The Patient Risk-Taker: Understanding the Drivers of Wealth and Inequality Across Countries

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Abstract

While economic inequality has been a topic of interest to researchers for decades, most literature is focused on inequality and its evolution in single country analyses, with very little research done on drivers of wealth inequality across countries. This paper documents an association between variations in country-level patience and risk preferences from experiments involving thousands of individuals from 76 countries, and cross-sectional wealth and wealth inequality measures. We find that patience is positively correlated with average wealth. Our results also suggest that patience is associated with a decrease in wealth inequality while risk-taking is associated with an increase in wealth inequality. These associations exist through the wealth distribution and are robust to the empirical specification and a set of controls. We also find that financial development is a driving channel of the observed association between the preferences and wealth.

Keywords: Patience, Risk Taking, Wealth, Wealth Inequality, Financial Development

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1 Introduction

F. S. Fitzgerald: The rich are different from you and me.
E. Hemingway: Yes, they have more money.

In most economies, wealth distributions are skewed to the right, displaying thick upper tails, that is, large and slowly declining top wealth shares. Indeed, these statistical properties characterize wealth distributions across a large cross-section of countries and time periods. This phenomenon was noted by Vilfredo Pareto's seminal work Cours d'Economie Politique (1896), which inspired the conceptualization of "Pareto's Law" by Samuelson (1965), as follows:

> *In all places and all times, the distribution of income (and wealth) remains the same. Neither institutional change nor egalitarian taxation can alter this fundamental constant of social sciences.*

An overview of the stylized facts regarding the distribution of wealth is helpful to contextualize its skewness. According to the World Inequality Database, in 2021, the top 1% of global wealth holders owned 38% of the world's total wealth, while the bottom 50% of wealth holders owned only 2% of the world's total wealth (Chancel et al. (2022)). In the United States, the top 10% of households owned 69% of the country's wealth, while the bottom 50% owned just 2% of the wealth in 2019 (Wolff (2021)). The inequality has only become worse over time. In 1978, the top 1% owned 22% of the United States' wealth, compared to 37% in 2018 (Saez and Zucman (2020)). Wealth inequality is also a significant issue in Europe, where the top 10% of wealth holders own 56% of the wealth, while the bottom 50% own only 4%. Even in Sweden, a country lauded for having relatively low levels of inequality, the top 10% of households held 66% of the country's total wealth, while the bottom 50% of households held a meagre 1% (Chancel et al. (2022)). As wealth inequality is becoming increasingly salient, and its consequences more evident, there has been a resurgence of interest in the various mechanisms that can generate the aforementioned statistical properties of wealth distributions, resulting in new investigations, new data, and a revival of interest in older theories and insights.

Our study addresses two key research questions:

> *Can heterogeneous patience and risk preferences explain the variation in within-country wealth inequality across countries? i.e., why wealth is more unequally distributed in some countries than others?*
>
> *Can heterogeneous patience and risk preferences explain across-country inequality in wealth i.e., why some countries are, on average, wealthier than others?*

In doing so, the aim of this study is not only to understand why the skewness of wealth distributions differs across countries, but to also understand the elements of wealth formation for the average individual. We leverage data from a fully incentivized experiment, the Global Preference Survey (GPS) of around 80,000 individuals across 76 countries from Falk et al. (2018) and combine it with data on wealth inequality from the World Inequality Database (WID). The WID provides information about the Gini coefficient and different wealth shares while the GPS contains population-representative patience and risk-taking measures elicited and translated through standardized techniques. A notable advantage of the GPS data set is that it was collected in 2012, an economically stable year with no aggregate income or wealth shocks. This implies that our results don't represent a short-term reaction, but rather a deep and persistent underlying force.

Our results suggest that patience exhibits a statistically significant, positive correlation with average wealth. We also provide evidence that patience and risk preferences are statistically significant predictors of wealth inequality across countries. On the one hand, an increase in aggregate patience reduces the Gini coefficient for wealth but on the other hand, an increase in aggregate risk-taking behavior is accompanied by an increase in the Gini coefficient. In addition to the effects of these preferences in isolation, we also find that their interaction term yields a weakly significant and positive effect on the Gini coefficient for wealth. The coefficient suggests that conditional on risk taking being high, an increase in patience will increase the Gini coefficient (as compared to the decrease, when evaluated in isolation) and vice versa. These results differ in magnitude, direction, and significance across the wealth distribution. While an increase in risk taking increases the share of total wealth held by the top 1% and 10% of the wealth distribution, it reduces the share of wealth held by the bottom 50%. Furthermore, while an increase in patience weakly decreases the wealth share of the top 1% and 10%, it significantly increases the share of total wealth held by the bottom 50%. Therefore, we find that increases in both risk taking and patience have re-distributive effects, albeit in opposing directions. While this sounds in part mechanical, we highlight that a change in patience, particularly, leaves the share of wealth held by 50-90% (i.e., middle 40%) almost unchanged, and mostly results in a redistribution from the top 10% to the bottom 50%. The correlation between risk taking and wealth inequality exists even after controlling for income inequality, implying that risk-taking is able to explain the disparity in wealth that does not arise from differences in labor income.

We also find that patience is significantly and positively correlated with measures of financial development such as gross savings, domestic credit to the private sector and market capitalization of the domestic stock market, all as a ratio of GDP. Our results are robust to using other measures of aggregate savings and borrowing behaviors, such as the fraction of the population that has saved or borrowed any money. Risk taking, on the other hand, is significantly correlated with only the market capitalization measure, and this correlation is positive and robust to the inclusion of controls. We provide evidence that financial development could be a driver or channel for patience and risk taking to explain differences in average wealth across countries, but not for differences in wealth inequality across countries. We find that financial development exhibits a large, statistically significant correlation with average wealth. This correlation loses both significance and magnitude when the preferences are added to the specification, pointing towards the mediating role of financial development in the relationship between preferences and average wealth. Our results are unable to establish a similar, statistically significant correlation between financial development and wealth inequality in the first place, and thus, the evidence on the mediating role of financial development in the relationship between preferences and wealth inequality is inconclusive.

While our study sheds light on the vital role of preferences and financial development in explaining cross-country variations in wealth and wealth inequality, it is important to contextualize these findings within the broader body of literature on wealth and economic inequality. An extensive line of work has studied the differences in economic development across countries, focusing on per capita income and its long-term growth. Since wealth and income are very closely linked, this literature also has valuable insights for understanding the determinants of wealth. The development accounting framework relates these outcomes to human capital, physical capital and residual factor productivity (Caselli (2005) and Hsieh and Klenow (2010)). However, this framework leaves open the question of how these macro-level differences arise in the first place. A rich stream of research addresses this question and has argued that these differences in wealth and development across countries result from processes that are decided upon at the individual level and, crucially, are affected by individual patience and risk-taking preferences. From the perspective of human capital theory, patience implies greater incentives to acquire education (Barro and McCleary (2003) and Ben-Porath (1967)), which is positively correlated with income and wealth. From the context of labor economics, particularly occupational sorting, patience implies a preference for occupations with steep earnings profiles and high earnings growth (Fouarge et al. (2014), Heckman et al. (2006), and Huizen and Alessie (2015)), while risk-taking is correlated with the earnings risk of the individual's occupation (Bonin et al. (2007) and Fouarge et al. (2014)). Both, the type of earnings profile and the cross-sectional earnings risk, are correlated with labor income, thereby also affecting wealth. More recently, empirical research has focused on micro-level accumulation decisions as an explanation for the differences in development across countries. Higher patience implies a higher propensity to save, and risk taking implies a higher allocation of these savings to risky, high return assets or capital. In addition to affecting personal wealth levels, it also leads to a higher physical capital stock in the economy which, as mentioned above, is in itself a driver of economic development. This has been tested empirically by several studies (Cagetti (2003), Dohmen et al. (2015), Falk et al. (2018), and Hübner and Vannoorenberghe (2015)).

While a lot of research has focused on the factors that contribute to the accumulation of wealth, it is important to also examine the distribution of wealth and the factors that shape wealth inequality. The two are intimately related, as the determinants of wealth are often the same as those that contribute to wealth inequality. Nevertheless, it is important to position our study in relation to other studies in the field of wealth inequality specifically.

