Journal of International Money and Finance 146 (2024) 103130

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

Cross-country variation in economic preferences and the asset composition of international investment positions

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ARTICLE INFO

JEL classification:
E71
F21
F32

Keywords:
Time Preference
Risk Aversion
Negative Reciprocity
International Investment Position
Equity Investment
Foreign Direct Investment

ABSTRACT

A stylized fact of international capital markets is that advanced countries tend to be long and developing countries short in risky assets (i.e., portfolio equity and foreign direct investment (FDI)). In other words, residents of advanced countries hold a larger stock of portfolio equity abroad than residents of developing countries, and firms in advanced countries have more foreign subsidiaries than firms in developing countries. This paper is the first to utilize a large-scale international survey on economic preferences to propose a behavioral explanation for the heterogeneity in the asset composition of international investment positions. We provide robust empirical evidence that countries with a high time preference (i.e., patience) or a high risk preference (i.e., risk-taking) tend to have a positive net international investment position and a positive net risky position. In addition, we show that countries with a high degree of negative reciprocity (e.g., willingness to punish for unfair action) tend to have a positive net FDI position. Overall, our findings suggest that preferences are important determinants of cross-country variation in net foreign asset positions.

1. Introduction

The international financial landscape is characterized by the growth of cross-border gross asset and liability positions and large differences in the asset structure of these positions (Gourinchas and Rey, 2014). If the seven largest advanced economies, the G7, are compared with the four major emerging economies, BRIC, there seems to be a clear division between the two country groups. The sum of cross-border assets and liabilities has increased much more in the G7 countries than in the BRIC countries (see Figure A1 in the Appendix). Furthermore, residents in the G7 countries have heavily invested in portfolio equity abroad and foreign direct investment (FDI), which can be considered risky assets, whereas residents in the BRIC countries have preferred safer assets such as foreign government bonds. As a result, residents in the G7 countries hold more risky assets abroad than foreigners in the G7 countries (i.e., a positive net risky position) and residents in the BRIC countries own less risky assets abroad than foreigners in the BRIC countries (i.e., a negative net risky position) (see Figure A2 in the Appendix). The positive relationship between risk preference and net risky position has been modeled in the finance literature, for example, by Dumas (1989) and in the economics literature, for example, by Gourinchas and Rey (2022) and Stepanchuk and Tsyrennikov (2015). However, possibly due to the lack of a global dataset on economic preferences, the relationship between economic preferences and net positions of different asset classes has not been empirically tested

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https://doi.org/10.1016/j.jimonfin.2024.103130

Available online 2 July 2024

before our paper. We utilize the Global Preferences Survey[1] (GPS) introduced by Falk et al. (2018) and provide robust empirical evidence that cross-country variation in economic preferences explains a large share of the heterogeneity in the asset composition of international investment positions. In other words, our analysis suggests that the division in the asset structure of gross positions between the G7 and the BRIC countries arises from the differences in their preferences as the inhabitants of the G7 countries have, on average, a higher degree of patience and risk-taking than those in the BRIC countries.[2]

In his 2012 Ely Lecture, Obstfeld (2012) noted that the growth of gross asset and liability positions poses a danger to financial stability if the composition of the asset and liability side differs.[3] Illiquid assets cannot pay short-term debts. According to Gourinchas and Rey (2007), the asymmetric composition of the US external balance sheet (i.e., high return on risky assets and low-yielding safe liabilities) has provided a sizeable excess return for it. Even though the composition of external balance sheets might have these important implications, only a few papers have examined the determinants of external positions. When Lane and Milesi-Ferretti (2001) consider country's size, GDP per capita and trade openness, they find that countries with a high GDP per capita invest heavily in FDI, and countries with a high degree of openness receive a lot of FDI. Consequently, countries with a higher GDP per capita tend to have a positive net FDI position, while there is a negative correlation between trade openness and net FDI position. Mendoza et al. (2009) show that if countries differ in contract enforceability, a country with the highest degree of enforcement of financial contracts will accumulate a net positive position in risky productive assets but a much larger negative position in safe bonds. This is due to the ability of this country to insure away idiosyncratic risk. Accordingly, Vermeulen and de Haan (2014) investigate the relationship between a country's domestic financial development and the composition of its net foreign asset position. They find that financial development leads to higher net equity (i.e., net risky position), to a lower net debt position, and overall to a lower net foreign asset position. In our paper, we show that economic preferences are more important determinants of net risky positions than financial development is.[4]

Our main interest in terms of economic preferences are time preference and risk preference. Time preference is one of the most fundamental concepts in economics, and according to the Metzler diagram, an agent with a higher time preference factor becomes a net creditor while an agent with a lower time preference factor becomes a net debtor (see, e.g., Obstfeld and Rogoff, 1996, pp. 31-34; Metzler, 1960). As already noted, the relationship between risk preference and net risky position has been theoretically modeled both in finance and economics (see, e.g., Dumas, 1989; Gourinchas and Rey, 2022; Stepanchuk and Tsyrennikov, 2015). Yet, in addition to time and risk preference, we test all other preference measures which are included in the Global Preferences Survey (GPS): negative reciprocity, positive reciprocity, altruism and trust. We find that negative reciprocity (i.e., the willingness to punish unfair behavior even at one's own cost) has explanatory power on net FDI positions. Investment is classified as direct investment (FDI) when it means having control or a significant degree of influence on the management of an enterprise in another economy (IMF, 2009, p. 100). According to the empirical literature on FDI determinants, contract enforcement increases FDI attractiveness (see, e.g., Bailey, 2018; Contractor et al., 2020). In the behavioral economics literature, (negative) reciprocity is seen as a contract enforcement device (see, e.g., Fehr et al., 1997; Falk et al., 2018). However, we are not aware of a theoretical model that would connect negative reciprocity to the net FDI positions.

