Stolper–Samuelson theorem, countries specialize in producing and exporting goods in which they have a comparative advantage. Thus, trade should increase the real return to the factor that is relatively abundant in a country. In advanced economies, where capital and skilled labor are more abundant, trade openness leads to higher income concentration among top earners and increased income inequality. Conversely, in developing countries, trade openness is expected to benefit unskilled labor by raising wages and income, thereby reducing income inequality.

However, there are concerns about the impact of skill-biased technological change, where advancements in technology (such as the rise of computers) boost the demand for skilled workers. Trade also promotes technology transfers and catchup processes (Berman and Machin, 2000; Burstein et al., 2013; Zhu and Trefler, 2005), which may increase the skill intensity and relative demand for skilled workers in developing countries. The skill premium and hence income inequality may increase in countries of all income groups when they open up to international trade. Regarding trade in tasks or intermediate goods, Feenstra and Hanson's (1996) offshoring model states that trade liberalization makes it easier to offshore less skill-intensive production to a skill-poor country. Offshoring of less-skilled production decreases the wages and bargaining

power of less-skilled workers in advanced economies, but offshore activities are more skill-intensive from the perspective of the workforce in developing countries. Thus, labor demand becomes more skill-intensive in both countries, raising the skill premium in both countries.

2.4. Trade Openness and the Finance-Inequality Nexus

The preceding sections establish that financial development and trade openness each independently influence inequality. However, to motivate an interaction between them—that is, to argue that the effect of financial development on inequality varies systematically with trade openness—a more direct theoretical mechanism is required. We propose three complementary channels.

The first is the financial capture channel. In open economies, large and export-oriented incumbent firms develop a strong demand for sophisticated financial services—trade credit, currency hedging, and international capital market access—to remain competitive. This creates political and market incentives to orient the financial system toward the needs of established, wealthy users. Claessens and Perotti (2007) show that politically connected incumbents systematically shape financial development to their advantage, limiting the redistributive benefits of an expanding financial system. As trade openness intensifies this incumbency pressure, financial development in more open economies is less likely to extend broadly to low-income households, reducing its equalizing effect.

The second is the skill-biased trade channel. The Stolper-Samuelson theorem predicts that trade openness raises returns to the relatively abundant factor. In advanced economies, this benefits capital and skilled labor; in developing countries, trade-induced technological upgrading also raises the relative demand for skilled workers (Feenstra and Hanson, 1996). As trade openness widens the skill and income premium, the capacity to access and benefit from finance diverges along the same lines. High-income households can offer superior collateral and demonstrate creditworthiness, making them the primary beneficiaries of financial development. Low-income households, whose relative economic position has been weakened by trade-induced factor market shifts, find their effective access to finance constrained even as the financial system expands. Financial development thus amplifies, rather than offsets, trade-induced inequality.

The third is the credit selectivity channel. Greater trade openness exposes economies to external demand shocks and commodity price fluctuations, increasing macroeconomic volatility. Under higher uncertainty, financial intermediaries tighten credit standards and favor borrowers with established collateral and credit histories—disproportionately the wealthy and large firms (Stiglitz and Weiss, 1981). Financial development in such conditions expands sophisticated financial instruments and services for high-end users rather than broadening retail credit to low-income households.

These three channels are mutually reinforcing. Collectively, they predict that the inequality-reducing effect of financial development weakens as trade openness increases: in highly open economies, financial development is captured, redirected, and selectively distributed in ways that benefit the wealthy, leaving the poor with less to gain. This prediction is precisely what the empirical results confirm.

3 Data and Method

3.1 Data

Our sample covers 103 developed (43) and developing (60) countries, investigating panel data on them from 1985 to 2020. The dataset was selected based on data availability, particularly the data on inequality and financial development. All variables were averaged over nonoverlapping four-year periods to mitigate the effects of business fluctuations and measurement errors. The data were averaged over nine four-year periods rather than considered annually or quarterly to smooth out short-term fluctuations in growth rates. We require that a country should have data for at least four nonoverlapping time points to be included in any estimated systems. In the dynamic growth model, it has become popular to average data over a period to solve missing data problems.

As a rise in income and wealth inequalities is mostly due to the growing concentration of income and wealth at the top households of income and wealth distribution, we consider top income and wealth shares as measures of income and wealth inequalities, respectively. We first consider the top 1% income share, i.e., the pretax national income share held by the 99%–100% group, denoted as *top1*. As a robustness check, we also consider the top 10% income share, i.e., the pretax national

income share held by the 90%–100% group, denoted as *top10*. To provide a broader picture, we consider the bottom 50% income share, i.e., the pretax national income share held by the 0%–50% group, denoted as *bot50*, to determine how financial development affects the bottom half of the income distribution. Similarly, we consider the top 1% wealth share, i.e., the net personal wealth share held by the 99%–100% group, denoted as *wtop1*; the top 10% wealth share, i.e., the net personal wealth share held by the 90%–100% group, denoted as *wtop10*; and the bottom 50% wealth share, i.e., the net personal wealth share held by the 0%–50% group, denoted as *wbot50*. These data are sourced from the World Inequality Database, which aims to provide open and convenient access to the most extensive available database on the historical evolution of the world distribution of income and wealth, both within and between countries. Pretax national income is the sum of all pretax personal income flows accruing to the owners of production factors, labor, and capital before considering the impact of the tax or transfer system but after considering the impact of the pension system. Net personal wealth is the total value of nonfinancial and financial assets (e.g., housing, land, deposits, bonds, and equities) held by households minus their debts.

Regarding financial development, as there are two major sectors in the financial system—banks and stock markets (Figure 2)—we first consider the most popular indicator of banking development, private credit (*priv*), which is credit provided to the private sector by domestic money banks as a share of gross domestic product (GDP). Private credit measures the ease with which an entrepreneur or company with a sound project can obtain finance, hence reflecting the extent to which new firms have opportunities to obtain bank financing (Levine et al., 2000; Beck et al. 2000; Rajan and Zingales, 2003; Clarke et al., 2006; Jauch and Watzka, 2016). Next, we consider stock market development, proxied by the total value of all traded shares in a stock market exchange as a percentage of GDP (*tradval*). We then follow the common practice in the empirical literature to consider the logarithm of the sum of private credit and the logarithm of the market total value traded as an indicator of overall financial development, denoted as *fd*. All financial variables were obtained from the Global Financial Development Database.

Regarding trade openness, we follow Frankel and Romer (1999), Irwin and Tervio (2002), and Dollar and Kraay (2003) and use the trade share, measured as the logarithm of the sum of imports and exports over GDP (*trade*) (sourcing the data from the World Development Indicators of the World Bank). It measures the actual exposure to trade

interactions and accounts for the effective level of integration. To strengthen our empirical results, we included various control variables (see the Appendix (Table A3) for more details).

3.2 Method

To estimate how trade openness influences the relationship between financial development and inequality, we consider the following panel data regression model:

$$ineq_{it} = \rho ineq_{it-1} + c_1 fin_{it} + c_2 fin_{it} \times trade_{it} + c_3 trade_{it} + hCV_{it-1} + \mu_i + v_{it} \quad (1)$$

where $ineq_{it}$ is income or wealth inequality in country i at time t ; $ineq_{it-1}$ is one-period lagged income inequality, capturing the persistency in inequality; fin_{it} is the level of financial development; $trade_{it}$ denotes trade openness; $fin_{it} \times trade_{it}$ is the interaction term between trade openness and financial development; CV_{it-1} is a set of control variables that are lagged one period to mitigate endogeneity problem; μ_i is the country fixed effect; and v_{it} is an error term.

