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Contents

Abstract

In a financially integrated world, some countries become international net creditors while others become international net debtors. This paper examines the long-run determinants of the net international investment position (NIIP). Using a cross-sectionally augmented error correction model estimated with the dynamic common correlated effects estimator on data for 38 countries from 1990 to 2023, we test several theoretical hypotheses – including the stages of development hypothesis, the life-cycle hypothesis, and Ricardian equivalence. The results show that an increase in relative GDP per capita and relative central government (CG) debt/GDP reduces the NIIP/GDP in the long run, while a rise in relative old-age dependency increases it. For selected countries, we decompose changes in the long-run NIIP/GDP since 1990. In the United States, a decline in the long-run NIIP/GDP reflects rising relative GDP per capita, falling relative old-age dependency, and, from 2018, growing CG debt/GDP. In Japan, relative population aging and a decline in relative GDP per capita support an increase in the long-run NIIP/GDP, while the expansion of relative CG debt/GDP weighs it down.

JEL codes: F21, F30, F41, C23

Keywords: Net international investment position, capital flows, Ricardian equivalence, stages of development hypothesis, life-cycle hypothesis, cross-section dependence, dynamic common correlated effects estimator

Introduction

The net international investment position (NIIP) measures the net external component of a country's wealth and is a key indicator of a country's external stock balance. It provides an aggregate view of a country's net financial position (assets minus liabilities) with respect to the rest of the world. Despite its importance, the literature on NIIP is scarce, particularly when compared with the abundant literature on current account balance. However, focusing solely on current account balances may be insufficient for investigating the long-run fundamentals of the NIIP, since it takes into account only flow balance and not stock balance.

We test a wide variety of theoretical predictions related to the NIIP. For this purpose, we adopt a reduced-form model approach instead of testing a structural model based on theoretical optimization.

Long-run factors behind changes in NIIP may include public debt accumulation. If the Ricardian Equivalence (Barro, 1974, 1989) holds, an increase in fiscal deficit would be fully financed by an increase in private saving. That suggests that fiscal balance will have no impact on the current account balance and thereby the NIIP. In contrast, the well-known "twin deficits hypothesis" is based on the assumption that the Ricardian Equivalence does not hold, as demonstrated by many empirical studies.[1] This hypothesis suggests there is a positive association between government budget balances and current account balances in the medium term. Hence, countries with high levels of fiscal deficit import foreign savings, i.e., they run a current account deficit, which ultimately reduces their NIIP.

NIIP changes can be linked to the "stages of development hypothesis." Economies with low per capita income can import capital due to their higher marginal product of capital (i.e., higher real interest rate). Alternatively, as one way to explain the Lucas Paradox (1990), Alfaro et al. (2008) argue that more institutionally developed countries may attract capital inflow (from less developed economies) despite their lower marginal product of capital. Developed countries tend to have more developed institutions and legal systems, as well as sophisticated financial markets. For such economies, capital tends to "flow against the current," that is, capital flows from developing to developed economies.[2]

[1] See Chinn and Prasad (2003), Chinn (2005), Chinn and Ito (2007, 2022, 2025), Erceg et al. (2005), Bussière (2010), Corsetti and Müller (2006), and Gruber and Kamin (2007).
[2] Weak property rights protections, inadequate anti-corruption measures, excessive red tape, and political instability may discourage investment in poorer countries.

The NIIP can also be affected by demographic factors. For example, Ando and Modigliani (1963) argue that a country's level of aggregate saving depends on the demographic structure of the population – the life cycle hypothesis. Both young and old generations live on dissaving in their life cycle, while the working-age population saves to pay off debts accumulated in their youth and also to prepare for retirement. Hence, demographic variables that reflect the population's age structure are important determinants of the saving behaviour and, therefore, should have an impact on the NIIP.

Our empirical analysis uses a balanced panel of 38 countries covering the period 1990–2023. We begin by testing for weak cross-section dependence, and then we examine the unit root properties of the considered variables. Based on the cross-sectional dependence test proposed by Pesaran (2015, 2021), we reject the null hypothesis of weak dependence for the NIIP (as a share of GDP, henceforth NIIP/GDP), relative central government debt (as a share of GDP, henceforth CG debt/GDP), relative GDP per capita, relative old- and young-age dependency ratios. Furthermore, using the panel unit root test that accounts for cross-sectional dependence suggested by Pesaran (2003), we cannot reject the null hypothesis of non-stationarity for NIIP/GDP, relative CG debt/GDP, and relative GDP per capita.

Taking these findings into account, we estimate the cross-sectionally augmented error correction model (CS-ECM) using the dynamic common-correlated effects estimator (DCCE, Chudik and Pesaran, 2015) – mean group (MG, Chudik and Pesaran, 2019). This estimation strategy enables the estimation of long-run effects, allows coefficients to vary across panel units, and accounts for cross-sectional dependence. To the best of our knowledge, this is the first study to examine the long-run determinants of NIIP/GDP that uses panel econometric methods that jointly take into account the dynamic and diverse nature of the relationships across countries and the presence of unobservable common factors.