The empirical literature on the determinants of net international investment positions is scarce. This is, to some extent, surprising because, as Obstfeld (2012) states, the main reason why current accounts matter is that, over the long run, the accumulated current account tracks the net foreign asset position. While introducing an updated version of the External Wealth of Nations database, Lane and Milesi-Ferretti (2018) provide a descriptive analysis of the cross-border holdings of financial assets and liabilities. Our estimates of external assets and liabilities are taken from the External Wealth of Nations database. Turrini and Zeugner (2019) adopt the concept of net international investment position norms, obtained as cumulated current account norms, to estimate country-specific benchmarks. They consider a very large set of explanatory variables but not economic preferences. Nieminen (2022) examines the relationship between time preference and net foreign asset position, providing empirical evidence for a positive association between the two. Yet, he considers neither the asset composition of international investment positions nor other preferences.

According to the current account literature (see, e.g., Chinn and Prasad, 2003; Chinn and Ito, 2007; Gruber and Kamin, 2007; Ca' Zorzi et al., 2012; Coutinho et al., 2022), macroeconomic, demographic, and institutional factors are the most important medium-term determinants of current accounts. As the current account balance measures net capital flow, net foreign asset positions and current account balances are closely related in the long run. Our set of control variables is derived from the current account literature, which is much larger than the literature on net international investment positions. We use Bayesian Model Averaging (BMA) as a model selection method for finding the most important determinants of total net foreign asset position and net positions of different asset classes. The BMA method has been used in the current account literature (see Ca' Zorzi et al., 2012; Coutinho et al., 2022).

Among the economic preferences that we include in our analysis, time preference has been studied the most in economics. Based on previous empirical studies, patience is positively correlated with macro-level outcomes such as GDP per capita and saving rates (Sunde

[1] The Global Preferences Survey is the first global dataset on economic preferences that is representative at the country level.

[2] Based on the Global Preferences Survey, the median of patience is 0.54 and the median of risk-taking is −0.03 for the G7 countries. In contrast, the median of patience is −0.09 and the median of risk-taking is −0.26 for the BRIC countries (measured as differences to the world mean in the standard deviation of the respective preference measure).

[3] Catão and Milesi-Ferretti (2014) find that the ratio of net foreign liabilities to GDP is a significant crisis predictor, and this is mainly due to the net position in debt instruments. In other words, from the recipient's perspective, debt is riskier than equity or FDI.

[4] Stepanchuk and Tsyrennikov (2015) point out that as both an increase in risk aversion and an increase in the variance of income induce precautionary savings, the assumption of differences in risk aversion and the assumption of differences in financial development are two sides of the same coin.

et al., 2022), as well as with current account balances and total net foreign asset positions (Nieminen, 2022). These macro-level findings are consistent with experimental individual-level studies that show that patience is positively related to saving (Sutter et al., 2013; Falk et al., 2018) and negatively related to indebtedness (Meier and Sprenger, 2010). Korff and Steffen (2022) consider a wider set of preferences and provide evidence that if countries differ in negative reciprocity, they tend to trade less with each other. Our contribution derives from combining data on external assets and liabilities (the External Wealth of Nations database) with a dataset on economic preferences (the Global Preferences Survey, GPS) and testing the hypotheses on the relationships between the components of international investment position and time, as well as risk preferences that have previously been formulated but not yet tested in the economics literature. Overall, in our empirical analysis, we find that 1) patience is a very important determinant of total net foreign asset positions, net risky positions, and net FDI positions with a positive coefficient; 2) risk-taking is an important determinant of net risky positions with a positive coefficient; and 3) negative reciprocity is an important determinant of net FDI positions with a positive coefficient.

The rest of the paper is structured as follows. Section 2 outlines a simple theoretical framework and testable hypotheses. Data and methodology are described in Section 3. Section 4 presents the empirical results and several robustness checks. Section 5 offers a concluding discussion.

2. Theoretical framework and testable hypotheses

In this Section, we describe a simple theoretical framework from which the relationship between time preference and net foreign asset position as well as the relationship between risk preference and net risky position can be derived. In all variants, we assume that the world consists of two countries, A ("advanced") and E ("emerging"), which are populated by representative agents.

2.1. Cross-country variation in time preference and net foreign asset position

Agents in country A have a higher time preference factor than agents in country E. Consequently, country A has a lower autarky interest rate than country E. There is only one security, which is risk-free. As countries A and E become financially integrated, A will become a net lender and E a net borrower due to the difference in autarky interest rates. Hence, we expect the following:

Hypothesis 1. (*There is a positive relationship between time preference and net foreign asset position*) The positive relationship between time preference and total net foreign asset position has been illustrated in international macroeconomics by the Metzler diagram (see, e.g., Obstfeld and Rogoff, 1996, pp. 31-34; Metzler, 1960).[5]

2.2. Cross-country variation in risk preference and net risky position

Agents in country A have a lower risk avoidance than agents in country E. Consequently, country A has a lower risk premium than country E. There are two securities that differ in riskiness and expected return; the riskier security has a higher expected return. As countries A and E become financially integrated, A will invest in risky assets in country E due to the difference in risk premium in autarky. Hence, we expect the following:

Hypothesis 2. (*There is a positive relationship between risk preference and net risky position*) The positive relationship between risk preference and net risky position has been modeled in the finance literature, for example, by Dumas (1989) and in the economics literature, for example, by Gourinchas and Rey (2022), Maggiori (2017), and Stepanchuk and Tsyrennikov (2015).[6]

3. Data and econometric methodology

In this Section, we describe our data and econometric methodology.

3.1. Data

Our sample consists of 76 countries in the period 2010–2019. The listing of countries is presented in Table A2 in the Appendix. We include all countries for which we have data on both net positions and economic preferences. For some control variables, there are a

[5] If the world consists of two countries with constant but different rates of time preferences, there cannot be a steady state with international mobility of financial capital. To solve this problem, overlapping-generations models and intertemporally nonadditive preferences have been suggested (see, e.g., Buiter, 1981, Fukao and Hamada, 1989; Obstfeld, 1990).

