UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

WORKING PAPER
No. 4

UNCTAD/WP/2023/3
APRIL 2023

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Wealth Distribution, Income Inequality and Financial Inclusion: A Panel Data Analysis

Abstract

Research and data indicate that wealth inequality is more concentrated than income inequality and that there is a high correlation between both variables. Yet, most empirical studies on the determinants of economic inequality focus on income and not wealth inequality and they rarely examine the nexus between the two variables. Against this backdrop, this paper examines the impact of income inequality on the distribution of wealth using panel data and controlling for the roles of financial inclusion and other potential drivers of wealth inequality. We find evidence that lagged wealth and savings rates increase wealth inequality globally as well as in the developed and developing countries samples. We also find that income inequality and return on deposits are dis-equalizing in developing countries while financial inclusion is equalizing in developed countries. In both the global and developing countries samples, financial inclusion has a negative relationship with wealth inequality, but the coefficients are not statistically significant. The findings of the paper have important policy implications for national efforts to address wealth inequality.

Key words

Wealth, income, inequality, distribution, Gini, financial inclusion

United Nations

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Acknowledgements

The authors thank an anonymous referee for very valuable suggestions and comments provided on an earlier version of the paper. Useful suggestions by Anida Yupari Aguado are also gratefully acknowledged.

1. Introduction

Since the inclusion of inequality as one of the 17 Sustainable Development Goals (SDGs) adopted by United Nations member States in 2015, there has been an upsurge in interest and research on economic inequality and related issues, reflecting global concerns that the benefits of recent growth have not been equitably distributed both within and across countries. The focus on distribution issues has become even more relevant and timely because the asymmetric impacts of the COVID-19 pandemic, interest rate hikes in advanced economies, and recent food and energy price increases, have led to divergent fortunes between the rich and the poor thereby exacerbating existing inequalities (World Bank 2022a; UNCTAD 2022). Societies care about high and extreme inequalities because they are morally wrong and have consequences for sustainable development. High inequality constrains growth and hampers poverty reduction. It can also deepen social and political divide, and ultimately lead to violence (United Nations 2020). In this context, an understanding of the core determinants of wealth inequality is important not only from an academic but also from a policy, perspective.

Three important facts have emerged from the recent literature on economic inequality: the high levels of wealth inequality; the higher concentration of wealth inequality relative to income inequality; and the high correlation between wealth and income inequality (De Nardi and Fella 2017; Chancel et al. 2021; Davies and Shorrocks 2021). These facts suggest that wealth inequality is a much more serious issue than income inequality and that there may be a causal relationship between both phenomena. Yet, most of the empirical papers examining the drivers of economic inequality in the literature focus on income and not wealth inequality.[1] They also do not investigate whether income inequality is a driver of wealth inequality, even though extant theories assign an important role to differences in earnings or income in explaining sources of wealth inequality (Benhabib, Bisin and Luo 2017). To the best of our knowledge, the exceptions are (Shin 2020) and Fouejieu et. al. (2020). Shin (2020) examined the drivers of income and wealth inequalities in the Republic of Korea as well as the relationships between them. He found that the most important drivers of wealth inequality in the Republic of Korea are income and loans. Similarly, Fouejieu et. al. (2020) investigated the link between financial inclusion and economic inequality using data for the period 2004-2015 and found that financial inclusion improves income and wealth inequalities. However, they did not examine the link between income and wealth inequalities. There is also a different, but related, literature that attempts to use calibrated models to reproduce the skewed and thick tail observed in the distribution of wealth (Benhabib and Bisin 2018; De Nardi and Fella 2017; Benhabib, Bisin and Luo 2017; Hendricks 2007). These studies find that wealth distribution has a much thicker tail than earnings distributions, indicating that differences in earnings alone cannot fully explain changes in wealth inequality and that other factors also play important roles.

Against this backdrop, this paper examines the role of income inequality in explaining wealth distribution after controlling for the impacts of financial inclusion and other potential determinants of wealth distribution. The estimations are done using global, developed, and developing country samples as the sources and dynamics of wealth are likely to be different in these categories of countries. Our paper differs from Shin (2020) because the focus of that paper was on the Republic of Korea while our paper uses a global sample. In addition, our estimations account for the endogeneity of the regressors while Shin (2020) does not. The present paper also differs from Fouejieu et. al. (2020) in the sense that it examines the impact of both income inequality and financial inclusion on wealth inequalities while their paper focused on the role of financial inclusion alone. In addition, unlike Fouejieu et. al. (2020), we control for other sources of wealth accumulation, such as the savings rate and return on capital, that the literature indicates are potential drivers of changes in wealth inequality (Piketty 2014; Benhabib, Bisin and Luo 2017). An examination of the role of financial inclusion in the distribution of

[1] Davies and Shorrocks (2021) compared global trends in both income and wealth inequalities but did not investigate whether there is a causal relationship between both variables.

wealth is important because, over the past few decades, there has been relatively rapid progress towards financial inclusion, particularly in developing countries. While its role in the growth process, and in reducing income inequality, has been well documented (Demirgüç-Kunt and Singer 2017; Beck, Demirgüç-Kunt and Levine 2007), its impact on wealth distribution is neither well understood nor well established in the empirical literature. In this context, our paper complements and contributes to the existing literature on the determinants of wealth inequality.