Our main findings are as follows. We first find that the long-run coefficient on relative CG debt/GDP is statistically significant and negative. Hence, an increase in relative CG debt/GDP reduces NIIP/GDP in the long run. A country that increases its level of central government debt tends to import foreign savings, and therefore, its NIIP tends to decrease through a current account deficit. Second, an increase in relative GDP per capita leads to a reduction in the NIIP/GDP in the long run. This implies that capital flows to relatively fast growing economies. Countries that record an above-average increase in GDP per capita increase their net external liabilities. Third, an increase in the relative old age dependency ratio increases the NIIP/GDP in the long run. Thus, in the long run, the NIIP/GDP tends to increase in countries with relatively aging populations. People accumulate assets, in particular, due to increasing longevity. Hence, the positive coefficient corresponds with life-cycle consumption smoothing.

We decompose the changes in the theoretical long-run values of the NIIP/GDP from 1990 onwards to identify which variables were drivers of these changes. For the U.S., the decline in the long-run NIIP/GDP was driven by a decrease in the relative old age dependency ratio, for most of the sample period (1990-2023) an increase in the relative GDP per capita, and—from 2018 to 2023—an increase in the relative CG debt/GDP. In contrast, Japan's increase in the long-run NIIP/GDP was driven by relative population ageing and, for most of the sample period, a decline in relative GDP per capita. However, the rise in relative CG debt/GDP during most of the analysed period contributed to a decrease in the long-run NIIP/GDP.

The rest of the paper is structured as follows. Section 1 reviews the relevant literature, while Section 2 presents the econometric methodology. Section 3 reports the empirical results and discusses the findings, while Section 4 presents robustness checks. Section 5 compares the changes in actual and long-run NIIP/GDP and decomposes the latter. Section 6 offers concluding remarks.

1 Literature overview

There is rich literature on current account balance determinants, including Debelle and Faruqee (1996), Chinn and Prasad (2003), Lee et al. (2008), Ca' Zorzi et al. (2012), and Phillips et al. (2013), among others.[3] In contrast, the literature on the NIIP is relatively scarce, despite its important role as a fundamental state variable in international macroeconomics. Notable exceptions include Masson et al. (1994), Lane and Milesi-Ferretti (2001a, 2001b, 2007, 2018), Vermeulen and de Haan (2014), Turrini and Zeugner (2019), Nieminen (2022), Milesi-Ferretti (2023), and Nieminen and Kuziemska-Pawlak (2024).

Turrini and Zeugner (2019) estimate NIIP norms and prudential thresholds (both expressed as a share of GDP). For the former, they obtain NIIP norms as cumulated current account norms (as a share of GDP). They do not regress NIIP directly on explanatory variables due to difficulties associated with non-stationary variables in the panel (see Turrini and Zeugner, 2018, p. 151). For prudential thresholds, they obtain NIIPs' prudential thresholds as the threshold for the NIIPs interacted with relative income per capita that maximizes signal power in predicting external crises.

Masson et al. (1994) investigated the long-run determinants of net foreign asset (NFA) equilibrium in the United States, Japan, and Germany. Using a cointegration approach, they find that it is a function of demographic variables and public debt. Specifically, their results for the USA and Japan indicate that a higher domestic debt/GNP ratio lowers NFA/GNP ratio in the long run, while an older population raises it.

Using cross-sectional data, Lane and Milesi-Ferretti (2001) explore the correlations between NFAs and country characteristics, such as level of development, size, and openness to trade. The point estimate of GDP per capita is significant and positive in the regressions for the full sample and developing countries, but not significant for industrial countries. The coefficient on trade openness is significant and positive for the full sample and the subsample of industrial countries. Finally, the coefficient on country size is significant and positive for industrial countries, the full sample (excluding oil producers), and developing countries (also excluding oil producers).

Lane and Milesi-Ferretti (2002) show that while the evolution of NFA positions can be linked to shifts in relative output levels, the stock of public debt, and demographic factors, the impact

[3] See also Chinn (2005), and Chinn and Ito (2007, 2022, 2025). Chinn and Ito (2022) summarize different categories of theoretical and empirical papers on the determinants of current account balances.

often varies depending on the sample. Using panel dynamic ordinary least squares (DOLS) regressions with fixed time and country effects, they find a positive influence of output per capita on the NFA position (ratio to GDP) for industrial countries, and usually a negative influence for developing countries. Furthermore, using cross-sectional data, Lane and Milesi-Ferretti (2002) find a positive impact of output per capita on NFA position across industrial countries, and a point estimate that is not always significant for developing countries.

Using a pooled mean group estimator (PMG), Vermeulen and de Haan (2014) investigate the relationship between a country's NFA position (and its composition) and its domestic financial development. They find that financial development, proxied by the private credit-to-GDP ratio, reduces a country's long-run NFA position-to-GDP ratio.

Nieminen (2021) examines the long-run relationship between consumer patience in the sense of intertemporal utility maximization and NFA positions. He finds that countries inhabited by patient individuals tend to have a positive NFA position (ratio to GDP), whereas those inhabited by impatient individuals tend to have a negative one. Nieminen and Kuziemska-Pawlak (2024) confirm that countries with a high time preference (i.e., patience) tend to have a positive NIIP (ratio to GDP). This is theoretically plausible since time preference is a decisive factor in saving and investment decisions.

2 Data and methodology

Our sample consists of 38 countries over the period 1990-2023 and is a balanced panel dataset.[4] We exclude economies with a population of less than 1 million or those where the NIIP/GDP ratio is outside the range of [-1, 1]. Regarding the independent variables, it is the level of the variable, excluding global factors, that affects the NIIP/GDP.[5] To eliminate the influence of global conditions for each year and country, we calculate differences between variables and their GDP-weighted sample averages (excluding the country in question). For brevity, these differences are referred to by their simple variable names. For example, "CG debt/GDP" refers to the difference between a country's CG debt/GDP and GDP-weighted sample average (excluding a given country).[6] Descriptions of all variables and data sources are presented in Table A2, and descriptive statistics are reported in Table A3.