The largest strand of literature has emphasized the role of earnings or income inequality in explaining wealth inequality. At the outset, Pareto assumed that a skewed distribution of labor earnings would map into a skewed distribution of wealth, focusing then on the determinants of skewed distribution of earnings. Pareto's work inspired a rich body of literature that explored whether heterogeneity in agents' occupational preferences could produce a skewed labor earnings distribution, and thereby a skewed wealth distribution. Many researchers, most notably Cagetti (2003), Castaneda et al. (2003), and Kindermann and Krueger (2022), tried introducing heterogeneity into the earnings framework by using precautionary savings as an optimal response to stochastic earnings. They argue that, since households face the uninsured idiosyncratic risk of going into unemployment (getting laid-off, for example), they accumulate wealth primarily due to precautionary motives. Since some occupations are "riskier" than others, there will be a distribution of precautionary savings, which could explain the skewed distribution of wealth. However, this work has tended to conclude that, although realistic and important, earnings inequality and precautionary savings are not enough to explain the large wealth concentration in the data. This follows from the inability of the models to reproduce the thick right tail of the wealth distribution observed in the data.

Another large body of literature studies the role of "scale dependence" in generating the skewness of the wealth distribution. Scale dependence implies that returns on wealth are an increasing function of wealth itself; this is in line with the findings of Bach et al. (2020) and Fagereng et al. (2020). This could be due to, for example, the existence of economies of scale in wealth management, as in Kacperczyk et al. (2019) or due to barriers to access such as the fixed costs of holding high return assets, as in Kaplan et al. (2018). With scale dependence as their primary argument, Gabaix et al. (2016) highlight that a small number of exceptionally wealthy individuals together with their investments can have an influential role in the distribution of wealth, escalating inequality. Charles and Hurst (2003), Kopczuk and Saez (2004), and Nardi (2004) also suggested that inter-generational transmissions like bequests and inheritances could help explain the persistence of wealth inequality over time, arguing that wealthier households are better and more likely to pass on their wealth to the next generation, thereby creating a "vicious circle" of persistent wealth inequality.

Differential savings rates, caused by varying levels of labor income risk and inter-generational transfers as explained above, could contribute to generating a skewed wealth distribution. More recently, however, literature has chosen to focus on return heterogeneity as a proposed mechanism to explain high wealth concentration. A study by Xavier (2021) argues that a source of the observed wealth dispersion is the allocation of wealth between different asset classes. The asset portfolios at the top of the wealth distribution tend to own a larger share of equity than bottom or middle ones, in which residential real estate predominates. He suggests that some individuals can be characterized as "high return types" (reflecting their education, talent as investors and risk tolerance, for example) who earn persistently higher returns, accumulate more wealth, and end up at the top of the wealth distribution. Relatedly, Benhabib et al. (2011) and Kuhn et al. (2020) also provide model-based evidence that stochastic idiosyncratic returns to wealth, or capital income risk, can induce a skewed distribution of wealth. This "type dependence" was further explored by Fagereng et al. (2020) who emphasized that heterogeneity in returns does not just arise from differences in the allocation of wealth between safe and risky assets, but rather that returns are heterogeneous even within narrow asset classes. These differences in allocation arise from stable differences in risk tolerance, but they also reflect heterogeneity in sophistication and financial information.

As discussed, differential savings rates and return heterogeneity can help explain wealth inequality. Standard savings theory predicts that individuals who place a larger weight on future payoffs will be wealthier throughout the life cycle than more impatient individuals because of differences in savings behavior. According to expected utility theory, individuals have different risk preferences, and thus demand varying risk premiums in the context of investing in financial assets. As a result, people differ in their choice of assets (safe versus risky) and their allocation of wealth across different asset classes, most notably, the allocation of wealth between equity and risk-free assets (Merton (1969)). Extensive experimental evidence, ranging from the famous marshmallow experiments conducted in the 1960s to more recent investigations, points towards pervasive heterogeneity in patience and risk preferences across individuals, but does not link this to economic inequality (Augenblick et al. (2015), Barsky et al. (1997), Benjamin et al. (2010), Dohmen et al. (2011), Falk et al. (2018), Frederick et al. (2002), Harrison et al. (2002), and Mischel et al. (1989)). A smaller literature on wealth inequality has studied the impact of preference heterogeneity in macro models. Krusell and Anthony (1998) show that a small degree of stochastic heterogeneity in discount factors (i.e., patience preferences) allows the model to match observed data on wealth distribution. Contrary to their infinite-horizon setup, Hendricks (2007) studies the effects of stochastically evolving, discount-factor heterogeneity in a finite life-cycle model and finds that time-preference heterogeneity makes only a modest contribution to accounting for the observed high wealth concentration. Krueger et al. (2016) argue that the introduction of additional dimensions of household heterogeneity, such as economic preferences, can better capture the distribution of wealth captured in the data. In a model calibrated to match micro- and macro-evidence on household income dynamics, Carroll et al. (2017) show that a modest degree of heterogeneity in household preferences or beliefs is sufficient to match empirical measures of wealth inequality in the United States. More recently, using a large sample of middle-aged individuals drawn from high-quality administrative data in Denmark, Epper et al. (2020) have documented a significant correlation between the individuals' time discounting in incentivized experiments and their positions in the real-life wealth distribution.

We provide support for this preference-based mechanism. Our first main contribution is to document a large association between patience and average wealth, and between both patience and risk-taking with wealth inequality at the country level. The relationship between patience and risk taking with wealth is precisely estimated and exists throughout the wealth distribution. Secondly, we provide evidence suggesting that financial development could be a driver of the observed association between patience and wealth. Unlike previous studies, which are either simulation-based, or focus on inequality within a single country, our study has the advantage that it is the first to evaluate, on the basis of heterogeneous preferences, the differences in both wealth and wealth inequality across countries.

The structure of the paper is as follows. Section 2 presents the data and its sources. Section 3 presents the empirical results and Section 4 features their interpretation and discussion. Section 5 concludes. Section 6 contains the appendix.

2 Data and Summary Statistics

In this study, we rely on three main sources of data: the Global Preferences Survey (GPS), the World Inequality Database (WID), and the World Bank Data Bank (WDB).

2.1 Global Preferences Survey

The primary data source used in this study is from the Global Preference Survey (GPS) conducted by Falk et al. (2018), specifically in line with the framework of the 2012 Gallup World Poll. GPS is a survey representing population samples from countries across the world and investigates social and economic issues on an annual basis. The upcoming section will discuss important characteristics of the data used in the study.

The GPS covers 76 countries and used samples from each country to measure preferences for each nationality represented in the survey. The median sample size for each country was 1,000 participants. The selection process for participants consisted of thorough probability sampling. The total number of participants in the GPS exceeds 80,000. The aim of the GPS is to provide a globally representative data sample. Thus, the survey includes countries with different geographical locations, diverse cultures, and varying levels of economic growth. It involves 25 countries from Europe, 22 from Asia and the Pacific, 15 from the Americas and 14 African countries. Roughly 90% of the world population and global income is represented by this set of countries.

In order to conduct preference measurements, two survey items were used for each preference. These items were selected in an initial survey validation study. Multiple incentive choice experiments were used in the validation procedure for each preference, and the measures were constructed using specific items that were chosen for their optimal performance among various alternatives (for more details, see

Falk et al. (2023)). For most preferences, the optimization procedure resulted in a combination of two survey items, one quantitative item and one qualitative item. This puts respondents into a precisely defined hypothetical choice scenario.

For each preference, the survey items are combined into a single preference measure using the weights that endogenously emerged from this experimental validation procedure. In particular, the experimental validation procedure allows an analysis of which linear combination of survey items performs best in predicting the corresponding experimental behaviour. These weights are used to compute the final preference measures, in line with the goal of constructing variables that have experimental counterparts. Each preference measure has been standardized at the individual level for ease of interpretation. As a result, every preference in the individual-level world sample has a mean of zero and standard deviation of one.

2.1.1 Patience

The measure of patience is derived from the combination of responses to two survey measures, one with a quantitative and one with a qualitative format. The quantitative survey measure consists of a series of five interdependent hypothetical binary choices between immediate and delayed financial rewards, a format commonly referred to as a "staircase" or "unfolding brackets" procedure (Cornsweet (1962)). In each of the five questions, participants had to decide between receiving a payment today or larger payments in 12 months:

Suppose you were given the choice between receiving a payment today or a payment in 12 months. We will now present to you five situations. The payment today is the same in each of these situations. The payment in 12 months is different in every situation. For each of these situations we would like to know which one you would choose. Please assume there is no inflation, i.e., future prices are the same as today's prices. Please consider the following: Would you rather receive amount x today or y in 12 months?