Using the Gini index for wealth as our measure of wealth inequality, we find evidence that lagged wealth and savings rates increase wealth inequality globally as well as in the developed and developing countries samples. Furthermore, we find that income inequality and returns on deposits are dis-equalizing in developing countries while financial inclusion is equalizing in developed countries. In both the global and developing countries samples, financial inclusion has a negative relationship with wealth inequality, but the coefficients are not statistically significant. Regarding the drivers of extreme wealth inequality or concentration, as measured by the share of the top 1 percent in wealth, we find that lagged wealth is the most significant driver of extreme wealth inequality in all samples considered, underscoring the fact that there is persistence in the distribution of wealth. That said, there are also important differences in the results across samples. For example, in the global sample, income inequality is an important driver of extreme wealth inequality or concentration while in the developed countries sample the savings rate matters.

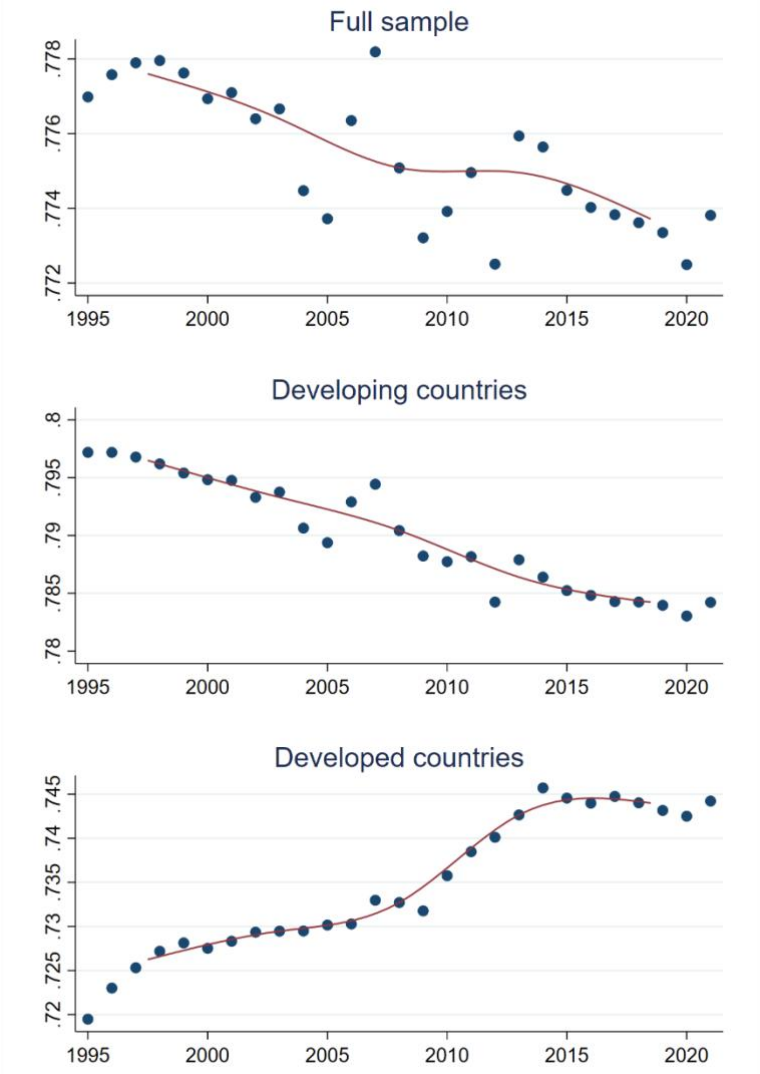
The rest of the paper is organised as follows. Section 2 highlights some stylized facts on wealth and income inequalities. It also discusses recent developments regarding financial inclusion. Section 3 presents the empirical framework adopted in the analyses as well as a discussion of the variables and sources of data used. Section 4 presents and analyses the estimation results while section 5 examines the sensitivity of the results to changes in the choice of selected indicators. Section 6 contains concluding remarks and policy implications of the paper.

2. Some facts on wealth inequality, income distribution and financial inclusion

We begin our investigation of the determinants of wealth distribution with an examination of data on wealth and income inequalities (Figure 1 and Table 1). Several points can be made from the data. First, the level of wealth inequality is very high globally, with the Gini index of net personal wealth hovering between 0.70 and 0.80 in the period 1995-2021 (Figure 1). The same conclusion results from a look at the shares of different groups in wealth. For example, in 2021 the share of the top 1 percent in global wealth was 39.2 percent, while the share of the bottom 50 percent was only 1.85 percent. That said, at the global level, there was only a marginal increase in the share of the top 1 percent in wealth from 38.3 percent in 1995 to 39.2 percent in 2021. However, the share of the top 10 percent in wealth fell from 79.9 percent in 1995 to 76.1 percent in 2021.

Second, wealth inequality is much higher than income inequality globally and in all regions of the world. For example, in 2021, the share of the top 1 percent in global wealth was 39.2 percent compared to their share of global income of 19.1 percent. Similarly, the share of the top 10 percent in global wealth was about 76.1 percent while the share of the same group in global income was 52.2 percent. It is worth noting that in the same year, the bottom 50 percent of the population accounted for 8.5 percent of global income but only 1.85 percent of global wealth.

Figure 1. Evolution of Gini coefficient for wealth, by country group



Note: Each dot is a simple average across countries, and the sample covers 172 countries for the period 1995-2021. Grouping countries into developed and developing is based on United Nations' "Standard Country or Area Codes for Statistical Use". Data sourced from World Inequality Database (by the World Inequality Lab).