First, we test variables for weak cross-sectional dependence (CD). While weak CD should not pose a problem, strong CD implies that all units are exposed to the same common factors. Common factors are usually unobserved or unobservable and are often interpreted in panel data models as shocks that influence all cross-sectional units (e.g., countries) at the same point in time but to different degrees. Examples of common factors include the U.S. quantitative easing, U.S. trade policy, global commodity prices, and global economic shocks (e.g., banking crises, pandemics). We test weak cross-sectional dependence by using the CD-test proposed by Pesaran (2015, 2021). For the CD-test, the null hypothesis is weak dependence, and the alternative hypothesis is strong dependence. Based on the CD-test, we reject the null hypothesis of weak dependence for all variables considered in the analysis (Table 1).

Table 1 Cross-sectional dependence test results

Variable	CD test statistic	p-value
NIIP/GDP	3.1	0.002
GDP per capita	38.0	0.000
CG debt/GDP	61.4	0.000
Old age dependency	35.8	0.000
Young age dependency	33.5	0.000

Note: The table reports the results of the CD-test (Pesaran, 2015, 2021).

[4] Table A1 in the Appendix lists the sample economies.
[5] The same argument applies to current account balance. See Phillips et al. (2013) and Kuziemska-Pawlak and Mućk (2020).
[6] For GDP per capita, we use the difference between the natural logarithm of GDP per capita in a given country and the natural logarithm of the GDP-weighted sample average.

Next, we estimate the number of common factors influencing the NIIP/GDP. Knowledge of the number of factors is key to multiple econometric estimation methods. While methods such as the Common Correlated Effects (CCE) estimator (Pesaran, 2006) do not require exact knowledge of the number of factors, the number of cross-section averages has to be equal to or larger than the number of common factors (Karabiyik et al., 2017; Juodis et al., 2021). Based on the criteria from Ahn and Horenstein (2013), we find that the NIIP/GDP is exposed to two common factors (Table 2).

Table 2 Results of the estimation of the number of common factors

IC	# factors	IC	# factors
ER	2	GR	2

Note: The two criteria from Ahn and Horenstein (2013) are the "Eigenvalue Ratio" (ER) and the "Growth Rate" (GR). We use the option: "Remove individual and time fixed effect and standardize variance of each cross-section to 1" (Ditzen and Reese, 2023).

The next step is to verify the order of integration of the variables considered in the analysis. A variable is defined to be integrated of order one if it must be differenced once to produce a stationary series, i.e., a series with a constant mean and constant, finite variance. We use the panel unit root test that accounts for cross-sectional dependence proposed by Pesaran (2003), where the null hypothesis assumes that all series are non-stationary. For the NIIP/GDP, CG debt/GDP, and GDP per capita, the null hypothesis of non-stationarity cannot be rejected (Table 3).[7]

[7] Masson et al. (1994) analyze the post-war patterns of the ratios of net foreign assets to GNP for the United States, Japan, and Germany. They find that the non-stationarity of the ratio cannot be rejected for any of the three countries. However, the non-stationarity of its first difference can be rejected, indicating that the ratio is integrated of order one. Lane and Milesi-Ferretti (2002) provide evidence on the presence of unit roots in ratio of net foreign assets to GDP separately for industrial and developing country samples.

Table 3 Panel unit root test results

Variable	Level		First difference	
	Z[t-bar] statistic	p-value	Z[t-bar] statistic	p-value
NIIP/GDP	1.8	0.963	-13.3	0.000
GDP per capita	0.9	0.827	-13.5	0.000
CG debt/GDP	-0.6	0.279	-9.8	0.000
Old age dependency	-5.7	0.000		
Young age dependency	-10.6	0.000		

Note: The table reports the results of the panel unit root test in the presence of cross-sectional dependence (Pesaran, 2003).

Finally, we estimate the cross-sectionally augmented error correction model (CS-ECM) for the NIIP/GDP using the dynamic common-correlated effects mean group (DCCE-MG) estimator (Chudik and Pesaran, 2015, 2019). The error correction model consists of two terms: one captures the short-run deviations from equilibrium, and the other captures the long-run movements, with our primary focus being the latter. We select candidate determinants of the NIIP/GDP behaviour based on the literature. Given the limited number of time series observations, we employ parsimonious specifications with a restricted set of potential determinants. To proxy the unobserved common factors driving cross-sectional dependence, we use cross-sectional averages (CSAs). The residuals are tested for strong cross-sectional dependence. If strong CD is not accounted for, it would potentially lead to 1) omitted variable bias, 2) correlation of residuals across units. Based on the CD test statistic and associated p-value, the null hypothesis of weak CD on residuals fails to be rejected (Table 4).

3 Estimation results

This section provides an economic interpretation of the long-run estimates presented in Table 4. First, the long-run impact of CG debt/GDP on NIIP/GDP is negative, as expected. An increase in CG debt/GDP decreases the NIIP/GDP in the long run. A point estimate of -0.6 (specification 2, Table 4) implies that a 1 percentage point (pp) increase in CG debt (% of GDP) is associated with a 0.6 pp decline in NIIP (% of GDP) in the long run.