Eq. (1) is estimated using the GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). The GMM estimator accounts for unobserved individual-specific effects, allows for the inclusion of lagged-dependent variables as regressors, and provides better control for the endogeneity of all the explanatory variables. First, to eliminate the unobservable country fixed effects, Eq. (1) is differentiated as follows:

$$\begin{aligned} ineq_{it} - ineq_{it-1} = & \rho(ineq_{it} - ineq_{it-1}) + c_1(fin_{it} - fin_{it-1}) + c_2(fin_{it} * \\ & trade_{it} - fin_{it-1} * trade_{it-1}) + c_3(trade_{it} - trade_{it-1}) + \\ & h(CV_{it} - CV_{it-1}) + (v_{it} - v_{it-1}) \end{aligned} \quad (2)$$

i.e.,

$$\begin{aligned} \Delta ineq_{it} = & \rho \Delta ineq_{it-1} + c_0 \Delta fin_{it} + c_1 \Delta fin_{it} * trade_{it} + c_2 \Delta trade_{it} + \\ & h \Delta CV_{it-1} + \Delta v_{it} \end{aligned} \quad (3)$$

While differentiating eliminates the country fixed effect, the estimator renders the estimates biased and inconsistent if we use the ordinary least squares estimate method in a dynamic panel data model. The new error term ($\Delta v_{it} = v_{it} - v_{it-1}$) is correlated with the lagged-dependent variable ($\Delta ineq_{it-1} = ineq_{it-1} - ineq_{it-2}$). These explanatory variables are assumed to be uncorrelated with future realizations of the error term ($E(\Delta ineq_{it-1}, \Delta v_{it}) \neq 0$). To solve this problem, the instrumental variable

approach is applied to deal with the endogeneity of the explanatory variables, where the predetermined and endogenous variables in the first differences are instrumented with appropriate lags of the specified variables in the levels. However, the efficiency of this instrumental approach may be relatively weak as lagged levels are often poor instruments for first differences. Therefore, Blundell and Bond (1998) proposed the system GMM approach. Specifically, the estimator combines the regression in differences (Eq. 1) with the regression in levels (Eq. 2). The first differenced equation uses lagged levels as instruments, and the instruments for the level equation are the lagged differences in the corresponding variables.

The consistency of the GMM estimator depends on the validity of the instruments and the assumption that the differenced error terms do not exhibit second-order serial correlation in disturbances. To check this, two specification tests are performed. The first is the Hansen J test for the null hypothesis of the joint exogeneity of all the instruments, where failure to reject the null hypothesis supports the model. The second is the AR(2) test for the assumption of no second-order serial correlation. Accepting the null hypothesis of no second-order serial correlation indicates that the residuals are serially uncorrelated. When the number of instruments is large relative to the cross-sectional sample size, these tests become less effective. Thus, we use collapse to reduce the number of instruments (Roodman, 2009a). All regressions are estimated using two-step system GMM with Windmeijer (2005)-corrected standard errors, which correct for the downward finite-sample bias in the asymptotic variance of the two-step estimator and remain valid under heteroskedasticity—a relevant concern given the diverse error structures across advanced and developing economies in the sample.

4 Empirical Results

This section presents the empirical results. We first focus on income and wealth shares and then move to the marginal effect results. The Hansen J test and the AR(2) test cannot reject the null hypothesis in our sample for all models. Furthermore, the number of instruments is less than the number of countries. The lagged-dependent variable was positive and significant, implying substantial persistence. These support our model specifications.

Table 1: Income share and financial development (banking development)

VARIABLES	(a) Top 1% income share					(b) Top 10% income share					(c) Bottom 50% income share				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Intop1	Intop1	Intop1	Intop1	Intop1	Intop10	Intop10	Intop10	Intop10	Intop10	lnbot50	lnbot50	lnbot50	lnbot50	lnbot50
ineq ₋₁	0.928*** (0.044)	0.803*** (0.064)	0.836*** (0.068)	1.031*** (0.136)	1.002*** (0.171)	0.926*** (0.026)	0.838*** (0.045)	0.848*** (0.047)	0.895*** (0.045)	1.126*** (0.171)	0.957*** (0.032)	0.832*** (0.049)	0.836*** (0.072)	0.841*** (0.098)	0.622*** (0.139)
priv	-0.346*** (0.078)	-0.429*** (0.080)	-0.447*** (0.146)	-0.685*** (0.186)	-0.797*** (0.250)	-0.105*** (0.018)	-0.150*** (0.033)	-0.143*** (0.043)	-0.161*** (0.042)	-0.306*** (0.094)	0.097** (0.040)	0.142*** (0.048)	0.176** (0.069)	0.184** (0.075)	0.183** (0.080)
priv*trade	0.081*** (0.018)	0.102*** (0.017)	0.109*** (0.030)	0.148*** (0.037)	0.155*** (0.046)	0.023*** (0.004)	0.034*** (0.007)	0.032*** (0.008)	0.035*** (0.008)	0.054*** (0.018)	-0.021** (0.010)	-0.030*** (0.011)	-0.037*** (0.014)	-0.038** (0.015)	-0.032** (0.016)
trade	-0.317*** (0.073)	-0.401*** (0.065)	-0.432*** (0.107)	-0.558*** (0.135)	-0.634*** (0.187)	-0.092*** (0.016)	-0.145*** (0.026)	-0.134*** (0.029)	-0.140*** (0.032)	-0.217*** (0.068)	0.097** (0.039)	0.131*** (0.039)	0.151*** (0.050)	0.142** (0.058)	0.129** (0.058)
gdppc		0.584*** (0.176)	1.040** (0.474)	1.088 (0.809)	0.361 (0.673)		0.293*** (0.098)	0.260** (0.113)	0.409** (0.186)	-0.053 (0.090)		-0.269*** (0.083)	-0.149 (0.179)	0.091 (0.254)	-0.035 (0.374)
gdppcsq		-0.034*** (0.010)	-0.055** (0.024)	-0.060 (0.041)	-0.021 (0.036)		-0.017*** (0.006)	-0.015** (0.006)	-0.023** (0.010)	0.004 (0.005)		0.016*** (0.005)	0.010 (0.009)	-0.003 (0.014)	0.005 (0.021)
sec			-0.191 (0.161)	-0.040 (0.221)	0.284 (0.310)			-0.024 (0.035)	-0.054 (0.041)	0.081** (0.039)			-0.031 (0.075)	-0.055 (0.087)	-0.303** (0.122)
inf				-0.016 (0.016)	-0.018 (0.018)				-0.003 (0.004)	-0.011 (0.009)				-0.001 (0.004)	0.007 (0.007)
ind				0.003 (0.073)	0.069 (0.096)				-0.002 (0.032)	0.082** (0.034)				-0.047 (0.039)	0.038 (0.083)
corrupt				0.041** (0.020)	0.031 (0.027)				0.012* (0.006)	0.013** (0.005)				-0.001 (0.008)	0.004 (0.009)
redistribution					-0.025 (0.045)					0.013 (0.025)					0.090*** (0.031)
Constant	1.542*** (0.342)	-0.280 (0.727)	-1.757 (1.803)	-2.316 (3.089)	0.139 (2.247)	0.698*** (0.136)	-0.011 (0.354)	0.133 (0.420)	-0.572 (0.635)	0.225 (0.467)	-0.315* (0.167)	0.987*** (0.378)	0.444 (0.805)	-0.383 (0.989)	1.157 (1.600)
Obs. (countries)	584(87)	583(86)	518(85)	518(85)	464(76)	584(87)	583(86)	518(85)	518(85)	464(76)	584(87)	583(86)	518(85)	518(85)	464(76)
Instruments	35	35	17	17	29	46	46	46	46	20	28	23	34	34	33