The qualitative measure of patience is given by the respondents' self-assessment regarding their willingness to wait on an 11-point Likert scale, asking: *"how willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?"*

2.1.2 Risk taking

A series of related quantitative questions in combination with one qualitative question was used in order to determine risk taking. To determine the quantitative measure, a series of five binary-choice questions, similar to those for the patience measure, were asked. The participants could choose between a fixed lottery and different safe payments:

Please imagine the following situation. You can choose between a sure payment of a particular amount of money, or a draw, where you would have an equal chance of getting amount x or getting nothing. We will present to you five different situations. What would you prefer: a draw with a 50% chance of receiving amount x, and the same 50% chance of receiving nothing, or the amount of y as a sure payment?

If the choice of the participant was the lottery, the safe payment in the following question would increase, and vice versa, hence highlighting the individual's certainty equivalent. The qualitative question gives the respondent an 11-point scale to self-assess their willingness to take risks, the question being: *"In general, how willing are you to take risks?"*. Previous research has shown the subjective self-assessment to be predictive of risk-taking behaviour in the field in a representative sample (Dohmen et al. (2011)) as well as of incentivized experimental risk taking across countries in student samples (Vieider et al. (2015)).

2.1.3 Computation of indices at individual level

For measurement of both patience and risk taking, an individual-level index was created that aggregated responses across different survey items. The indices of each trait were calculated by using the z-score of each survey site at individual level and then weighing the z-scores using the weights resulting from the experimental validation procedure of Falk et al. (2023). The weights assigned to each preference are determined by analysing the observed behaviour in the experimental validation study, using the coefficients of an Ordinary Least Squares (OLS) regression. The coefficients are calculated based on the responses to the respective survey items, ensuring that the weights sum up to one. The measures are given by:

$$Patience = 0.7115185 * \text{Staircase patience} + 0.2884815 * \text{Will. to give up sth. today} \quad (1)$$

$$Risktaking = 0.4729985 * \text{Staircase risk} + 0.5270015 * \text{Will. to take risks} \quad (2)$$

2.1.4 Computation of country-level averages

In order to calculate the country-level averages, the sampling weights provided by Gallup were utilized to weigh the individual-level data. These weights are crucial in ensuring that our measures accurately reflect the population at the country level, thereby enhancing the reliability of our findings.

2.2 World Inequality Database

The second data source used in this study is the World Inequality Database (WID). WID overcomes limitations that are not captured in surveys by combining different data sources: national accounts, survey data, fiscal data, and wealth rankings. WID produces reliable estimates for wealth inequality by combining income tax data and inheritance data, relying on national governments to provide public access to report detailed statistics of income, inheritance, and wealth in each country.

2.2.1 Per capita net personal wealth

Net personal wealth concluded by WID is measured by the total value of non-financial and financial assets (for example housing, land deposits and equities) minus debts, held by households. All individuals, households and unincorporated enterprises who have not separated accounts from their households are included in the household sector. In our study, we refer to this measure as average wealth or per capita wealth.

2.2.2 Gini coefficient of wealth inequality

The Gini coefficient is a measure of inequality that ranges from 0 (indicating perfect equality) to 1 (suggesting one person has all the resources in an economy). However, this measure has significant limitations. Primarily, it lacks intuitive meaning and cannot easily be understood by the general public who are not experts in the field. Additionally, as a synthetic measure, it may mask poor underlying data and important changes that occur for certain groups within the distribution.

2.2.3 Shares of total wealth held by top 1%, top 10% and bottom 50%

In order to mitigate for the aforementioned limitations of the Gini coefficient, we also use measures that quantify the share of total wealth owned or held by the top 1%, top 10% and bottom 50% of the wealth distribution.

2.3 World Data Bank

Important data for our study is also retrieved from our third source, the World Bank Data Bank (WDB). WDB coordinates statistical data for macroeconomic and financial information at both the country level and the global level. The World Bank obtains its information through statistical systems of member countries, international organizations, and academic institutions. We rely on its biggest collection of development indicators - the World Development Indicators (WDI) database – to retrieve data on measures of financial development that have been elaborated on below.

2.3.1 Gross savings (% of GDP)

Gross savings are calculated as gross national income less total consumption, plus net transfers. Essentially, gross savings reflect the difference between disposable income and consumption on a macro scale.

2.3.2 Domestic credit to private sector (% of GDP)

Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations such as finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies. This measure is referred to as 'private credit' in our study.

2.3.3 Market capitalization of listed domestic companies (% of GDP)

Market capitalization is the share price multiplied by the number of shares outstanding for listed domestic companies. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies are excluded. Reported data are end of year values.

2.3.4 Percentage of population that has borrowed any money

The definition for borrowed any money is the percentage of respondents who reported that they have borrowed any money, by oneself or together with someone else, independent of reason in the past year.

2.3.5 Percentage of population that has saved any money

Saved any money is defined as the percentage of respondents who report personally saving or setting aside any money for any reason and using any mode of saving in the past year.

Table 1: Descriptive Statistics

	Min	**Mean**	**Max**	**Median**	**SD**	**p10**	**p25**	**p75**	**p90**
Patience	-0.61	0	1.07	-0.09	0.37	-0.38	-0.26	0.13	0.6
SD of Patience	-2.71	0	1.77	0.06	1	-1.36	-0.69	0.76	1.27
Risk Taking	-0.79	0.01	0.97	-0.02	0.3	-0.31	-0.16	0.16	0.39
SD of Risk Taking	-2.1	0	2.4	-0.16	1	-1.23	-0.67	0.7	1.33
Log [Wealth p/c]	7.36	10.68	12.64	10.62	1.19	9.29	9.69	11.7	12.26
Log [GDP p/c]	5.39	8.3	10.87	8.22	1.56	6.17	7.1	9.6	10.5
Gini Coefficient of Wealth	0.7	0.78	1.01	0.77	0.06	0.73	0.74	0.8	0.87
Wealth Share: Top 1%	0.17	0.31	0.57	0.29	0.08	0.23	0.25	0.34	0.43
Wealth Share: Top 10%	0.51	0.64	0.89	0.61	0.08	0.57	0.58	0.67	0.76
Wealth Share: Bottom 50%	-0.05	0.03	0.07	0.04	0.02	0	0.03	0.05	0.05
% of pop: saved money	0.13	0.54	0.85	0.55	0.18	0.28	0.41	0.67	0.76
% of pop: borrowed money	0.26	0.52	0.86	0.49	0.15	0.35	0.41	0.62	0.74
Gross Savings: % of GDP	-0.13	0.22	0.49	0.22	0.11	0.12	0.15	0.27	0.35
Private Credit: % of GDP	0.05	0.62	1.75	0.47	0.46	0.14	0.27	0.94	1.3
Market Cap: % of GDP	0	0.59	2.09	0.5	0.45	0.15	0.25	0.81	1.14

3 Empirical Results and Analysis

From Table 1, we can see that heterogeneity in preferences exists not only within countries but also across countries. In this section, we start with investigating the relationship between preferences and average wealth or per capita wealth across countries, and then we analyze the impact of these preferences on wealth inequality. We also investigate the potential mediating role of financial development in the aforementioned relationships. We find that patience exhibits a large and significant association with wealth, while risk taking exhibits a more robust correlation with wealth inequality.

3.1 Preferences and Economic Development

Previous studies have addressed the "wealth causes patience" and "patience causes wealth" dichotomy at an individual level. We contribute to this body of literature by investigating whether variation in average wealth (or per capita wealth) can be explained by preferences, akin to the correlations that have been established with per capita income.

$$\begin{aligned}\log[\text{Wealth}_{\text{p/c}}]_i = \beta_0 &+ \beta_1 \times \text{Patience}_i + \beta_2 \times \text{Risk Taking}_i \\ &+ \beta_3 \times (\text{Patience}_i \times \text{Risk Taking}_i) + \beta_4 \times \log[\text{GDP}_{\text{p/c}}]_i \\ &+ \gamma \times \text{Controls}_i + \epsilon_i\end{aligned}$$

Table 2 presents the OLS regression estimates for how average wealth varies with the preferences. Columns (1) and (2) provide evidence that patience is strongly correlated with per capita wealth, and this correlation is robust to geographic controls. The point estimates of column (2) suggest that a one standard deviation increase in the patience measure is associated with an increase in log [Wealth p/c] of 1.40 units. Similar evidence does not exist for risk taking and per capita wealth, with both being nearly uncorrelated with each other across both specifications (4) and (5).