The results are in line with the twin deficits hypothesis, which posits a positive relationship between fiscal balance and current account balance in the medium term (see, e.g., Chinn and Prasad, 2003; Chinn and Ito, 2007, 2022).[8] According to Ricardian Equivalence (Barro, 1974, 1989), a change in the budget balance is offset by the same absolute change in private net savings (sign reversed). When a country increases its budget deficit, private savings increase in anticipation of higher future taxes, implying that a change in the budget balance does not affect the current account balance. When Ricardian Equivalence does not hold, however, a worsening of the fiscal balance can decrease domestic net savings, thereby worsening the current account balance – the twin deficits hypothesis.

Second, the long-run coefficient on GDP per capita is significantly negative. A point coefficient of -1.1 means that a 10 percent increase in a country's GDP per capita is associated with an 11 pp decrease in its ratio of NIIP to GDP in the long run (specification 2, Table 4). Hence, an increase in GDP per capita is associated with an increase in net external liabilities (share of GDP) in the long run.[9]

Countries that increase their GDP per capita more than others, i.e., experience relatively fast economic growth, attract foreign savings and finance part of their investment through net capital inflows from abroad. These net capital inflows accumulate over time and show up as a more negative NIIP/GDP in the long run.

Third, the long-run effect of old age dependency ratio on NIIP/GDP is positive. An increase in the old population (as a percentage of the working-age population) by 1 pp leads to an increase in NIIP (as a percentage of GDP) by 4.6 pp in the long run (specification 2, Table 4). Therefore, countries experiencing population ageing faster than other countries tend to

[8] An increase (decrease) in fiscal balance results in an increase (decrease) in public debt, while an increase (decrease) in current account balance results in an increase (decrease) in net international investment position, ceteris paribus.

[9] The Mean Group estimator (with fixed effects) uses within variation, i.e., variation within an individual unit (e.g., country) over time.

increase their NIIP/GDP in the long run. This suggests that populations that age relatively quickly tend to accumulate net external assets.

The result is consistent with the life-cycle hypothesis (Ando and Modigliani, 1963), which posits that countries with a high share of young or retired population tend to save less, while countries with a high share of working population tend to save more. A positive coefficient corresponds with life-cycle consumption smoothing. People accumulate assets, particularly due to increasing longevity.

Finally, our results show that the long-run coefficient on the young age dependency is not statistically significant, which means that its changes do not alter the NIIP/GDP in the long run. An increase in the young age dependency may decrease household savings due to higher needs for current consumption and investment of the youth in themselves (i.e., education), lowering the current account balance. On the other hand, it may increase saving in anticipation of large future expenses (e.g., education and housing), potentially increasing the current account balance and thereby the NIIP. Our results demonstrate that the long-run coefficient on the young age dependency is not statistically significant, suggesting that the two opposing effects mentioned above may effectively cancel each other out.

Table 4 Baseline estimation results

	(1) D.NIIP/GDP	(2) D.NIIP/GDP	(3) D.NIIP/GDP
Adjustment Term			
L.NIIP/GDP	-0.456***	-0.593***	-0.685***
	(0.034)	(0.042)	(0.044)
Long Run Estimates			
GDP per capita	-1.055***	-1.140***	-0.978***
	(0.368)	(0.278)	(0.306)
CG debt/GDP	-0.798***	-0.619***	-0.694***
	(0.161)	(0.148)	(0.150)
Old age dependency		4.563**	4.536*
		(2.121)	(2.373)
Young age dependency			-0.930
			(0.940)
Short Run Estimates			
D.GDP per capita	0.158	0.321	0.359
	(0.194)	(0.209)	(0.237)
D.CG debt/GDP	-0.039	0.001	0.048
	(0.058)	(0.071)	(0.073)
D.Old age dependency		-1.508	-1.250
		(1.526)	(1.687)
D.Young age dependency			-0.122
			(1.221)
Observations	1,254	1,254	1,254
R-squared	0.528	0.416	0.357
Number of groups	38	38	38
T	33	33	33
CD	-1.366	-0.721	-1.315
CD p-value	0.172	0.471	0.189

*Note: The table reports the estimation results of the cross-sectionally augmented error correction model. The dynamic common-correlated effects estimator (DCCE, Chudik and Pesaran, 2015) is used. Long-run and short-run coefficients are assumed to be heterogenous (Mean Group estimates). Cross-sectional averaged variables are NIIP/GDP and CG debt/GDP (see the first robustness check). Only contemporaneous CSAs are added (see the second robustness check). Standard errors are in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

4 Sensitivity analysis

As a first robustness check, we modify our preferred specification (i.e., specification 2 in Table 4) by changing the set of CSAs. We report the estimation results in Table 5. Column 1 contains the estimation results when no CSA is included. This specification leads to a rejection of the null hypothesis of weak cross-section dependence, indicating that cross-sectional dependence remains in the error term and OLS becomes inconsistent. To account for this strong cross-sectional dependence, we sequentially add CSAs. Column 2 includes only the CSA of NIIP/GDP. Columns 3, 4, and 5 then sequentially add the CSAs of CG debt/GDP, GDP per capita, and old-age dependency, respectively.