Hansen J (p-value)	0.253	0.756	0.390	0.660	0.883	0.283	0.283	0.123	0.187	0.851	0.276	0.627	0.302	0.179	0.605
AR(2) (p-value)	0.486	0.469	0.550	0.702	0.690	0.283	0.315	0.581	0.494	0.777	0.0217	0.0361	0.0806	0.121	0.933

Note: Standard errors are in parentheses. *** p < 0.01; ** p < 0.05; * p < 0.1

Table 2: Income share and financial development (stock market development)

VARIABLES	(a) Top 1% income share					(b) Top 10% income share					(c) Bottom 50% income share				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	lntop1	lntop1	lntop1	lntop1	lntop1	lntop10	lntop10	lntop10	lntop10	lntop10	lnbot50	lnbot50	lnbot50	lnbot50	lnbot50
ineq ₋₁	0.883*** (0.052)	0.832*** (0.102)	0.701*** (0.123)	0.602*** (0.159)	0.700*** (0.241)	0.920*** (0.027)	0.845*** (0.042)	0.832*** (0.048)	0.795*** (0.075)	0.685*** (0.195)	0.938*** (0.035)	0.754*** (0.107)	0.738*** (0.129)	0.892*** (0.083)	0.828*** (0.083)
tradval	-0.189** (0.075)	-0.473*** (0.179)	-0.486*** (0.175)	-0.335** (0.140)	-0.720* (0.373)	-0.080** (0.033)	-0.059** (0.029)	-0.077** (0.036)	-0.099** (0.041)	-0.183** (0.083)	0.105** (0.049)	0.103* (0.059)	0.135* (0.073)	0.187* (0.101)	0.157* (0.092)
tradval*trade	0.044** (0.017)	0.107** (0.041)	0.115*** (0.039)	0.077** (0.032)	0.162** (0.080)	0.019** (0.008)	0.014** (0.007)	0.018** (0.008)	0.023** (0.009)	0.042** (0.020)	-0.024** (0.011)	-0.025* (0.013)	-0.034** (0.016)	-0.042* (0.024)	-0.034* (0.020)
trade	-0.133*** (0.040)	-0.134 (0.092)	-0.283*** (0.097)	-0.198*** (0.073)	-0.396** (0.187)	-0.054*** (0.018)	-0.047** (0.019)	-0.048** (0.020)	-0.065*** (0.024)	-0.102** (0.042)	0.057** (0.022)	0.068** (0.032)	0.061 (0.039)	0.109*** (0.040)	0.085* (0.045)
gdppc		-0.270 (0.581)	-1.070 (0.724)	-0.330 (0.524)	0.267 (0.449)		0.108 (0.078)	0.173 (0.112)	0.285* (0.161)	-0.223 (0.544)		-0.172 (0.116)	-0.213 (0.198)	-0.038 (0.292)	0.276 (0.389)
gdppesq		0.014 (0.033)	0.055 (0.039)	0.017 (0.028)	-0.013 (0.025)		-0.007 (0.004)	-0.010* (0.006)	-0.016* (0.009)	0.011 (0.029)		0.011 (0.007)	0.013 (0.011)	0.002 (0.016)	-0.015 (0.021)
sec			0.314 (0.190)	0.032 (0.173)	-0.029 (0.097)			-0.015 (0.044)	-0.048 (0.047)	0.089 (0.159)			0.035 (0.053)	-0.008 (0.117)	-0.022 (0.094)
inf				-0.008 (0.016)	-0.002 (0.013)				-0.007 (0.005)	0.001 (0.009)				0.005 (0.006)	0.007 (0.008)
ind				0.023 (0.070)	-0.045 (0.071)				-0.010 (0.028)	-0.015 (0.036)				-0.000 (0.051)	-0.030 (0.055)
corrupt				-0.035 (0.028)	-0.008 (0.018)				-0.001 (0.009)	-0.009 (0.014)				0.006 (0.009)	0.010 (0.012)
redistribution					-0.030 (0.048)					-0.036 (0.027)					0.031* (0.016)

Constant	0.895*** (0.247)	2.319 (2.732)	5.745* (3.135)	3.427 (2.198)	1.454 (1.968)	0.535*** (0.144)	0.366 (0.385)	0.174 (0.468)	0.076 (0.816)	2.449 (2.491)	−0.082 (0.090)	1.070 (0.675)	1.141 (1.003)	0.007 (1.252)	−1.032 (1.550)
Obs. (countries)	436(76)	487(79)	442(78)	392(74)	373(68)	436(76)	436(76)	392(74)	392(74)	373(68)	490(80)	487(79)	442(78)	392(74)	373(68)
Instruments	29	27	27	29	20	47	47	47	47	19	33	27	27	29	38
Hansen J (p-value)	0.0966	0.122	0.568	0.179	0.817	0.473	0.499	0.247	0.477	0.472	0.205	0.466	0.130	0.303	0.320
AR(2) (p-value)	0.635	0.499	0.734	0.885	0.697	0.241	0.279	0.521	0.901	0.646	0.0116	0.0401	0.266	0.132	0.110

Note: Standard errors are in parentheses. *** p < 0.01; ** p < 0.05; * p < 0.1

4.1 Income shares

Tables 1 and 2 report the estimation results for income shares. Columns (1)–(5) of Table 1 indicate that private credit has a statistically significant and negative effect on the top 1% income share. However, the interaction term of private credit and trade openness has a statistically significant and positive effect on the top 1% income share. The estimates imply that banking development reduces the top 1% income share—an effect that moderates with increased trade openness. This evidence is consistent with the financial capture channel developed in Section 2.4: in open economies, export-oriented and incumbent firms have stronger incentives to orient financial services toward their own needs, and financial development consequently benefits capital owners and high-income groups disproportionately while leaving low-income households with limited credit access (Claessens and Perotti, 2007). The skill-biased trade channel also operates in parallel: as trade openness raises returns to skilled labor and capital, high-income households gain both from trade directly and from their superior access to an expanding financial system. As such, financial development—total, banking, and stock market—widens the income inequality of countries with greater trade openness. Similar results are reached with the top 10% income share in Columns (6)–(10) of Table 1.

Similar results are found for stock market development in Table 2, where the value traded and its interaction with trade openness are negative and positive, both of which are statistically significant. Stock market development decreases the top 1% income share and thus income inequality, but greater trade openness reduces this effect.

In the bottom 50% income share in Columns (11)–(15) of Tables 1 and 2, we find the opposite results. Financial development—total, banking, and stock market—improves the bottom 50% of the income share, but the effect is mitigated with increased trade openness. It is also found that trade openness is positive and significant. Trade openness raises the bottom 50% of the income share and thus income inequality, but the effect decreases with financial development.