The third point evident in the data is that wealth and income inequalities vary significantly across regions. For example, if we focus on the share of the top 1 percent in wealth, in 2021, Latin America had the highest wealth inequality (45.2 percent), followed by Asia and Africa (36.1 percent) and North America (34.5 percent). Oceania and Europe had the lowest levels of wealth inequality with the top 1 percent accounting for 25.5 percent and 26 percent of wealth respectively. Regarding the share of the top 10 percent in wealth, in 2021 it was about 77 percent in Latin America, 72 percent in Asia and 71 percent in Africa while it was about 62 percent in Oceania and 61 percent in Europe. It is worth mentioning that although the share of the top 10 percent in wealth in Africa in 2021 (71 percent) is below the share of the top 10 percent in global wealth (76 percent), six of the seven countries where the top 10 percent of the population has wealth shares above 80 percent in 2021 were in Africa. South Africa led the group with a share of the top 10 percent in wealth of about 86 percent, followed by Sao Tome and Principe and Central African Republic with about 81 percent, and Mozambique, Namibia and Eswatini (formerly Swaziland) with 80 percent. With a share of about 80 percent, Chile is the only non-African country that has a share as high as 80 percent. Interestingly, the six countries that had the

lowest wealth inequality in 2021 were in Europe: The Netherlands with top 10 wealth share of 48 percent, Slovakia with a share of about 50 percent, Denmark with a share of about 51 percent, Belgium with a share of 52 percent and Malta with a share of about 54 percent.

Table 1. Wealth and income shares of selected groups in 1995 and 2021 (%)

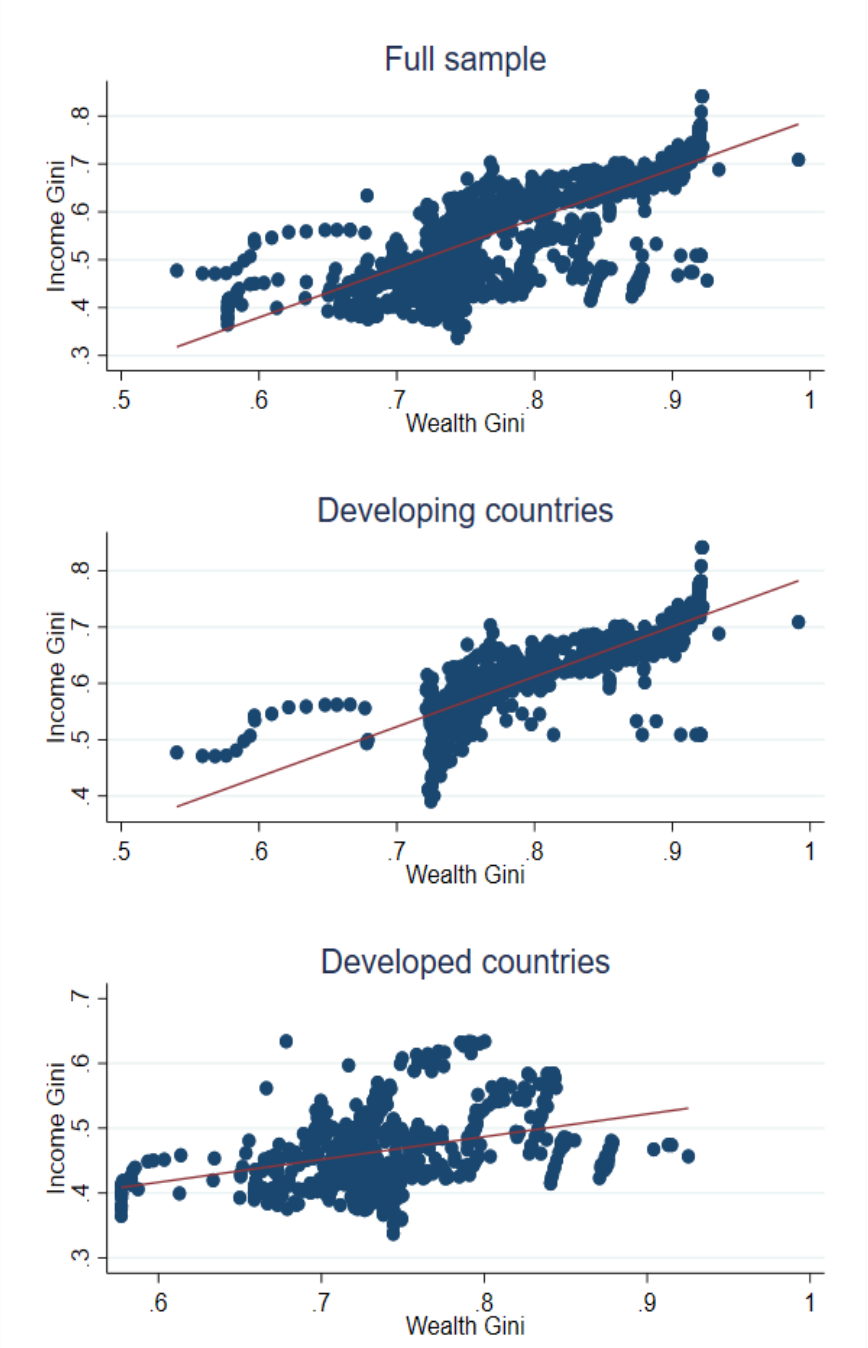
	Year	Top 1 %		Top 10 %		Bottom 50 %	
		Income share	Wealth share	Income share	Wealth share	Income share	Wealth share
Africa	1995	18.9	42.1	55.3	76.3	7.6	0.01
	2021	19.9	36.1	54.6	71.1	8.8	1.31
Asia	1995	22.2	42.3	55.4	75.2	10.2	3.53
	2021	18.2	36.1	50.7	72.1	10.1	3.46
Europe	1995	9.8	22.0	34.2	57.7	17.3	3.93
	2021	11.7	26.0	35.8	60.9	18.9	3.24
Latin America	1995	21.7	43.1	57.3	74.9	9.4	1.14
	2021	25.0	45.2	57.8	76.9	9.8	0.47
North America	1995	14.4	28.2	39.9	65.5	15.9	2.31
	2021	19.0	34.5	45.7	70.0	13.8	1.72
Oceania	1995	9.4	23.4	31.8	59.2	13.6	3.08
	2021	12.6	25.5	37.0	61.6	12.2	2.47
World	1995	18.9	38.3	56.1	79.9	7.1	1.47
	2021	19.1	39.2	52.2	76.1	8.5	1.85

Source: World Inequality Database (by the World Inequality Lab).