The CD p-values at the bottom of Table 5 indicate that in models (2)–(4), the null hypothesis of weak cross-section dependence cannot be rejected at the 5% significance level. However, in model (5), the CD test rejects the null at the 5% significance level. Since our panel is not very large, so as not to reduce the degrees of freedom, we prefer to add only the minimum number of CSAs necessary. We focus on the specifications where the null hypothesis cannot be rejected. Across these models, the statistical significance and signs of the coefficients remain consistent with what we found in Table 4. Hence, the estimation results in Table 4—where the CSAs of NIIP/GDP and CG debt/GDP are included—are robust when including only the CSA of NIIP/GDP, as well as when including the CSAs of NIIP/GDP, CG debt/GDP, and GDP per capita.

Table 5 Alternative estimates: changing the number of cross-sectional averages

	(1)	(2)	(3)	(4)	(5)
	D.NIIP/GDP	D.NIIP/GDP	D.NIIP/GDP	D.NIIP/GDP	D.NIIP/GDP
Adjustment Term					
L.NIIP/GDP	-0.456***	-0.556***	-0.593***	-0.626***	-0.707***
	(0.041)	(0.041)	(0.042)	(0.045)	(0.048)
Long Run Estimates					
GDP per capita	-2.613*	-1.156***	-1.140***	-1.282***	-0.623**
	(1.428)	(0.242)	(0.278)	(0.377)	(0.312)
CG debt/GDP	-0.177	-0.560***	-0.619***	-0.670***	-0.556***
	(0.359)	(0.129)	(0.148)	(0.156)	(0.139)
Old age dependency	-4.735	4.855**	4.563**	4.734**	4.218
	(6.902)	(1.993)	(2.121)	(2.013)	(2.635)
Short Run Estimates					
D.GDP per capita	0.348***	0.276*	0.321	0.417*	0.294
	(0.117)	(0.160)	(0.209)	(0.221)	(0.181)
D.CG debt/GDP	-0.097	-0.031	0.001	0.020	-0.008
	(0.065)	(0.066)	(0.071)	(0.074)	(0.075)
D.Old age dependency	0.258	-1.256	-1.508	-1.437	0.278
	(1.767)	(1.600)	(1.526)	(1.544)	(1.715)
Observations	1,254	1,254	1,254	1,254	1,254
R-squared	0.519	0.428	0.416	0.397	0.363
Number of groups	38	38	38	38	38
T	33	33	33	33	33
CD	2.998	0.217	-0.721	-0.965	-2.098
CD p-value	0.003	0.828	0.471	0.335	0.036

*Note: The table reports the estimation results of the cross-sectionally augmented error correction model using the dynamic common-correlated effects estimator (DCCE, Chudik and Pesaran, 2015). Long-run and short-run coefficients are assumed to be heterogeneous (Mean Group estimates). The cross-sectional averaged variables are: none (column 1), NIIP/GDP (column 2), NIIP/GDP, CG debt/GDP (column 3), NIIP/GDP, CG debt/GDP, GDP per capita (column 4), NIIP/GDP, CG debt/GDP, GDP per capita, old age dependency (column 5). Only contemporaneous cross-sectional averages are added. Standard errors are in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

As a second robustness check, we modify specification (2) in Table 4 by varying the number of lags of CSAs of NIIP/GDP and CG debt/GDP. The estimation results are presented in Table 6. Given that we have 34 observations per country, we set the maximum number of lags of CSAs to 3 ($\sqrt[3]{34} = 3.2$; see Chudik and Pesaran, 2015). The CD p-values in the penultimate row of Table 6 indicate that the null hypothesis of weak cross-sectional dependence cannot be rejected for any of the specifications. The estimates of long-run parameters on GDP per capita and CG debt/GDP are statistically significant and have the same signs as in the baseline specification (specification 2 in Table 4). The long-run coefficient on old age dependency is not statistically significant in specifications 2–4, which include one to three lags of the CSAs of NIIP/GDP and CG debt/GDP. Given that the time dimension of our panel is not very large, we prefer the specification with contemporaneous CSAs (no lags) so as not to reduce the degrees of freedom.

Table 6 Alternative estimates: changing the number of cross-sectional lags

	(1)	(2)	(3)	(4)
	D.NIIP/GDP	D.NIIP/GDP	D.NIIP/GDP	D.NIIP/GDP
Adjustment Term				
L.NIIP/GDP	-0.593***	-0.605***	-0.588***	-0.621***
	(0.042)	(0.043)	(0.050)	(0.047)
Long Run Estimates				
GDP per capita	-1.140***	-1.107***	-1.454***	-1.494***
	(0.278)	(0.261)	(0.431)	(0.483)
CG debt/GDP	-0.619***	-0.602***	-0.596***	-0.767***
	(0.148)	(0.138)	(0.185)	(0.219)
Old age dependency	4.563**	3.470	4.869	4.633
	(2.121)	(2.137)	(3.120)	(3.644)
Short Run Estimates				
D.GDP per capita	0.321	0.268	0.322	0.446
	(0.209)	(0.213)	(0.237)	(0.274)
D.CG debt/GDP	0.001	-0.072	-0.067	-0.011
	(0.071)	(0.081)	(0.089)	(0.096)
D.Old age dependency	-1.508	-2.019	-1.636	-1.159
	(1.526)	(1.490)	(1.428)	(2.031)
Observations	1,254	1,216	1,178	1,140
R-squared	0.416	0.408	0.387	0.346
Number of groups	38	38	38	38
T	33	32	31	30
CD	-0.721	-1.265	-0.856	-1.410
CD p-value	0.471	0.206	0.392	0.159
cr_lags	0	1	2	3