This evidence also holds when we add other control variables. In particular, to strengthen our empirical results, we first add the logarithm of real per capita GDP (*gdppc*) and its squared term (*gdppcsq*) to capture the Kuznets curve effect. Then, we add the logarithm of gross secondary education enrollment (*sec*), the logarithm of consumer price index inflation (*inf*), and the logarithm of industry value added as a percentage of GDP (*ind*) to control the effects of human capital, macroeconomic

uncertainty, and industrialization on inequality. Next, we include the control of corruption (*corrupt*) to account for the effect of institutional quality on inequality. Finally, we consider fiscal redistribution via taxes and social transfers (*redistribution*). As Column (15) of Tables 1 and 2 indicates, most redistribution through the tax and transfer system is toward low-income groups, which might result in greater equality. The redistribution policy is believed to be the most important instrument for governments to reduce income inequality (Piketty and Zucman, 2014).

Table 3: Wealth share and financial development (banking development)

	(a) Top 1% wealth share					(b) Top 10% wealth share					(c) Bottom 50% wealth share				
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	lnwtop1	lnwtop1	lnwtop1	lnwtop1	lnwtop1	lnwtop10	lnwtop10	lnwtop10	lnwtop10	lnwtop10	lnwbot50	lnwbot50	lnwbot50	lnwbot50	lnwbot50
ineq ₋₁	0.930*** (0.026)	0.957*** (0.030)	0.955*** (0.039)	0.936*** (0.071)	1.008*** (0.112)	0.912*** (0.024)	0.849*** (0.057)	0.847*** (0.057)	0.848*** (0.064)	0.856*** (0.031)	1.086*** (0.095)	1.017*** (0.101)	0.983*** (0.098)	1.041*** (0.106)	0.863*** (0.090)
priv	-0.065** (0.027)	-0.097** (0.042)	-0.089* (0.046)	-0.113** (0.049)	-0.125*** (0.047)	-0.060** (0.027)	-0.075*** (0.028)	-0.070** (0.029)	-0.079** (0.031)	-0.069*** (0.022)	0.490* (0.274)	0.554*** (0.193)	0.528*** (0.181)	0.593*** (0.224)	0.395** (0.181)
priv*trade	0.016*** (0.006)	0.017** (0.007)	0.016** (0.008)	0.014* (0.007)	0.018** (0.009)	0.014** (0.006)	0.018*** (0.006)	0.017*** (0.006)	0.017*** (0.006)	0.016*** (0.005)	-0.118* (0.066)	-0.112** (0.051)	-0.113** (0.045)	-0.116** (0.057)	-0.114*** (0.042)
trade	-0.074*** (0.027)	-0.078** (0.032)	-0.077** (0.034)	-0.073** (0.032)	-0.078** (0.036)	-0.056** (0.024)	-0.071*** (0.023)	-0.068*** (0.023)	-0.071*** (0.023)	-0.067*** (0.020)	0.481** (0.245)	0.461** (0.190)	0.466*** (0.169)	0.489** (0.211)	0.453*** (0.162)
gdppc		0.046 (0.097)	0.085 (0.092)	0.138 (0.360)	0.066 (0.447)		0.060*** (0.023)	0.064*** (0.022)	0.058** (0.027)	0.048* (0.026)		-0.173 (0.126)	-0.231* (0.138)	-0.185 (0.136)	-0.298** (0.123)
gdppcsq		-0.002 (0.005)	-0.004 (0.005)	-0.006 (0.020)	-0.002 (0.024)		-0.003** (0.001)	-0.004*** (0.001)	-0.003* (0.002)	-0.002* (0.001)		0.007 (0.007)	0.011 (0.008)	0.007 (0.008)	0.016** (0.007)
sec			-0.048 (0.041)	-0.065 (0.049)	-0.112 (0.134)			-0.006 (0.010)	-0.002 (0.011)	0.003 (0.015)			0.062 (0.056)	0.024 (0.069)	0.166** (0.072)
inf				-0.011 (0.006)	-0.009 (0.007)				-0.002 (0.003)	-0.001 (0.003)				0.016 (0.022)	-0.032 (0.020)
ind				0.020 (0.074)	0.038 (0.099)				0.004 (0.007)	0.003 (0.009)				-0.051 (0.063)	0.050 (0.056)
corrupt				0.002 (0.010)	-0.000 (0.014)				-0.003 (0.003)	-0.003 (0.003)				0.001 (0.017)	0.001 (0.017)
redistribution					0.028** (0.014)					-0.005 (0.005)					-0.010 (0.031)
Constant	0.528*** (0.129)	0.299 (0.446)	0.296 (0.374)	0.205 (1.496)	0.400 (1.856)	0.604*** (0.142)	0.665*** (0.175)	0.661*** (0.179)	0.694*** (0.215)	0.656*** (0.158)	-2.090** (1.054)	-1.301 (1.015)	-1.185 (0.926)	-1.411 (1.024)	-0.934 (0.704)

Obs. (countries)	438(77)	438(77)	396(76)	396(76)	396(76)	437(85)	437(85)	437(85)	437(85)	396(76)	399(81)	399(81)	399(81)	399(81)	360(72)
Instruments	24	24	24	24	24	48	48	48	48	51	18	18	18	18	33
Hansen J (p-value)	0.324	0.237	0.450	0.471	0.615	0.394	0.798	0.768	0.805	0.778	0.479	0.567	0.556	0.362	0.766
AR(2) (p-value)	0.147	0.128	0.122	0.127	0.115	0.674	0.684	0.682	0.742	0.328	0.184	0.213	0.198	0.208	0.137

Note: Standard errors in are parentheses. *** p < 0.01; ** p < 0.05; * p < 0.1

Table 4: Wealth share and financial development (stock market development)

