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Franziska Hünnekes
European Central Bank
Maximilian Konradt
Geneva Graduate Institute
Moritz Schularick
University of Bonn
Christoph Trebesch
Kiel Institute
Julian Wingenbach
Goethe University Frankfurt

Chemin Eugène-Rigot 2
P.O. Box 136
CH - 1211 Geneva 21
Switzerland

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Franziska Hünnekes* Maximilian Konradt† Moritz Schularick§

European Central Bank *Geneva Graduate Institute* *University of Bonn*

Christoph Trebesch‡ Julian Wingenbach**

Kiel Institute *Goethe University Frankfurt*

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Abstract

In the past decade, Germany has been the world champion in exporting capital ("Exportweltmeister"). No other country invested larger amounts of savings outside its borders. However, we find that Germany plays in the third division when it comes to investment performance. To show this, we construct a comprehensive new database on the returns on foreign investment for 13 advanced economies back to the 1970s. The data reveal that Germany's annual returns on foreign assets were 2 to 5 percentage points lower than those of comparable countries. Germany ranks last among the G7 countries and earns significantly lower foreign returns within asset classes, especially for equity and foreign direct investments. These aggregate results are confirmed with micro data on equity returns by 50,000 mutual funds worldwide. German funds perform worse across all sectors and destination countries of investment. They also seem to do a worse job in timing the market.

JEL classification: F21, F30, F31, F36, G15

Keywords: International Capital Flows, Foreign Assets, Investment Returns

*European Central Bank; *Email:* franziska.huennekes@gmail.com

†Geneva Graduate Institute; *Email:* maximilian.konradt@graduateinstitute.ch

§University of Bonn, CEPR; *Email:* schularick@uni-bonn.de

‡Kiel Institute for the World Economy, CEPR, CESifo; *Email:* christoph.trebesch@ifw-kiel.de

**Goethe University Frankfurt; *Email:* wingenbach@econ.uni-frankfurt.de

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1 Introduction

In a famous scene in Michael Lewis' book "The Big Short", a senior executive at Deutsche Bank, Greg Lippmann, tours Wall Street in 2007 to short-sell securities containing US subprime mortgages. When asked who was still buying these toxic high-risk papers, "he always just said: Düsseldorf" (Lewis 2010, p. 67). As a matter of fact, Düsseldorf based IKB Bank was one of the first banks to fail in 2007. Via its "Rhinebridge" investment vehicle, IKB Bank heavily invested in the US subprime mortgage market. IKB Bank subsequently had to be rescued by the German government. These and other anecdotes have tainted the reputation of German investors in global markets, as the notion of "stupid German money" indicates.

Is there economic truth in this caricature? Are German investment returns particularly low, and if so, why? From the point of view of German savers and economic policymakers, this is a first order question. In the past decade, Germany was the world's foremost exporter of savings. More than 300 billion Euros of German savings are sent abroad every year; the International Monetary Fund forecasts continuing current account surpluses of close to 7% of GDP for the coming years. Despite the heavy losses on American and other investments in the 2008 crisis, Germany has exported 3.4 trillion Euros in the past decade alone, equivalent to about 89% of GDP.

This study presents the first broad-based empirical assessment of Germany's investments abroad over the entire postwar period, placing it in international comparison. In a first step, we compile a new long-run dataset on German investment returns and valuation changes across seven decades. The data starts in 1949 and builds on various historical publications. Using this new series, we compare Germany's foreign returns to its domestic returns and assess the consumption insurance offered by foreign investments, and their role as a hedge for demographic risks. In a second step, we compare Germany's returns to those of other countries, for which we compile a second database on foreign returns for 13 advanced economies (including Germany). Our aim was to create the most comprehensive international database on international investment returns that is comparable and consistent across countries. To alleviate concerns about data quality and comparability, we start in 1970 when international balance of payment data starts to be harmonized. We also build on previous high-quality work and data, in particular the international investment data by Lane and Milesi-Ferretti (2007b) and carefully check and clean each sub-component of the returns series for each country.

Importantly, we also complement the aggregate, country-level analysis using rich micro-

level data. To do so, we compare quarterly returns on equity investments by more than 50,000 mutual funds worldwide, with equity holdings of roughly 10 trillion US dollars as of 2020. We then compare the investment performance of German funds to those of other countries. Throughout, we thus focus on an international comparative perspective, which is a central contribution of this paper.

In principle, all economies have access to the same investment opportunities abroad. Therefore, it is informative to compare the returns on foreign assets of one country to those of another. We thus ask, how large are the returns on foreign investment of each nation in international capital markets, and how does Germany compare? In other words, we focus on returns on external assets, not on the difference between returns on assets and liabilities. This is the relevant question to assess investment performance, as the liability structure of countries is a function of the investment decisions of others.

Comparing rates of return on external assets across different countries seems relevant for at least two reasons. First, even minor differences in rates of return can have very large implications for wealth accumulation and international wealth transfers, as we illustrate below. This is because the external asset positions of most countries are very large in absolute terms. Second, a better understanding on the returns on foreign capital helps to inform both research and policy. With regard to research, a large body of work has explored current account imbalances and the role of foreign returns.[1] However, the large differences in aggregate returns we document in this paper are puzzling, and pose a challenge to the literature. Why do some countries earn much higher foreign returns than others? Why do equity investors from Germany or Spain persistently underperform those from Japan or Sweden? There is very little research on these questions. Our paper sheds light on the large differences in "the international returns of nations" and narrows down potential explanations for the observed differences, by focusing on the case of Germany.

One challenge, discussed in more detail below, is that aggregate series on international investment positions and balance of payments are prone to mismeasurement and, for most countries, they cannot be disaggregated and scrutinized as is the case for US data (see e.g., Curcuru, Thomas, and Warnock 2009; Gohrband and Howell 2015). In particular, there is the concern that valuation effects due to "other" changes bias the computed returns, possibly because of biased FDI series (see e.g., Curcuru, Dvorak, and Warnock 2013; Zucman 2013). To address this concern we conduct several sensitivity checks, in particular by excluding valuation changes due to other adjustments and computing returns without

[1] See e.g. Gourinchas and Rey (2014) as well as the detailed literature review below.

FDI, in addition to the micro-level analysis in Section 4.2. The results confirm the poor performance of German foreign investments.

With regard to policy, the paper relates to an ongoing debate on current account imbalances and capital exports. Germany's large surpluses, in particular, have been criticized as excessive by many economists (see e.g., Bernanke 2015; den Haan, Ellison, Ilzetzki, McMahon, and Reis 2016; Krugman 2017) as well as international institutions (e.g., European Commission 2016; IMF 2016). As a case in point, in 2017, *The Economist* cover story referred to the country's large-scale capital exports as the "German problem [...] damaging the world economy", by hindering the recovery in the euro area, and possibly driving credit and asset price bubbles abroad. Since the early 2010s, the IMF has continued to press the German government to enact policies to help reduce the surplus, in particular by increasing domestic investments. Within Germany, however, the consensus view was that Germany's capital exports were beneficial, due to high foreign returns, better international risk sharing, and as a hedge against adverse demographic trends, in line with the traditional textbook view (see e.g., Fuest 2017; German Council of Economic Experts 2017; German Ministry of Finance 2017; Schuknecht 2014; Sinn 2017; Weidmann 2014).[2]

The results of our paper shed doubt on the view that Germany's large-scale capital exports are allocated in a beneficial way.

First, we find that the returns on German foreign assets were considerably lower than the returns earned by other countries investing abroad. Since 1975, the average of Germany's annual foreign returns was about 5 percentage points lower than that of the US and close to 3 percentage points lower than the average returns of other European countries. Germany fared particularly bad as an equity investor where investment returns underperformed by 4 percentage points annually. An analysis using data on more than 50,000 mutual funds' equity holdings substantiates this finding.

Second, we find that Germany earned significantly lower foreign returns *within* each asset category, after controlling for risk. To make this point, we control for asset composition, exchange rate effects and the geographic distribution. We also estimate an international capital asset pricing model, determining country-specific alphas and controlling for exposure to systematic market risk. The results suggest that Germany's weak financial performance abroad is not merely the consequence of a conservative investment strategy that focuses on safer assets. The low German returns compared to other countries also cannot be explained by exchange rate movements, nor by the build-up of Target2 balances.

[2]For the textbook view see e.g., Taylor and Williamson (1994) and Obstfeld and Rogoff (1996).

Instead, valuation losses are a big part of the explanation as the value of Germany's external asset portfolio has stagnated or decreased, while other countries saw considerable capital gains. Germany's investment losses are remarkable given that the world economy has witnessed a price boom across all major asset markets over the past 30 years (Jordà, Knoll, Kuvshinov, Schularick, and Taylor 2019). The micro-level data on mutual funds confirm that German investors perform significantly worse than their international peers. The poor performance of German mutual funds is not driven by specific sectors or destination countries of the equity investments. Instead, our results suggest that German funds do worse in timing the market, especially during periods of rising stock market valuations.