*Note: The table reports estimation results of a cross-sectionally augmented error correction model using the dynamic common-correlated effects estimator (DCCE, Chudik and Pesaran, 2015). Long-run and short-run coefficients are assumed to be heterogeneous (Mean Group estimates). The cross-sectional averaged variables are NIIP/GDP and CG debt/GDP. The "cr_lags" row specifies the number of lags of CSAs. When cr_lags equals 0, only contemporaneous CSAs are added, not lags. When cr_lags equals 1, contemporaneous CSAs and the first lag of the CSAs are added. When cr_lags equals 2, contemporaneous CSAs, the first and the second lag of the CSAs are added. When cr_lags equals 3, contemporaneous CSAs, the first, the second, and the third lag of the CSAs are added. Standard errors are in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.*

5 Long-run NIIP/GDP

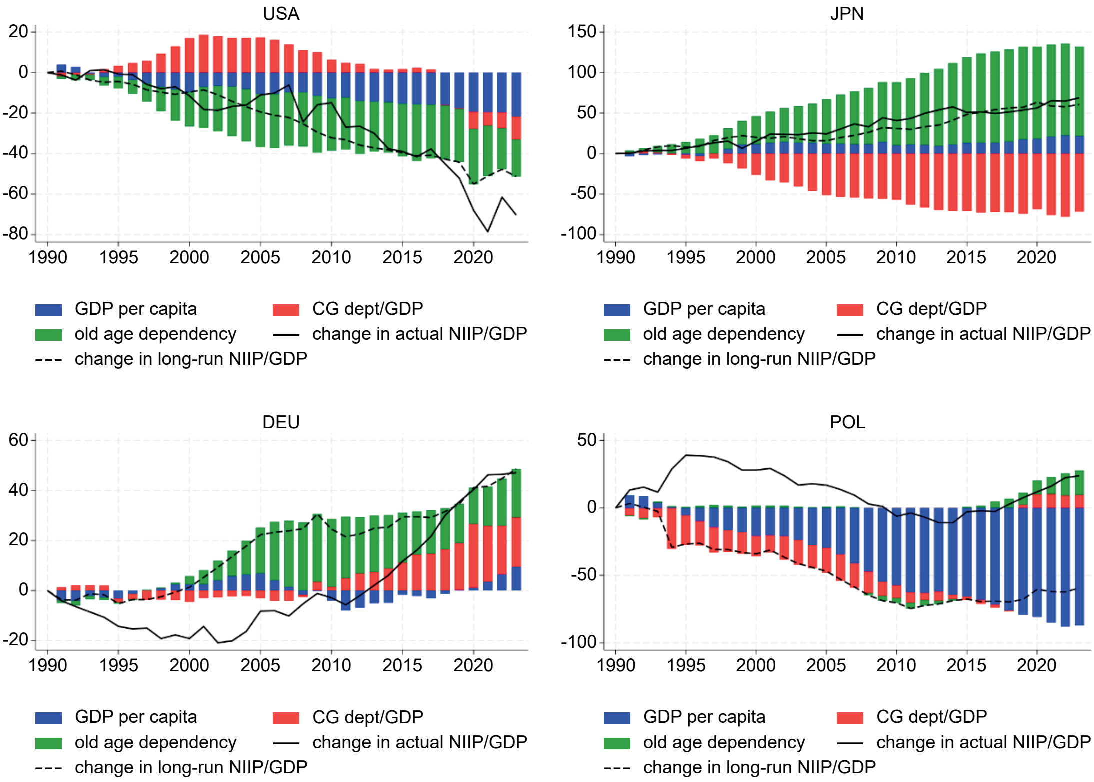
In this section, we compare the changes in actual NIIP/GDP with the changes in theoretical, long-run NIIP/GDP. To calculate the latter, we use the estimated parameters (specification 2 in Table 4) and changes in the levels of the explanatory variables relative to 1990. Figure 1 illustrates the changes in actual and long-run NIIP/GDP for the U.S. (the largest net external debtor in our sample in 2023; upper left panel), Japan (the largest net external creditor in our sample in 2023; upper right panel), Germany (a country with one of the highest net external assets; lower left panel), and Poland (an emerging market economy, with a U-shaped evolution of NIIP/GDP over the last two decades; lower right panel).

Changes in the actual NIIP/GDP seem to follow the calculated, long-run NIIP/GDP changes to a significant extent, although substantial short-run deviations occur. For instance, in the 1990s in Germany, while the actual NIIP/GDP was declining, the theoretical, long-run NIIP/GDP remained broadly stable, and towards the mid-1990s in Poland, actual NIIP/GDP moved sharply upward while the long-run NIIP/GDP sharply declined in 1994. In what follows, we concentrate on changes in long-run NIIP/GDP, which are the focus of our study. To examine the factors affecting the changes in the long-run NIIP/GDP, we decompose the changes in long-run NIIP/GDP relative to 1990 into contributions of changes in GDP per capita, CG debt/GDP, and old age dependency. The results of this decomposition for the U.S., Japan, Germany, and Poland are depicted in Figure 1, and we discuss them below.