The fourth point emanating from the data is that between 1995 and 2021 extreme wealth inequality (measured by the share of the top 1 percent in wealth) increased in Europe, Latin America, North America, and Oceania but the most significant increases were observed in North America (6.3 percentage points) and Europe (4 percentage points). By contrast, extreme wealth inequality fell in Africa and Asia, although they continue to exhibit very high levels of wealth inequality relative to Europe and Oceania. An examination of the share of the top 10 percent in wealth also leads to a similar message that between 1995 and 2021 wealth inequality fell in Africa and Asia while it increased in Europe, North America, Oceania, and Latin America.

Another interesting feature observed in the data on the distribution of income and wealth is the high correlation between income and wealth inequalities (Figure 2). Using data for the period 1995-2021, the pairwise correlation between the Gini indices for income and wealth inequalities is positive, with a coefficient of 0.76 in the global sample, 0.86 in the developing countries sample, and 0.37 in the developed countries sample.

Figure 2. Relation between wealth inequality and income inequality



Note: Each dot is a country-year, and the sample covers 152 countries for the period 1995-2021. Grouping countries into developed and developing is based on United Nations' "Standard Country or Area Codes for Statistical Use". Data sourced from World Inequality Database (by the World Inequality Lab).

Regarding financial inclusion, our discussion of the situation in this area will focus on three indicators: (i) the percentage of adults who reported either, having an account with a financial institution, or personally used a mobile money service in the past year; (ii) the percentage of adults who saved at a financial institution in the past year; and (iii) the percentage of adults who reported having borrowed any money from any source in the past year (World Bank 2022b). Table 2 presents data on these indicators of financial inclusion. The following three messages are evident in the data. First, over the

past decade, significant progress has been made both globally and in all regions of the world. Globally, the percentage of adults with an account increased from 50.6 percent in 2011 to 76.2 percent in 2021 and the percentage of adults who saved at a financial institution rose from 22.4 percent to 29.4 percent in the same period. Furthermore, the percentage of adults who borrowed any money (from any source) increased from 47.5 percent to 52.9 percent from 2017 to 2021. An examination of the indicators for the regions of the world also leads to a similar message that there has been an improvement in financial inclusion over the past decade. Second, globally the pace of progress in financial inclusion is much faster when the focus is on the indicator that measures the percentage of adults with an account compared with either the percentage of adults who saved at a financial institution or the percentage of adults who borrowed any money.

The third message that emanates from the data on financial inclusion is that the levels of financial inclusion are much higher in East Asia & Pacific and Europe & Central Asia compared with Latin America & Caribbean, Middle East & North Africa, South Asia, and Sub-Saharan Africa. In addition, in 2021 Sub-Saharan Africa had the lowest level of financial inclusion based on the percentage of adults with an account while South Asia had the lowest level of financial inclusion based on the percentage of adults who saved at a financial institution. Interestingly, when we focus on the percentage of adults who borrowed any money then Sub-Saharan Africa emerges as the most financially inclusive in 2021 with 55.6 percent. That said, when we consider the percentage of adults who borrowed from a formal financial institution then Sub-Saharan Africa does not fare as well. In fact, based on this indicator East Asia & Pacific is the most financially inclusive (with 36.7 percent), followed by Europe & Central Asia (39.5 percent), Latin America & Caribbean (30.3 percent), Middle East & North Africa (15.3 percent), Sub-Saharan Africa (with 14.4 percent), and South Asia (with 12.1 percent). These differences in levels of financial inclusion across regions are not surprising given that the regions are at different levels of economic development.

Table 2. Selected indicators of financial inclusion

	Percentage of adults with an account		Percentage of adults who saved at a financial institution		Percentage of adults who borrowed any money	
	2021	2011	2021	2011	2021	2017
East Asia & Pacific	82.85	59.81	42.13	31.16	54.65	48.55
Europe & Central Asia	89.57	69.34	36.74	24.66	54.25	51.21
Latin America & Caribbean	73.55	39.47	17.81	9.81	51.32	37.95
Middle East & North Africa	52.84	37.76	14.68	10.23	52.41	44.56
South Asia	67.89	32.33	11.16	11.1	43.84	41.48
Sub-Saharan Africa	55.07	23.32	15.63	13.86	55.9	45.63
World	76.2	50.63	29.43	22.37	52.87	47.47

Source: World Bank Global Financial Inclusion Database.

3. Empirical framework

The baseline model that we adopt for the empirical analysis is specified in equation (1).

$$Wealth_{it} = \beta_1 Wealth_{it-1} + \beta_2 I_{it} + \beta_3 S_{it} + \beta_4 R_{it} + \beta_5 F_{it} + \mu_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where subscript i denotes country and t indicates period. $Wealth_{it}$ is wealth inequality in country i in period t, $Wealth_{it-1}$ is lagged wealth inequality (in country i and period $t-1$), I_{it} is income inequality in country i in period t, S_{it} is savings rate in country i in period t, R_{it} is the return on capital in country i in period t, F_{it} is financial inclusion in country i in period t, μ_i are country fixed effects, γ_t are time fixed effects, and ε_{it} is an error term.