Columns (7) and (8) demonstrate a "horse race" between the two preferences that have conceptually been linked to wealth. In these two specifications, we also include an interaction term between patience and risk taking. It allows us to examine whether the relationship between wealth and patience varies depending on the level of risk-taking, or vice versa. Additionally, there are underlying economic mechanisms that motivate the usage of the interaction effect. For example, a patient population is more likely to save more, and if this population is risk taking or risk tolerant, they would save or invest in risky projects, which would exacerbate wealth inequalities given the variations in returns, and the idiosyncratic shocks on capital income across individuals (Xavier (2021)). This interdependence between the two preferences has been investigated before (Abdellaoui et al. (2019), Anderhub et al. (2001), and Somasundaram and Eli (2022)). The results suggest that patience exhibits a strong and robust correlation with per capita wealth. As the point estimates in column (8) suggest, a one standard deviation increase in the patience measure increases log [Wealth p/c] by 1.68 units. For risk taking, on the other hand, a one standard deviation increase results in a 0.65 unit decrease in log [Wealth p/c]. However, this relationship is not highly statistically significant.

As mentioned earlier, a large strand of literature has focused on income or earnings as the chief driver of wealth. We test this hypothesis by adding per capita income as a supplemental control to our regressions; in doing so, previously significant preference covariates now become weakly correlated or uncorrelated with per capita wealth. Column (9) suggests that the point estimate for patience is positive and of magnitude 0.35 but is weakly statistically significant. This implies that a one standard deviation increase in the patience measure increases log [Wealth p/c] by 0.35 units. The point estimate for risk taking is not highly statistically significant either but suggests that a one standard deviation increase in the risk-taking measure leads to a 0.33 unit decreases in log [Wealth p/c]. The interaction term of patience and risk taking is estimated to -0.82 but is not highly significant. On the other hand, our results in columns (3), (6) and (9) provide evidence that per capita income is a strongly significant predictor of per capita wealth.

Table 2 helps us conclude that that on an aggregate level, the more patient a country is, the higher its average wealth is. This is in line with previous literature that suggests that the more patient individuals are, the more they save, and thus they accumulate more wealth (De Nardi and Fella (2017) and Epper et al. (2020)). On a macro-level, patience is beneficial for average wealth since it allows countries to delay gratification and make long term investments such as education, infrastructure, and research. In contrast, countries that prioritize short-term gains may be more likely to engage in risky or unsustainable economic practices that ultimately harm their long-term prospects. However, it is important to note that there are many factors that contribute to a country's wealth beyond its level of patience, such as geography, natural resources, institutional and political stability, and culture.

Table 2: Wealth and Preferences

	Log [Wealth p/c]								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patience	1.91***	1.40***	0.20				2.13***	1.68***	0.35
	(0.30)	(0.31)	(0.23)				(0.30)	(0.37)	(0.27)
Risk Taking				−0.43	0.43	−0.06	−1.09***	−0.65	−0.33
				(0.46)	(0.42)	(0.24)	(0.39)	(0.46)	(0.29)
Patience x Risk Taking							−0.07	−0.81	−0.82
							(1.32)	(1.28)	(0.82)
Log [GDP p/c]			0.70***			0.73***			0.69***
			(0.07)			(0.06)			(0.07)
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	74	72	72	74	72	72	74	72	72
R^2	0.36	0.59	0.84	0.01	0.46	0.83	0.43	0.60	0.84

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, and an island dummy. *p < .10, **p < .05, ***p < .01.

3.2 Preferences and Economic Inequality

While income inequality is certainly of interest to economists and policy makers worldwide, more recently the focus has shifted to wealth inequality, particularly why wealth inequality exceeds income inequality. Using the Gini coefficient for wealth as a measure of wealth inequality, Table 3 reports the OLS regression estimates for how wealth inequality varies with patience and risk taking. We also introduce the standard deviations of preferences as explanatory variables. This is done for two reasons. Firstly, the Gini index itself is a measure of variation or dispersion of wealth, so from a functional form perspective it is more appropriate. Secondly, it is the variation in patience preferences, not just their aggregate arithmetic means, that explain the variation in wealth. While the aggregate arithmetic means of preferences are relevant for establishing an interesting empirical correlation, the use of standard deviations is more in line with the mechanism of preference-based wealth inequality – because there is a large heterogeneity in people's patience and risk taking, there will be a large heterogeneity in how much wealth people accumulate, leading to wealth inequality.

$$\begin{aligned}\text{Gini of Wealth}_i = \beta_0 &+ \beta_1 \times \text{Patience}_i + \beta_2 \times \sigma_{\text{Patience}_i} + \beta_3 \times \text{Risk Taking}_i \\ &+ \beta_4 \times \sigma_{\text{Risk Taking}_i} + \beta_5 \times (\text{Patience}_i \times \text{Risk Taking}_i) \\ &+ \beta_6 \times (\sigma_{\text{Patience}_i} \times \sigma_{\text{Risk Taking}_i}) + \gamma \times \text{Controls}_i + \epsilon_i\end{aligned}$$

Columns (1) and (2) show that patience and its standard deviation are individually weakly correlated with wealth inequality. However, these correlations lose significance when regressed together, as shown in columns (3), (4) and (5). Risk taking is significantly correlated with wealth inequality and is robust to the inclusion of the standard deviation term but not the inclusion of controls, represented by columns (6) through (10). In specifications (11) through (13), we regress the Gini coefficient on patience and risk taking together and then include the standard deviation terms. Results provide evidence that patience and risk taking are strongly associated with wealth inequality, and this association is robust to the inclusion of the standard deviation terms. The standard deviation terms themselves, as in column (12), are not highly statistically significant covariates.

Upon adding the interaction term, the point estimates of patience and risk taking become even more statistically significant. The interaction term itself also happens to be a significant predictor of wealth inequality. These correlations are robust to the addition of controls, as can be seen by comparing columns (14) and (15). In specification (16), we additionally control for the Gini coefficient of income inequality. Risk taking remains strongly significant and positively correlated. The point estimate of the interaction term is also significant and positive, but we see that patience is now only weakly significantly correlated with the Gini measure. In specifications (17) through (19), we also include an interaction term of the standard deviations of patience and risk taking. In column (17), the coefficient of patience is statistically significant and negative, risk taking is strongly and positively correlated with wealth inequality, and their interaction term is still a significant positive predictor. The standard deviation terms and their interaction effect are uncorrelated with the dependent variable. Next, we introduce our geographic and per capita income controls. Our results in column (18) provide evidence that patience and risk taking are strongly correlated with wealth inequality, with their coefficients being negative and positive respectively. The interaction term of the two preferences and the interaction term of their standard deviations are also positively and significantly correlated with wealth inequality. However, this correlation is not as strongly significant as that of patience and risk taking.

In the final specification (19), we also control for the Gini measure of income inequality. The results suggest that risk taking is still a strongly significant and positive predictor of the Gini measure of wealth inequality. The point estimate conveys that a one standard deviation increase in the risk-taking measure increases the Gini measure of wealth inequality by 0.075 units. The results also suggest that the interaction term of the standard deviation of patience and risk taking is also significantly correlated with the wealth Gini measure and is estimated to be 0.012. It is important to note that we cannot disregard the point estimates of patience and the interaction term of patience and risk-taking. Although not highly statistically significant, the point estimate of patience is still negative and suggests that a one standard deviation increase in our patience measure decreases the Gini measure by 0.038 units. The coefficient for the interaction term of patience and risk taking is estimated to be 0.128. Our results thus provide evidence that patience and risk taking are also able to explain the specific part of wealth inequality that does not arise from labor income differences but rather heterogeneity in accumulation decisions that affect the stock of wealth, such as saving and investing.

Table 3: Wealth Inequality and Preferences

	Gini Coefficient of Wealth Inequality									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Patience	−0.034*		−0.025	−0.038	−0.010					
	(0.018)		(0.028)	(0.032)	(0.031)					
σ Patience		−0.011*	−0.004	−0.002	−0.007					
		(0.007)	(0.010)	(0.011)	(0.010)					
Risk Taking						0.058**		0.057**	0.033	0.026
						(0.022)		(0.022)	(0.025)	(0.023)
σ Risk Taking							0.005	0.004	0.009	0.009
							(0.007)	(0.007)	(0.008)	(0.007)
Patience X Risktaking										
σ Patience X σ Risk Taking										
Controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Gini Income control	No	No	No	No	Yes	No	No	No	No	Yes
N	76	76	76	73	73	76	76	76	73	73
R^2	0.045	0.037	0.047	0.223	0.344	0.086	0.006	0.089	0.228	0.359

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, an island dummy and log [GDP p/c]. *p < .10, **p < .05, ***p < .01.