For the United States, in most of the sample period 1990-2023, an increase in GDP per capita and, for the whole sample period, a decline in old age dependency contributed to a decline in long-run NIIP/GDP. We can conjecture that an increase in GDP per capita led to more net capital inflow. One way of interpreting our results for the U.S. is that rising GDP per capita involved further deepening of financial markets and led to capital inflows. Decrease in old age dependency contributed to decrease in net capital outflow. As a result, these factors led the U.S. to import capital from the rest of the world, which helped increase the U.S.'s net foreign liabilities. Regarding the impact of CG debt/GDP, while between 1994 and 2017 a fall in CG debt/GDP contributed to a rise in the long-run NIIP/GDP, between 2018 and 2023, an increase in CG debt/GDP dragged down the long-run NIIP/GDP.

Japan more or less mirrors the U.S. In the entire sample period 1990-2023, relative population aging contributed to an increase (compared to 1990) in the long-run NIIP/GDP in Japan. Moreover, for most of the sample period, Japan's CG debt/GDP grew and negatively affected its long-run NIIP/GDP. Turning to the impact of GDP per capita, a decrease in GDP per capita contributed to a rise in Japan's long-run NIIP/GDP for most of the sample period. Although Japan remains a developed country, its GDP per capita advantage over much of the rest of the world has gradually diminished. During the sample period, Japan experienced "lost decades," during which many other countries narrowed the gap with Japan.

Figure 1 Changes in actual and long-run NIIP/GDP (relative to 1990, in percentage points)



Note: The figure shows the decomposition of changes from 1990 in theoretical, long-run NIIP/GDP (implied by model 2 in Table 4, given the independent variables). The changes in theoretical, long-run NIIP/GDP are compared with the changes in actual NIIP/GDP. Both actual and long-run NIIP/GDP are multiplied by 100. Hence, the changes are expressed in percentage points.

Source: Own elaboration based on Milesi-Ferretti (2024), World Bank, and International Monetary Fund data.

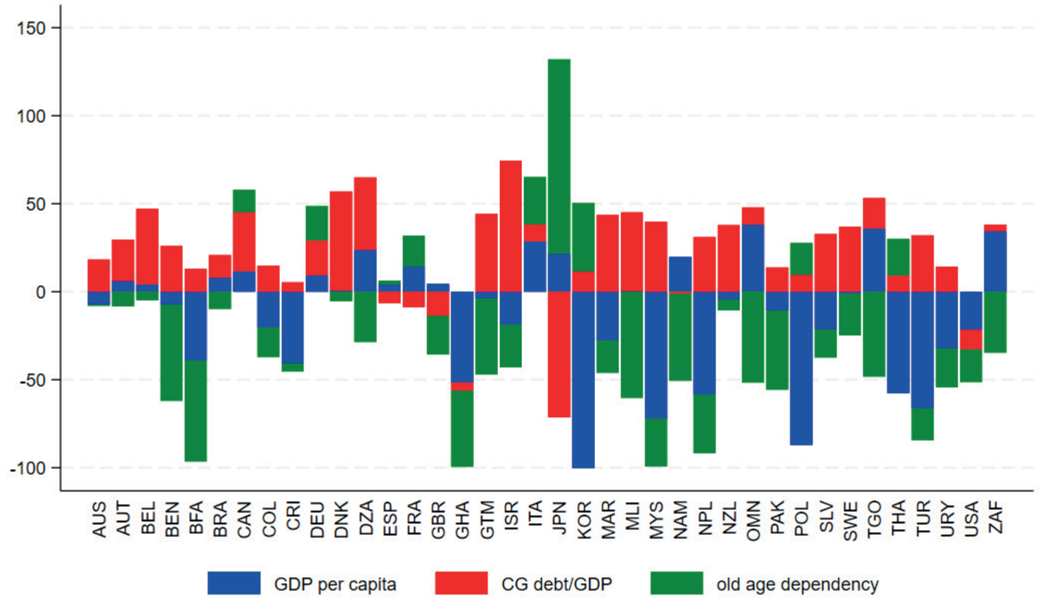
Germany has one of the highest NIIP/GDP ratios. While one might expect its long-run NIIP/GDP decomposition to be similar to that of Japan, that is not necessarily the case (see the lower left panel of Figure 1). An increase in old age dependency led to an increase in Germany's long-run NIIP/GDP starting from 1997, later than in Japan. The contribution of changes in old age dependency to changes in long-run NIIP/GDP moderately declined in the last decade. From 2009 onward, a decrease in CG debt/GDP led to an increase in long-run

NIIP/GDP. And, from 2019, a decrease in GDP per capita in Germany also contributed to an increase in Germany's long-run NIIP/GDP.

Lastly, we observe Poland, an emerging market economy. From the lower right panel, we can see that the largest driver of changes in long-run NIIP/GDP was changes in GDP per capita. The real convergence of the Polish economy, manifested in an increase in GDP per capita, contributed to a decrease in the long-run NIIP/GDP for most of the analyzed period. The increase in GDP per capita encouraged foreign investors to invest capital in the country, leading to an increase in its net external liabilities. Until 2018, the effect of the increase in GDP per capita was reinforced by an increase in CG debt/GDP, which also contributed to a decrease in long-run NIIP/GDP. The increase in long-run NIIP/GDP in recent years was due to population aging and a decline in CG debt/GDP.

