Economics Bulletin

Volume 42, Issue 4

The impact of financial openness on income inequality

Cheng Zhou
Xi'an University of Technology

Abstract

This study empirically analyzes the impact of financial openness on income inequality using a sample of 68 countries from 1980 to 2019. The main finding is that financial openness expands income disparity by increasing the income share of high-income groups while decreasing the income share of low-income groups. In developing countries, financial openness has the largest positive impact on income inequality, emerging market countries are second, and developed countries are third. External shocks, which are transmitted through the interplay of the exchange rate and interest rate channels, exacerbate income inequality as a result of financial openness.

Citation: Cheng Zhou, (2022) "The impact of financial openness on income inequality", *Economics Bulletin*, Volume 42, Issue 4, pages 1931-1945
Contact: Cheng Zhou - zhouchengxjtu@outlook.com.
Submitted: March 22, 2022. **Published:** December 30, 2022.

1. Introduction

In the context of financial globalization, income inequality or disparity is widening in many countries. For example, as shown in Figure 1, the Gini coefficient of national incomes in most East Asian countries has increased from [0.3, 0.4] in 1980 to [0.5, 0.6] in 2019. Income inequality is also expanding in countries gradually opening up financial markets, such as China, from 0.38 in 1980 to 0.56 in 2019. Besides that, income inequality has risen in certain European countries and other developing countries. As a result, income inequality exists all over the world today.

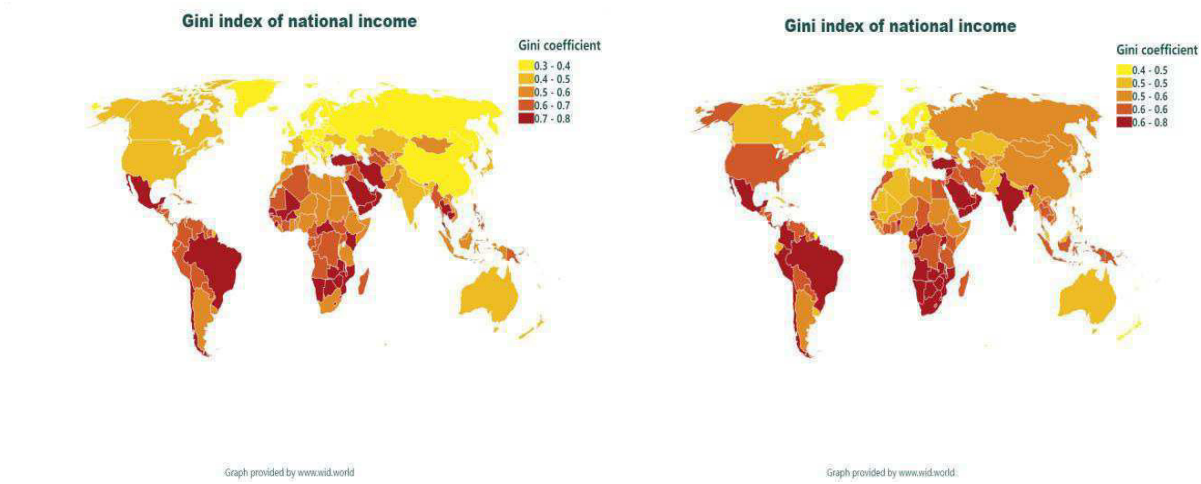

Figure 1: Changes in Global Income Inequality

Source:https://wid.world/share/#0/countriesmap/gptinc_p0p100_992_j/all/1980/eu/k/p/yearly/s/false/0.36082000000000003/0.8/curve/false/country;https://wid.world/share/#0/countriesmap/gptinc_p0p100_992_j/all/2019/eu/k/p/yearly/s/false/0.36082000000000003/0.8/curve/false/country. The left subgraph shows 1980; the right subgraph shows 2019.