Table 3 (contd.) : Wealth Inequality and Preferences

	Gini Coefficient of Wealth Inequality								
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Patience	−0.048***		−0.060*	−0.066**	−0.086**	−0.044	−0.061*	−0.081**	−0.038
	(0.018)		(0.031)	(0.030)	(0.037)	(0.038)	(0.030)	(0.037)	(0.037)
σ Patience		−0.011	0.005	0.008	0.003	−0.004	0.008	0.002	−0.006
		(0.007)	(0.011)	(0.010)	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)
Risk Taking	0.071***		0.075***	0.093***	0.093***	0.069**	0.094***	0.100***	0.075**
	(0.022)		(0.023)	(0.024)	(0.031)	(0.030)	(0.024)	(0.030)	(0.030)
σ Risk Taking		0.004	−0.002	−0.0002	0.005	0.008	−0.00001	0.005	0.008
		(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)
Patience X Risktaking				0.175**	0.166*	0.146*	0.165**	0.147*	0.128
				(0.079)	(0.084)	(0.080)	(0.080)	(0.083)	(0.079)
σ Patience X σ Risktaking							0.006	0.012*	0.012*
							(0.006)	(0.007)	(0.006)
Controls	No	No	No	No	Yes	Yes	No	Yes	Yes
Gini Income control	No	No	No	No	No	Yes	No	No	Yes
N	76	76	76	76	73	73	76	73	73
R^2	0.168	0.041	0.171	0.225	0.343	0.423	0.235	0.378	0.458

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, an island dummy and log [GDP p/c]. *p < .10, **p < .05, ***p < .01.

In order to understand the underlying dynamics of these changes in wealth inequality, we investigate the impact of preferences on the share of different wealth percentiles. To do so, we regress the shares of wealth held by different wealth percentiles viz. share of total wealth held by top 1%, top 10% and bottom 50% on the patience and risk-taking measures. The wealth share held by the middle 40% has been excluded on purpose. This is because when it is considered along with the top 10% and bottom 50% of the wealth distribution, the effects of preferences on these wealth shares will mechanically add up to zero. An intuitive way to think about this is as a redistribution of wealth, therefore the cumulative effect on the whole wealth distribution will be null. The OLS estimates of this regression are reported in Table 4.

$$\begin{aligned}
&\text{Share of Total Wealth held by Top 1\%, Top 10\% or Bottom 50\%}_i \\
&= \beta_0 + \beta_1 \times \text{Patience}_i + \beta_2 \times \sigma_{\text{Patience}_i} + \beta_3 \times \text{Risk Taking}_i + \beta_4 \times \sigma_{\text{Risk Taking}_i} \\
&\quad + \beta_5 \times (\text{Patience}_i \times \text{Risk Taking}_i) + \beta_6 \times (\sigma_{\text{Patience}_i} \times \sigma_{\text{Risk Taking}_i}) \\
&\quad + \gamma \times \text{Controls}_i + \epsilon_i
\end{aligned}$$

As columns (1) and (2) suggest, an increase in patience decreases the share of wealth held by the top 1% of the wealth distribution, while an increase in risk taking increases the same. The results show that risk-taking remains statistically significant upon the addition of control variables, but patience becomes weakly significant. The point estimates in column (2) can be interpreted as follows: a one standard deviation increase in our patience measure reduces the share of total wealth held by the top 1% by 0.083 units; a one standard deviation increase in our risk-taking measure increases the share of total wealth held by the top 1% by 0.116 units. In this specification, we also see that the interaction term of patience and risk taking is significant. The coefficient suggests that conditional on having a positive patience measure, an increase in risk taking will result in an additional increase in the share of total wealth held by the top 1%. Or, conditional on having a positive risk-taking measure, an increase in patience also increases the wealth share held by the top 1%. We also see that the point estimates of the standard deviation of patience, the standard deviation of risk taking, and the interaction term of the standard deviations are not highly statistically significant, but are estimated to be 0.004, 0.014 and 0.013 respectively.

The point estimates in specification (5) suggest that risk taking is a strongly significant predictor of the share of wealth held by the top 10%, and patience is also a significant predictor of the same. An increase of one standard deviation in the patience measures leads to a decline of 0.076 units in the share of wealth held by the top 10%. On the other hand, a one standard deviation increase in the risk-taking measure leads to a 0.106 unit increase in the share of wealth held. The interaction term of the two preferences is very weakly significant, with a positive magnitude of 0.170. The coefficients for the standard deviation of patience, the standard deviation of risk taking, and the interaction term of the standard deviations are estimated to be 0.006, 0.012 and 0.016 respectively, but only the latter is statistically significant.

For the share of total wealth held by the bottom 50%, our results from column (8) show that patience and risk taking are both statistically significant predictors. We see that while patience decreases wealth share and risk-taking increases wealth share for the top 1% and top 10%, the opposite effect is observed for the bottom 50% i.e., a one standard deviation increase in the patience measure actually increases the share of total wealth held by 0.030 units, and a one standard deviation increase in the risk-taking measure actually decreases the share of total wealth held by 0.036 units. Although this sounds mechanical, it is not. If that were the case, a rise in the share of wealth held by the top 10% because of more risk taking could be accompanied by a fall in the share of the middle 40%, leaving the share of wealth of the bottom 50% unchanged. As our results suggest, that is not true. No two statistically significant changes in shares mechanically cancel each other out. All other point estimates are not highly statistically significant, but again it is noteworthy to see that the direction of estimates is reversed compared to those for the top 1% and top 10% shares of wealth. We elaborate on these correlations in the discussion section.

Table 4: Wealth Distribution and Preferences

	Wealth Share - Top 1%			Wealth Share - Top 10%			Wealth Share - Bottom 50%		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patience	−0.094**	−0.083	−0.013	−0.083**	−0.076*	−0.019	0.015	0.030**	0.019
	(0.042)	(0.051)	(0.050)	(0.038)	(0.045)	(0.045)	(0.012)	(0.014)	(0.015)
σ Patience	0.012	0.004	−0.007	0.012	0.006	−0.004	−0.002	0.001	0.003
	(0.014)	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)	(0.004)	(0.004)	(0.004)
Risk Taking	0.138***	0.116***	0.076*	0.126***	0.106***	0.073*	−0.027***	−0.036***	−0.029**
	(0.033)	(0.042)	(0.040)	(0.030)	(0.038)	(0.036)	(0.009)	(0.012)	(0.012)
σ Risk Taking	0.004	0.014	0.019*	0.004	0.012	0.016*	0.001	−0.0003	−0.001
	(0.009)	(0.011)	(0.010)	(0.008)	(0.010)	(0.009)	(0.003)	(0.003)	(0.003)
Risk Taking x Patience	0.250**	0.202*	0.169	0.215**	0.170	0.143	−0.047	−0.047	−0.042
	(0.109)	(0.115)	(0.105)	(0.099)	(0.103)	(0.095)	(0.031)	(0.032)	(0.031)
σ Patience x σ Risk Taking	0.008	0.013	0.014	0.011	0.016*	0.016**	−0.001	−0.003	−0.003
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.002)	(0.003)	(0.002)
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Gini Income Controls	No	No	Yes	No	No	Yes	No	No	Yes
N	76	73	73	76	73	73	76	73	73
R^2	0.274	0.399	0.509	0.276	0.410	0.504	0.134	0.315	0.361

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, an island dummy and log [GDP p/c]. *p < .10, **p < .05, ***p < .01

In specifications (3), (6) and (9), we additionally include the Gini coefficient of income inequality as a control variable. The intention behind this is that it allows us to isolate the non-income effect of patience and risk-taking on wealth, or in other words, the effect of these preferences on wealth that arises solely from accumulation decisions like saving and investing. In doing so, we see that the point estimates for patience lose significance across all wealth percentiles. It is interesting to see, however, that the share of wealth held by the middle 40% remains unchanged (the effects for top 10% and bottom 50% cancel out), implying a direct distribution from the top 10% to the bottom 50%. On the other hand, risk taking is robust to the addition of the new control variable and remains statistically significant across the wealth distribution. The interaction terms of patience and risk-taking are of similar magnitude to their previous point estimates, but their statistical significance is not ideal.

The point estimate for risk taking in column (3) suggests that a one standard deviation increase in the risk-taking measure increases the share of total wealth held by the top 1% by 0.076 units. The coefficient of the standard deviation of risk taking, estimated to be 0.019, is also statistically significant. In this specification we also see that the two interaction terms are very weakly significant and positively correlated with the share of wealth. In specification (6), the point estimate of risk taking suggests that a one standard deviation increase in the risk-taking measure leads to a 0.073 unit increase in the share of total wealth held by the top 10%. We observe that the standard deviation of risk taking and the interaction term of the standard deviations of patience and risk taking are statistically significant. As in previous specifications, both are positively correlated with the wealth share and the coefficients are estimated to be 0.016. The point estimate for the interaction term of the two preferences is 0.143, but not highly statistically significant. In the final specification in column (9), we see that a one standard deviation increase in the risk-taking measure decreases the share of wealth held by the bottom 50% by 0.029 units. Statistical significance across the remaining point estimates is weak. It is still noteworthy that the point estimate for patience is more significant for the bottom 50% than the top 1% and top 10% and is positive as compared to negative for the latter two. A one standard deviation increase in the patience measure leads to 0.019 units increase in the share of wealth held by the bottom 50%.