[6] The first version of Gourinchas and Rey (2022) is from 2010. Maggiori (2017) assumes that countries differ in financial development. He interprets this difference as the reason why risk preferences might differ. According to Stepanchuk and Tsyrennikov (2015), the assumption that individuals in the US are less risk-averse than elsewhere is another way of modelling the fact that the U.S. has more developed financial markets than the rest of the world. They model the combined effect of dominant currency and difference in risk-aversion.

few missing observations; this typically results in 70 countries in the regression analysis for the period.[7] Our sample period ends in 2019 because it is the most recent year for which we have data on net positions for all 76 countries. The descriptive statistics are provided in Table 1, a detailed description of all the variables and data sources is provided in Table A1 in the Appendix, and the correlation matrix is provided in Table A3 in the Appendix. The possible multicollinearity between explanatory variables is tested by the variance inflation factor (VIF) and reported below the regression tables.

3.1.1. Dependent variables

We have three dependent variables: 1) Total net foreign asset position, 2) Net risky position, and 3) Net FDI position. We also tested other asset classes, but these three were chosen for the following reasons: 1) The decomposition of external assets and liabilities into net risky and net safe position is widely used in international macroeconomics (see, e.g., Gourinchas and Rey, 2019); 2) The net FDI position is the main component of the net risky position[8]; 3) Our empirical analysis in Section 4 confirms the relationships between our dependent variables and economic preferences.[9]

Data on net positions are from the External Wealth of Nations database (see Lane and Milesi-Ferretti, 2018). The net positions are stock variables, and they are measured at the end of the particular year.

The total net foreign asset (NFA) position (or net international investment position, NIIP) is the difference between an economy's external financial assets and liabilities:

$$\text{Total net foreign asset position} = \frac{\text{Total assets} - \text{Total liabilities}}{\text{GDP}}$$

External assets and liabilities are defined on the basis of residence, not nationality. Net positions are measured as ratios to GDP. Following Gourinchas and Rey (2014), the net risky position is defined as:

$$\text{Net risky position} = \frac{(\text{Portfolio equity assets} - \text{Portfolio equity liabilities}) + (\text{FDI assets} - \text{FDI liabilities})}{\text{GDP}}$$

In other words, riskiness is considered from the investor's point of view. Portfolio equities are risky due to the high volatility and FDI because of low liquidity.

The net FDI position is defined simply as:

$$\text{Net FDI position} = \frac{\text{FDI assets} - \text{FDI liabilities}}{\text{GDP}}$$

3.1.2. Main explanatory variables

The data on preferences are taken from the Global Preferences Survey (GPS) introduced by Falk et al. (2018). The GPS data were collected within the framework of the 2012 Gallup World Poll. Consequently, the GPS data is time-invariant. By covering 76 countries and more than 80,000 participants worldwide, it is the first global dataset on economic preferences that is representative at the country level.

The GPS has data on patience, risk-taking, negative and positive reciprocity, altruism, and trust. We include patience and risk-taking in our analysis because patience is a measure of time preference (Hypothesis 1), and risk-taking is a measure of risk preference (Hypothesis 2). However, we also test all other preference measures and find that negative reciprocity has explanatory power on net FDI positions. Negative reciprocity measures the willingness to punish unfair behavior even at one's own cost.

As the economic preferences were measured in 2012 and in our regression analysis, the net positions were from the end of 2019, economic preferences are predetermined. The values of the economic preferences are differences to the world mean in the standard deviation of the respective preference measure.

[7] Fuel exports has the least observations: 692 out of 760. To ensure consistency, we use only one data source for each variable. For 70 countries out of the 76 included in the Global Preferences Survey, we have data on the net positions in 2019 and at least one observation on all of the control variables listed in Table 1 in the period 2010–2019.

[8] The share of FDI assets on risky assets is, on average, 0.775, and the share of FDI liabilities on risky liabilities is 0.829.

[9] The distribution of net portfolio equity positions has small variance but high skewness. As a result, it is difficult to link net portfolio equity positions to explanatory variables. The net safe position (reserve assets + debt assets – debt liabilities) was not included because foreign exchange reserves dominate it and hence the determinants are very different from the net risky positions. In our sample, there is a statistically significant concave relationship between patience and net safe position.

Table 1
Descriptive statistics, 76 countries, 2010–2019.

Variable	Min	Max	Median	Mean	St. dev.	# Obs.
Dependent variables:						
Total net foreign asset position	−1.560	2.348	−0.268	−0.210	0.533	760
Net positions of different asset classes:						
Net risky position[a]	−1.234	1.362	−0.187	−0.172	0.352	760
Net FDI position	−1.236	1.386	−0.168	−0.186	0.297	760
Explanatory variables:						
Measure of economic preferences:						
Patience	−0.613	1.071	−0.093	−0.003	0.370	76
Risk-taking	−0.792	0.971	−0.020	0.013	0.302	76
Negative reciprocity	−0.489	0.739	0.004	0.013	0.275	76
Positive reciprocity	−1.038	0.570	0.024	−0.034	0.342	76
Altruism	−0.940	0.906	−0.097	−0.038	0.343	76
Trust	−0.706	0.609	−0.081	−0.022	0.278	76
Control variables:						
Log GDP per capita	7.208	11.169	9.640	9.585	1.002	750
GDP per capita growth	−0.100	0.181	0.022	0.023	0.029	755
Fiscal balance	−0.230	0.119	−0.027	−0.031	0.036	755
Fuel exports	0.000	1.000	0.055	0.160	0.246	692
Financial openness	−1.924	2.322	1.049	0.723	1.585	730
Old dependency ratio	0.008	0.471	0.117	0.156	0.099	760
Child dependency ratio	0.153	1.001	0.349	0.405	0.201	760
Population growth	−2.258	7.687	1.112	1.073	1.169	760
Voice and accountability	−1.907	1.690	0.110	0.076	0.934	760
Rule of law	−2.323	2.130	−0.074	0.110	0.992	760
Private credit ratio	0.032	1.847	0.496	0.576	0.393	731

See Table A2 in the Appendix for a list of countries.
[a] Net risky position = Net portfolio equity position + net FDI position. (This definition is adopted from Gourinchas and Rey (2014).)

3.1.3. Control variables

The current account balance measures net capital flow, and in the long-run, total net foreign asset positions and current accounts are closely related.[10] Hence, it is natural that the set of control variables is derived from the current account literature (e.g., Ca' Zorzi et al., 2012). Our set of control variables covers most of the variables included by Vermeulen and de Haan (2014). The small differences, such as the lack of exchange rate changes, result from the fact that our focus is on deeper determinants. Hence, our empirical methodology is also different.