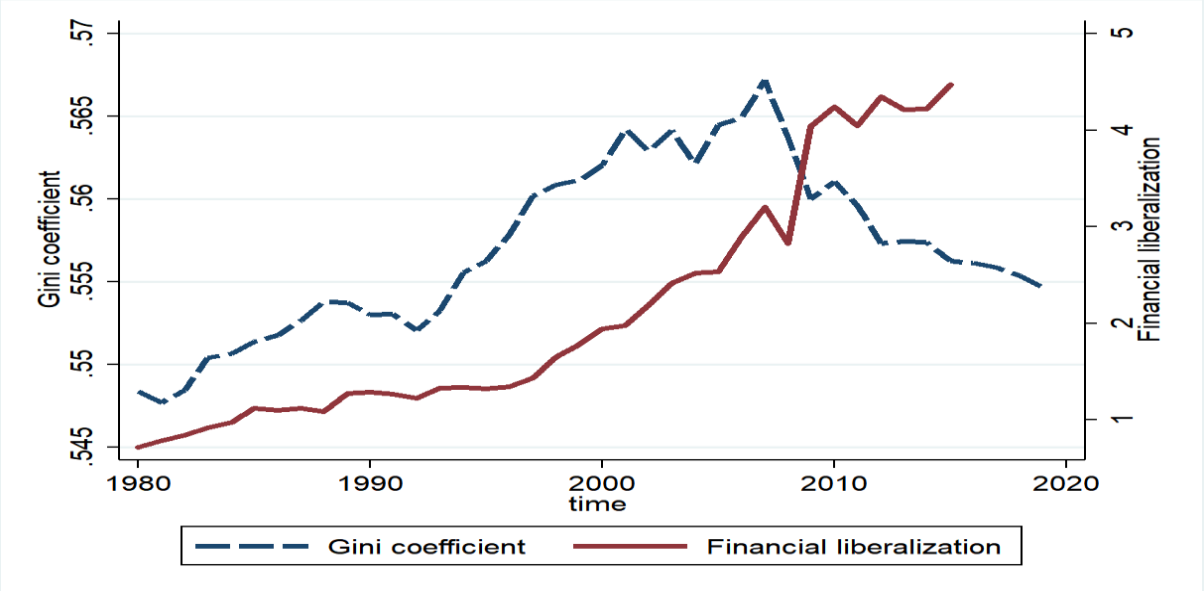

Figure 2: Income Inequality Along with Financial Liberalization

Source: World Inequality Datasets (WID); Lane and Milesi-Ferretti (2018).

Simultaneously, as financial globalization progressed, international capital flows increased, resulting in a steady rise in the size of foreign assets and liabilities owned by residents. Figure 2 depicts that, while income inequality as measured by the Gini coefficient has increased since 1980, the proportion of foreign assets and liabilities held by residents has climbed as well, rising from 71.73 percent in 1980 to 446.92 percent in 2010, that is, the highest level in this period. Based on these stylized facts, we want to look at the impact of financial openness on income inequality over the last 40 years. Mainly, is the impact in emerging market economies more significant than that in developing countries, owing to the former having more open financial markets? Moreover, how does financial openness affect income inequality?

It is not the first study to examine the link between financial openness and income inequality. Many works of literature have already speculated about the effect of financial openness (as opposed to capital controls, which have the opposite effect: the more capital controls, the less financial openness) on income inequality. For example, Liu *et al.* (2020) developed a small open economy model with overlapping generations to investigate the impact of capital account regulation on income inequality. They claim that capital inflow liberalization increases income inequality because the labor-income effect outweighs the capital-income effect. Especially the policy of opening capital outflows raises capital and labor incomes, lowering income inequality. Thus, the direction of capital movement plays a role in income inequality regarding financial liberalization policies.

Using a two-sector model, Liu *et al.* (2021) discuss China's optimal capital account strategy and argue that complete financial openness would exacerbate productivity disparities between enterprises and diminish residents' welfare in financial repression. De Ferra *et al.* (2020) explore the impact of a sudden cessation in capital inflows on the consumption of heterogeneous households. They discover that if a country's external debt concentrates in lower-income families, fewer capital inflows will cause aggregate consumption to contract even more. Finally, Eichengreen *et al.* (2021) and Cerra *et al.* (2021) examine the influence of financial globalization on income inequality in great detail. As they addressed, those different types of capital flows, such as foreign direct investments, portfolios, and remittances, have distinct impacts on income distributions due to the complementarity between capital and labor in the sectors or industries to which capital flows. In a nutshell, these researchers theorize that capital account opening causes income inequality to rise.

Other researchers empirically examine whether financial openness increases or decreases income inequality. Using new sample data from the University of Texas Inequality Project, Bumann and Lensink (2016) confirm that financial liberalization reduces income inequality, depending on the financial depth of a specific country. Zhang and Naceur (2019) investigate the relationship between financial development, income inequality, and poverty using a sample of 143 countries from 1961 to 2011. They conclude that financial liberalization, one facet of financial development, considerably increases income disparity and poverty.