3.3 Preferences and Financial Development

It is important to investigate the mechanisms behind these correlations. It is unlikely that these results are driven by primarily by earnings or labor income inequality, because as Table 3 and 4 suggest, these correlations exist even after we control for the Gini measure of income inequality. This implies that these unequal wealth distributions must be as a result of factors that affect the accumulation and growth of the wealth stock. Therefore, we are interested in investigating whether preferences affect wealth and wealth inequality through the channel of financial development.

Table 5 investigates how financial development measurements are related to variation in preference measures. Results show that patience is significant across all financial development measures - gross savings, domestic credit to the private sector, market capitalization of the domestic stock market, percentage of population borrowing and saving any money - with patience maintaining its significance when accounting for controls, except for column (6), where significance is lost. Risk taking on the other hand does not have as significant and robust of a correlation with financial development.

$$\begin{aligned}\text{Financial Development Measure}_i &= \beta_0 + \beta_1 \times \text{Patience}_i + \beta_2 \times \text{Risk Taking}_i \\ &+ \beta_3 \times (\text{Patience}_i \times \text{Risk Taking}_i) + \gamma \times \text{Controls}_i + \epsilon_i\end{aligned}$$

Columns (2) and (4) indicate that there is a significant positive correlation between patience and the financial development measurements 'Gross Savings' and 'Private Credit' (both as % of GDP) even after adding relevant controls. The estimates from column (2) indicate that a one standard deviation increase in patience increases 'Gross Savings – percentage of GDP' by 0.115 units. Point estimates for column (4) shows a larger increase of 0.38 units for 'Private Credit – percentage of GDP' for a single standard deviation increase in patience. Column (6) shows that one standard deviation increase in patience increases Market Capitalization - percentage of GDP by 0.091 units, however, the correlation is not highly significant. Columns (8) and (10) indicate a strong significant correlation and an increase of 0.146 and 0.340 units for 'Percentage of population that has borrowed money' and 'Percentage of population that has saved money', for each standard deviation increase in patience, respectively.

Risk-taking's correlation with financial development is not statistically significant across all specifications. However, columns (3), (6) and (7) indicate significant findings. For each standard deviation increase in risk taking there is a 0.471 decrease in 'Private Credit – Percentage of GDP', yet this correlation is no longer statistically significant once controls are accounted for. When accounting for controls, statistically significant results are observed for risk taking's relationship with 'Market Capitalization – Percentage of GDP'. A unit standard deviation increase in the risk-taking measure results in a 0.743 unit increase in 'Market Capitalization – Percentage of GDP'. In column (6), we also see that the interaction term of patience and risk taking is significant at the 10% level and its coefficient is estimated to be 1.826.

To evaluate the mediating role of financial development measures between preferences and wealth and wealth inequality, we follow the guidelines outlined by Baron and Kenny (1986), James and Brett (1984), and Judd and Kenny (1981). Therefore, we start by running a regression of wealth on the financial development measures, and then we also add our preference measures to the mix. The results are reported in Table 6.

$$\begin{aligned}
\log[\text{Wealth}_{\text{p/c}}]_i &= \beta_0 + \beta_1 \times \text{Financial Development Measure}_i + \gamma \times \text{Controls}_i + \epsilon_i \\
\log[\text{Wealth}_{\text{p/c}}]_i &= \beta_0 + \beta_1 \times \text{Financial Development Measure}_i + \beta_2 \times \text{Patience}_i \\
&\quad + \beta_3 \times \text{Risk Taking}_i + \beta_4 \times (\text{Patience}_i \times \text{Risk Taking}_i) \\
&\quad + \gamma \times \text{Controls}_i + \epsilon_i
\end{aligned}$$

Across specifications (1), (3), (5), (7) and (9), we see that the measures of financial development are statistically significant, albeit to varying extents. A note of caution is in order here. Due to endogeneity, these point estimates cannot be evaluated with the intention of establishing causality, but rather just to measure conditional correlations that help observe the mechanism or channel through which preferences affect wealth. Upon adding the preferences measures to each specification, we see that the point estimates for patience are statistically significant for each of the specifications (2), (4), (6) and (8). More importantly, however, we observe a decrease in statistical significance and magnitude of the financial development measures. To exemplify using specifications (1) and (2), we see that in the former, gross savings as a fraction of GDP is a significant "predictor" of average wealth with point estimate of 2.015. Upon adding the preferences, we see that this point estimate is no longer statistically significant and reduces in magnitude to 0.328. These results suggest that gross savings as a percentage of GDP is mediating the variation and explanatory power of the preferences, which is why it loses significance and magnitude when we add the preferences themselves in the same specification. Similar conclusions can be drawn for the other specifications. This is a telltale sign of these financial development measures being a mediator or channel for preferences to affect average wealth.

We also do a similar analysis for wealth inequality, wherein the "first step" regressions between financial development measures and the Gini measure of wealth inequality are mostly statistically insignificant (see Table 7 in the appendix). The results suggest that market capitalization of listed domestic companies as a fraction of GDP is the only plausible channel through which patience and risk-taking can affect wealth inequality.

Table 5: Financial Development and Preferences

	Gross Savings - % of GDP		Private Credit - % of GDP		Market Cap - % of GDP		% of pop. that has borrowed any money		% of pop. that has saved any money	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Patience	0.075^{**}	0.115^{**}	0.817^{***}	0.380^{**}	0.405^{**}	0.091	0.143^{***}	0.146^{**}	0.295^{***}	0.340^{***}
	(0.034)	(0.054)	(0.118)	(0.166)	(0.171)	(0.280)	(0.044)	(0.071)	(0.046)	(0.060)
Risk Taking	0.022	−0.013	-0.471^{***}	−0.224	0.376	0.743^{**}	0.126^{**}	0.077	0.008	−0.083
	(0.045)	(0.058)	(0.149)	(0.179)	(0.225)	(0.280)	(0.057)	(0.077)	(0.059)	(0.065)
Patience X Risk Taking	0.011	−0.036	0.183	0.285	0.923	1.826^{*}	0.045	−0.028	0.094	−0.072
	(0.153)	(0.163)	(0.517)	(0.506)	(0.858)	(0.937)	(0.195)	(0.212)	(0.202)	(0.180)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	70	67	73	70	43	43	74	71	74	71
R^2	0.083	0.245	0.429	0.627	0.245	0.423	0.221	0.313	0.386	0.628

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, an island dummy and log [GDP p/c]. *p < .10, **p < .05, ***p < .01

Table 6: Preferences, Financial Development and Wealth

	Average Wealth: log [Wealth p/c]									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gross Savings - % of GDP	2.015*	0.328								
	(1.205)	(1.167)								
Private Credit - % of GDP			1.194***	0.812***						
			(0.259)	(0.289)						
Market Cap - % of GDP					0.343	0.038				
					(0.325)	(0.333)				
% of pop. who borrowed any money							1.336*	0.017		
							(0.754)	(0.781)		
% of pop. who saved any money									2.785***	1.677*
									(0.593)	(0.864)
Patience		1.464***		1.044**		1.782***		1.650***		0.953*
		(0.374)		(0.395)		(0.438)		(0.403)		(0.510)
Risk Taking		−0.318		−0.272		−0.677		−0.700		−0.519
		(0.452)		(0.439)		(0.570)		(0.467)		(0.460)
Patience X Risk Taking		−0.097		−0.651		−0.105		−0.754		−0.668
		(1.274)		(1.239)		(1.846)		(1.304)		(1.264)
Observations	66	66	69	69	43	43	70	70	70	70
R^2	0.481	0.608	0.616	0.666	0.471	0.659	0.488	0.603	0.605	0.628

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, and an island dummy. *p < .10, **p < .05, ***p < .01

4 Discussion

As our empirical results suggested, patience plays a crucial role in explaining differences in average wealth. We also found that patience reduces wealth inequality, whereas risk taking increases it. It is important, however, to delve into the meaning of these results and interpret them in tandem with economic theory and literature.