The choice of an empirical framework and the regressors we included in the study are guided by the existing literature on the distribution of wealth and the sources of wealth accumulation (Piketty 2014; Benhabib, Bisin and Luo 2017; Killewald, Pfeffer and Schachner 2017).[2] The intuition behind the regressors and their expected signs are discussed below. The first explanatory variable included in the model is lagged wealth which is expected to be positively related to the dependent variable. It is important to include lagged wealth in equation (1) because the evolution of wealth inequality in several countries spanning the entire twentieth century suggests that it is path dependent.[3] Our descriptive analysis across countries over the last 25 years (Figure 1) also shows that year-on-year changes in wealth inequality are small. It should be noted that lagged wealth could also be regarded as a proxy, albeit an imperfect one, for inheritances and bequests. Piketty (2014) argues that inheritances and bequests play an important role in the accumulation of wealth and so need to be considered in understanding the dynamics of wealth inequality.[4]

The second variable we have included as a regressor in the estimated equation is income inequality, which is expected to have a positive relationship with wealth inequality. The inclusion of this regressor is justified by the following literature linking earnings inequality to wealth inequality (Benhabib and Bisin 2018; De Nardi and Fella 2017; and Benhabib, Bisin and Luo 2017). It also makes sense to include it as a regressor given the high correlation between the two variables as captured in Figure 2. The third variable that we have included as a regressor is the savings rate. Given that people at the bottom of the distribution are more focused on how to meet their subsistence needs, and tend to have insufficient income to save, an increase in the savings rates is expected to increase wealth inequality. De Nardi and Fella (2017) suggest that differences in savings across groups can help provide an understanding of changes in wealth inequality.

The fourth variable we have included as a regressor is the rate of return on assets or capital. According to Piketty (2014), when the rate of return on capital is higher than the rate of growth of the economy, wealth inequality increases significantly. De Nardi and Fella (2017) have also identified heterogeneity in rates of return to capital as a factor in explaining wealth inequality. The final regressor we have included in the regression is financial inclusion and the literature suggests that more financial inclusion should reduce wealth inequality. Fouejieu et. al. (2020) argue that financial inclusion is an important

[2] It is challenging to examine the determinants of wealth inequality when wealth is "net worth" because some values could be negative and in this case the Gini index is not bounded between 0 and 1. However, this problem does not arise in our paper as the wealth Gini in our sample lies in the interval 0.69 and 0.99.

[3] It has also been noted that large contractions of inequality happened only during the world wars (Atkinson and Piketty 2007).

[4] Unfortunately, there is no data on inheritances and bequests for many countries in the sample, and so it was not possible to include a direct measure of this variable in the regressions. An increase in inheritance or bequest is expected to increase wealth inequality, given the fact that it is mostly families that are relatively well-off that leave bequests for their children.

determinant of economic inequality and that a more inclusive financial system will improve wealth distribution.

We measure wealth inequality and income inequality with their respective Gini coefficients sourced from the World Inequality Lab. Savings rate and return on deposits are from the World Bank's World Development Indicators (WDI). Financial inclusion, proxied by the share of adults that borrowed from a formal financial institution, is sourced from the Global Findex Database of the World Bank.

The resulting dataset is a panel of 97 countries for the period 2004-2021. The panel data starts from 2004 because that is when the data on financial inclusion became available. Table A3 in the Annex provides the full list of countries and the composition of the subsamples. The data are aggregated into 3-year periods using simple averaging. The aggregation is necessary to accommodate several features of the data. First, it is an unbalanced panel with a slowly moving outcome variable. Second, the data on financial inclusion is available once every three years because the data collection is based on surveys that are rolled out every three years. See Table A1 in the Annex for the full list of variables, their sources, definitions and computational choices, and Table A2 for the summary statistics.

To control for the endogeneity of the lagged dependent variable and other regressors we estimate Equation (1) using the System Generalized Method of Moments (GMM) technique developed by Arellano and Bover (1995) and Blundell and Bond (1998). More specifically, we implement the two-step system GMM and report Windmeijer-corrected standard errors.[5] For the transformation of variables in system GMM we use orthogonal deviation because it is most suited for a dataset with missing observations. Furthermore, the panel specification allows us to control for unobserved country-specific heterogeneity and time effects (Fajeau 2021).

At this stage, it would be interesting to examine the correlation among our variables of interest, while recognising that correlations do not imply causality (Table 3). The striking feature of the data is the close bilateral relationship between wealth inequality and income inequality: the correlation between the wealth Gini and the income Gini is 0.82. As expected, financial inclusion (proxied by the share of adults who borrowed from formal financial institutions) is negatively correlated with wealth inequality (-0.24) and with income inequality (-0.28), and positively correlated with the savings rate (0.18). Furthermore, the savings rate, the return on deposits and the return on equity all have a very weak bilateral correlation with wealth inequality.

Table 3. Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Wealth Gini	1.00					
(2) Income Gini	0.82	1.00				
(3) Financial inclusion	-0.24	-0.28	1.00			
(4) Savings rate	-0.01	-0.05	0.18	1.00		
(5) Return on deposits	-0.01	-0.20	0.33	0.03	1.00	
(6) Return on equity	-0.05	-0.24	0.38	0.10	0.88	1.00

Note: Authors' calculations. Data covers the period 2004-2021.

[5] The estimation is implemented using Stata xtabond2 command (see Roodman 2009).