Third, German returns on foreign assets were considerably lower than the returns on domestic assets and we find little evidence that foreign returns have positive effects for consumption insurance. The return on Germany's external assets is highly correlated with German economic activity – even more so than domestic returns – and thus provides no hedge against domestic consumption shocks. Moreover, 70% of Germany's foreign assets are invested in other advanced economies that face similar demographic risks. In the past decade, less than 10% of capital flows went to younger, more dynamic economies outside of Europe or North America, even though emerging markets now account for more than 50% of world GDP.

Table 1 summarizes the main findings of the study. The table ranks countries by their average return on foreign assets, using all countries for which we have sufficiently detailed data (see Section 2 for details and methodology). Germany has the worst investment performance among the G7 countries. In the full country sample from 1975 to 2020, Germany ranks 11^{th}, with only Finland and Portugal performing worse. The picture looks similar if we consider the past decade (2009-2020), where Germany ranks 11^{th}. The same is true when we use real returns, deflating each country's foreign asset returns with domestic inflation rates (see Table A2, where Germany ranks 9^{th}).

The cumulative effects of these bad investment returns are quantitatively large, as can be illustrated with a simple counterfactual exercise. In the decade since the 2008 financial crisis alone, Germany could have become about 3 to 4 trillion Euros richer had its returns in global markets corresponded to those earned by Norway or Canada, respectively. This implies a (hypothetical) wealth loss of 102% to 136% of German GDP (see Section 4 for details). On a per capita basis, this implies an amount of about 41,000 to 54,000 Euros of foregone wealth for each German citizen (compared to the performance of Norway and

Table 1: Returns on foreign assets, 1975 to 2020

	Rank	1975-2020	1999-2020	2009-2020
United States	1	10.48	8.03	8.91
Denmark	2	9.94	5.39	6.68
United Kingdom	3	9.79	5.40	3.99
Canada	4	9.25	5.65	9.23
Sweden	5	8.76	6.31	5.40
Norway	6	8.02	6.22	7.61
Italy	7	7.65	3.28	4.07
Spain	8	7.43	1.88	2.61
France	9	7.06	3.79	3.93
Netherlands	10	6.63	5.02	6.10
Germany	11	4.89	3.76	3.82
Finland	12	4.73	4.59	4.78
Portugal	13	4.59	2.48	1.92

Notes: This table shows average, nominal returns on foreign assets for various time samples. Countries are ranked by their average return. We compare nominal returns in domestic currency to abstract from different national inflation dynamics. The ranking is similar with real returns (see Appendix A1). Data for Denmark and Portugal starts in 1981 and 1993, respectively. No data is available for Japan. For details see Section 2.

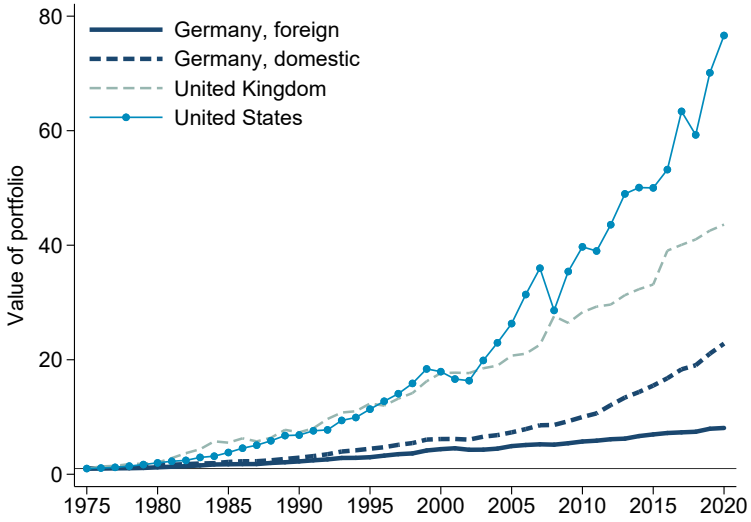
Canada).[3] These numbers are only an illustrative thought experiment, but they highlight the economic relevance of return differentials on foreign investments.

The large cumulative effects are also evident in Figure 1, which compares the total return performance of foreign asset position of Germany, the US and the UK, as well as a portfolio of domestic German assets (stocks, bonds and houses). Assume you invested 1 Euro in global capital markets in 1975 and that you reinvest any dividends or interest gains. As of 2020, you would own 43 to 76 times of that initial investment had you followed the investment strategy of the UK or the US. In comparison, the initial investment only increased by a factor of 8 using the returns on German foreign assets (before inflation). German domestic assets increased to 22 times of the initial investment.

Related literature: This paper contributes to the existing literature in several ways. First, it compares the foreign investment returns of 13 nations in a systematic way. Much

[3]Numbers are based on the German population in 2020, which was 83.2 million according to the German Statistical Office.

Figure 1: Cumulated nominal returns, 1975 to 2020



Notes: This graph shows cumulated total returns since 1975 for a portfolio with an initial value of 1. We focus on foreign nominal returns of the US, the UK and Germany, as well as the German domestic return (data from Jordà et al. (2019)). Returns are cumulated over the years using the following formula: $\prod_{i=0}^{t}(1+r_i)$. For details see Section 2.

of the literature focuses on individual countries and typically compares the returns on assets abroad to those earned by foreigners on inward investments, i.e., on liabilities (for a survey see, e.g. Gourinchas and Rey 2014). A main motivation of that strand of research is to examine the size of the "exorbitant privilege", referring to the phenomenon that some countries, mainly the United States, can borrow at low yields from abroad and reinvest these into higher-yielding assets internationally (Curcuru, Dvorak, and Warnock 2008, 2013; Gourinchas and Rey 2007a; Lane and Milesi-Ferretti 2003; Meissner and Taylor 2008). Here, we take a broader perspective and benchmark returns across countries, decompose these returns, and examine their determinants in a sample spanning multiple decades. This adds to a small literature that compares international returns (Habib 2010; Lane and Milesi-Ferretti 2003, 2007a). We apply a broad range of tests across countries that so far have only been employed to analyze return differentials of individual countries. In particular, using newly gathered data and new estimates for our 13-country sample, we compute how valuation changes due to exchange rates, the asset composition, and the geographical distribution of foreign investments affect returns.[4]

[4]Bénétrix, Lane, and Shambaugh (2015) also analyze a large set of countries but they mainly focus on valuation changes due to exchange rates and not on their effects on returns.

Second, this study is the most comprehensive analysis of the returns of Germany's external assets, going as far back as the 1950s, and applying a similar degree of rigor as influential studies conducted for the United States. Our basic methodological approach resembles that of the Bundesbank (2014, 2018). We also get similar return estimates for the overlapping sample period from 2005 to 2017 (see Appendix A2 for a detailed comparison with these and other studies focusing on Germany). Our contribution is to put these numbers into perspective by benchmarking the investment performance to that of similar economies, by adding five decades of data, and by studying *why* German returns are so low. The results reveal how badly German investments have done in international comparison, including in the past decade. This stands in contrast to earlier work on German foreign investment which came to different conclusions about the profitability by only comparing German foreign investment with foreigners' investment in Germany. Furthermore, our findings on risk sharing and demographic hedging question two of the most common arguments in support of Germany's large capital outflows.

The structure of this paper is as follows. We first guide the reader through some technical but important preliminaries about data, balance of payment arithmetic and methodology used. The next section presents long run series for returns, yields, and valuation changes on German foreign investments. We then compare returns on German foreign assets to returns on the foreign assets of other countries, both on aggregate and for a sample of mutual fund equity holdings. Moreover, we study potential explanations for why German returns are so low in international comparison. The last section looks at the performance of foreign assets as a hedge for domestic consumption and demographic risks.

2 Data and definitions

This section gives an overview of the main data and definitions used. We start by describing the method for computing returns and the classification of investment types, then discuss the data for Germany, and move on to international data.