In Table 4, we took a step in this direction by conducting a deeper analysis of the relationship between the preferences and wealth inequality, that is, we sought to understand if and how the effect of preferences varies across the wealth distribution. To facilitate understanding, Table 4 can be thought of as being representative of the re-distributive effects of patience and risk taking on wealth. The effect of patience on wealth exists across the distribution but varies in magnitude and direction. Patience makes the "wealthy" agents (those on the upper end of the wealth distribution) poorer relative to the "poor" (those on the lower end of the wealth distribution). In other words, patience seems to have a positive re-distributive effect on wealth, in the sense that it moves wealth from the hands of the rich into the hands of the poor. This conclusion is in line with results from Table 3, which suggested that an increase in patience decreases the Gini coefficient of wealth, implying a reduction in wealth inequality. According to the aforementioned correlations, there are "decreasing returns" of patience on wealth. Since wealth is positively correlated with patience (according to Table 2 and several years of economic literature, as mentioned above), there is reason to believe that wealthy people are in expectation, more patient than their poor counterparts. Our decreasing returns hypothesis would suggest that an increase in patience will make a wealthy agent save only infinitesimally more, but for a poor agent, this increase of patience could make them go from not saving to saving money (this is underpinned by the positive and statistically significant correlation we obtain between gross savings and/or fraction of population that has saved any money, with patience in Table 5); thus, an increase in patience increases the wealth of the poor (bottom 50%) more than it does for the wealthy (top 1% or top 10%). Similar arguments can be made for occupational choice depending on the steepness of earnings profile.

Risk taking, on the other hand, was statistically significant across all specifications in Table 4. While risk taking increased the share of total wealth held by the top 1% and top 10%, it decreased the share held by the bottom 50%. This negative redistribution can be explained through the lens of scale dependence and type dependence, as mentioned earlier. As Kaplan et al. (2018) suggests, there exist "investment barriers" such as the fixed costs of holding certain high return assets such as real estate and hedge funds, to name a few. An increase in risk taking, therefore, has different implications across the wealth distribution. For "wealthy" agents, an increase in risk taking would mean, for example, going from investing in financial securities to investing in real estate; for "poor" agents, an increase in risk taking would mean a higher allocation of equity in an existing investment portfolio, because they cannot afford to pay the fixed costs of high return assets. Clearly, such a disproportionate change in choice of assets favoring the wealthy is bound to increase their share of wealth relative to the poor.

Stylized versions of Sims (2003) theory of rational inattention suggest that getting information about one's investments requires expending resources, and that learning about more volatile assets (ergo, assets with higher returns) consumes more resources. Investors with higher information capacity (due to greater ability to bear information costs or higher financial literacy) hold larger portfolios on average, tilt their average holdings toward riskier assets within the risky portfolio, and adjust their investments more aggressively in response to changes in payoffs (Bach et al. (2020) and Fagereng et al. (2020)). Wealthy individuals are expected to have higher information capacity, not only because of their greater ability to bear information costs, but also due to higher financial literacy. Thus, even if we were to hypothetically get rid of the fixed costs associated with high initial outlay of certain high return assets, wealthy agents are still disproportionately benefited by an increase in risk taking, because their higher information capacity enables them to choose from a more diverse menu of assets to invest in.

We can also derive insights from the aspect of financial sophistication. It is true that there is a positive correlation between financial sophistication and wealth (Calvet et al. (2007)). Wealthy agents tend to on average be more financially sophisticated than less wealthy agents. Agents with greater financial sophistication tend to invest more efficiently and more aggressively, specifically, their portfolios have higher Sharpe ratios but also higher volatility. Firstly, low wealth agents (i.e., also low financial sophistication) are less likely to participate in the equity market. Then, let's say increased risk taking brings along a newly acquired taste for risky assets for these low wealth agents, and they choose to participate in the equity market. Due to low financial sophistication, these agents are much more likely to invest inefficiently and hold under-diversified portfolios, in worst cases even reducing their stock of wealth in the process. Again, this variation in the efficiency of investments due to heterogeneous financial sophistication across the wealth distribution also disproportionately favors the wealth accumulation for high wealth agents, thereby increasing their share of wealth relative to the low wealth agents. Thus, an increase in risk taking exacerbates wealth inequality, which is in line with our results in Table 3.

In Table 5, we see that indeed there are statistically significant correlations between the preferences and financial development measures. As theory would also suggest, patience increases gross savings. This positive correlation exists even when we look at a different aggregate savings measure – the percentage of the population that has saved any money. A similar conclusion can be drawn for the measure of domestic credit offered to the private sector. It exhibits a positive correlation with patience, and this correlation is robust to using another borrowing measure, the percentage of the population that has borrowed any money. Credit behavior theory, however, suggests that patient individuals borrow less compared to impatient individuals, because they don't like immediate benefits as much as the latter. Clearly then, patience should decrease borrowing, and thus also reduce the domestic credit offered to the private sector. There are two counterarguments to be made here. Firstly, our borrowing measure does not differentiate between short-term borrowing like credit cards and long-term debt instruments. An increase in patience could imply that people move from the former to the latter, and thus results in an increase in borrowing and also domestic credit. Secondly, since patient individuals are inclined to make future-oriented investments such as, inter alia, in financial markets, physical and human capital accumulation, it is plausible that they will demand more external finance. Therefore, borrowing and domestic credit will increase. Note that, although not strongly statistically significant, an increase in risk taking increases the fraction of population that has borrowed any money. This is also consistent with theory, as an increase in risk taking implies an increase in the likelihood of holding credit instruments. The last measure of financial development, the market capitalization of listed domestic companies, is also positively correlated with patience, even if it is not a statistically significant correlation after adding relevant controls. It is interesting to note here that market capitalization is the only measure of financial development that exhibits a strong and statistically significant correlation with risk taking. An increase in a population's risk-taking tendency will translate into an increased desire in investing in "risky" assets like equity. Of course, businesses seeking funding will then also be more likely to do so via equity, and thus list on the domestic stock market, which increases the market capitalization. We also see that the interaction term of patience and risk-taking exhibits a large positive and significant correlation with the market capitalization measure. Conditional on having high levels of patience, risk taking increases the market capitalization further. High levels of patience would imply people are willing to make future-oriented investments, and then an increase in risk taking would mean they would go from investing in safe assets to risky ones like equity. Therefore, our results are consistent with what theory would predict. Overall, our results imply that patience plays a more direct and decisive role in financial development than risk-taking.

In Table 6, we seek to establish financial development as a mediating channel or mechanism for patience and risk taking to affect wealth. A good starting point is that almost all our proxies for financial development are significantly correlated with average wealth. A note of caution here: since we cannot keep all factors (including GDP per capita), which might cause an endogeneity and/or multi-collinearity problem, under control, it should be underlined that results do not imply causality, but conditional correlation.

Once the preference measures are added to the mix, the financial development measures either lose significance, reduce in magnitude substantially, or both, in the "horse race" specification. As elaborated upon earlier, these preference measures, particularly patience, are strong predictors of financial development. This means that when we use financial development measures as explanatory variables in Table 6, a large part of their explanatory power comes from the underlying variation in preferences that they are mediating. As a result, when these preferences are also added as explanatory variables alongside financial development measures, these financial development measures are no longer capturing the part of the variation that is explained by these preferences. This reduction in magnitude and significance suggests that financial development could be a channel or driver in the relationship between preferences and average wealth. In more statistical terms, our results suggest that financial development is partially mediating the relationship between preferences and average wealth. With that being said, it is important to note that the reduction in statistical significance and magnitude differs across the measures of financial development. This can be attributed to the fact that financial development can also be explained or affected through other means, including but not limited to technological and institutional factors. Each financial development measure can be explained by an amalgamation of these factors, varying in the effect each has relative to the other. For example, if we look at columns (1) and (2) compared with columns (3) and (4), we see that gross savings experiences a larger reduction in magnitude compared to private credit (domestic credit to the private sector) upon adding the preferences to the mix. This could mean that preferences explain a larger part of the variation in gross savings than in private credit, where institutional and technological factors could have a more important and influential role. In Table 7 (see appendix), we do a similar mediation analysis for wealth inequality, but the results are inconclusive. Our data suggests that there is no statistically significant (conditional) correlation between our financial development measures and wealth inequality in the first place, with the exception of the measure of market capitalization of listed domestic companies. As a result, no subsequent mediation analysis can be carried out. This suggests two things. Firstly, while financial development can help explain the disparity of average wealth across countries (i.e., why some countries have higher per capita wealth levels than others), it is unable to directly explain the disparity of wealth within a country (i.e., why some countries exhibit higher wealth inequality levels than others). Secondly, it thus follows that financial development is a plausible mediating channel for preferences to explain average wealth, but not for preferences to explain wealth inequality. Further research is needed to understand the channels, if any, by virtue of which patience and risk taking can explain wealth inequality at a country level.