4. Regression results

Table 4 presents the results of the estimation of equation 1 using System GMM. Before proceeding to the full specification reported in column 4, we investigate the relation between wealth inequality and income inequality (column 1), wealth inequality and financial inclusion (column 2), and wealth inequality, income inequality and financial inclusion (column 3). These parsimonious specifications allow us to shed light on the selected variables of interest, decrease the number of necessary instruments, and use larger datasets. In all four specifications, we instrument all right-hand side variables using their lags, because these variables can be endogenous. For example, financial inclusion is likely to influence savings rate and return on deposits because it increases opportunities to save and invest. In this and all subsequent tables we report standardised coefficients to ease comparison across regressors and specifications.

Table 4. Determinants of wealth inequality (Full sample)

Dep var: Wealth Gini	(1)	(2)	(3)	(4)
Lagged wealth Gini	0.875***	0.978***	0.756***	0.927***
	(10.05)	(11.14)	(5.50)	(8.84)
Income Gini	0.104*		0.263**	0.138
	(1.83)		(2.00)	(1.37)
Financial inclusion		-0.023	0.043	-0.032
		(-1.07)	(0.95)	(-1.33)
Savings rate				0.172***
				(3.23)
Return on deposits				0.007
				(0.76)
Observations	579	544	377	258
Countries	147	158	137	97
Instruments	11	11	15	26
AR(2)	0.015	0.362	0.866	0.350
Hansen(p-value)	0.194	0.246	0.629	0.495

Notes: Standardized beta coefficients; t statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01.
System GMM, two-step, orthogonal deviations, Windmeijer-corrected standard errors.

The results in column 1 confirm our prior expectations – wealth inequality is driven by its past realization and by income inequality. Both lagged wealth Gini and current period income Gini have positive statistically significant coefficients. Nonetheless, this result should be taken with caution because we cannot reject autocorrelation using the Arellano–Bond AR(2) test, and the autocorrelation of the residuals in differences persists even when higher lags are used as instruments for wealth inequality and income inequality. In column 2 we report the results of the specification that includes only lagged value of wealth Gini and financial inclusion. The lagged value of wealth Gini continue to have a positive statistically significant coefficient and the magnitude is large. The coefficient on financial inclusion is negative but not statistically significant. Yet, its inclusion breaks autocorrelation as attested by the AR(2) statistics. This specification also passes the Hansen test for joint validity of the instruments. In the next step, we combine the lagged value of wealth Gini, the income Gini and financial inclusion in a single specification. Lagged wealth Gini and the current income Gini have positive statistically significant coefficients and pass the AR(2) and Hansen tests. Finally, in column 4 we add savings rate and return to deposits. This specification fully corresponds to Equation 1. The model passes both AR(2) and

Hansen tests. The results of the estimation of this specification indicate that the lagged value of wealth Gini remains positive and highly statistically significant. In addition, savings rate appears among significant determinants. The coefficient is positive, implying that a higher savings rate increases wealth inequality. Other determinants, including financial inclusion and income inequality, have the expected signs but the coefficients are not statistically significant. We suspect that this result is driven by the heterogenous nature of our sample which includes both developed and developing countries. To test this hypothesis, we split our sample into two groups and rerun estimations.

In addition to the full sample, we performed estimations of equation 1 for the developing and developed countries samples. The findings are presented in Table 5, with column 1 containing results for the developing countries sample and column 2 the results of the estimation using the developed countries sample. In the estimation using the developing countries sample, the standard post-GMM tests, reported at the bottom of the table, confirm the validity of the specification. The results indicate that lagged wealth inequality has a statistically significant positive impact on current period wealth inequality. In addition, income inequality, savings rate and the return on deposits all have positive statistically significant impact on wealth inequality. Financial inclusion has the expected negative coefficient but is not statistically significant. Regarding the developed countries sample, the results suggest that wealth inequality is positively related with its past value and the savings rate and negatively related with financial inclusion. Income inequality and return on deposits have the expected positive signs but are not statistically significant. For the developed-country estimation, the small size of this sample makes it challenging to ensure the validity of model specifications and to instrument all right-hand side variables. For example, for this sample we could not compute the AR(2) test because of the small sample size. We address these issues in our robustness checks.

Table 5. Baseline estimations using developing and developed countries samples

Dep var: Wealth Gini	(1) Developing countries	(2) Developed countries
Lagged wealth Gini	0.782***	0.974***
	(5.22)	(12.95)
Income Gini	0.306**	0.173
	(2.07)	(0.73)
Financial inclusion	-0.044	-0.153**
	(-1.43)	(-2.09)
Savings rate	0.100*	0.147**
	(1.70)	(2.78)
Return on deposits	0.023***	0.026
	(3.15)	(0.62)
Observations	199	59
Countries	75	22
Instruments	26	12
AR(2)	0.351	.
Hansen(p-value)	0.336	0.514

Notes: Standardized beta coefficients; t statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01. System GMM, two-step, orthogonal deviations, Windmeijer-corrected standard errors.

5. Sensitivity analyses

To evaluate the stability of the results we undertake two robustness checks. First, we use an alternative way to proxy return on capital or assets. Second, we use an alternative measure of wealth inequality as our dependent variable.