In addition, employing the difference-in-difference estimation and propensity score matching, Li and Su (2021) analyze the impact of capital account liberalization on income inequality in developing countries. Their research reveals that capital account liberalization has increased income inequality in these countries. For 87 emerging market economies, Liu *et al.* (2020) show strong evidence that net capital inflows exacerbate income inequality. However,

empirical evidence in developed countries differs from that in developing or emerging economies. To reveal the difference and its channels, we use cross-country panel data to compare emerging market countries, developing countries, and developed countries.

We examine the influence of financial openness on income inequality and income distribution using 68 countries' data from 1980 to 2019. Notably, we look at the heterogeneous impact of financial openness on income inequality in emerging market countries, developing countries, and developed countries, as well as in different income quartiles (for example, income share by the highest 10%, highest 20%, lowest 20%, and lowest 10%) in these grouped countries. Financial openness allows much capital to flow across borders so that residents can allocate capital across countries freely. In that case, financial openness has expanded the amount and range of assets and liabilities available to residents in all countries.

We examine how financial openness affects income inequality through the exchange rate and interest rate channels in international capital flow. External shocks affect residents holding the value of foreign assets and liabilities through the exchange rate channel. The shocks affect the value of residents' holdings of domestic assets and liabilities through the interest rate channel. Through these channels, the income share of the high- and low-income groups changes, and the high- and low-income groups' income gap widens, eventually enlarging their income inequalities. Overall, our study has contributed to empirically assessing the heterogeneous impact of financial openness on income inequality and the channels it influences.

According to our study, financial openness has undoubtedly increased income inequality worldwide. Financial openness has the most significant impact on income inequality in developing countries. An increase in financial openness per unit leads to a rise in income inequality of roughly 1.5 percent in these countries. In emerging market countries, the influence is secondary. The developed countries are the tiniest of all.

In terms of heterogeneous consequences, financial opening raises the income share of high-income groups (such as the top 10% or top 20%) while lowering the income share of low-income groups (such as the lowest 10 percent or the lowest 20 percent). In other words, financial openness has a disproportionate impact on income distributions. As a result, the income gap between the high-income and low-income groups has grown.

Furthermore, the financial opening does affect income inequality via interest rate and exchange rate channels. Nominal exchange rate changes affect the value of foreign assets held by domestic residents, while nominal interest rate changes affect the value of domestic assets. Both alter the income disparity between high- and low-income groups. The increase in income disparity is due to the revaluation of net assets caused by the depreciation of the exchange rate and the rise in domestic interest rates, which raise the income share of high-income groups while lowering the income share of low-income groups.

2. Methodology and data

2.1 Methodology

To empirically estimate the impact of financial openness on income inequality for a sample of 68 countries from 1980 to 2019, we use the following benchmark panel regression model:

$$Gini_{it} = \alpha + \beta \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (1)$$

where $Gini_{it}$ is the Gini coefficient, which measures income inequality in country *i* at time *t*. Ka_open_{it} represents financial openness, associated with the estimated coefficient, β. X_{it} are vectors of control variables, including the inflation rate, Inf_{it}, population growth rate, Pop_{it}, trade openness, $Trade_{it}$, and economic policy uncertainty, Epu_r_{it}. γ are the estimated coefficients of these variables. We select the inflation rate because Nakajima (2015) and Albanesi (2007) address that inflation affects income inequality by disproportionately changing the real value of debtors' assets. As in Li and Su (2021) and Liu *et al.* (2021), we choose population size and trade openness as control variables. In addition, uncertainty in the economic environment, such as political instability, frequent policy turnover, and corruption, might also be an essential source of income inequality (Gupta *et al.* 2002, Chong and Gradstein 2007, and Lin and Fu 2016).

Moreover, μ_i is the individual fixed effect term, which controls aspects that do not vary with the individual, such as a country's legal institution. φ_t is the time-fixed effect term, which contains factors that do not change with the passage of a year, such as a world nominal interest rate shock. α is a constant term, and ε_{it} is an error term. $\beta > 0$ (or $\beta < 0$) indicates that financial openness increases (or decreases) income inequality.

To examine the heterogeneous impact, we decompose income inequality into four groups of income distributions: income share held by the top 10%, $f10$, income share held by the top 20%, $f20$, income share held by the lowest 20%, $l20$, and income share held by the bottom 10%, $l10$. Therefore, we expand the benchmark regression model into the following four equations:

$$f10_{it} = \alpha + \beta_{f10} \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (2)$$

$$f20_{it} = \alpha + \beta_{f20} \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (3)$$

$$l20_{it} = \alpha + \beta_{l20} \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (4)$$

$$l10_{it} = \alpha + \beta_{l10} \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (5)$$

where β_{f10} (β_{f20}, β_{l20}, β_{l10}) > 0 or (β_{f10} (β_{f20}, β_{l20}, β_{l10}) < 0) state that financial openness increases (or decreases) a group's income sharing. Suppose financial openness raises the income share of the high-income group (such as the top 10% or top 20%) while lowering the income share of the low-income group (such as the bottom 10% or bottom 20%). We deduce that financial openness increases income disparity and inequality in that case. It is, on the contrary, the polar opposite. Other variables are identical to those in Equation (1).