2.1 Return computation

We compute the aggregate domestic currency return as the sum of investment income, II_t, and aggregate valuation changes, VC_t, over the stock of assets at the beginning of year t:

$$\widetilde{r}_t^A = \frac{II_t^A + VC_t^A}{IIP_{t-1}^A} = \frac{II_t^A}{IIP_{t-1}^A} + \frac{VC_t^A}{IIP_{t-1}^A} = \widetilde{i}_t^A + \widetilde{vc}_t^A,$$

where the superscript A indicates the asset side of the economy, i.e. assets owned abroad,

financial account outflows and income earned by German residents. This is the standard approach in the literature (see e.g., Habib 2010). We transform the three measures of returns to real values using consumer price inflation π_t:

$$
\begin{aligned}
i_t^A &= \frac{1+\widetilde{i}_t^A}{1+\pi_t} - 1 && \text{(real yield)} \\
vc_t^A &= \frac{1+\widetilde{vc}_t^A}{1+\pi_t} - 1 && \text{(real valuation changes)} \\
r_t^A &= \frac{1+\widetilde{i}_t^A+\widetilde{vc}_t^A}{1+\pi_t} - 1 = i_t^A + vc_t^A + \frac{\pi_t}{1+\pi_t} && \text{(real return).}
\end{aligned}
$$

Following the residual approach, we compute aggregate valuation changes as all changes in the asset position not due to transactions in the financial account, FA_t:

$$VC_t^A = IIP_t^A - IIP_{t-1}^A - FA_t^A = VX_t^A + VP_t^A + VOT_t^A.$$

These aggregate valuation changes can be further split into valuation changes due to exchange rate changes, VX_t, changes due to price changes, VP_t, and changes due to other adjustments, VOT_t, which include write-offs and permanent losses but also residuals due to statistical discrepancies. The latter result mainly from changes in primary data sources and differences between in the primary data sources used for the stock and flow series. In the literature on the exorbitant privilege of the US, much attention focused on the treatment of this other adjustments term, which can be large in some cases (see e.g., Lane and Milesi-Ferretti 2009).

In the United States, the main reason for discrepancies are different revision policies for the IIP and the balance of payments, specifically revisions in asset data are more extensive than revisions in flow data (Curcuru et al. 2008). In Germany, this is not the case. The Bundesbank revises both stock and flow data up to the four previous years, and adjusts both accounts in order to ensure consistency. Therefore, in the main analysis we include other adjustments fully in our valuation gains following authors such as Habib (2010) and Lane and Milesi-Ferretti (2007a). However, we correct for statistical problems that are not accounted for in revisions, as discussed for example by the Bundesbank (2014) and Frey, Grosch, and Lipponer (2014). We explain our adjustments in detail in Section 2.3 and Section 2.4. Our procedure ensures that we include relevant permanent losses while, at the same time, not including changes due to purely statistical effects.

Nonetheless, stock-flow discrepancies pose a threat to the validity of our results with

regards to the measurement of returns. To address this, we carry out a series of sensitivity analyses, presented in Appendix A2.2. First, we compute returns including only investment income (e.g. coupon and dividend payments) and the estimated valuation changes due to exchange rates. Second, we exclude FDI, for which stock-flow discrepancies have been shown to be most prevalent (see e.g., Curcuru et al. 2013; Zucman 2013). Third, we show results for those countries which provide disaggregated data, allowing us to exclude valuation changes due to other adjustments (US since 1985, Portugal and UK since early 2000s, most remaining countries since mid-2000s, see Appendix A2.2). Fourth, we compute alternative returns based on the approaches in the received literature, namely by Curcuru et al. (2009) and Gohrband and Howell (2015), which make the series less sensitive to mismeasured positions. In each case, German returns remain low in international comparison and the overall patterns are roughly similar. We interpret these additional results as evidence that our baseline approach of including valuation changes due to other adjustments, while admittedly imperfect, is appropriate to compare foreign returns across countries.

2.2 Asset categories

Following standard practice, we will focus on four broad categories of foreign investments:

- **Foreign direct investment** (FDI) is any kind of foreign investment associated with control or significant influence over a foreign affiliate. This category also includes any additional investment associated with the foreign direct investment relationship, including reverse investment. Furthermore, real estate investments typically fall into the FDI category.

- **Portfolio investment** is further split into debt and equity investment, where debt investment refers to bonds of any kind and equity refers to any direct claims not classified as FDI. Furthermore, investment fund shares are combined with the equity part of portfolio investment. In our analysis, we will usually consider debt and equity (incl. investment fund shares) separately.

- **Other investment** is a combination of various additional investment categories. It mainly covers financial loans, trade credit and advances, currency, and deposits. In addition, 'other investment' includes some residual 'other equity' as well as claims from pension entitlements and insurances (the latter only since the recent reform of the Balance of Payments Manual). For euro-area countries, also Target2 balances

are included in the 'currency and deposits' subcategory.

- **Reserves** refer to any assets held by the central bank for the purpose of monetary operations.

2.3 German data

To compute returns, we combine data from three different balance of payments accounts published by the Bundesbank: the International Investment Position (IIP), the financial account, and data on primary income from the current account.

The IIP is available since 1949 from the Bundesbank. The flow accounts data there starts in 1971. We combine these series with data for 1949 to 1970 using a Bundesbank report published in commemoration of the 50th anniversary of Deutsche Mark, which is made available electronically by Histat/GESIS (Bundesbank 1998). The stock data and the recent flow data have been revised to match the requirements of the sixth edition of the IMF's Balance of Payments Manual (BPM).[5] The older flow data is still based on the previous edition of the BPM and it is denominated in Deutsche Mark (DM).

A main challenge in this context was to ensure the consistency of time series for each asset category over seven decades and adjust the old (pre-1971) data to make it compatible to the newer data. The challenges relate to the classification of asset classes and their subcategories:

First, we combine 'loans' and 'other investment' in the historical data into an aggregate category to make it consistent with the modern (BMP6) classification, which combines loans, currency, deposits and other investment activities under the label 'other investment'. The historical series, we created includes interest income from loans but not from 'other investment', since this mainly constitutes government stakes in international organizations.[6]

Second, in the old data, financial account flows of the central bank were recorded in a separate account. The data from this central bank account is similar to that in today's central bank flows in the financial account (we can compare the old and new series for a lengthy overlapping period, namely 1971-1997). Therefore, we use the data from the old Bundesbank account to measure financial account flows by the central bank in the period before 1971.

[5]The BPM5 was introduced in 1993 and implemented by the Bundesbank in 1995 for the current account and in 1998 for the IIP. The new BPM6 was introduced in 2009. Using the underlying data sources the Bundesbank was able to revise the old data in line with the most recent manual, which is very helpful for our purposes.

[6]See annotation in Table B6_07 in Bundesbank (1998).

Third, in the modern data, portfolio debt investments are divided into long-term and short-term bonds, while there is no such distinction in the old data, where this category is labeled as 'fixed income assets'.[7] Since these terms refer to the same asset class, we merge the old and new series and rename them "portfolio debt". This category captures both long-term and short-term bonds in history and today.

Fourth, we face the problem that reserve assets are a distinct category in the IIP and the financial account, while reserves are combined with 'other investment' in the primary income account.[8] As a result, we merge the two series so that returns can only be computed for the sum of 'other investment and reserves'.

Fifth, portfolio equity investment includes the subcategory 'investment fund shares' but data availability and reliability of this series is limited historically. The subcategory was fully incorporated in the German IIP only in 1994, but the estimation of the liability position is noisy and imprecise until the year 2009 (Frey et al. 2014). Therefore, we only compute returns from investment fund shares from 2010 onward and exclude this series until 2009. Since investment fund shares make up no more than 6% of total IIP assets and less than 1% of IIP liabilities before 2009, this does not affect our results much.[9] We face similar problems for the category of FDI debt, meaning loans that are part of foreign direct investment flows. The IIP series on this subcategory only starts in 1997 while it was included in the other accounts earlier on. We therefore exclude the data on FDI loans prior to 1997 to ensure consistent return series.

Sixth, the Bundesbank added financial derivatives to the IIP in 2010, as this category had become increasingly relevant. Financial derivatives are only recorded as balances in the financial account and not included in primary income, making it difficult to compute precise returns. Therefore, we subtract financial derivatives from aggregate quantities and do not consider them in our main return calculations. However, we do show some stylized facts on the amount of outstanding derivatives in Section 3. More generally, whenever any further new category is added to the IIP, we subtract the increase due to this addition

[7]More specifically, in German the category in the new data is called "Schuldverschreibungen" whereas it used to be "festverzinsliche Wertpapiere".

[8]In the BPM6, countries are left the choice whether to show the income flows separately or combine them with 'other investment'. In the old manual countries could choose to include the income flows either in 'other investment' or portfolio investment. The Bundesbank chose to combine the reserve asset income with 'other investment' income, such that there is a consistent time series available.

[9]The aggregate return on foreign assets is barely affected. The return on equity is lower if we include investment fund shares since their return is lower than the return on equity. Between 1994 and 2009, the inclusion of investment fund shares lowers the return from 8.71% to 6.1%. Hence, if anything, ignoring this sub-category will result in an overestimation of German returns (upward bias).

from the change in assets in the given year to avoid overestimating valuation gains.

Beyond the categorization of asset classes, we need to consider idiosyncratic breaks in the data series, changes in data availability, as well as mismatches between the three different accounts, as also discussed by Bundesbank (2014) and Frey et al. (2014).

First, the initial values in 1954 for IIP liability categories equity investment and debt instruments within portfolio investment are unrealistically low, compared to values in the following period, resulting in double or triple digit returns in the following year. We exclude these values as outliers.