It is not straightforward to select a measure of the return on capital – not only because of the lack of availability of cross-country comparable data but also because the measurement choices are likely to have bearing on our results. The composition of wealth and, therefore, return on capital, changes alongside the wealth distribution. Financial assets such as securities, take up an important part of wealth at the top of the distribution, while real estate and savings accounts are more prevalent among the middle class (Hills et al. 2013; Kennickell 2009). In our baseline specification we proxied return on capital by interest rate on deposits, i.e. the rate paid by commercial or similar banks for demand, time, or savings deposits. In the first robustness check, we replace return on deposits by return on equity. This approach allows us to check the sensitivity of the model to the choice of the variable measuring return on capital. Furthermore, this permits us to expand the sample size for developed countries and have a sufficiently larger sample for a valid system GMM estimation for the developed country sample.[6]

The results of the regressions using return on equity instead of return on deposits as a proxy for the return on capital are reported in Table 6, where column 1 contains the results for the full sample, column 2 – the results for developing countries, and column 3 – the results for developed countries. All specifications pass Arellano-Bond test for autocorrelation of residuals and Hansen test for over-identifying restrictions. The results are qualitatively similar to our baseline specification. In the full sample, the return on equity and financial inclusion become statistically significant. As expected, return on equity has a dis-equalizing effect while financial inclusion is equalizing. In the case of developing countries, the return on equity is not statistically significant (while return on deposit is statistically significant in the baseline model). In developed countries, financial inclusion has a negative statistically significant coefficient. In all cases, the past value of wealth inequality remains a strong predictor of current wealth inequality.

[6] The drawback of using this indicator, though, is that the full sample size reduces from 97 countries in the baseline specification to 79 countries in the first robustness check. The use of this indicator increases the sample of developed countries because the data on return on equity is available for countries with a stock market that is generally more prevalent in the developed countries group.

Table 6. Determinants of wealth inequality, robustness check using return on equity

Dep var: Wealth Gini	(1) Full sample	(2) Developing countries	(3) Developed countries
Lagged wealth Gini	0.847***	0.457*	0.919***
	(5.73)	(1.70)	(5.95)
Income Gini	0.105	0.490*	0.096
	(1.03)	(1.98)	(0.77)
Financial inclusion	-0.071**	0.002	-0.171*
	(-2.27)	(0.02)	(-1.77)
Savings rate	0.064	0.083	0.081
	(1.29)	(0.96)	(1.36)
Return on equity	0.063*	0.005	0.007
	(1.96)	(0.14)	(0.26)
Observations	219	103	116
Countries	79	39	40
Instruments	26	26	16
AR(2)	0.288	0.447	0.999
Hansen(p-value)	0.575	0.766	0.700

Notes: Standardized beta coefficients; t statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01. System GMM, two-step, orthogonal deviations, Windmeijer-corrected standard errors.

The second sensitivity analysis we conducted involves changing the way in which we measure wealth inequality, by using the share of the top 1 percent in wealth as the dependent variable instead of wealth Gini. This could be regarded as a measure of extreme wealth inequality or concentration since it captures changes in the tail of the distribution. The choice of the top 1 percent share is motivated by a longstanding research demonstrating that the top 1 percent is responsible for most changes in the wealth distribution in the past century (Roine and Waldenström 2015; Piketty and Zucman 2015). The results of estimating Equation 1 with the top 1 percent share of wealth as the dependent variable are presented in Table 7. Column 1 contains the results for the full sample, while columns 2 and 3 contain the results for developing and developed countries respectively. All specifications pass the Hansen test, the specifications in columns 1 and 2 pass the AR(2) test, while the AR(2) test statistics for column 3 cannot be calculated due to the small sample size. The results are broadly like our baseline results. The strongest determinant of the top 1 percent share of wealth in the current period is the top 1 percent share of wealth in the preceding period. Income inequality and the savings rate are among the statistically significant drivers of wealth inequality, with a dis-equalizing effect, while financial inclusion reduces the share of wealth held by the top 1 percent and thus has an equalizing effect.

In sum, our results suggest that wealth inequality is persistent or path-dependent, largely driven by their own past values. There is also some evidence that income inequality, savings rates, return on capital and financial inclusion play important roles in the distribution of wealth, although the results vary across samples. For example, income inequality seems to be more important in the developing countries sample compared to the developed countries sample, reflecting the fact that it is a more important source of wealth in developing rather than in developed countries (where financial assets dominate).

Table 7. Determinants of wealth inequality, using top 1% share as dependent variable

Dep var: Top 1% share of wealth	(1) Full sample	(2) Developing countries	(3) Developed countries
Lagged Top 1% share of wealth	0.943*** (10.63)	0.932*** (8.15)	0.970*** (8.18)
Top 1% share of income	0.163* (1.72)	0.117 (1.23)	-0.274 (-1.48)
Savings rate	-0.008 (-0.15)	-0.026 (-0.46)	0.123* (1.93)
Return on deposits	0.012 (0.90)	0.016 (1.28)	-0.011 (-0.66)
Financial inclusion	-0.014 (-0.58)	-0.045** (-2.06)	-0.075 (-0.91)
Observations	198	139	59
Countries	91	69	22
Instruments	24	24	14
AR(2)	0.335	0.350	.
Hansen(p-value)	0.749	0.703	0.620

Notes: Standardized beta coefficients; t statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01. System GMM, two-step, orthogonal deviations, Windmeijer-corrected standard errors.

6. Conclusions and policy implications

This paper examined the role of income inequality in explaining wealth distribution after controlling for the impacts of financial inclusion and other potential determinants of wealth distribution. The estimations are done using global, developed, and developing country samples as the sources and dynamics of wealth may be different in these categories of countries. We find evidence that lagged wealth and savings rates increase wealth inequality globally as well as in the developed and developing countries samples. Furthermore, we find that income inequality and returns on deposits are dis-equalizing in developing countries while financial inclusion is equalizing in developed countries. In both the global and developing countries samples, financial inclusion has a negative relationship with wealth inequality, but the coefficients are not statistically significant.

Regarding the drivers of extreme wealth inequality or concentration, as measured by the share of the top 1 percent in wealth, we find that lagged wealth is the most significant driver of extreme wealth inequality in all samples considered, underscoring the important fact that wealth inequality is persistent or path dependent. That said, there are also important differences in the results across samples. For example, in the global sample, income inequality is an important driver of extreme wealth inequality or concentration while in the developed countries sample the savings rate matters.