Finally, we look into how financial openness influences income inequality. Generally, the interest rate channel (see also Kaplan *et al.* 2018, and Bumann and Lensink 2016) and the exchange rate channel (see also De Ferra *et al.* 2020, and Verhoogen 2008) are two critical pathways for exogenous shocks to income inequality. With the financial opening up, the nominal exchange rate volatility has increased. Specifically, the depreciation (appreciation) of the nominal exchange rate decreases (increases) the value of foreign assets held in the exchange rate channel. Notably, changes in the nominal exchange rate have a minor impact on high-income households but a significant impact on low-income ones because they are at different income levels. As a result, income inequality caused by nominal exchange rate fluctuations is more pronounced for low-income households than high-income ones. Therefore, the net effect of the exchange rate channel on income inequality is proportional to the number of low-income

households.

In addition, domestic nominal interest rates have risen, and asset prices have fallen as monetary policy becomes tight. Thus, the value of assets held by residents decreases, and their income or return on the assets reduces. The change in the value of assets has a minor negative impact on high-income groups' income share but a significant negative impact on low-income groups. Through the interest rate channel, monetary policy shocks affect income inequality under financial openness.

Based on the benchmark regression equation, we take the nominal exchange rate (ex_{it}), domestic nominal interest rate (in_{it}), and the interaction between them as the conditioning variables of financial openness. Thus, we expand Equation (1) and determine the role of the corresponding channels:

$$Gini_{it} = \alpha + \beta \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \theta_{ex} \cdot Ka\_open_{it} \cdot ex_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (6)$$

$$Gini_{it} = \alpha + \beta \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \theta_{in} \cdot Ka\_open_{it} \cdot in_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (7)$$

$$Gini_{it} = \alpha + \beta \cdot Ka\_open_{it} + \gamma \cdot X_{it} + \theta_{ex\_in} \cdot Ka\_open_{it} \cdot ex_{it} \cdot in_{it} + \mu_i + \varphi_t + \varepsilon_{it}, \quad (8)$$

Equation (6) states the impact of financial openness on income inequality through the exchange rate channel. Coefficient $\theta_{ex} > 0$ measures the effect of nominal exchange rate depreciation on income inequality that accompanies financial openness. Equation (7) denotes the impact through the interest rate channel. Coefficient $\theta_{in} > 0$ measures the effect of the rising nominal interest rate on income inequality with increasing financial openness. Finally, Equation (8) states the impact through the interplay of the two channels. Coefficient $\theta_{ex\_in} > 0$ measures the associated effect.

2.2 Data

The data used in this study comes from Word Development Indicators (WDI) at the World Bank's datasets; the External Wealth of Nations Mark II database (Lane and Milesi-Ferretti 2018); the World Uncertainty Index (WUI) database; World Inequality Databases (WID); and the "Trilemma Indexes" on financial openness.

We take WID's Gini coefficient on income quantile to measure income inequality directly. A higher Gini coefficient indicates a greater degree of income inequality. Among them, "income inequality" refers to a set of variables dispersed from the 0% quantile to the 100% quantile. To measure income inequality accurately, we adopt four groups of distributed incomes from the WID: income shares owned by the top 10%, top 20%, lowest 20%, and lowest 10%.

The present study defines financial openness as the degree to which a country has unrestricted access to cross-border capital flows. This definition is consistent with Liu *et al.* (2021) and Chinn and Ito (2006). Thus, we can describe financial openness by opening capital accounts. Notably, we employ the Chinn-Ito index (KAOPEN) developed by Chinn and Ito (2006; 2008) to measure a country's capital account openness. In addition, the KAOPEN index contains information on cross-border financial transaction restrictions on Exchange Arrangements and Exchange Restrictions published annually by the International Monetary Funds. Although foreign direct investments are considered to affect wage distribution in financial openness (see also Chen *et al.* 2011, and Tomohara and Yokota 2011), we focus on the impact of financial openness on income distribution via changes in the value of assets rather than via its effect on employment.

Beyond that, the Consumer Price Index is used to calculate the CPI inflation rate.