Our set of control variables gauges macroeconomic, demographic, and institutional factors.[11] Due to missing observations, the number of countries decreases if the set of control variables is extended. Empirical results are always conditional on the model used, but we are not aware of any additional control variable that would undermine our empirical results.[12]

3.2. Econometric methodology

The relationships between the preference measures and the net positions (e.g., Hypotheses 1–2) are tested by estimating the following linear cross-sectional regression model by the OLS estimator:

$$NetPosition_{i,2019} = \alpha + \beta\, Preference_i + \vec{\mathbf{x}}_i'\boldsymbol{\gamma} + \varepsilon_i, \tag{1}$$

where $NetPosition_{i,2019}$ is the net position of a particular asset class (as a ratio to GDP) of country i at the end of 2019, α is the intercept, Preference is the measure of economic preferences, **x** is the vector of control variables, and ε is the residual.

The net positions of different asset classes are from the end of 2019 because this is the latest year for which we have data for all of the countries included in the Global Preferences Survey.[13] As a robustness check, we replicate the analysis by taking the net positions

[10] Current account balances account for the bulk of changes in the net international investment position (Turrini and Zeugner, 2019).
[11] It is relatively straightforward to identify the most important and the most widely-used macroeconomic and demographic factors from the current account literature. For institutional factors there are more alternatives. We took the institutional factors from the World Governance Indicators (WGI) database which includes six variables on institutional quality. Only Voice and accountability and Rule of law are included as control variables, because 1) due to high pairwise correlations and multicollinearity all of the WGI variables cannot be included together; 2) among the WGI variables Voice and accountability and Rule of law are the strongest determinants of net positions; 3) results on preferences are not sensitive to whether the rest of the WGI variables are included or excluded.
[12] In addition to the control variables included in the paper, we tested Public debt, Health expenditure, Trade openness, Privatization of banking sector, Securities market development, Bank entry barriers and Civil liberties.
[13] Our version (September 14, 2021) of the External Wealth of Nations database lacks the observation of 2020 for Cameroon, Haiti, Malawi, Venezuela, and Zimbabwe.

from 2015. Following Falk et al., (2018, Tables IX and X), who introduced the GPS, measures of preferences are included one at a time. Control variables are measured as 10-year averages over the period 2010–2019 due to missing observations and possible short-run fluctuations. As a robustness check, we use annual observations instead of multi-year averages.

If we consider a linear regression model such as (1), there is uncertainty about which explanatory variables to include on the right-hand side of the equation. In order to control for this model uncertainty, we utilize the Bayesian Model Averaging (BMA) method with the uniform model prior and some other reasonable assumptions (see Fernandez et al., 2001). The BMA method has been used in the current account literature (see Ca' Zorzi et al., 2012; Coutinho et al., 2022).

When testing the statistical significance of the explanatory variables, we include five control variables with the highest inclusion probability based on the BMA. This is the maximum number of control variables because we have only 70 observations. However, there are no cases in which a strongly statistically significant control variable would be excluded.[14] In addition, the Schwarz information criterion is used for model selection.

There is no particular reason why the relationships between net positions and economic preferences or the relationships between net positions and control variables should be linear. The reason for the assumption of linearity is practical because it is easier to tackle the model uncertainty with this assumption. However, as a robustness check, we do test the quadratic terms of both the preference measures and control variables.

4. Empirical results

In this Section, we test the relationships between preference measures and net positions with the data and methodology described in Section 3.

4.1. Variable selection for regression models

We utilize the Bayesian Model Averaging (BMA) method to assess the determinants of net positions. The posterior inclusion probabilities of each preference measure are presented in Table 2. The preference measures are included as explanatory variables one at a time. The high inclusion probabilities of patience (from 0.86 to 1.00) mean that it significantly explains the cross-country variation in all three net positions once the potential control variables have been taken into account. In addition to patience and risk-taking, the inclusion probabilities of negative reciprocity are also high. Hence, we also estimate equation (1) for negative reciprocity.

Inclusion probability does not give an indication of the sign of the coefficient. That is tested in Sections 4.2–4.4. However, posterior densities for the economic preferences with the highest inclusion probabilities are shown in Figures A3-A5 in the Appendix. The results of posterior inclusion probabilities and posterior densities (Table 2-3 and Figures A3-A5) are based on all possible specifications of the explanatory variables, that is, in this case, 4095 different specifications.

The posterior inclusion probabilities of each explanatory variable are presented in Table 3. For patience, risk-taking and negative reciprocity the numbers are the same as in Table 2. Based on the BMA method, patience is the second most important determinant of total net foreign asset positions and the most important determinant of both net risky positions and net FDI positions. Fiscal balance is highly significant for the total net foreign asset position. Risk-taking and the rule of law have a high inclusion probability for the net risky positions. Rule of law is the most widely used proxy for the quality of contract enforcement and the protection of property rights (see, e.g., a review by Nunn and Trefler, 2014). For the net FDI positions, negative reciprocity is more important than risk-taking, and its inclusion probability is also slightly higher than that of the rule of law.

4.2. Determinants of total net foreign asset positions

Results of cross-sectional regressions for total net foreign asset position are presented in Table 4. The larger models are selected by the BMA method (specifications (1), (4), and (6)) and the smaller ones by the Schwarz information criterion (specifications (3), (5), and (7)).[15] There is a strong positive relationship between total net foreign asset position and patience (specifications (1)-(3)).[16] In other words, countries inhabited by patient individuals tend to have a positive net foreign asset position, whereas impatient populations tend to have a negative NFA position. This result is not driven by an outlier (see Figure A6 in the Appendix).[17] The Schwarz information criterion includes patience in the first best specification (column (3)).

Patience is positively correlated with GDP per capita and with measures of institutional quality (see Table A3 in the Appendix), but

[14] There are three cases in which excluded control variable is statistically significant at the 10% level: Private credit in specifications (1)-(2) in Table 4 and Child dependency ratio in specification (3) in Table 6 (see Table A12 in the Appendix). However, none of these undermine our main results.