Second, the Bundesbank changed the valuation of its reserves and other external holdings after the introduction of the Euro in 1999. Before 1999, the reserves were valued using the "lower of cost or market" concept, while they are valued at market prices afterwards. According to Bundesbank (2012), this resulted in a €26.25 billion jump in the reported value of reserves and other assets held by the Bundesbank in 1999 (of these €25.42 billion are FX reserves and €0.83 billion are other assets). To correct for this one-time change, we subtract this increase from the change in the relevant IIP asset categories in 1999.

Third, there are issues with regard to market versus book valuations. For our purpose of computing investment returns, it is crucial to value assets at market prices. This is particularly challenging for the valuation of FDI. For listed companies, FDI equity is valued at market prices by the Bundesbank since 2004, but not before. For non-listed companies, the Bundesbank uses the values reported in the parent company's balance sheet, as is standard practice in many countries and is also recommended in the BPM6 (Bundesbank 2008). Moreover, no market prices are used for other, smaller components of FDI assets, for example assets related to construction sites. Only real estate assets have always been valued at market prices (Bundesbank 2008). The lack of market values in some parts of the FDI data may lead to an underestimation of returns, which is particularly problematic if Germany uses a different valuation approach than other countries. We explore how our results may be biased due to FDI valuation issues in Appendix A8, concluding that the effects are small.

Valuation issues are less relevant for the remaining asset categories. The Bundesbank has always reported portfolio investments at market prices.[10] For reserves, the Bundesbank provides market-based values since 1999. Before 1999, it applied the lowest value accounting principle, assigning the minimum of market value and original (purchasing) costs. For loans, deposits, and currency valuation changes are secondary, except for exchange rate

[10]The valuation used to be done by using price indices (Bundesbank 2008). Since 2006 individual securities can be tracked and valued to provide an even better estimate of foreign assets.

effects, which we consider throughout our analysis.

Taken together, these adjustments allow us to compute consistent time series of returns using primary income, financial account flows, and asset stocks for the asset categories of foreign direct investment, portfolio debt investment, portfolio equity investment, and 'other investment' (including reserves) starting in 1949.

Beyond data on German assets and liabilities, we use data on the German price level and GDP from the Macro History Database (MHD) (Jordà, Schularick, and Taylor 2017). MHD data is only available until 2016, so we append data from German Federal Statistics Office (GDP) and Eurostat (Harmonized Index of Consumer Prices (HICP)) from 2017. For GDP, we do this by using official data levels and applying the growth rates from the MHD data.

2.4 International data

In order to place German returns in a broader context, we compare them to other countries' returns on their foreign assets. For this purpose we construct a new international dataset on foreign returns that is of comparable quality than the German series we compiled. Our international database starts in 1970 because at that point data on the balance of payments become more comparable due to the alignment of reporting standards across most advanced countries (BPM5 and BPM6). Starting in the 1970s thus helps to reduce concerns about data comparability and bias. The increasing availability of harmonized data after the 1970s means that we can apply the exact same diligent procedure for cleaning the data and computing returns as we do for Germany. For Germany, we largely used Bundesbank data, while the main data source for the international comparison are the IMF's balance of payments and international investment position statistics. In this section we discuss a number of related data issues and how we dealt with them, so as to assure less bias and a high comparability across countries. In particular, we additionally rely on the External Wealth of Nations database Lane and Milesi-Ferretti (2007b), which provides cleaned and adjusted series for the asset side in addition to the IMF series when necessary. This is particularly helpful to get market valued positions instead of book values. Moreover, even in the presence of statistical distortions our focus on a large group of advanced economies makes it unlikely that they all suffer from systematic mis-reportings. To ensure that differences in data sources do not bias our estimates, in Appendix A3, we confirm that our results are robust when using IMF data for Germany instead of Bundesbank data.

The time series generally start in 1970 but there are differences across countries. Data

on assets is the most limited when drawing on national sources. Therefore, we add data on assets from the External Wealth of Nations database (EWN) of Lane and Milesi-Ferretti (2007b). We follow their recommendation regarding the starting year of when to use IMF data and when to use their estimates. This is mainly due to part of the older time series from the IMF still being book-value series. Lane and Milesi-Ferretti (2007b) on the other hand, provide estimates of market-value positions. Due to the relevance of valuation changes for our returns, we rely on their estimates. This allows us to compute returns for 12 additional countries. For five countries, the return series start in 1971, for an additional five countries the series starts at the latest in 1976. We provide details on countries and time spans covered in Table A7 in Appendix A3. To ensure comparability, we also exclude data on financial derivatives from the other countries' returns. In addition, we also check the consistency of the data sources as we do for Germany and adjust accordingly. These country-specific data issues are also described in Table A7.

To compute real returns, we use data on inflation from the World Bank's Word Development Indicators. Furthermore, we also use nominal GDP data from the World Development Indicators database in the regression analyses.

One important influence on returns are valuation changes due to exchange rates. Unfortunately, exchange-rate specific valuation changes are only published scarcely by some countries and there is no readily available dataset across countries, especially not by asset class. Therefore, we estimate exchange rate driven valuation change for each investment category in our sample as discussed in more detail in Appendix A4.1. For this purpose, we need data on the currency composition of assets, but such data is also not readily available. Instead, we follow the suggestions of Bénétrix et al. (2015)[11] to approximate the currency composition. For each asset category, we use different external sources. Table A8 in the appendix provides details on the data used for each country and asset type. We also discuss the data choices in the following.

For FDI assets, we use OECD data on bilateral FDI stocks, which starts in 1985 for most countries and covers a large set of partner countries.[12] Following Bénétrix et al. (2015), we assume that FDI in a country is always denominated in the local currency.

[11]This is an update and extension of Lane and Shambaugh (2010), which describes the process in some more detail.

[12]Bénétrix et al. (2015) suggest using the UNCTAD database. However, we find for our sample the OECD database is more useful. The UNCTAD data only covers the years 2001-2012. Its advantage is that it covers a large set of reporting countries, and that it includes the ultimate counterparts instead of the immediate target of the investments. This is relevant especially for the investment of large multinational corporations. The former is not relevant to us since we focus only on advanced economies. The latter is unlikely to affect the currency composition in a major way.

To estimate the currency shares of portfolio investment, we rely on data from the IMF's Coordinated Portfolio Investment Survey (CPIS). The survey collects data on the cross-border holdings of portfolio equity and debt assets starting in 2001. The holdings are broken down by country pairing and by currency. The currency breakdown includes US Dollars, British Pound, Euro, Japanese Yen, and Swiss Franc. Not all countries provide a currency breakdown since 2001. In those cases, we use information from the country breakdown to estimate currency shares. We adjust the country shares by the average ratio of country to currency shares when both are available since there is no one-for-one match between the two (especially for the US Dollar). Here, we again deviate from Bénétrix et al. (2015) who only use the country data available.

'Other investment' mainly comprises of loans and deposits by banks, and Bénétrix et al. (2015) suggest using the Locational Banking Statistics (LBS) provided by the Bank for International Settlements (BIS). This dataset covers cross-border lending by banks in US Dollars, British Pound, Euro, Japanese Yen, and Swiss Franc. We use these currency shares as an estimate for the currency share of 'other investment'. Data is available from 1977 onward.[13] However, for some countries data availability is limited, see Table A8 in Appendix A3.[14]

Reserve assets also include a significant share of foreign currency assets. Therefore, we gathered balance sheet and annual report data of each of the national central banks. In some cases, only approximate shares are reported (e.g. "more than 90%"). In these cases, we resort to IMF data on reserve positions and apply the reported shares. Furthermore, we use IMF data on special drawing rights (SDRs) which are also subject to valuation changes. Again, we provide details on coverage and sources by country in Table A8 in the appendix.

To validate our approach on exchange-rate driven valuation changes, we make use of the fact that some countries have started to publish a breakdown of IIP valuation changes in recent years, albeit usually with limited time coverage. Among these countries are Germany, the Netherlands, Portugal, Spain, the United Kingdom, and the United States. Whenever official time series are available, we use these. Otherwise, we rely on our own

[13] Bénétrix et al. (2015) report that they have access to more detailed data directly from the BIS, potentially covering the gaps in the officially reported series

[14] A notable case are the United States for which the currency breakdown is only available from 2012 on with exception of one data point in 1998. We use this fact to linearly interpolate between 1998 and 2012 to increase data coverage. We check whether this biases the US data by comparing the resulting series on valuation changes to the valuation changes published by the Bureau of Economic Analysis (BEA) since 2002 and find only small deviations (see Appendix A4 for details).

estimates.[15] Using these data, we can also show that our estimates are similar to the official time series, see Appendix A4 for the results. The similarity highlights that our approach works well. In the same appendix, we also compare our estimates to estimates using the currency shares of Bénétrix et al. (2015). These estimates are also very close to ours.[16]

As mentioned earlier, we also study the geographical distribution of assets, i.e., the countries where the assets are held. For this purpose, we rely on the same data sources as for the currency composition estimates. This is possible because the IMF's CPIS and the BIS's LBS databases both include data on the country composition as well. The FDI data refers to countries anyways. We discuss the approach in Section 3.2. In this case, too, data is not available for all years for all countries. Table A9 in Appendix A3 provides details.