Moreover, a country's total imports and exports ratio to its GDP is used to measure trade openness. Ahir *et al.* (2022) constructed the World Uncertainty Index for 143 countries by compiling the Economist Intelligence Unit country reports. And the total number of words in all accounts normalizes the WUI. Then, we adopt the index directly they constructed for the selected countries. A higher number on the index means higher uncertainty and vice versa.

We measure the domestic nominal interest rate using the deposit interest rate rather than the lending rate since our study focuses on the interest rate channel's role in household holdings of assets. Commercial banks pay the deposit interest rate for demand, time, or savings deposits. The authorities determine the nominal exchange rate or the rate specified in the legally sanctioned exchange market. It is calculated as an annual average based on monthly standards, that is, local currency units relative to the U.S. dollar per unit.

Following Kose *et al.* (2009), this study chooses a sample of 68 countries worldwide. The sample contains 21 emerging market economies, 26 developing and 21 developed countries. Significantly, the study updates the sample data's year to 2019. In addition, it constrains the sample period ranging from 1980 to 2019 since some countries imposed strong capital account controls before 1980; for example, China began its opening-up policies and reforms in 1979. Table 1 summarizes descriptive statistics for the variables.

Table 1: Descriptive Statistics

	Average	Standard error	Maximum	Minimum	Median	Observations
Gini	0.557	0.091	0.746	0.319	0.588	2 680
Ka_open	0.543	0.370	1	0	0.448	2 691
Inf	0.235	2.971	117.496	-0.117	0.045	2 585
Pop	0.014	0.010	0.060	-0.019	0.013	2 719
Trade	0.656	0.325	2.523	0.063	0.584	2 650
Epu_r	0.155	0.145	1.343	0	0.117	2 600
ex	399.068	1 894.583	25 000	2.28e-011	7.700	2 136
in	1.191	33.625	1 305.92	-0.004	0.070	1 523

From 1980 to 2019, income inequality peaks at 0.746. The average and median income inequality are 0.557 and 0.588, far above the internationally accepted *warning line* of 0.4. The degree of financial openness of 0.543 is a medium level. However, the level of financial openness for the countries selected is still low, by observing the median, 0.448. For the control variables, the volatilities of the nominal exchange rate and domestic nominal interest rate are relatively strong, 1 894.583 and 33.625, respectively. Overall, the level of economic policy uncertainty during this period remains relatively low, with an average of 0.155. Trade openness is equal to financial openness based on the average and median levels. It is worth noting that the inflation rate has a considerable dispersion among the countries, ranging from -0.117 to 117.476.

3. Empirical results

In this section, we first estimate the impact of financial openness on income inequality

using a representative sample of emerging market economies and developing and developed countries. Then, we examine the heterogeneous effects of financial openness on income quartiles by splitting income inequality into four. Finally, we investigate how financial openness affects income disparity through critical channels.

3.1 Basic results

Tables 2 and 3 present the basic results for all samples. Table 2 separately reports the estimated impact of the fixed effect (FE) and random effect (RE) models. As can be observed in columns 1 and 2, financial openness significantly increases income inequality. Other variables, such as the inflation rate, population growth rate, trade openness, and economic policy uncertainty, are controlled in columns 3 and 4. Nevertheless, the favorable effect of financial openness on income inequality remains significant. According to the preliminary result, increasing financial openness by one unit raises the Gini coefficient by 0.017 (1.7 percent) or 0.016 (1.6 percent). Therefore, the result suggests that financial openness exacerbates income inequality. Even though the estimation results of the FE and RE models are nearly identical, the Hausmann test ($p = 0.000$) in Table 2's last row indicates that the fixed effect model is suitable for processing cross-country panel data samples. As a result, this study employs the FE model in the subsequent regression estimation.

Table 2: Results of Fixed and Random Effects

	(1)	(2)	(3)	(4)
Ka_open	0.016***	0.015***	0.017***	0.016***
	(7.34)	(6.82)	(6.93)	(6.28)
Inf			0.000	0.000
			(0.92)	(0.85)
Pop			0.605***	0.709***
			(5.09)	(5.89)
Trade			0.025***	0.024***
			(6.84)	(6.49)
Epu_r			0.013***	0.014***
			(3.24)	(3.53)
Con.	0.549***	0.549***	0.516***	0.518***
	(428.29)	(65.61)	(154.77)	(65.07)
FE or RE	FE	RE	FE	RE
R^2	0.204	0.204	0.004	0.000
Obs.	2 651	2 651	2 420	2 420
Hausmann Test	$\chi^2(2) = 53.22$	$p = 0.000$	$\chi^2(6) = 94.60$	$p = 0.000$

Notes: ***1%, **5%, *10%. FE represents the fixed effect. RE represents the random effect. *Con.* denotes the constant term. *Obs.* denotes observations. T-values are shown in parentheses.