Figure 2 illustrates the decomposition of changes in long-run NIIP/GDP in 2023 (relative to 1990) for all countries in the sample. From 1990 to 2023, many countries experienced relative economic development, which exerted downward pressure on their NIIP/GDP (blue bars in Figure 2). The negative impact of an increase in GDP per capita on NIIP/GDP is especially great in Ghana, Korea, Malaysia, Nepal, Poland, Thailand, and Türkiye. The red bars for many countries are in positive territory. Thus, decreases in these countries' CG debt/GDP (relative to 1990) led to increases in their long-run NIIP/GDP. One explanation is that, as Bénétrix et al. (2015) show, many emerging market economies have become less reliant upon debt financing. For most countries, the contribution of changes in old age dependency to changes in long-run NIIP/GDP is negative (green bars). The exceptions are Canada, France, Germany, Italy, Japan, Korea, Poland, Spain, and Thailand. These countries have experienced relatively severe population ageing, the extent of which is exceptional in Italy, Japan, and Korea.

Figure 2 Change in long-run NIIP/GDP in 2023 (relative to 1990, in percentage points)



Note: The figure shows the decomposition of changes in 2023 compared to 1990 in theoretical, long-run NIIP/GDP (implied by model 2 in Table 4, given the independent variables). The long-run NIIP/GDP is multiplied by 100. Hence, the change in the long-run NIIP/GDP is expressed in percentage points.

Source: Own elaboration based on Milesi-Ferretti (2024), World Bank, and International Monetary Fund data.

6 Concluding remarks

Global integration of financial markets allows countries to be net creditors or net debtors. This paper examines the long-run determinants of the NIIP/GDP, one of the key variables in open economy macroeconomics.

Regarding the empirical strategy, we use a balanced panel of 38 countries over the period 1990–2023. We estimate a cross-sectionally augmented error correction model using the dynamic common-correlated effects estimator proposed by Chudik and Pesaran (2015). This approach allows us to jointly account for three key features of our macroeconomic panel data: dynamics, heterogeneity, and cross-sectional dependence.

The key findings are as follows. First, the long-run coefficient on CG debt/GDP is significantly negative. Hence, an increase in CG debt/GDP lowers NIIP/GDP in the long run. Second, the long-run effect of GDP per capita on NIIP/GDP is negative. Thus, countries that increase their GDP per capita increase their net external liabilities (share of GDP) in the long run. Finally, the long-run effect of old age dependency on NIIP/GDP is positive. Therefore, relatively aging countries tend to accumulate net external assets (share of GDP) in the long run.

Finally, for selected countries, we decompose changes in long-run NIIP/GDP between 1990 and 2023. In the United States, the decline in the long-run NIIP/GDP was driven by an increase in GDP per capita (for most of the sample period) and a decrease in the old age dependency (for the whole sample period). A decrease in CG debt/GDP between 1994 and 2017 contributed to an increase in the long-run NIIP/GDP, and its subsequent increase between 2018 and 2023 exerted downward pressure. By contrast, the increase in the long-run NIIP/GDP in Japan over the entire sample period was driven by relatively severe population aging and, for most of the period, by a decline in GDP per capita. Conversely, the rising CG debt/GDP throughout most of the analysed period contributed to a decrease in the long-run NIIP/GDP.

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Appendix

Table A1 Sample economies

Australia (AUS), Austria (AUT), Belgium (BEL), Benin (BEN), Burkina Faso (BFA), Brazil (BRA), Canada (CAN), Colombia (COL), Costa Rica (CRI), Germany (DEU), Denmark (DNK), Algeria (DZA), Spain (ESP), France (FRA), United Kingdom (GBR), Ghana (GHA), Guatemala (GTM), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Morocco (MAR), Mali (MLI), Malaysia (MYS), Namibia (NAM), Nepal (NPL), New Zealand (NZL), Oman (OMN), Pakistan (PAK), Poland (POL), El Salvador (SLV), Sweden (SWE), Togo (TGO), Thailand (THA), Turkey (TUR), Uruguay (URY), United States (USA), South Africa (ZAF)

Table A2 Data sources and variable descriptions

Variable	Data descriptions and transformations	Source of data
NIIP/GDP	"Net IIP excl gold / GDP domestic currency".	The External Wealth of Nations*
GDP per capita	"Gross domestic product per capita, constant prices". Units: "Purchasing power parity; 2017 international dollar". Natural logarithm.	International Monetary Fund, World Economic Outlook
CG debt/GDP	"Central government debt (percent of GDP)". Divided by 100.	International Monetary Fund, Global Debt Database
Young age dependency	"Age dependency ratio, young (% of working-age population)". Divided by 100.	World Bank, World Development Indicators
Old age dependency	"Age dependency ratio, old (% of working-age population)". Divided by 100.	World Bank, World Development Indicators
GDP	"GDP (current US$)".	World Bank, World Development Indicators

*Note: *Milesi-Ferretti, G.M. 2024. "The External Wealth of Nations Database," The Brookings Institution (based on Lane and Milesi-Ferretti, 2018).*

Table A3 Descriptive statistics

	# Obs.	Mean	St. dev.	Min	Max
NIIP/GDP	1292	-0.198	0.317	-0.978	0.869
Variable before relativization					
GDP per capita	1292	9.780	1.095	7.016	11.213
CG debt/GDP	1292	0.504	0.294	0.010	2.143
Old age dependency	1292	0.153	0.094	0.034	0.503
Young age dependency	1292	0.449	0.221	0.155	0.972
Variable after relativization					
GDP per capita	1292	-0.996	1.087	-3.539	0.413
CG debt/GDP	1292	-0.182	0.322	-0.784	1.270
Old age dependency	1292	-0.076	0.094	-0.255	0.235
Young age dependency	1292	0.167	0.219	-0.109	0.699

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