As mentioned above, the market capitalization of the domestic stock market exhibited statistically significant conditional correlation with the Gini coefficient of wealth inequality. When preferences are also added as explanatory variables, the point estimate of the measure slightly loses significance and magnitude. This is a classic sign of partial mediation. If we consider market capitalization as a percentage of GDP as an aggregate representative for the taste of the population for investing in risky assets, its mediating role reaffirms our belief that indeed it is investment behavior that could be the driver of wealth inequality.

Not all countries possess the attribute of patience. However, long-term policies and projects implemented by the state and civil society can foster the cultivation of patience among individuals in society (see Alan and Ertac (2018), Angerer et al. (2023), and Kaiser et al. (2022)). Based on our empirical evidence, we can offer two policy recommendations for different age groups. For school-age children, incorporating educational methods in the curriculum that promote patience can be a long-term policy strategy. Policymakers can also focus on adult savers, business owners, and professionals to achieve positive outcomes in the short term. To achieve this, policymakers can provide more support for the dissemination of financial literacy through universities and NGOs. In financial literacy courses designed for adults, tutors can highlight the positive impact of patience on financial decision-making. Policies and programs aimed at cultivating patience in individuals can contribute to financial development, which will in turn contribute to increasing per capita wealth. It is important to acknowledge that this is not a one-size-fits-all solution. Rather, these policy recommendations should be viewed as an essential element within a broader policy toolkit that addresses financial development and as a whole.

4.1 Limitations

Despite the valuable insights and contributions provided by this study, there are certain limitations that must be acknowledged and taken into consideration when interpreting its findings, particularly those inherent to a high-level, cross-country data set. In spite of performing plenty of robustness controls, there are some effects that are not accounted for in the data sample. We examine economic preferences across plenty of countries and cultures but fail to account for contextual differences that might impact economic preferences. Since it is a world population sample, economic institutions, history and other social norms varies across countries which affects how individuals behave. For example, in some countries trust in institutions is high, and social norms emphasize fairness and cooperation. On the other hand, in some countries trust in institutions does not exist which might lead to a more individualistic and competitive economic behaviour. When these contextual differences are not accounted for, limits in the generalizability of the findings may occur. The risk of biases and measurements errors also exist, due to our paper relying on self-reported data from an experiment. Another challenge that arises in our study is the inability to control for other determinants of wealth. Firstly, at an individual level, we know that factors such as education, cognitive ability, and parental wealth are strong predictors of wealth. However, since we work with an aggregate, country-level data set, it is difficult to be more granular and extensive when controlling for the wealth determinants mentioned above.

Our study also centers on a very limited set of economic preferences, namely, patience and risk taking. We argue that these two preferences are essential for understanding economic behaviour, however, other preferences such as social preferences and fairness may also be of interest. Furthermore, the measures of patience and risk taking are only proxies derived from experiments, and not an absolute measure of the same. Currently, the measurements are computed by series of related quantitative and qualitative questions. Acquiring more accurate proxies could be done by refining and adding more questions about each preference to improve the accuracy of the estimates. Also, the use of multiple proxies for the preferences can be used in order to capture different aspects of patience and risk taking, thus reducing measurement error. Other questions in already existing surveys, although designed for other purposes, can serve as additional proxies for the preferences measured in the GPS.

5 Conclusion

According to economic theory, differences in how patient and risk-taking people are generate differences in savings and investment behavior and thereby wealth inequality. We provide a direct empirical link for patience and risk taking with wealth and wealth inequality by combining cross-country experimental data on individuals' patience and risk taking with macroeconomic data revealing wealth and wealth inequality. We document a quantitatively important negative association between patience and wealth inequality, and a positive one between risk taking and wealth inequality. The association exists throughout the wealth distribution but has opposite effects at the top and bottom of the wealth distribution. While patience decreases the share of wealth held by the top of the wealth distribution, it increases the same for the bottom; while risk taking increases the share of wealth held by the top of the wealth distribution, it decreases the same for the bottom. We find that three-quarters of the association of risk taking and wealth inequality - both the Gini coefficient and shares of total wealth - still exists after controlling for income inequality, suggesting that risk taking is able to explain the part of wealth inequality that does not arise or can't be explained due to labor income differences. We conclude that financial development is a driver of the observed positive association between patience and wealth, consistent with findings of previous studies. For preferences and wealth inequality, market capitalization of the domestic stock market plays a vital mediating role, but findings are inconclusive for other measures of financial development.

Our study contributes to inequality research at a broader level. Most previous studies aiming at explaining inequality are either simulations that assume homogeneous preferences and behavior or are restricted to explaining inequality within a single country. Our findings that patience and risk taking predict sizeable differences in wealth and wealth inequality across countries suggests that heterogeneity in preferences has an important role to play in the formation of inequality to begin with. Nevertheless, further research should be conducted to understand the drivers, if any, between preferences and wealth inequality, with a richer cross-country data set across several time periods that not only allows for controlling for other determinants of wealth such as education and cognitive ability, but also facilitates a better understanding of the role of preferences in the evolution of wealth and wealth inequality over time.

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6 Appendix

Per capita income and preferences

	Per Capita Income: log [GDP p/c]									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Patience	2.63***	1.73***							2.67***	1.92***
	(0.38)	(0.35)							(0.39)	(0.41)
Risk Taking			−0.53	0.59					−1.34***	−0.53
			(0.60)	(0.47)					(0.46)	(0.48)
Trust					1.58**	0.56			0.73	0.31
					(0.63)	(0.48)			(0.50)	(0.42)
Negative Reciprocity							1.30**	0.51	0.54	0.09
							(0.64)	(0.49)	(0.51)	(0.44)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	76	73	76	73	76	73	76	73	76	73
R^2	0.39	0.70	0.01	0.59	0.08	0.59	0.05	0.59	0.48	0.71

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, and an island dummy. *p < .10, **p < .05, ***p < .01

Gini Coefficient of Income Inequality and Preferences

	Gini Coefficient of Income Inequality								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Patience	−0.17***	−0.08*	−0.09*				−0.20***	−0.12***	−0.14**
	(0.03)	(0.04)	(0.05)				(0.03)	(0.05)	(0.05)
Risk Taking				0.08*	0.02	0.03	0.15***	0.10*	0.11*
				(0.05)	(0.05)	(0.05)	(0.04)	(0.06)	(0.06)
Patience X Risk Taking							0.15	0.07	0.07
							(0.15)	(0.16)	(0.16)
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
GDP Control	No	No	Yes	No	No	Yes	No	No	Yes
N	76	73	73	76	73	73	76	73	73
R^2	0.24	0.42	0.42	0.04	0.39	0.39	0.36	0.45	0.45

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, and an island dummy. *p < .10, **p < .05, ***p < .01

Table 7: Preferences, Financial Development and Wealth Inequality

	Gini Index of Wealth Inequality									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gross Savings - % of GDP	−0.026	−0.035								
	(0.068)	(0.075)								
Private Credit - % of GDP			0.014	0.024						
			(0.021)	(0.021)						
Market Cap - % of GDP					0.042*	0.037				
					(0.023)	(0.026)				
% of pop. who borrowed any money							0.035	0.055		
							(0.047)	(0.049)		
% of pop. who saved any money									−0.026	0.015
									(0.048)	(0.057)
Patience		−0.036		−0.060		−0.121*		−0.052		−0.046
		(0.040)		(0.038)		(0.067)		(0.039)		(0.044)
Risk Taking		0.076**		0.095***		0.111**		0.074**		0.078**
		(0.033)		(0.030)		(0.049)		(0.031)		(0.031)
Patience X Risk Taking		0.115		0.163**		0.044		0.130		0.127
		(0.085)		(0.080)		(0.141)		(0.080)		(0.081)
σ Patience		−0.006		−0.002		0.008		−0.003		−0.004
		(0.012)		(0.010)		(0.020)		(0.011)		(0.011)
σ Risk Taking		0.007		0.005		0.011		0.009		0.009
		(0.009)		(0.008)		(0.012)		(0.008)		(0.008)
σ Patience X σ Risk Taking		0.012*		0.010		0.015		0.012*		0.012*
		(0.007)		(0.006)		(0.009)		(0.006)		(0.006)
Observations	67	67	70	70	43	43	71	71	71	71
R^2	0.314	0.441	0.350	0.499	0.391	0.585	0.342	0.477	0.339	0.465

Notes: OLS estimates. Controls include the distance to the Equator, average temperature, average precipitation, the share of the population living in (sub) tropical zones, terrain ruggedness, average distance to the nearest waterway, an island dummy, Gini of income and log [GDP p/c]. *p < .10, **p < .05, ***p < .01