Table 3 shows the estimated results for emerging market economies and developing and developed countries. Controlling other factors, the impact of financial openness on income inequality is more substantial in developing countries than in emerging market economies. For example, in emerging market countries, a one-unit rise in financial openness is related to a 1.3

percentage point increase in the Gini coefficient and a 1.5 percentage point increase in developing countries. The finding aligns with Liu *et al.* (2020), who document that capital account liberalization raises the Gini coefficient by 1.35 percent in 87 emerging market countries. However, developed countries show little evidence that financial openness increases income inequality. Therefore, the influence of financial openness on income inequality varies depending on the group of countries.

The findings suggest that financial openness (or capital account controls) can increase (or decrease) income inequality worldwide, especially in emerging market economies and developing countries.

Table 3: Results of the Emerging market, Developing, and Developed Countries

	Emerging market countries		**Developing countries**		**Developed countries**	
	(1)	(2)	(3)	(4)	(5)	(6)
Ka_open	0.020***	0.013**	-0.003	0.015***	0.046***	0.002
	(4.56)	(2.60)	(-1.09)	(3.88)	(11.80)	(0.40)
Inf		0.000		0.000		-0.190***
		(0.75)		(0.41)		(-6.57)
Pop		-0.601**		1.532***		0.454**
		(-2.54)		(8.53)		(2.16)
Trade		0.024***		-0.003		0.042***
		(3.25)		(-0.55)		(7.13)
Epu_r		0.039***		-0.016**		0.014**
		(4.80)		(-2.89)		(2.16)
Con.	0.595***	0.589***	0.613***	0.578***	0.408***	0.419***
	(306.07)	(78.35)	(423.50)	(95.84)	(116.42)	(68.92)
R^2	0.005	0.022	0.001	0.100	0.052	0.019
Obs.	836	742	992	856	823	822

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

3.2 The impact of financial openness on quartile incomes

Financial openness impacts quartile incomes, as shown in Table 4. It includes four equally quantified income shares in comparative analysis. Financial openness raises the income share of the high-income group (e.g., the top 10% and 20%). However, it has minimal effect on the low-income group's income share (e.g., the lowest 10 percent and the lowest 20 percent). For example, as the degree of financial openness rises one unit, the share of income increases by 1.3 percent in the top 20%. However, financial openness does not affect the income share of the bottom 20%. The outcomes are the same for the top 10% and bottom 10% of residents. Based on these results, financial openness exacerbates income inequality by raising the share of the wealth of income.

Tables 5-7 report estimates for emerging markets and developing and developed countries. Table 5 displays that in emerging market countries, financial openness decreases the income share of the high-income group while increasing the income share of the low-income group. Although the results in Table 5 indicate that financial openness might reduce income inequality

in these countries, financial openness has the net effect of increasing income disparity, as shown in Table 3. It may be related to the proportion of high- and low-income households and deserves further study.

Table 4: The Impact on Quartile Incomes of Financial Openness

	Highest 10%	Highest 20%	Lowest 20%	Lowest 10%
Ka_open	0.014**	0.013**	-0.000	0.000
	(2.98)	(2.82)	(-0.21)	(0.53)
Inf	0.002**	0.002**	-0.000	-0.000
	(2.64)	(2.79)	(-1.43)	(-0.94)
Pop	0.954***	0.832***	-0.200***	-0.098***
	(4.56)	(4.08)	(-3.83)	(-3.82)
Trade	-0.009	-0.009	-0.001	-0.002*
	(-1.39)	(-1.43)	(-0.93)	(-1.90)
Epu_r	-0.020***	-0.020***	0.002	0.001
	(-3.31)	(-3.26)	(1.59)	(0.72)
Con.	0.302***	0.459***	0.064***	0.025***
	(50.27)	(76.87)	(42.07)	(33.48)
R^2	0.075	0.065	0.066	0.025
Obs.	939	939	939	939