[15] This also holds true for Tables 5-6.

[16] The assumption of linearity holds true for all other dependent variables and the three preferences measures from the GPS (i.e., the quadratic terms of preference measures are not statistically significant in Tables 5-6).

[17] Results for the economic preferences excluding the United Arab Emirates are presented in Table A9 in the Appendix. The total net foreign asset position of the United Arab Emirates in 2019 is a potential outlier (see Table A8 in the Appendix). If the United Arab Emirates is excluded, the quadratic term of Patience is not statistically significant at the 5% level (specification (2) in Table A9 in the Appendix) in which case the relationship between the total NFA position and patience is not only positive but also linear.

Table 2
Posterior inclusion probabilities for preference measures.

	Dependent variable: Total net foreign asset position in 2019					
Measure of preferences:						
Patience	0.86					
Risk-taking		0.45				
Neg. reciprocity			0.31			
Pos. reciprocity				0.17		
Altruism					0.09	
Trust						0.12
Control variables:	Yes	Yes	Yes	Yes	Yes	Yes
	Dependent variable: Net risky position in 2019					
Measure of preferences:						
Patience	0.97					
Risk-taking		0.60				
Neg. reciprocity			0.57			
Pos. reciprocity				0.20		
Altruism					0.08	
Trust						0.08
Control variables:	Yes	Yes	Yes	Yes	Yes	Yes
	Dependent variable: Net FDI position in 2019					
Measure of preferences:						
Patience	1.00					
Risk-taking		0.41				
Neg. reciprocity			0.73			
Pos. reciprocity				0.29		
Altruism					0.08	
Trust						0.09
Control variables:	Yes	Yes	Yes	Yes	Yes	Yes

See Table 1 for the set of control variables. All countries for which we have data are included (70 countries).

Table 3
Posterior inclusion probabilities for the explanatory variables of net positions in 2019.

	Total net foreign asset position			Net risky position			Net FDI position		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Measure of preferences:									
Patience	0.86			0.97			1.00		
Risk-taking		0.45			0.60			0.41	
Neg. reciprocity			0.31			0.57			0.73
Control variables:									
Log GDP per capita	0.64	0.71	0.85	0.17	0.46	0.38	0.09	0.19	0.17
GDP per capita growth	0.12	0.10	0.11	0.50	0.17	0.20	0.56	0.23	0.26
Fiscal balance	0.90	0.95	0.96	0.13	0.12	0.12	0.08	0.08	0.08
Fuel exports	0.30	0.15	0.14	0.31	0.31	0.34	0.12	0.14	0.12
Financial openness	0.21	0.32	0.41	0.08	0.09	0.10	0.24	0.33	0.31
Old dependency ratio	0.34	0.18	0.21	0.10	0.10	0.15	0.09	0.19	0.13
Child dependency ratio	0.34	0.39	0.25	0.10	0.14	0.17	0.10	0.15	0.21
Population growth	0.62	0.86	0.88	0.12	0.18	0.30	0.09	0.12	0.16
Voice and accountability	0.60	0.17	0.15	0.12	0.12	0.12	0.08	0.17	0.25
Rule of law	0.12	0.14	0.13	0.14	0.64	0.71	0.09	0.62	0.65
Private credit ratio	0.20	0.09	0.09	0.10	0.09	0.09	0.08	0.27	0.19

Control variables are country-level averages during the period 2010–2019. All countries for which we have data are included (70 countries).

the variance inflation factors (VIFs) of our preference measures are below 3 in Tables 4-6. This means that the results on preference measures do not suffer from multicollinearity. For the most part this holds true also for the control variables as the VIFs are below 10, which is a commonly used threshold value for severe multicollinearity.[18] In Table 4 the only exception is Child dependency ratio in specifications (1)-(2), (4) and (6). Based on specification (1), a one standard deviation increase in patience is associated with a 0.223 larger net foreign asset position (ratio to GDP). The coefficients of patience in columns (1) and (3) in Table 4 are well in line with the coefficient average of patience over all models, which is 0.553 in Figure A3 in the Appendix.

Consequently, we find strong support that Hypothesis 1 – "There is a positive relationship between time preference and net foreign

[18] High variance inflation factors are reported below the particular tables.

Table 4
Determinants of total net foreign asset positions in 2019.

	Dependent variable: Total net foreign asset position						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Measure of preferences:							
Patience	0.604***	0.797***	0.610***				
	(0.223)	(0.207)	(0.219)				
Patience^2		−0.738**					
		(0.336)					
Risk-taking				0.350**	0.551***		
				(0.173)	(0.188)		
Neg. reciprocity						0.334	0.330
						(0.226)	(0.224)
Control variables:							
Log GDP per capita	0.227	0.229	0.304**	0.260*		0.317**	0.402***
	(0.145)	(0.140)	(0.127)	(0.153)		(0.141)	(0.099)
Fiscal balance	7.618**	8.607***	7.614**	9.422***	8.639***	9.967***	10.223***
	(3.000)	(2.876)	(3.049)	(3.314)	(2.976)	(3.222)	(3.331)
Financial openness				−0.068		−0.086	−0.096*
				(0.061)		(0.059)	(0.054)
Child dependency ratio	−0.626	−0.639		−1.178	−2.465***	−0.706	
	(1.001)	(0.938)		(1.048)	(0.685)	(0.983)	
Population growth	0.244	0.271*	0.180**	0.340**	0.395***	0.357**	0.292***
	(0.161)	(0.150)	(0.081)	(0.154)	(0.146)	(0.153)	(0.088)
Voice and accountability	−0.213**	−0.181**	−0.238***				
	(0.084)	(0.077)	(0.080)				
Constant	−2.172	−2.094	−3.093**	−2.292	0.590***	−3.018*	−4.030***
	(1.587)	(1.531)	(1.235)	(1.689)	(0.194)	(1.537)	(0.935)
R^2	0.501	0.541	0.497	0.477	0.449	0.478	0.472
SIC rank			1		2		2
# Obs.	70	70	70	70	70	70	70

Control variables are country-level averages during the period 2010–2019. Heteroscedasticity-robust standard errors are in parentheses. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Multicollinearity was tested using the variance inflation factor (VIF). In specifications (1)-(2), (4) and (6), the VIFs of Child dependency ratio were high (between 8.83 and 10.15). In other specifications and for other variables, VIFs were below 7.
In specifications (1), (4), and (6), the five control variables with the highest posterior inclusion probability were included (see Table 3). Specifications (3), (5), and (7) were selected by the Schwarz information criterion (SIC).

asset position" – holds true for the total net foreign asset positions in our sample. This is theoretically plausible because time preference, which we measure by patience, is a decisive factor in saving and investment decisions. Further robustness checks are discussed in Section 4.5.