The findings of this paper have several implications for policies geared towards addressing wealth inequality. First, it underscores the need for governments to put in place measures to make wealth inequality less persistent. Fiscal policy, in the form of taxation of inheritance, is one instrument that can be used by governments to make wealth inequality less persistent. Second, reducing income inequality will go a long way towards dampening wealth inequality. Policies addressing income inequality, for example progressive taxation, social protection measures, and education policies, are crucial for

reducing wealth inequality. Third, governments can reduce the dis-equalizing effects of differences in savings rates by incentivising the rich to increase consumption and investment in productive activities to boost aggregate demand, foster growth, and create decent jobs thereby moderating the impact of savings rates on inequality. Government social transfer programmes targeted to households at the bottom of the distribution will also enable them to meet their basic needs and save thereby reducing inequality. In addition, public investments in infrastructure will provide poorer households and entrepreneurs access to markets thereby enhancing their ability to earn income and reducing wealth inequality. Finally, the findings of this paper imply that a more inclusive financial system can dampen wealth inequality. In this context, there is a need for governments to strengthen efforts to enhance access to financial services and systems, particularly for the vulnerable groups in society.

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Annex

Table A1. Sources and definitions for the variables used in the analysis

Data source, producer, URL	Variable name	Variable definition and unit of measurement
World Inequality Database, World Inequality Lab, https://wid.world/	Wealth Gini	Gini (net personal wealth), equal split individuals, ages 20+. Net personal wealth is defined as financial and non-financial assets minus liabilities.
	Top 1% share of wealth	Share of net personal wealth belonging to 1% of the wealthiest.
	Income Gini	Gini (pre-tax national income), equal split individuals, ages 20+. Pre-tax national income includes wages, pensions, insurance payments, and return on capital through return on investment/savings and property ownership.
	Top 1% share of income	Share of pre-tax national income belonging to 1% of the highest earners.
World Development Indicators, World Bank, https://databank.worldbank.org/source/world-development-indicators	Savings rate	Gross domestic savings (% of GDP).
	Return on deposits	Return on deposits is calculated as the difference between deposits interest rate (%) i.e. the rate paid by commercial or similar banks for demand, time, or savings deposits and the growth rate of nominal GDP
Bloomberg data through World Bank Global Financial Indicators, https://databank.worldbank.org/source/global-financial-development	Return on equity	Return on equity is calculated as the difference between stock market return and the growth rate of nominal GDP. Stock market return (%, year-on-year) is the growth rate of annual average stock market index. Annual average stock market index is constructed by taking the average of the daily stock market indices available at Bloomberg.
Global Findex Database, World Bank, https://www.worldbank.org/en/publication/globalfindex/Data	Financial inclusion	Share of adults (% age 15+) reported having borrowed from a formal financial institution.

Note: All data used for the analysis is freely available from publicly accessible sources, with URLs indicated in the table.

Table A2. Summary statistics

	N	Mean	SD	Min	Max
Wealth Gini	258	0.78	0.06	0.69	0.99
Income Gini	258	0.57	0.08	0.38	0.74
Top 1% share of wealth	258	0.31	0.08	0.17	0.58
Top 1% share of income	195	0.16	0.05	0.07	0.31
Financial inclusion	258	16.94	16.40	0.91	82.83
Savings rate	258	20.00	15.15	-31.49	73.25
Return on deposits	258	-48.07	328.69	-5293.22	21.25
Return on equity	137	-23.19	23.65	-126.24	22.98

Table A3. Countries included in the analysis

Albania	**Gabon**	**Netherlands**
Algeria	**Gambia**	**New Zealand**
Angola	**Georgia**	**Niger**
Argentina	**Ghana**	**Nigeria**
Armenia	**Guinea**	**North Macedonia**
Australia	Hungary	**Norway**
Bahrain	**Indonesia**	**Oman**
Bangladesh	**Iran (Islamic Republic of)**	**Pakistan**
Belarus	**Iraq**	**Peru**
Benin	Israel	**Philippines**
Bosnia and Herzegovina	Japan	**Qatar**
Botswana	**Jordan**	**Republic of Türkiye**
Brazil	**Kenya**	**Romania**
Bulgaria	**Korea, Republic of**	**Russian Federation**
Burkina Faso	**Kuwait**	**Rwanda**
Cambodia	**Kyrgyzstan**	**Senegal**
Cameroon	**Lao People's Dem. Rep.**	**Sierra Leone**
Canada	**Lebanon**	**Singapore**
Central African Republic	**Lesotho**	**South Africa**
Chad	**Madagascar**	**Sri Lanka**
Chile	**Malaysia**	**State of Palestine**
China	**Maldives**	**Switzerland**
Colombia	**Mali**	**Tajikistan**
Comoros	**Mauritania**	**Tanzania, United Republic of**
Congo	**Mauritius**	**Thailand**
Congo, Dem. Rep. of the	**Mexico**	**Togo**
Costa Rica	Moldova, Republic of	**Uganda**
Côte d'Ivoire	**Mongolia**	**Ukraine**
Croatia	Montenegro	**Uruguay**
Czechia	**Morocco**	**Zambia**
Ecuador	**Mozambique**	**Zimbabwe**
Egypt	**Myanmar**	
France	**Namibia**	

Note: Developing countries are marked in bold; the standard font is for developed countries. Grouping countries into developed and developing is based on United Nations' "Standard Country or Area Codes for Statistical Use" as of December 2021 (https://unstats.un.org/unsd/methodology/m49/).