	(a) Top 1% wealth share					(b) Top 10% wealth share					(c) Bottom 50% wealth share				
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	lnwtop1	lnwtop1	lnwtop1	lnwtop1	lnwtop1	lnwtop10	lnwtop10	lnwtop10	lnwtop10	lnwtop10	lnwbot50	lnwbot50	lnwbot50	lnwbot50	lnwbot50
ineq ₋₁	0.815*** (0.055)	0.832*** (0.119)	0.693*** (0.181)	0.860*** (0.179)	0.915*** (0.186)	0.662*** (0.177)	0.916*** (0.158)	0.834*** (0.131)	0.654*** (0.222)	0.930*** (0.131)	0.603*** (0.048)	0.469*** (0.096)	0.538*** (0.123)	0.910*** (0.101)	0.894*** (0.102)
tradval	-0.134** (0.067)	-0.160** (0.075)	-0.181* (0.101)	-0.194* (0.114)	-0.192* (0.113)	-0.083* (0.050)	-0.106* (0.061)	-0.059** (0.028)	-0.165* (0.085)	-0.082* (0.046)	0.299** (0.137)	0.364** (0.163)	0.356* (0.186)	0.297* (0.173)	0.307** (0.142)
tradval*trade	0.031* (0.016)	0.036** (0.018)	0.044* (0.023)	0.047** (0.024)	0.047* (0.025)	0.019* (0.011)	0.025* (0.013)	0.014** (0.006)	0.037* (0.020)	0.020* (0.010)	-0.072** (0.034)	-0.077** (0.039)	-0.079* (0.041)	-0.069* (0.040)	-0.076** (0.033)
trade	-0.069*** (0.027)	-0.082** (0.032)	-0.078* (0.045)	-0.089 (0.057)	-0.081 (0.060)	-0.059 (0.040)	-0.054* (0.030)	-0.030* (0.016)	-0.081** (0.037)	-0.044* (0.025)	0.146* (0.080)	0.138* (0.078)	0.115 (0.093)	0.137 (0.092)	0.123 (0.121)
gdppc		0.054 (0.078)	-0.637 (0.608)	-0.358 (0.294)	-0.069 (0.553)		0.031 (0.142)	-0.151 (0.153)	-0.172 (0.523)	0.238 (0.294)		0.279 (0.357)	0.218 (0.396)	0.779 (1.034)	-0.024 (0.670)
gdppcsq		-0.002 (0.004)	0.032 (0.032)	0.017 (0.017)	0.003 (0.029)		-0.001 (0.008)	0.008 (0.008)	0.010 (0.028)	-0.012 (0.015)		-0.018 (0.020)	-0.014 (0.021)	-0.042 (0.055)	0.002 (0.035)
sec			0.123 (0.126)	0.086 (0.075)	0.003 (0.106)			0.026 (0.038)	0.033 (0.103)	-0.044 (0.044)			0.015 (0.121)	-0.362 (0.316)	-0.218 (0.474)
inf				-0.012 (0.017)	-0.012 (0.023)				0.027** (0.012)	0.008 (0.009)				0.001 (0.022)	-0.000 (0.018)
ind				-0.064 (0.081)	-0.061 (0.114)				0.043 (0.125)	-0.094 (0.103)				0.094 (0.132)	0.206 (0.194)
corrupt				0.007 (0.059)	0.005 (0.035)				-0.012 (0.017)	0.003 (0.016)				0.056 (0.037)	0.033 (0.035)

redistribution					0.004					−0.011					0.009
					(0.046)					(0.031)					(0.062)
Constant	0.822***	0.563	3.709	2.310*	1.146	1.622**	0.408	1.411*	2.174	−0.196	0.000	−0.881	−0.810	−3.341	−0.566
	(0.302)	(0.520)	(2.727)	(1.258)	(2.238)	(0.743)	(1.079)	(0.823)	(2.554)	(1.223)	(0.336)	(1.483)	(1.561)	(4.083)	(2.037)
Obs.(countries)	365(78)	365(78)	365(78)	339(74)	323(68)	403(80)	401(79)	365(78)	339(74)	323(68)	331(74)	367(75)	331(74)	305(70)	289(64)
Instruments	42	42	35	40	42	12	14	44	21	37	27	27	27	69	50
Hansen J (p-value)	0.874	0.881	0.880	0.861	0.611	0.466	0.210	0.630	0.793	0.947	0.597	0.865	0.687	0.804	0.756
AR(2) (p-value)	0.117	0.120	0.353	0.334	0.300	0.421	0.262	0.593	0.814	0.832	0.590	0.0854	0.345	0.461	0.542

Note: Standard errors are in parentheses. *** p < 0.01; ** p < 0.05; * p < 0.1

Table A2: Descriptive statistics

	top1	top10	bot50	wtop1	wtop10	wbot50	priv	privtrade	tradval	tradvaltrade	gdppc	redistribution	sec	trade	inf	ind	corrupt
Panel A: Summary statistics																	
Mean	2.662	3.743	2.717	3.325	4.117	1.411	3.669	15.75	1.994	8.54	8.731	1.783	4.297	4.228	1.63	3.256	3.223
std.dev	0.404	0.24	0.331	0.284	0.13	0.696	0.949	4.985	2.054	9.064	1.435	1.018	0.519	0.565	1.356	0.323	1.297
Min	1.007	2.877	1.258	2.491	3.626	-4.382	0.0287	0.106	-7.152	-25.6	5.522	-3.689	1.336	2.549	-2.897	1.67	0
Max	4.16	4.386	3.572	4.012	4.476	2.855	5.505	32.3	6.472	38.18	11.55	3.234	5.088	6.039	8.011	4.295	6
Obs.	891	891	891	700	700	650	875	848	543	540	889	804	823	872	876	842	784
Panel B: Correlation matrix																	
top1	1																
top10	0.929***	1															
bot50	-0.848***	-0.939***	1														
wtop1	0.840***	0.795***	-0.761***	1													
wtop10	0.817***	0.796***	-0.776***	0.943***	1												
wbot50	-0.515***	-0.465***	0.511***	-0.663***	-0.744***	1											
priv	-0.296***	-0.372***	0.384***	-0.225***	-0.230***	0.111*	1										
privtrade	-0.319***	-0.392***	0.414***	-0.236***	-0.223***	0.133*	0.848***	1									
tradval	-0.128*	-0.176**	0.223***	-0.0637	-0.0905	-0.00116	0.570***	0.360***	1								
tradvaltrade	-0.143**	-0.188***	0.241***	-0.072	-0.0949	0.0079	0.576***	0.432***	0.984***	1							
gdppc	-0.524***	-0.619***	0.577***	-0.376***	-0.348***	0.0955	0.668***	0.632***	0.378***	0.385***	1						
redistribution	-0.610***	-0.715***	0.705***	-0.508***	-0.452***	0.149**	0.403***	0.396***	0.164**	0.169**	0.736***	1					
sec	-0.434***	-0.524***	0.471***	-0.303***	-0.273***	0.0918	0.601***	0.552***	0.322***	0.340***	0.783***	0.659***	1				
trade	-0.212***	-0.246***	0.262***	-0.154**	-0.121*	0.113*	0.206***	0.686***	-0.124*	-0.00713	0.278***	0.217***	0.234***	1			
inf	0.324***	0.369***	-0.344***	0.209***	0.217***	-0.129*	-0.650***	-0.630***	-0.344***	-0.360***	-0.550***	-0.352***	-0.441***	-0.291***	1		
ind	0.208***	0.190***	-0.172**	0.209***	0.102	-0.0674	-0.078	-0.116*	0.120*	0.140*	-0.242***	-0.361***	-0.0673	-0.102	0.149**	1	
corrupt	-0.542***	-0.607***	0.569***	-0.416***	-0.366***	0.0661	0.494***	0.443***	0.325***	0.332***	0.717***	0.601***	0.532***	0.157**	-0.336***	-0.255***	1

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.2 Wealth shares

Tables 3 and 4 report the estimation results for wealth shares. Columns (1)–(5) of Table 3 indicate that private credit has a statistically significant and negative effect on the top 1% wealth share. However, the interaction term of private credit and trade openness has a statistically significant and positive effect on the top 1% wealth share. The estimates imply that banking development reduces the top 1% wealth share—an effect that alleviates with increased trade openness. Similar results are found for stock market development in Table 4, where the value traded and its interaction with trade openness are both statistically significant but negative and positive, respectively. Stock market development decreases the top 1% wealth share, but greater trade openness moderates this effect. Similar results were found in the top 10% wealth share, having no significant change in the sign and significance.