Based on specifications (4)-(7), there is a statistically significant positive relationship between risk-taking and total net foreign asset position, but not between negative reciprocity and total net foreign asset position. However, risk-taking is not selected by the Schwarz information criterion in the first best specification.

4.3. Determinants of net risky positions

The results on the net risky position are presented in Table 5. For patience and risk-taking the results are very similar to those in Table 4: there is a strong positive linear relationship between the dependent variable and these two preference measures (specifications (1)-(4) in Table 5). However, unlike in Table 4, the Schwarz information criterion includes risk-taking in the first best specification of net risky positions (column (4) in Table 5). These results are not driven by potential outliers (see Figures A9-A10 in the Appendix).[19]

There is no indication of severe multicollinearity in Table 5. Based on specification (1), a one standard deviation increase in patience is associated with a 0.186 larger net risky position (ratio to GDP). Based on specification (3), a one standard deviation increase in risk-taking is associated with a 0.090 larger net risky position (ratio to GDP). The coefficient average of risk-taking over all models (0.219 in Figure A4 in the Appendix) is smaller than the coefficients of risk-taking in Table 5. This is because the posterior inclusion probability of risk-taking is below one (0.60 in Table 3).

Consequently, we find strong support that Hypothesis 1 – "There is a positive relationship between time preference and net foreign asset position" – holds true for the net risky position in our sample. Similarly, we find strong support that Hypothesis 2 – "There is a positive relationship between risk preference and net risky position" – holds true in our sample. This is theoretically plausible because risk preference, which we measure by risk-taking, is a fundamental determinant of portfolio allocation. Again, further robustness

[19] Results for the economic preferences excluding the United Arab Emirates and the Netherlands are presented in Table A10 in the Appendix. Net risky positions of the United Arab Emirates and the Netherlands both in 2019 are potential outliers (see Table A8 in the Appendix). The results remain.

Table 5
Determinants of net risky positions in 2019.

	Dependent variable: Net risky position					
	(1)	(2)	(3)	(4)	(5)	(6)
Measure of preferences:						
Patience	0.503***	0.565***				
	(0.178)	(0.134)				
Risk-taking			0.299**	0.319***		
			(0.128)	(0.089)		
Neg. reciprocity					0.375**	0.331**
					(0.149)	(0.152)
Control variables:						
Log GDP per capita	−0.028		0.081		0.056	
	(0.057)		(0.110)		(0.108)	
GDP per capita growth	−5.007**	−5.806**	−1.490		−1.592	
	(2.462)	(2.386)	(3.105)		(3.185)	
Fiscal balance	2.021					
	(2.355)					
Fuel exports	0.345		0.280	0.432*	0.269	0.439**
	(0.224)		(0.215)	(0.225)	(0.215)	(0.217)
Population growth			0.035		0.084	
			(0.080)		(0.070)	
Rule and law	0.067		0.161**	0.231***	0.174**	0.206***
	(0.073)		(0.079)	(0.058)	(0.082)	(0.058)
Constant	0.207	−0.046	−1.030	−0.290***	−0.848	−0.288***
	(0.558)	(0.079)	(1.137)	(0.045)	(1.109)	(0.049)
R^2	0.3757	0.334	0.325	0.309	0.341	0.302
SIC rank		1		1		1
# Obs.	70	70	70	70	70	70

Control variables are country-level averages during the period 2010–2019. Heteroscedasticity-robust standard errors are in parentheses. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Multicollinearity was tested using the variance inflation factor (VIF), and in all regressions, VIFs were below 5.
In specifications (1), (3) and (5), the five control variables with the highest posterior inclusion probability were included (see Table 3). Specifications (2), (4) and (6) were selected by the Schwarz information criterion (SIC).

checks are discussed in Section 4.5.

Based on specifications (5)-(6), there is a statistically significant positive relationship between negative reciprocity and net risky position. This is probably because the net FDI position is the main component of the net risky position. In addition, if patience is not included in the model, the rule of law is associated positively with the net risky position. We will discuss the role of the rule of law in more detail in Section 4.4.

4.4. Determinants of net FDI positions

The results of cross-sectional regressions for net foreign direct investment (FDI) position are presented in Table 6. The coefficients of all three preference measures (patience, risk-taking, and negative reciprocity) are positive and statistically significant. However, the Schwarz information criterion selects only patience and negative reciprocity in the first best models. The net FDI position of the Netherlands is a potential outlier (see Table A8 and Figure A12 in the Appendix). However, the results on patience and negative reciprocity are not sensitive to whether that country is included or not (see Table A11 in the Appendix).

Apart from Log GDP per capita in specification (1), multicollinearity is not an issue in Table 6. Based on specification (5), a one standard deviation increase in negative reciprocity is associated with a 0.098 larger net FDI position (ratio to GDP). The coefficient average of negative reciprocity over all models (0.259 in Figure A5 in the Appendix) is smaller than the coefficients of negative reciprocity in Table 6. This is because the posterior inclusion probability of negative reciprocity is below one (0.73 in Table 3).

Overall, we find that there is a positive relationship between negative reciprocity (i.e., the willingness to punish unfair behavior even at one's own cost) and net FDI position. In the behavioral economics literature, (negative) reciprocity is seen as a contract enforcement device (see, e.g., Fehr et al., 1997; Falk et al., 2018). However, we do not claim that we are able to propose a theoretical explanation for this empirical finding.