Finally, we use data on exchange rates from the Bundesbank for Deutsche Mark (until 1998) and Euro (since 1999). All other required bilateral exchange rates are approximated using BIS data on US Dollar exchange rates.

2.5 Mutual fund data

We complement the analysis at the macro-level by using a representative dataset on global equity holdings of mutual funds from FactSet (Cremers, Ferreira, Matos, and Starks 2016; Ferreira, Keswani, Miguel, and Ramos 2013). The data encompass monthly holdings of individual equities securities at the fund level, collected from regulatory filings, stock exchange announcements and mutual fund industry directories. Factset encompasses more than 50,000 mutual funds and is considered the leading dataset for studying global equity ownership (Ferreira and Matos 2008).

For the purpose of this study, the main advantage of the dataset is its granularity. Compared to the aggregate data, we are able to exploit heterogeneity within the class of equities and shed light on potential channels that help explain the observed differences in rates of return. One drawback of the data is that it includes no other portfolio investment positions beyond equity and is limited to the mutual fund sector. Nonetheless, mutual fund equity holdings offer a valuable complementary perspective on German capital exports.

To ensure comparability with our aggregate data, we limit the sample to mutual funds from the same group of countries, although the results remain unchanged when including

[15] We do not include the UK data since their estimation procedure is less sophisticated and builds on less detailed data than ours, see the Appendix A4 for details on this.

[16] We provide this additional comparison because the currency data of Bénétrix et al. (2015) differs slightly from ours and in some cases is more detailed, as discussed above. However, we cannot rely on their more detailed data for our estimations because they only provide the currency shares for the aggregate asset positions. For our analysis we need the currency shares separately for each asset category.

Table 2: Mutual fund holdings compared with IMF CPIS, 2020

	2020 Holdings (in USD bn.)	% of IMF CPIS
Canada	467	13
Denmark	99	12
Finland	22	4
France	449	21
Germany	230	7
Italy	63	3
Japan	23	1
Netherlands	276	11
Norway	1,024	47
Portugal	5	5
Spain	133	14
Sweden	200	15
United Kingdom	2,199	48
United States	4,777	23
Total	9,967	20

Notes: This table shows the aggregate external equity holdings of mutual funds by country of origin as of 2020, expressed in billion USD. We benchmark the mutual fund positions against aggregate data on external equity positions by the IMF CPIS. In total, the holdings for the 14 countries in our sample comprise roughly 10 tn. USD, spanning 20% of the CPIS holdings in 2020.

the remaining advanced economies. We also discard any domestic equity holdings. The coverage between 1999 and 2021 is sufficiently long to study rates of return over time.

Importantly, the dataset covers a significant share of the total external equity positions of the countries in our sample. Table 2 depicts aggregate mutual fund positions by country expressed in billion US dollars. As of 2020 the total mutual fund holdings in our data cumulate to roughly 10 trillion US dollars across the 14 advanced economies. This spans a sizeable 20% of external equity holdings reported in IMF CPIS for the same period. For Germany, our data in 2020 encompass holdings of 230 billion US dollars, which represents 7% of Germany's total foreign equity positions.[17]

The data includes a fund identifier, the country of origin of a particular fund and the market value and number of shares of each stock. In addition, the stock identifiers allow to merge data on the firm country and sector. We complement the dataset with three-month total returns from CRSP (for North-American stocks) and Datastream (for

[17]For a more detailed comparison of the mutual fund and aggregate data by country see Karolyi, Ng, and Prasad (2020).

non-North American stocks), which we convert to the domestic currency of the investor using quarterly exchange rates from the BIS. Formally, we compute the total return in quarter t of an investor i's portfolio:

$$r_{i,t}^{P} = \sum_{p=1}^{P} w_{p,i,t-1} r_{p,t},$$

where $r_{p,t}$ is the total return on security p, expressed in the currency of the investor country.[18] P is the total number of stocks in the portfolio of investor i. $w_{p,i,t-1}$ is the weight of security p in investor i's total portfolio measured in US dollars at the start of the quarter, with $\sum_{p}^{P} w_{p,i,t-1} = 1$ and $w_{p,i,t-1} \geq 0$.

We apply a number of cleaning steps that are common in the literature on mutual funds (Camanho, Hau, and Rey forthcoming): First, due to sporadic reporting we create a quarterly panel by retaining the last reporting data of a fund in a quarter. Second, we exclude positions if their value is negative, which represents data error. We also remove individual holdings if they exceed 500% or -80% rates of quarterly return. Moreover, we drop fund observations with quarterly returns above 200% or below -50%. Positions with a share price above 500,000 USD are also discarded, due to potential reporting errors.

3 Germany's capital exports since WW2

3.1 Evolution of Germany's current account and foreign assets

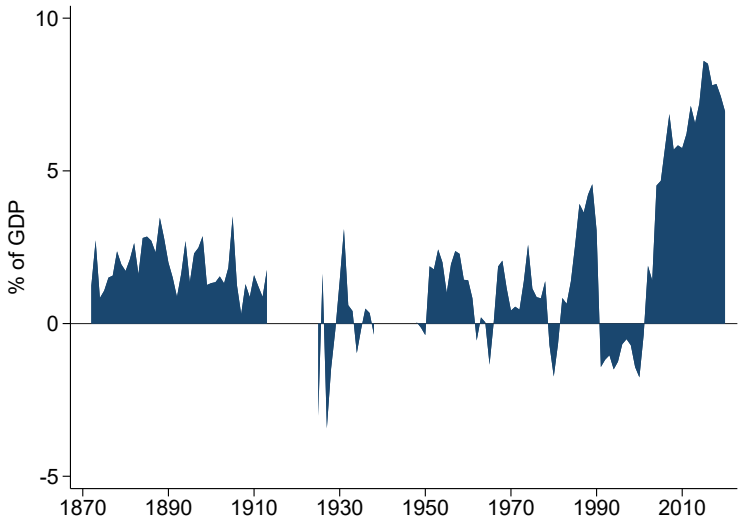
Germany has been running current account surpluses for the most part of its modern economic history. Notable exceptions are the late 1920s and the first ten years after reunification in 1990. Figure 2 shows that the last decade is characterized by exceptionally high surpluses, even by historical standards. The recent surpluses were about three times higher relative to GDP than in gold standard times and during the so-called economic miracle in the 1950s and 1960s.

Due to its consistently high capital exports, Germany ranks among the world's top external creditors, both in absolute numbers and relative to GDP.[19]

[18] We compute these using the total return in dollars $r_{p,t}^{USD}$ and the change in the USD exchange rate $\Delta FX_t^{USD} = \frac{FX_t^{USD} - FX_{t-1}^{USD}}{FX_{t-1}^{USD}}$, using the formula $r_{p,t} = r_{p,t}^{USD} + \Delta FX_t^{USD} \times (1 + r_{p,t}^{USD})$.

[19] In absolute numbers Germany ranked second in 2020, only exceeded by Japan. In percent of GDP Germany ranked eighth, when excluding the small oil exporting countries. For details see Figure 3.

Figure 2: German current account balance in % of GDP, 1872–2020



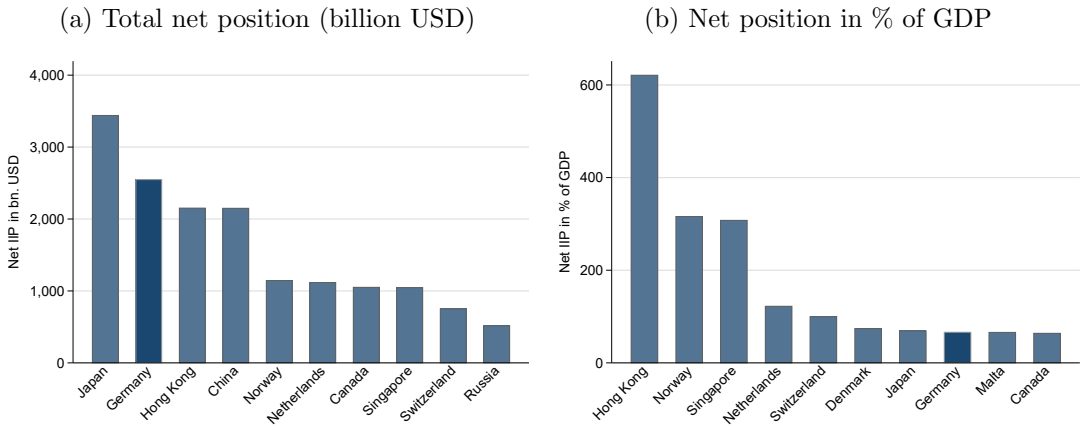
Notes: This figure shows Germany's long history of current account surpluses, which is interrupted only by few periods with deficits, in particular after Germany's reunification in 1990. The past two decades stand out, showing record surpluses both in absolute terms and as a share of GDP. No data is available for 1914–1924 and 1939–1947. Data from the Macro History Database (Jordà et al. 2017) and Bundesbank.