In the bottom 50% wealth share in Columns (11)–(15) of both Tables 3 and 4, we find opposite results. Financial development—total, banking, and stock market—improves the bottom 50% wealth share, but the effect is mitigated with increased trade openness. Moreover, trade openness is positive and significant. Trade openness raises the bottom 50% wealth share and thus income inequality, but the effect decreases with financial development. This evidence also holds when we add other control variables, maintaining their signs and significance. However, the impact of redistribution on the wealth share of the bottom 50% is not as statistically significant as the results for the income share groups. This may align with the public choice theory, which proposes that redistribution often favors those with political influence. Additionally, it can lead to increased inequality if affluent households use their political power to take advantage of poorer individuals.

Table 5: Marginal effect of financial development at different levels of trade openness

(1) Income share						
	Banking development			Stock development		
	Top 1%	Top 10%	Bot 50%	Top 1%	Top 10%	Bot 50%
minimum	−0.410***	−0.171***	0.102**	−0.315*	−0.079**	0.073*
mean	−0.146*	−0.079*	0.047*	−0.039	−0.008	0.015
maximum	0.133*	0.019	−0.011	0.252**	0.066*	−0.045
(2) Wealth share						
	Banking development			Stock development		
	Top 1%	Top 10%	Bot 50%	Top 1%	Top 10%	Bot 50%
minimum	−0.081**	−0.030***	0.109	−0.075	−0.033	0.117*
mean	−0.051	−0.004	−0.086	0.005	0.000	−0.013
maximum	−0.020	0.025**	−0.292***	0.089**	0.036**	−0.149***
<i>Note:</i> Period dummies are included. Standard errors are in parentheses. *** p < 0.01; ** p < 0.05; * p < 0.1.						

4.3 Marginal effect

Such a model specification (Eq. 1) recognizes the fact that trade openness may act as both a covariate and moderator. The marginal effect of financial development depends on the extent of trade openness: $\frac{\partial ine_{it}}{\partial fin_{it}} = c_1 + c_2 trade_{it}$. In particular, c_1 measures the impact of a 1% change in financial development on income inequality when trade openness is zero. If $c_1 > 0$ and $c_2 < 0$, financial development raises income inequality, and the effect decreases with increased trade openness. If $c_1 < 0$ and $c_2 > 0$, financial development reduces income inequality, and the effect increases with greater trade openness.

In the top 1% and 10% income and wealth share results, trade openness is negative and significant across the equations. Trade openness has both direct and indirect effects on the top income shares. Trade openness worsens the top income share, but the effect decreases with financial development. To illustrate, we follow Baltagi et al. (2009) to evaluate the partial derivative of income inequality with respect to financial development using Columns (5) and (10) of Table 1, and the marginal effect results are presented in Table 5 and Panel (a) of Figure 3. The derivative of the top 1% (10%) income share with respect to financial development at the sample mean level of trade openness is −0.146 (−0.079). The same derivative evaluated at the minimum level of trade openness is −0.410 (−0.171). When trade openness is at its maximum value, the derivative is 0.133 (0.019). Financial development reduces the top income share and income inequality in countries with low trade openness but increases them in countries with high trade openness. To further characterize this reversal, we compute the

threshold level of trade openness at which the marginal effect of financial development on inequality equals zero. Given the linear-in-parameters marginal effect $\partial Y / \partial FD = \tilde{c}_1 + \tilde{c}_2 \times Trade$, the sign-reversal threshold is $Trade^* = -\tilde{c}_1 / \tilde{c}_2$. For the top 1% (10%) income share specification in Column (5) of Table 1, this yields $Trade^* = 5.14(5.67)$ in log terms, equivalently to approximately 171% (290%) of GDP. Comparing this threshold to the sample distribution — where the mean trade openness is 67% of GDP and the maximum is 403% of GDP — approximately 10% of country-year observations in the sample exceed the top 1% threshold, concentrated among very small, highly open economies such as Singapore, Luxembourg, and Malta. This indicates that while the sign reversal is real and economically meaningful, the inequality-increasing effect of financial development applies only to the most trade-exposed minority of countries in the sample; for the large majority, financial development continues to reduce income concentration at the top. This evidence also holds when we split the banking development and stock market development and estimate the regressions for the two income groups separately (see Figure 3).

Regarding wealth share, in Column (5) of Table 3, as presented in Table 5 and Panel (c) of Figure 3, the derivative of the top 1% wealth share with respect to financial development at the sample minimum, mean, and maximum levels of trade openness is -0.081 , -0.051 , and -0.020 , respectively. Financial development reduces the top wealth share in countries with low trade openness but increases it in countries with high trade openness. Moreover, as presented in Panel (c) of Figure 3 based on Column (10), the marginal effect of financial development on the top 10% wealth share is -0.030 , -0.004 , and 0.025 when trade openness is at the minimum, mean, and maximum values, respectively.

Then, we turn to the bottom 50% income and wealth shares in Tables 1–4 (c), where we find the opposite results in all tables. Financial development—total, banking, and stock market—improves the bottom 50% of the income share, but the effect is mitigated with increased trade openness. For example, in Column (15) of Table 1 and as depicted in Panel (a) of Figure 3, the derivative of the bottom 50% income share with respect to financial development at the sample minimum, mean, and maximum levels of trade openness is 0.102 , 0.047 , and -0.011 , respectively. Moreover, in Column (15) of Table 1 and as depicted in Panel (c) of Figure 3, the derivative of the bottom 50% wealth share with respect to financial development at the sample minimum, mean, and

maximum levels of trade openness is 0.109, -0.086 , and -0.292 , respectively. The only exception is for the wealth share sample, where the marginal effect is less significant than the income share sample results. Future research may need to focus more on the wealth share.

Overall, in a more open environment, the evidence indicates that financial development benefits income- and wealth-rich individuals at the expense of income- and wealth-poor individuals. Trade openness brings not only more investment opportunities but also more foreign competition. This strengthens the incentive of wealthy and export-oriented incumbents to capture the financial sector and orient financial services toward their needs, leaving low-income households with diminished effective access to finance as the economy becomes more open (Claessens and Perotti, 2007). Through the compounding mechanisms of financial capture, skill-biased factor market shifts, and credit tightening under trade-induced volatility (detailed in Section 2.4), financial development benefits the rich more in highly open economies, resulting in rising income and wealth inequalities.

5 Conclusion

The past decades have seen increasing financial development and inequality in many countries. However, how financial development is linked to inequality remains ambiguous. We emphasize that the relationship between financial development and inequality depends on the degree of trade openness because it affects the degree of financial development and inequality. To check whether the effect of financial development on inequality depends on trade openness, we use the system GMM to investigate panel data on 103 developed and developing countries from 1985 to 2020.

Our result supports economic theories predicting an inequality-narrowing effect of financial development, but the effect moderates with increased trade openness. This result confirms our arguments that the degree of a country's trade openness affects the relationship between financial development and inequality. In other words, trade may offset the beneficial effect of financial development on income distribution. This evidence does not imply that trade is detrimental to the economy. Instead, it suggests the need for the government to tackle the potential negative impact of trade on financial development such that financial development can be an effective instrument to fight against income and wealth inequalities.