In Tables A4-A7 in the Appendix, we decompose the net FDI position into the share of FDI assets in total assets and the share of FDI liabilities in total liabilities, as well as into the gross FDI assets (ratio to GDP) and the gross FDI liabilities (ratio to GDP). It seems that the observed relationship in net FDI positions originates from a negative relationship on the liabilities side. In other words, countries with a lower degree of negative reciprocity tend to receive more FDI (see Figure A18 in the Appendix), and actually, FDI is often the main type of foreign investment in these countries (see Figure A16 in the Appendix).

Patience is not associated with the share of FDI assets, but it is positively correlated with gross FDI assets (see Tables A4-A7 in the Appendix). This implies that countries inhabited by patient individuals tend to have a large outward FDI stock (see Figure A17 in the Appendix), but these countries also have a lot of other types of foreign investments.

Table 6
Determinants of net FDI positions in 2019.

	Dependent variable: Net FDI position					
	(1)	(2)	(3)	(4)	(5)	(6)
Measure of preferences:						
Patience	0.574***	0.519***				
	(0.169)	(0.128)				
Risk-taking			0.196**	0.247**		
			(0.093)	(0.105)		
Neg. reciprocity					0.357**	0.345**
					(0.148)	(0.140)
Control variables:						
Log GDP per capita	0.008		0.009			
	(0.122)		(0.054)			
GDP per capita growth	−4.792**	−4.224**	−3.557		−3.617	
	(2.183)	(2.101)	(2.310)		(2.209)	
Fuel exports	0.030					
	(0.140)					
Financial openness	−0.040		−0.058*		−0.062*	
	(0.037)		(0.032)		(0.031)	
Child dependency ratio	0.067				0.309*	
	(0.365)				(0.175)	
Voice and accountability					0.034	
					(0.059)	
Rule of law			0.147**	0.156***	0.189**	0.132***
			(0.071)	(0.050)	(0.073)	(0.046)
Private credit			0.154			
			(0.102)			
Constant	−0.189	−0.118**	−0.295	−0.246***	−0.251***	−0.243***
	(1.307)	(0.057)	(0.509)	(0.035)	(0.092)	(0.035)
R^2	0.424	0.393	0.297	0.216	0.343	0.246
SIC rank		1		2		1
# Obs.	70	70	70	70	70	70

Control variables are country-level averages during the period 2010–2019. Heteroscedasticity-robust standard errors are in parentheses. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. Multicollinearity was tested using the variance inflation factor (VIF). In specification (1), the VIF of Log GDP per capita was high (9.44). In other specifications and for other variables, VIFs were below 6.
In specifications (1), (3), and (5), the five control variables with the highest posterior inclusion probability were included (see Table 3). Specifications (2), (4), and (6) were selected by the Schwarz information criterion (SIC).

There is a strong positive relationship between the net FDI position and the rule of law (see Table 3 and Table 6). Based on Table A13 in the Appendix, this relationship is quadratic (see also Figure A15 in the Appendix).[20] The decomposition reveals that the positive relationship is driven by the positive relationship between gross FDI assets and the rule of law (see Tables A5 and A7 in the Appendix). It could be that good contract enforcement and the protection of property rights have a positive impact on FDI outflows because they create favorable conditions for multinational companies to emerge and hence to invest abroad, as suggested by Globerman and Shapiro (2002).

4.5. *Additional robustness checks*

In Sections 4.2-4.4, we considered model uncertainty in the linear cross-sectional regression model and possible multicollinearity among the explanatory variables.[21] The former was handled by the Bayesian Model Averaging (BMA) method and by the Schwarz information criterion (SIC). The latter was tested by the variance inflation factor (VIF). In addition, as already mentioned, we verified that restricting the number of control variables to five does not affect our empirical results on the relationships between the economic preferences and the net positions (see Table A12 in the Appendix for the cases in which an additional control variable is statistically significant at the 10 % level). The main results were also robust to excluding potential outliers, such as the United Arab Emirates and the Netherlands (see Tables A9-A11 in the Appendix).[22]

When introducing our econometric methodology in Section 3.2, we referred to two robustness checks on the control variables and one on the dependent variables: allowing for nonlinearities in the control variables, using annual observations instead of multi-year

[20] The quadratic term is statistically significant whether or not the Netherlands is included.
[21] In addition, we tested the quadratic terms of preference measures and found that with one exception they are statistically insignificant for our three dependent variables. The one exception is patience in total NFA position regression which is statistically significant at the 5% level with 70 countries and statistically significant at the 10% level if a potential outlier (the United Arab Emirates) is excluded.
[22] In addition, we tested that our main results are robust to excluding countries which have been classified as financial centers for example by Lane and Milesi-Ferretti (2018).

averages on the control variables, and replicating the analysis by taking the net positions from 2015. In Table A13 in the Appendix, we present the cases in the context of Tables 4-6 in which the quadratic term of a control variable is statistically significant at the 5 % level. Some of the relationships between the net positions and control variables are quadratic, but these nonlinearities in control variables do not affect our empirical results on the relationships between the economic preferences and the net positions. In Tables A14-A15 in the Appendix, all countries for which we have data are included, and as the timing of the control variables is different from that of Tables 4-6, the number of countries is not 70 as in Tables 4-6, but varies between 59 and 76. Our main empirical results on are not sensitive to whether annual or multi-year averages on control variables are used (see Table A14 in the Appendix). In addition, these results are not specific to 2019 as the results remain if the net positions are from 2015 and control variables from the period 2006–2015 (see Table A15 in the Appendix).

The Global Preferences Survey introduced by Falk et al. (2018) is the first global dataset that is representative at the country level, and it covers a relatively large number of countries. However, we wish to test whether our empirical results are insensitive to which survey dataset is used to measure economic preferences. The International Test on Risk Attitudes (INTRA) conducted by the University of Zurich and introduced by Rieger, Wang and Hens (2015) and Wang, Rieger and Hens (2016) provides a large-scale international survey on time and risk preferences. In total, 6912 university students in 53 countries participated in the INTRA. Unfortunately, we are unaware of any alternative large-scale international survey data on negative reciprocity.