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

Table 5: Results for Emerging Market Economies

	Highest 10%	Highest 20%	Lowest 20%	Lowest 10%
Ka_open	-0.024***	-0.028***	0.008***	0.004***
	(-3.25)	(-3.73)	(4.37)	(4.45)
Inf	0.001	0.001	-0.000	-0.000
	(1.56)	(1.62)	(-0.74)	(-0.39)
Pop	1.113**	1.073**	-0.089	-0.030
	(2.92)	(2.80)	(-0.96)	(-0.68)
Trade	-0.035***	-0.034**	0.007**	0.002*
	(-3.00)	(-2.91)	(2.46)	(1.77)
Epu_r	-0.013	-0.016	0.004*	0.002
	(-1.24)	(-1.58)	(1.77)	(1.45)
Con.	0.368***	0.527***	0.048***	0.019***
	(33.39)	(47.61)	(17.79)	(14.78)
R^2	0.092	0.076	0.025	0.015
Obs.	276	276	276	276

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

Table 6 shows that financial openness raises the income share of the high-income group in developing countries. A one-unit rise in financial openness relates to a 6% increase in income share for the top 10% of residents and a 5.8% increase for the top 20%. Financial openness,

however, reduces the income share of the lowest 20% of residents by only 0.7 percent. Moreover, it impacts the poorest 10% of residents almost little. These findings are broadly consistent with those of Table 4's full-sample estimation. The results in Table 6 imply that financial openness boosts the income share of high-income groups while decreasing the income share of low-income groups. Therefore, financial openness in developing countries leads to more significant income inequality than in other countries.

Table 6: Results for Developing Countries

	Highest 10%	Highest 20%	Lowest 20%	Lowest 10%
Ka_open	0.060***	0.058***	-0.007**	-0.002
	(6.31)	(6.19)	(-2.70)	(-1.52)
Inf	0.061**	0.046**	-0.001	-0.000
	(2.96)	(2.26)	(-0.20)	(-0.05)
Pop	1.966***	1.838***	-0.582***	-0.280***
	(3.76)	(3.55)	(-4.61)	(-4.82)
Trade	-0.009	-0.004	-0.003	-0.002
	(-0.60)	(-0.27)	(-0.93)	(-1.35)
Epu_r	-0.028*	-0.027*	0.005	0.002
	(-1.87)	(-1.76)	(1.47)	(1.08)
Con.	0.302***	0.464***	0.060***	0.023***
	(18.26)	(28.30)	(14.94)	(12.61)
R^2	0.146	0.159	0.111	0.081
Obs.	283	283	283	283

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

Table 7: Results for Developed Countries

	Highest 10%	Highest 20%	Lowest 20%	Lowest 10%
Ka_open	0.010	0.013**	-0.008***	-0.005***
	(1.67)	(2.17)	(-3.72)	(-4.00)
Inf	-0.033	-0.024	-0.016	0.007
	(-0.83)	(-0.61)	(-1.11)	(0.76)
Pop	-0.259	-0.373**	0.168**	0.087**
	(-1.50)	(-2.16)	(2.66)	(2.32)
Trade	0.008	0.003	-0.002	-0.001
	(1.46)	(0.62)	(-0.85)	(-0.83)
Epu_r	-0.007	-0.005	-0.004**	-0.002**
	(-1.41)	(-0.94)	(-1.98)	(-2.12)
Con.	0.237***	0.387***	0.086***	0.035***
	(36.74)	(59.99)	(36.61)	(25.11)
R^2	0.073	0.030	0.013	0.011
Obs.	380	380	380	380

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

Financial openness in developed countries has lowered the income share of low-income groups by 0.8 percent for the lowest 20% and 0.5 percent for the lowest 10%, as seen in Table 7. However, the impact of financial openness on the income share of the highest income group needs to be clarified. For example, an increase in the financial openness of one unit relates to a 1.3 percent increase in income share in the top 20% of residents but no significance in the top 10%. On the whole, the impact of financial openness on income disparity in developed countries is very evident.

3.3 Channels of interest rate and exchange rate

This part reveals the impact on income disparity of financial openness by channels of nominal interest rate and nominal exchange rate. Table 8 shows the pathways through which financial openness affects income inequality. The nominal exchange rate is essential in the impact of financial openness on income inequality in columns 1 and 2. The favorable effect of financial openness on income inequality can be significantly decreased (or increased) by a rise (or drop) in the nominal exchange rate, which is a depreciation (or appreciation) of the nominal exchange rate. As shown in column 4 of Table 8, the nominal interest rate affects financial openness's impact on income inequality. The effect of financial openness on income inequality, which is now at 1.7 percent, becomes significant while the domestic nominal interest rate rises. This channel's influencing rationale is similar to the exchange rate channel.