Data availability statement

Appendix: Country List and descriptive statistics

Table A1: A list of Countries

High income (43 countries)
Australia, Austria, Barbados, Belgium, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR-China, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Rep., Kuwait, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Qatar, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Kingdom, United States, Uruguay, Venezuela, RB
Non-high income (60 countries)
Argentina, Armenia, Bangladesh, Bolivia, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Fiji, Georgia, Ghana, Guatemala, Honduras, India, Indonesia, Iran, Islamic Rep., Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lao PDR, Lesotho, Madagascar, Malawi, Malaysia, Mauritania, Mauritius, Mexico, Moldova, Morocco, Nepal, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Romania, Russian, Federation, Rwanda, Sierra Leone, South Africa, Sri Lanka, Tajikistan, Tanzania, Thailand, Tonga, Tunisia, Turkey, Uganda, Ukraine, Vietnam

Table A2: Descriptive statistics

	top1	top10	bot50	wtop1	wtop10	wbot50	priv	privtrade	tradval	tradvaltrade	gdppc	redistribution	sec	trade	inf	ind	corrupt
Panel A: Summary statistics																	
Mean	2.662	3.743	2.717	3.325	4.117	1.411	3.669	15.75	1.994	8.54	8.731	1.783	4.297	4.228	1.63	3.256	3.223
std.dev	0.404	0.24	0.331	0.284	0.13	0.696	0.949	4.985	2.054	9.064	1.435	1.018	0.519	0.565	1.356	0.323	1.297
Min	1.007	2.877	1.258	2.491	3.626	-4.382	0.0287	0.106	-7.152	-25.6	5.522	-3.689	1.336	2.549	-2.897	1.67	0
Max	4.16	4.386	3.572	4.012	4.476	2.855	5.505	32.3	6.472	38.18	11.55	3.234	5.088	6.039	8.011	4.295	6
Obs.	891	891	891	700	700	650	875	848	543	540	889	804	823	872	876	842	784
Panel B: Correlation matrix																	
top1	1																
top10	0.929***	1															
bot50	-0.848***	-0.939***	1														
wtop1	0.840***	0.795***	-0.761***	1													
wtop10	0.817***	0.796***	-0.776***	0.943***	1												
wbot50	-0.515***	-0.465***	0.511***	-0.663***	-0.744***	1											
priv	-0.296***	-0.372***	0.384***	-0.225***	-0.230***	0.111*	1										
privtrade	-0.319***	-0.392***	0.414***	-0.236***	-0.223***	0.133*	0.848***	1									
tradval	-0.128*	-0.176**	0.223***	-0.0637	-0.0905	-0.00116	0.570***	0.360***	1								
tradvaltrade	-0.143**	-0.188***	0.241***	-0.072	-0.0949	0.0079	0.576***	0.432***	0.984***	1							
gdppc	-0.524***	-0.619***	0.577***	-0.376***	-0.348***	0.0955	0.668***	0.632***	0.378***	0.385***	1						
redistribution	-0.610***	-0.715***	0.705***	-0.508***	-0.452***	0.149**	0.403***	0.396***	0.164**	0.169**	0.736***	1					
sec	-0.434***	-0.524***	0.471***	-0.303***	-0.273***	0.0918	0.601***	0.552***	0.322***	0.340***	0.783***	0.659***	1				
trade	-0.212***	-0.246***	0.262***	-0.154**	-0.121*	0.113*	0.206***	0.686***	-0.124*	-0.00713	0.278***	0.217***	0.234***	1			
inf	0.324***	0.369***	-0.344***	0.209***	0.217***	-0.129*	-0.650***	-0.630***	-0.344***	-0.360***	-0.550***	-0.352***	-0.441***	-0.291***	1		
ind	0.208***	0.190***	-0.172**	0.209***	0.102	-0.0674	-0.078	-0.116*	0.120*	0.140*	-0.242***	-0.361***	-0.0673	-0.102	0.149**	1	
corrupt	-0.542***	-0.607***	0.569***	-0.416***	-0.366***	0.0661	0.494***	0.443***	0.325***	0.332***	0.717***	0.601***	0.532***	0.157**	-0.336***	-0.255***	1

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3: Variable definition and source

Variable	Abbreviation	Definition	Data Source
TOP 10% income share	Top10	Pre-tax national income share held by the p90p100 group.	the World Inequality Database (WID)
TOP 1% income share	Top1	Pre-tax national income share held by the p99p100 group. Pre-tax national income =Pre-tax labor income [total pre-tax income ranking]+Pre-tax capital income [total pre-tax income ranking]	the World Inequality Database (WID)
Bottom 50% income share	Bot50	Pre-tax national income share held by the p0p50 group.	the World Inequality Database (WID)
TOP 10% wealth share	Wtop10	Net personal wealth share held by the p90p100 group. [Net personal wealth]=[Personal non-financial assets]+[Personal financial assets]-[Personal debt]	the World Inequality Database (WID)
TOP 1% wealth share	Wtop1	Net personal wealth share held by the p99p100 group.	the World Inequality Database (WID)
Bottom 50% wealth share	Wbot50	Net personal wealth share held by the p0p50 group.	the World Inequality Database (WID)
Private credit by deposit money banks to GDP (%)	Priv	The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	Global Financial Development Database
Stock market total value traded to GDP (%)	Tradval	Total value of all traded shares in a stock market exchange as a percentage of GDP.	Global Financial Development Database
School enrollment, secondary (% gross)	Sec	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	UNESCO Institute for Statistics (http://uis.unesco.org/). Data as of September 2021.

Inflation, consumer prices (annual %)	Inf	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	International Monetary Fund (IMF)
Trade (% of GDP)	Trade	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Development Indicators (WDI)
GDP per capita (constant 2015 US\$)	Gdp	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2015 U.S. dollars.	World Development Indicators (WDI)
Industry (including construction), value added (% of GDP)	Ind	Industry (including construction) corresponds to ISIC divisions 05-43 and includes manufacturing (ISIC divisions 10-33). It comprises value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water, and gas. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 4. Note: For VAB countries, gross value added at factor cost is used as the denominator.	World Development Indicators (WDI)
control of corruption	Corruption	Established by the WORLD BANK, the Control of Corruption Indicator (CCI) captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Development Indicators (WDI)
Redistribution	Redistribution	abs_red: Estimated absolute redistribution, the number of Gini-index points market-income inequality is reduced due to taxes and transfers: the difference between the gini_mkt and gini_disp.	The Standardized World Income Inequality Database (SWIID)