We do not utilize the BMA method when preference measures are taken from the INTRA because 1) the relationships between net positions and economic preferences are nonlinear, and 2) the number of countries is limited. The INTRA includes financial centers such as Luxembourg which have very atypical values, for example, in the net risky positions. These potential outliers were excluded from the sample.[23] We estimate the parameters of the following quadratic regression model by the OLS estimator:

$$NetPosition_{i,2019} = \alpha + \beta_1 Intra_i + \beta_2 Intra_i^2 + \beta_3 \overline{Ctrl_i} + \beta_4 \overline{\mathrm{Ctrl}_i^2} + \varepsilon_i, \quad (2)$$

where $\mathrm{NetPosition}_{i,2019}$ is a net position of a particular asset class (as a ratio to GDP) of country i at the end of 2019, α is the intercept, Intra is the measure of economic preferences from the INTRA, Ctrl is the control variable, and ε is the residual.

All control variables were tested, and the specification of equation (2) with the highest R^2 is presented in Table 7.[24] There is a strong quadratic relationship between patience and the total net foreign asset positions (column (1)). For most of the countries, the relationship is positive (see Figure A19 in the Appendix). However, patience is not statistically significant for the net risky or the net FDI positions if a control variable is included (compare columns (3) and (5) in Table 7 with columns (3) and (5) in Table A20 in the Appendix). Consequently, we find that Hypothesis 1 – "There is a positive relationship between time preference and net foreign asset position" – holds true, but only for the total net foreign asset position if the time preference measure is taken from the INTRA.

In the INTRA, risk preference is measured such that higher values imply lower risk-taking. There is a quadratic relationship between risk aversion and the net risky positions (column (4) in Table 7). For most of the countries, the relationship is negative (see Figure A20 in the Appendix). Consequently, we find that Hypothesis 2 – "There is a positive relationship between risk preference and net risky position" – holds true if the risk preference measure is taken from the INTRA.

5. Concluding remarks

As highlighted by Gourinchas and Rey (2014), the international financial landscape is characterized by the growth of cross-border gross asset and liability positions and large differences in the asset structure of these positions. Residents of advanced countries hold a larger stock of portfolio equity abroad than residents of developing countries, and firms in advanced countries have more foreign subsidiaries than firms in developing countries. If riskiness is considered from the investor's point of view, portfolio equity and FDI are risky. Thus, it can be said that advanced countries tend to be long and developing countries short in risky assets (Gourinchas and Rey, 2014). In this paper, we utilized the Global Preferences Survey, which is the first global dataset that is representative at the country level, and we provided robust empirical evidence that cross-country variation in economic preferences explains a considerable share of the heterogeneity in the asset composition of international investment positions.

More specifically, we found that patience is positively related to total net foreign asset position, net risky position, as well as net FDI position. Risk-taking is positively related to the net risky position, while negative reciprocity (i.e., willingness to punish for unfair action) is positively related to the net FDI position. With regard to time and risk preference, our empirical results are novel, but consistent with theoretical models in finance and economics (see, e.g., Metzler, 1960; Obstfeld and Rogoff, 1996, pp. 31-34; Buiter, 1981 for time preference and Dumas, 1989; Gourinchas and Rey, 2022; Stepanchuk and Tsyrennikov, 2015 for risk preference). We are unaware of any formal theoretical model that links negative reciprocity to external positions. The empirical results are robust to several considerations, such as model uncertainty, multicollinearity, nonlinearities, potential outliers, different data frequencies, and different measurement periods, and most of them are also robust to alternative data on preferences.

Previous empirical research on net international investment position and current account balance has largely concentrated on proximate macroeconomic determinants such as GDP per capita. As we focus on preferences, which can be considered deep determinants, our empirical analysis contributes to the literature. If it is the case that economic preferences are largely stable and

[23] The list of countries included in the INTRA is presented in Tables A16 in the Appendix. The descriptive statistics for this sample are provided in Tables A17 in the Appendix. The listing of potential outliers is presented in Tables A19 in the Appendix.

[24] This is a simple information criterion type of selection procedure.

Table 7
Determinants of net positions with alternative preference measures in 2019.

	Total net foreign asset position		Net risky position		Net FDI position	
	(1)	(2)	(3)	(4)	(5)	(6)
Measure of preferences:						
Patience (INTRA)	−2.033		−1.099		−0.356	
	(1.278)		(0.931)		(1.107)	
Patience (INTRA)^2	3.017***		1.143		0.617	
	(1.079)		(0.934)		(0.976)	
Risk aversion (INTRA)[a]		1.459		1.568		1.640
		(0.880)		(1.221)		(1.128)
Risk aversion (INTRA)^2		−1.136		−1.749**		−1.821**
		(0.950)		(0.828)		(0.788)
Control variables:						
Log GDP per capita				−4.116*	−3.100**	−3.868***
				(2.364)	(1.246)	(1.184)
Log GDP per capita^2				0.226*	0.167**	0.210***
				(0.122)	(0.065)	(0.059)
Fiscal balance	0.030	0.045				
	(0.028)	(0.052)				
Fiscal balance^2	−0.013	−0.013				
	(0.008)	(0.008)				
Voice and accountability			0.135**			
			(0.055)			
Voice and accountability^2			0.169**			
			(0.064)			
Constant	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.454	0.240	0.381	0.439	0.355	0.449
# Obs.	48	48	47	47	50	50

Heteroscedasticity-robust standard errors are in parentheses. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % levels, respectively. All countries for which we have data are included except the potential outliers on net positions (see Tables A16 and A19 in the Appendix for the included countries).

[a] Risk aversion is the opposite of risk-taking.

exogenous, the distribution of the external wealth of nations might be surprisingly persistent and weakly responsive to changes in economic policies. The same logic applies to the asset structure of external positions. Broadly speaking, it would be important to understand under what conditions economic integration among regions characterized by heterogenous preferences results in persistent or harmful external imbalances. More narrowly, our empirical findings call for formal theoretical reasoning on the relationship between negative reciprocity and FDI. Finally, bilateral data on asset positions could shed more light on how differences in preferences affect asset positions.

CRediT authorship contribution statement

Mika Nieminen: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. **Kamila Kuziemska-Pawlak:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

The authors thank the editor, Menzie D. Chinn, and one anonymous referee for useful comments.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jimonfin.2024.103130.

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