Table 8: The Impact of Interest Rate and Exchange Rate Channels

	(1)	(2)	(3)	(4)	(5)	(6)
Ka_open	0.017***	0.020***	0.015***	0.022***	0.006	0.015**
	(7.77)	(7.57)	(5.99)	(7.66)	(1.46)	(2.98)
Inf		0.000		0.000		0.003
		(0.99)		(0.70)		(0.21)
Pop		0.474***		0.300**		0.978***
		(3.52)		(1.99)		(3.27)
Trade		0.021***		0.015***		0.028***
		(4.93)		(3.99)		(4.63)
Epu_r		0.014**		-0.003		0.005
		(2.95)		(-0.61)		(0.75)
Ka_open × ***exchange_rate***	-1.19e-06**	-1.24e-06**				
	(-2.16)	(-2.20)				
Ka_open × ***deposit_rate***			0.016*	0.017**		
			(1.96)	(2.06)		
Ka_open × ***exchange_rate*** × ***deposit_rate***					0.046**	0.048**
					(2.49)	(2.11)
Con.	0.559***	0.529***	0.575***	0.554***	0.570***	0.528***
	(462.53)	(131.46)	(415.60)	(128.11)	(198.22)	(72.69)
R^2	0.140	0.000	0.107	0.054	0.076	0.003
Obs.	2 073	1 870	1 487	1 331	517	462

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

Furthermore, column 6 presents that the interplay between the interest rate channel and the exchange rate channel worsens the impact of financial openness on income inequality, with the last column reaching 4.8 percent. The reason is that, in an open economy, the value of residents' assets has an enormous impact on changes in their income via the interest rate and exchange rate channels than those in their income via a single channel. While the nominal exchange rate depreciates and the domestic nominal interest rate rises, the value of low-income groups' domestic and foreign assets is adversely affected to a greater extent. As a result of financial openness, income disparities have widened through the two channels.

Table 9 presents the role of these channels in various quartile income groups. The impacts on income shares of financial openness through the interest rate and exchange rate channels are 6.1 percent for the top 10% of the residents and 6.5 percent for the top 20%. However, financial openness lowers low-income groups' income shares through the channels, which are 1.4 percent for the bottom 20% and 0.5 percent for the bottom 10%.

Table 9: The Heterogeneous Impact of Interest Rate and Exchange Rate Channels

	Highest 10%	**Highest 20%**	**Lowest 20%**	**Lowest 10%**
Ka_open	0.043***	0.041***	-0.006**	-0.002*
	(3.86)	(3.62)	(-2.40)	(-1.79)
Inf	-0.049	-0.053*	0.008	0.002
	(-1.59)	(-1.72)	(1.27)	(0.60)
Pop	3.865***	3.869***	-0.727***	-0.263***
	(4.83)	(4.76)	(-4.15)	(-3.59)
Trade	0.000	0.004	-0.002	-0.001
	(0.03)	(0.30)	(-0.63)	(-0.98)
Epu_r	0.005	0.001	0.002	0.001
	(0.40)	(0.11)	(0.92)	(1.24)
Ka_open × ***exchange_rate*** × ***deposit_rate***	0.061*	0.065*	-0.014*	-0.005
	(1.69)	(1.79)	(-1.73)	(-1.54)
Con.	0.264***	0.422***	0.068***	0.026***
	(16.66)	(26.12)	(19.67)	(18.03)
R^2	0.012	0.008	0.005	0.001
Obs.	175	175	175	175

Notes: ***1%, **5%, *10%. T-values are shown in parentheses.

Accompanied by capital account opening up, the income share of high-income groups rises, and the income share of low-income groups falls through the interest rate and exchange rate channels. This is because the value of foreign assets owned by residents has decreased as the nominal exchange rate depreciates. At the same time, rising nominal interest rates have reduced the value of their domestic assets. As a result, low-income residents' income share has shrunk even further. Nevertheless, the income share of high-income residents has increased. Therefore, the income gap between high-income and low-income groups has grown, and

financial openness has exacerbated income disparities.

4. Conclusion

Financial openness substantially impacts income disparity due to residents of each country being able to possess foreign assets and liabilities more than before in a financially integrated world. We examine the heterogeneous impact of financial openness on income inequality, mainly focusing on a sample of 68 countries from 1980 to 2019. Financial openness significantly influences income inequality in developing countries, followed by emerging market countries, and finally, developed ones. All this occurs due to increasing the income share of high-income groups while decreasing the income share of low-income groups. We further document how financial openness influences income inequality using the same sample data. Financial openness affects income inequality through the interest rate and exchange rate channels. The combined effect through the two channels is more significant than each.

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