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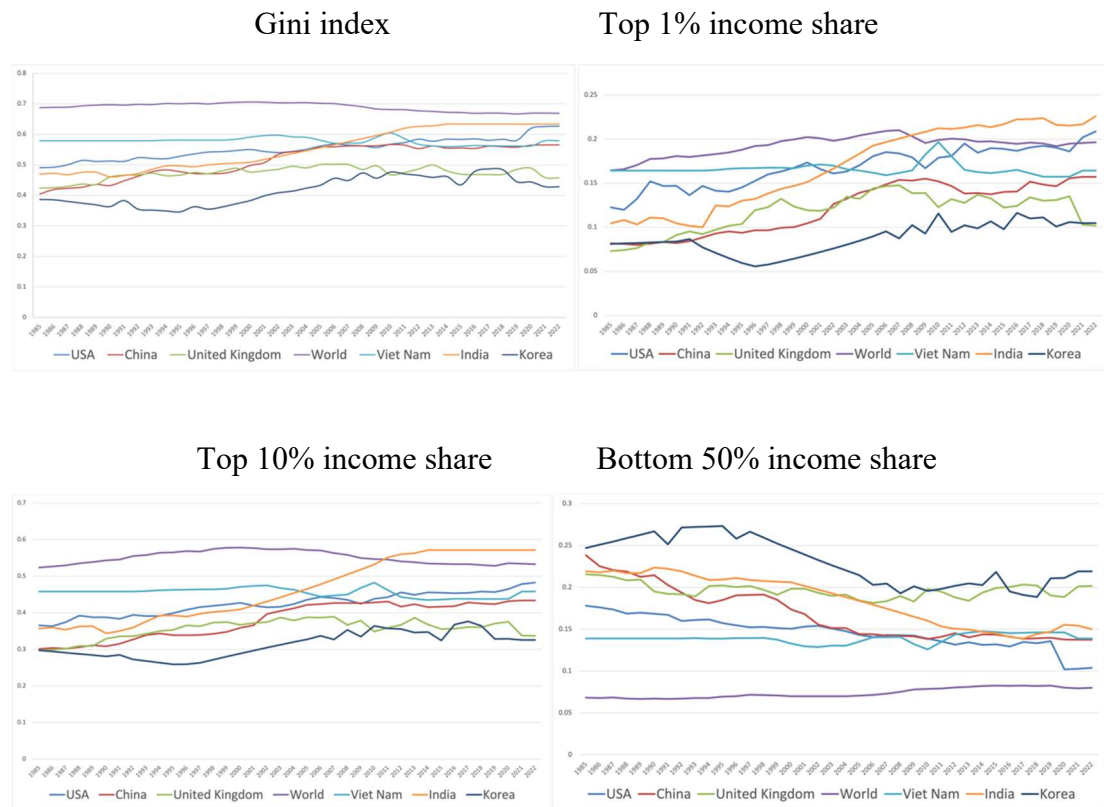
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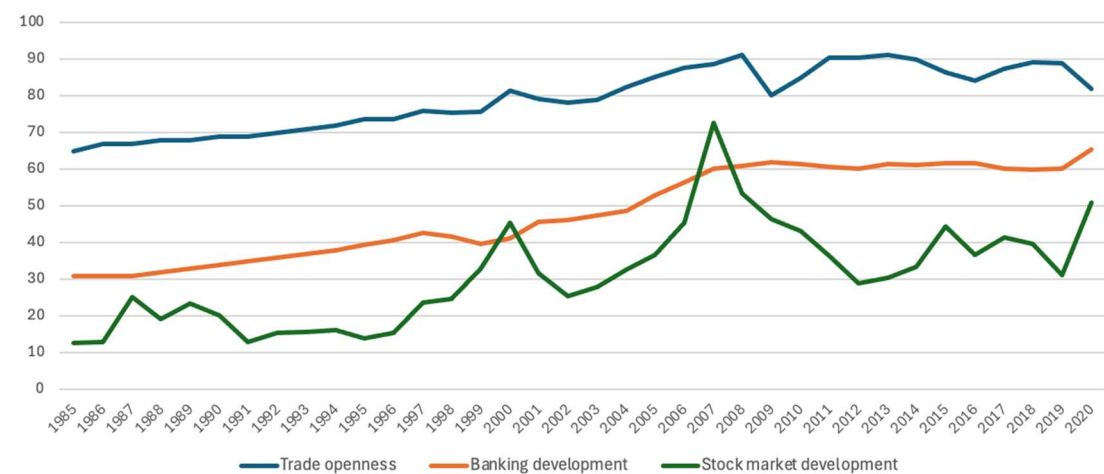
Figure legends

Figure 1: Gini index and income share for selected countries (1985–2020)



Data source: The Standardized World Income Inequality Database

Figure 2: Global trade openness and financial development



Data source: The World Bank's Global Financial Development Database.

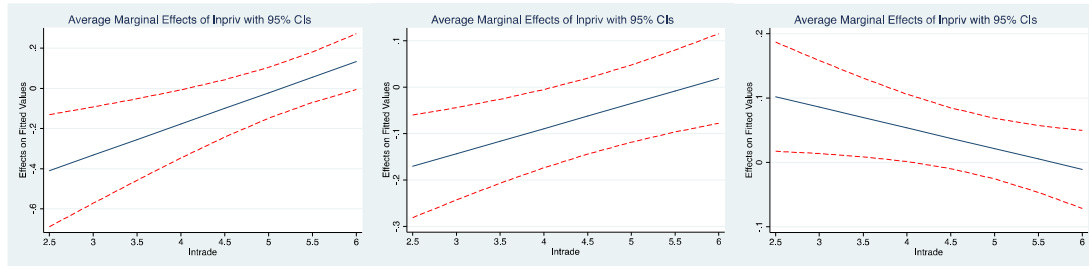
Figure 3: Marginal effects of financial development on income and wealth share

(a) Income shares and banking development

a. Top 1% income share

b. Top 10% income share

c. Bottom 50% income share

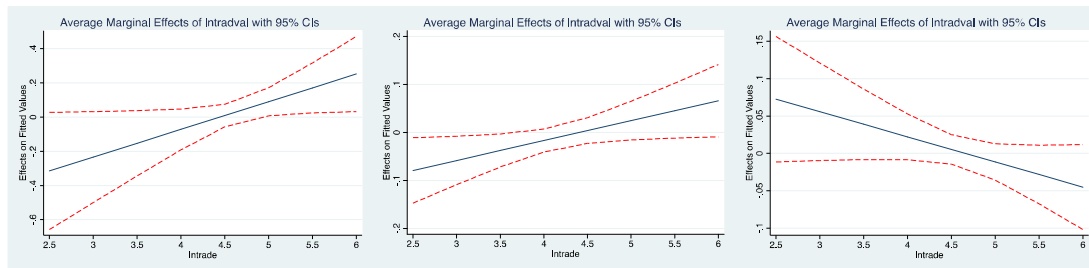


(b) Income shares and stock market development

a. Top 1% income share

b. Top 10% income share

c. Bottom 50% income share

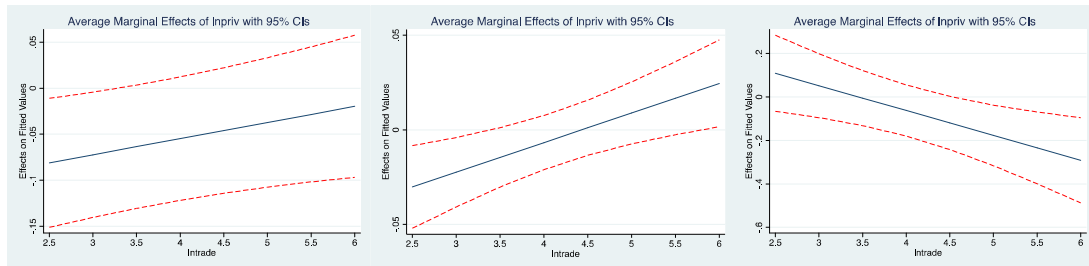


(c) Wealth shares and banking development

a. Top 1% wealth share

b. Top 10% wealth share

c. Bottom 50% wealth share



(d) Wealth shares and stock market development

a. Top 1% wealth share

b. Top 10% wealth share

c. Bottom 50% wealth share