Furthermore, Figure 4 shows that Germany not only has a large net position but also a large gross position. Both the asset and liability positions rose strongly since the mid-1990s and now amount to 305% and 243% of GDP respectively. While they initially grew in tandem leaving the net position at relatively small levels, the gap has been increasing since the mid-2000s and especially in recent years. The net position has been positive over the entire post-war period with few exceptions. It currently stands at 61% of GDP. This reflects Germany's sustained past current account surpluses.

How does Germany's international investment position (IIP) compare to accumulated capital exports? In a simple framework, one can think of Germany's external asset portfolio as a savings account. Adding up all the payments that have flowed into this account correspond to the historical book value of gross investments. The difference between historical costs and market value then reflects valuation gains on that portfolio. In other words, the larger the difference between the accumulated flow measure and the current market value of external investments, the higher the capital gains.

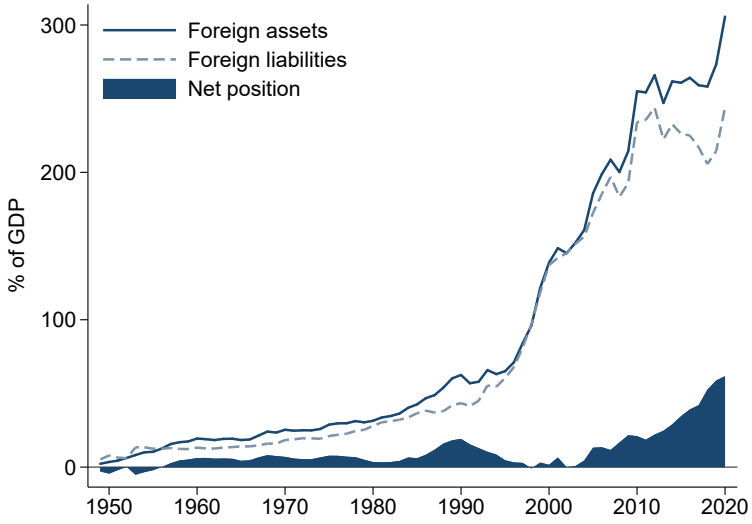
Figure 5 demonstrates that the value of Germany's gross foreign asset position very closely tracks the cumulated financial account outflows. This implies that the valuation

Figure 3: The world's largest net creditors, 2020



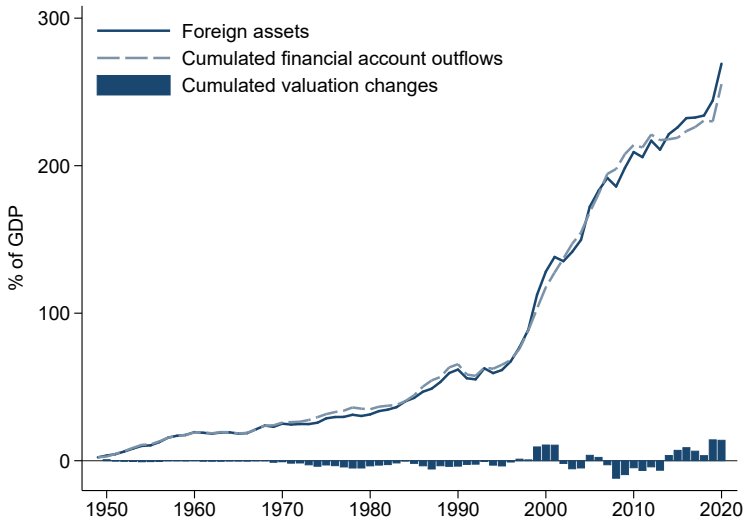
Notes: The net position is the difference between foreign assets (assets held abroad) and foreign liabilities (domestic assets held by foreigners). In USD terms Germany's net position is only exceeded by Japan. The graph excludes small oil exporting countries with large net positions in % of GDP. Data on asset positions are from the Bundesbank and the IMF, data on GDP from the World Bank.

Figure 4: Germany's international investment position, 1949–2020



Notes: The net position is the difference between foreign assets (assets held abroad) and foreign liabilities (domestic assets held by foreigners). The graph shows the significant build up of Germany's gross positions since the 1990s, of both assets and liabilities (financial globalization). The net position has grown most markedly over the last decade (large and sustained current account surpluses). Assets data from Bundesbank. GDP from the Macro History Database (Jordà et al. 2017) and the German Statistical Office.

Figure 5: Germany's foreign assets and cumulated financial account outflows, 1949-2020



Notes: This graph shows that Germany's cumulated financial outflows (blue dotted line) closely track the stock of total foreign assets (blue line). This indicates small valuation gains or even losses on the gross asset position. More specifically, the difference between the two series equals cumulated valuation changes, which are negative with the exception of a few years (blue bars). Foreign assets and cumulated financial account flows are adjusted to remove statistical differences between the series, see Section 2.3 for details. Financial derivatives are excluded. Data from the Bundesbank.

gains, i.e., the wedge between historical flows and current market value, have been small. The blue bars in Figure 5 show that this wedge has often even been negative and is generally small.[20] In light of the multi-decade asset price boom that has characterized the world economy in the past decades, this fact is clearly noteworthy (see Jordà et al. 2019).

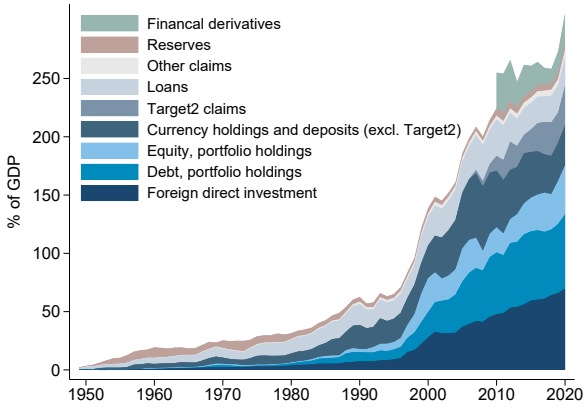
3.2 Germany's external portfolio: asset types and geography

The composition of Germany's foreign assets also changed notably over time. The balance of payments data broadly distinguishes between five different asset categories: foreign direct investment (FDI), portfolio investment, other investment, reserves, and financial derivatives. For Germany, we have data on the first four categories since 1949, but data on financial derivatives only starts in 2010 since this is an investment type that only became relevant more recently. Therefore, we will show derivatives once here and exclude

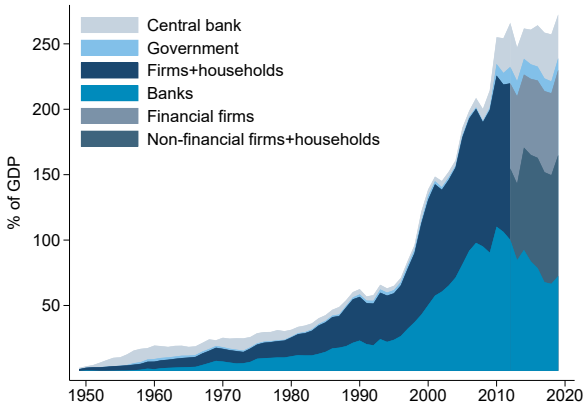
[20]We thank a reviewer for pointing out that Germany's valuation losses were small during the 2008 crisis. We investigate the role of safe vs risky assets and compositional effects in Section 5.1. We find that the composition of external assets (by asset class type) can only explain about a quarter of the observed differences in returns relative to other G7 economies (see Table 10 as well as Appendix A5).

Figure 6: Composition of Germany's international investment position, 1949–2020

(a) Foreign assets by type



(b) Foreign assets by sector

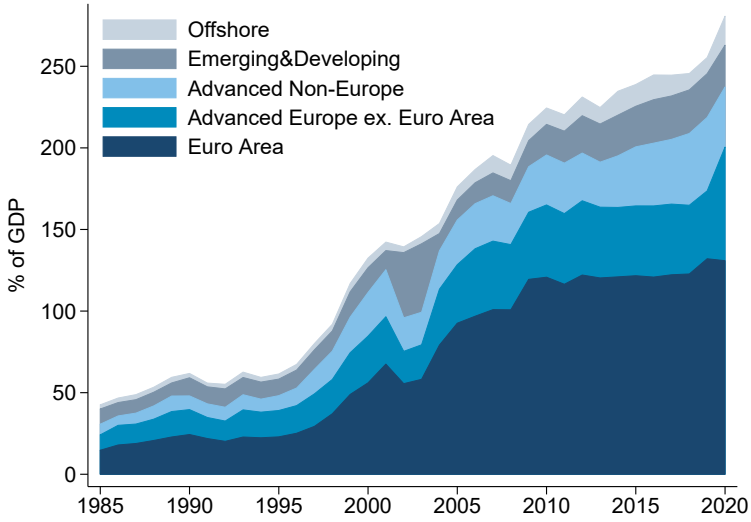


Notes: This graph shows the composition of Germany's foreign assets over time along two dimensions: by type of investment (a) and by sector (b). Asset data from the Bundesbank. Data on assets by sector available until 2019. The data split between firms and households is only available since 2012. GDP data from the Macro History Database (Jordà et al. 2017) and the German Statistical Office.

them from the remainder of the analysis, as discussed in Section 2. This will facilitate the interpretation of developments over time.

Panel (a) of Figure 6 shows the changing composition regarding asset classes over time. The rise in the overall level in assets was largely driven by increases in foreign direct investment and portfolio investment reflecting increasing international financial integration. Reserve assets on the other hand made up 20-30% of all assets until the 1970s but have become almost irrelevant today. Target2 balances have been increasing in recent years but

Figure 7: Geographical distribution of aggregate IIP assets, 1985-2020



Notes: This graph shows that the majority of German foreign assets are invested in other advanced economies, especially in Europe. The geographical distribution is estimated from additional data sources, see Section 2.4. The figure excludes financial derivatives since no data on their geographical distribution available. Choice of offshore countries is based on Bundesbank list of offshore banking centers. GDP from the Macro History Database (Jordà et al. 2017) and the German Statistical Office.

only represent about 12% of all assets. As Target2 balances do not generate income, they could potentially bias our estimated downwards. Throughout the analysis, we will pay close attention that our findings are unaffected by the inclusion of Target2 balances.

In addition to the composition by functional category, one can also decompose the foreign asset position by domestic sectors. Here, the balance of payments distinguishes between four broad sectors: banks, firms and households, the government, and the central bank. In more recent data, the non-bank private sector is further split into financial firms and non-financial firms plus households. Panel (b) of Figure 6 shows the changing composition by sector over time. The panel shows that the increase in gross position since the 1990s was mainly driven by banks increasing their exposure relative to GDP. However, since the financial crisis the banking sector reduced its exposure. This decline has been partially offset by non-financial firms.

It is equally interesting to consider the geographical distribution of assets. Unfortunately, no official data on the country of residence of the counterparties are available. Therefore, we rely on additional data sources to estimate the geographical distribution of

foreign investments for Germany and other countries, as discussed at the end of Section 2.4.

Figure 7 shows the resulting decomposition into four regions since 1985.[21] The figure reveals that Germany mainly invests in other advanced economies, especially in fellow European countries. The introduction of the Euro in 1999 further increased the European exposure as even more investment went to other euro-area countries. Today, almost 70% of all investments are in other advanced European economies, another 15% are in non-European advanced economies (mainly the US), and only the remaining 15% are invested in other countries worldwide, including offshore destinations.

4 International comparison: Germany vs. other countries

Our main focus is comparing German foreign returns to other countries' foreign returns. The international comparison is the most natural to gauge Germany's relative performance when investing abroad since all (advanced) economies in principle have access to the same investment opportunities. As a complementary exercise, we also contrast German returns on foreign assets with domestic rates of return in Appendix A1.

For the international comparison, we computed returns for a group of 12 additional advanced economies from 1975 to 2020. We started by collecting data for each of the G7 countries, although no detailed long-run data on foreign assets and their returns are available for Japan. We added as many additional OECD countries as possible. The final selection is based on data availability in particular with regard to the level of disaggregation and the years covered. All returns are expressed in countries' domestic currencies.

In addition, we compare returns using a representative international database of mutual fund equity holdings to ensure that our results are not an artefact of the aggregate data. We provide similar descriptive statistics and analyses focusing on mutual funds from the same set of advanced economies at quarterly frequency since 1999.

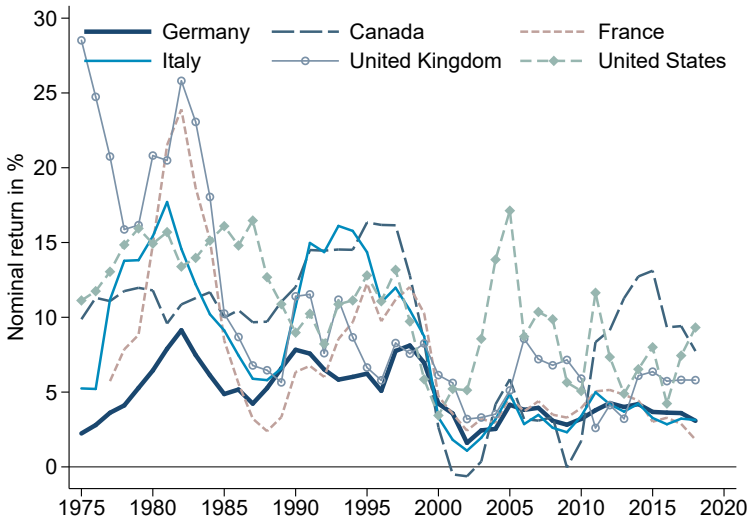
4.1 International comparison: Aggregate data

4.1.1 Descriptive evidence

For now, we focus on the other G7 members for comparison to keep the graphs and tables simple. We will include additional advanced economies in the comparison group in the next step. Figure 8 shows that German returns abroad were consistently lower than those of other countries. Importantly, this does not apply only to the US with its

[21] The additional data sources needed do not allow for a meaningful estimation for the period before 1985.

Figure 8: Nominal returns in comparison, 5-year rolling means, 1975-2020



Notes: This graph shows that Germany's returns on foreign assets (dark blue line) were almost always lower than the foreign returns of other G7 members (excluding Japan due to data availability). Rolling means computed over 5 year windows and plotted at the third year of the window. We compare nominal domestic currency returns to abstract from the effects of different inflation dynamics across the countries. The overall picture is similar when plotting real returns, as shown in Appendix A1. For more details see Section 2.

"exorbitant privilege" in international finance, but also to Italy, France, Canada, and the UK.

Table 3 summarizes the key return statistics in comparison and over different time horizons. The table demonstrates that German returns were lower than the European average, and consistently lower than domestic returns.

4.1.2 Regression results

Is Germany's financial underperformance statistically significant in a broader country panel? In the next step, we test whether German returns are lower relative to a larger group of countries. As explained, the countries we consider are 12 comparable OECD economies, namely Canada, Denmark, Finland, France, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, the UK, and the US. We regress the observed annual returns for Germany and these other advanced economies on standard control variables as well as a "German dummy". We are mainly interested in the size and significance of the coefficient on the German dummy as it tells us whether German returns differ significantly compared

Table 3: Comparing returns, nominal, various time horizons

	1975-2020	1999-20	2009-20	1980-89	1990-99	2000-09	2010-20
Germany, foreign assets	4.89	3.76	3.82	6.68	7.13	2.78	3.93
Germany, domestic assets	7.27	6.80	8.48	6.81	8.52	4.41	8.59
Canada	9.25	5.65	9.23	10.27	15.30	1.23	9.27
France	7.06	3.79	3.93	13.56	8.60	3.41	4.01
Italy	7.65	3.28	4.07	10.23	13.17	2.28	3.71
United Kingdom	9.79	5.40	3.99	16.30	7.94	5.20	4.97
United States	10.48	8.03	8.91	14.93	10.70	7.74	7.39
Germany minus domestic	-2.37	-3.03	-4.66	-0.13	-1.38	-1.63	-4.66
Germany minus US	-5.59	-4.26	-5.09	-8.25	-3.56	-4.97	-3.46
Germany minus Europe[1]	-2.82	-0.67	-0.89	-5.19	-3.34	-0.46	-1.00

Notes: This table shows that Germany's returns on foreign assets were lower than the return on domestic assets as well as the foreign returns of other G7 members (excluding Japan due to data availability). Foreign returns are computed as discussed in Section 2, while the domestic German return is from Jordà et al. (2019). We compare nominal domestic currency returns to abstract from the effects of different inflation dynamics across the countries.
[1] Europe is an average of DK, ES, FI, FR, GB, IT, NL, NO, PT, SE.

to other countries. In the cross-country setting, we focus on nominal returns because we are interested in the direct returns that individual countries earn abroad, abstracting from inflation dynamics across the countries. Using this data, we estimate the following model using pooled OLS:

$$\tilde{r}_{it} = \alpha + \beta D_{it} + \delta Z_{it} + \gamma_t + u_{it}, \tag{1}$$

where D_{it} is a dummy variable which is 1 for Germany and 0 for the other countries, Z_{it} are control variables and γ_t are yearly time fixed effects. In line with the existing literature, we control for the size of the net foreign asset position as well as past financial account balances relative to GDP to capture rebalancing effects via returns in countries with large past and current external imbalances (as discussed by e.g., Gourinchas and Rey 2014).

The results are shown in Table 4. Columns 1-4 present our core finding: German foreign investment returns are consistently about 2 percentage points lower than the returns of other countries. Moreover, while the exact under-performance fluctuates between 1 and 3 percentage points, the finding is robust across different periods. Another important finding is that the investment under-performance we measure is statistically significant.

Excluding the Target2 balances from the total pool of Germany's foreign assets does not alter our main finding. This is shown in Columns 5 and 6 of Table 4, which focus on the period after 1998 when the Euro (and, thus, the Target2 system) was introduced.

Table 4: Determinants of returns on foreign assets (all assets), 1985-2020

	Baseline (all assets)				Excluding Target2	
	(1) 1985-2020	(2) 1985-1998	(3) 1999-2020	(4) 2009-2020	(5) 1999-2020	(6) 2009-2020
Germany dummy	-2.32***	-3.15**	-1.36***	-1.62***	-1.17**	-1.26**
	(0.58)	(1.39)	(0.50)	(0.61)	(0.49)	(0.61)
Constant	4.31*	4.16*	14.17***	7.34***	14.18***	7.32***
	(2.25)	(2.20)	(1.21)	(1.78)	(1.22)	(1.78)
Observations	459	174	285	156	285	156
Adjusted R^2	0.37	0.24	0.42	0.27	0.42	0.27
No. countries	13	13	13	13	13	13
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

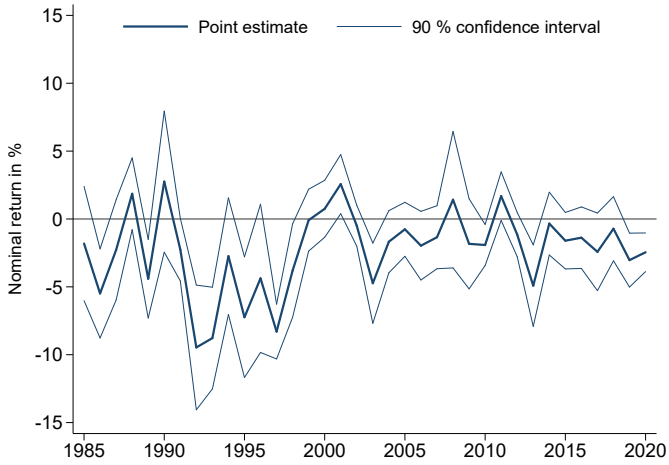
Notes: This table shows that German returns on foreign assets are significantly lower than the foreign returns of other advanced economies. This is true across different samples (Columns 1-4) as well as when Target2 balances are excluded (Columns 5-6). The dependent variable is the nominal rate of return on total foreign assets by country and year. The regressions include control variables for net foreign assets and the financial account balance (coefficients not shown). Data for Denmark and Portugal starts in 1981 and 1993, respectively. No data for Japan available. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The coefficients confirm that Germany's returns on foreign assets are about 1.1 to 1.3 percentage points lower than the returns of other countries.[22]

We next analyze how the Germany dummy evolved over time to see if the German under-performance is driven by particular episodes. To test this, we interact the German country dummy with year fixed effects to estimate a time-varying effect. The regression and control variables are the same as in the full specification above. The resulting coefficients are plotted in Figure 9. The chart shows that German under-performance has been relatively persistent over time. The first half of the 1990s saw particularly bad returns. Also the most recent decade shows significantly lower returns for Germany. Only the late 1980s and the early 2000s were periods in which Germany's returns were comparable to those of other countries. It is noteworthy that German returns never outperform other countries. The German dummy is not significantly positive in any year since 1985. Instead, periods of average performance are followed by spells of substantial under-performance.

[22]Using IMF and EWN data also for Germany leaves our results unchanged (see Table A11 in Appendix A3).

Figure 9: Germany fixed effect over time (country dummy)



Notes: This graph plots the coefficient for the Germany dummy in each year since 1985 (dark blue line) as well as its 90% confidence interval (light blue lines). The regression builds on Column 1 in Table 4 and controls for net foreign assets, the financial account balance and year effects. The main take away is that the under-performance of German foreign returns has been relatively persistent over time.

4.1.3 International CAPM results

In a last step, we estimate a variant of the international capital asset pricing model (iCAPM). The capital-asset pricing model relates a portfolio's performance to its co-movement with the market portfolio as a measure of exposure to systematic risk. We build on the seminal 3-factor model by Fama and French (1993). In addition, we control for market momentum as proposed in Carhart (1997). Since our interest is on international positions, often denominated in foreign currency, we also include an exchange rate factor from Lustig, Roussanov, and Verdelhan (2011).

Controlling for market risk based on these four risk factors and the market factor, the resulting intercept α yields the *risk-adjusted excess return* of German international investments. In light of the previous results, our prior is that at least for some asset classes German foreign investments have a negative α.

As a broad market portfolio index is only available for traded assets, we focus on portfolio investment in equities and debt. More specifically, we estimate the following iCAPM specification:

$$\tilde{r}_t^j - \tilde{r}_t^{safe} = a^j + \beta^j(\tilde{r}_t^{j,global} - \tilde{r}_t^{safe}) + \gamma_1^j HML_t + \gamma_2^j SMB_t + \gamma_3^j MOM_t + \gamma_4^j HML_{FX,t} + u_t^j, \quad (2)$$

where j indicates the asset category: either portfolio equity or portfolio debt. $\tilde{r}_t^{safe}$ is a safe rate and $\tilde{r}_t^{j,global}$ the global market return, HML_t, SMB_t and MOM_t are developed market factors for size, value and momentum retrieved from Ken French's website and $HML_{FX,t}$ is the exchange rate factor from Lustig et al. (2011).

We use data at quarterly frequency, published by the Bundesbank since 2004. Semi-annual data are available from 1986. In order to allow for comparability with the the rest of the analysis, we impute quarterly returns from the semi-annual data for 2002 and 2003. The results are virtually identical when relying on the post-2004 sample only. We use the following transformed values of the semi-annual return: $\tilde{r}_t^{sa,qt} = \sqrt{(1+\tilde{r}_t^{sa})} - 1$, where $\tilde{r}_t^{sa} = \frac{II_t^A + VC_t^A}{IIP_{t-1}^A}$ and t indicates half-years.

For the safe rate, we use the 1-month Euribor rate as well as the 10-year Bund rate for comparison. To proxy the global market portfolio, we combine different sources. For equity, we rely on the data of Jordà et al. (2019), which we previously also used for the domestic return on capital. Jordà et al. (2019) create a global equity return by weighting the individual countries' returns with GDP shares. Since their series are only available at an annual frequency, we create our own quarterly series based on their original sources.[23] As a global portfolio debt return, we use the global fixed income index from the Bank of America.[24] We compute quarterly averages of all factors to match the frequency of the return data.

Table 5 indicates that German equity and portfolio returns strongly co-move with the market, i.e., they have a β of around 1. The significant negative α-coefficients for equity returns confirm that German foreign equity asset returns are significantly lower on a risk-adjusted basis. The performance of the German foreign debt asset portfolio is slightly better, and but remains marginally negative for both risk-free rate proxies. In the light of these regressions, Germany's negative α is mainly driven by the bad performance of the foreign equity portfolio.

[23] Due to data availability, we have to deviate from the original sources in some cases and leave out Sweden. Details on the data can be found in Appendix A9.

[24] Data downloaded from ThomsonReuters Eikon.

Table 5: CAPM regressions, 2002 to 2020

	Equity		Debt	
	(1) Interbank, 1-month	(2) Bund, 10-year	(3) Interbank, 1-month	(4) Bund, 10-year
α	-0.74**	-0.76**	-0.04	-0.02
	(0.34)	(0.34)	(0.19)	(0.17)
β	0.88***	0.88***	1.06***	1.06***
	(0.05)	(0.06)	(0.12)	(0.12)
Observations	72	72	72	72
Adjusted R^2	0.83	0.83	0.63	0.62
4 factors	Yes	Yes	Yes	Yes

Notes: This table shows that excess rates of return on Germany's foreign asset holdings are negative on a risk-adjusted basis. The dependent variable is the excess quarterly return on external holdings over the risk-free rate. All specifications include the excess market return and the four risk factors described in equation (2). Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.1.4 Aggregate financial consequences – a counterfactual exercise

In this section, we aim to quantify the cumulative financial loss (or foregone gains) caused by Germany's low returns on foreign assets. For this, we need to construct a counterfactual in which German returns would have been comparable to those of other countries.

We compute Germany's counterfactual investment income assuming that Germany achieved the rates of return by the other G7 members (we also include Norway, which achieved one of the highest returns over the past decade). We then compare these counterfactual values to the realized income earned and compute the aggregate cumulative loss or gain. To evaluate the economic size of the effects, we deflate the losses using German CPI and express them as percent of German GDP in 2020. More specifically, we compute the aggregate loss, $Loss_t$, in each year as

$$Loss_t = \tilde{r}_{t,DE} IIP^A_{t-1,DE} - \tilde{r}_{t,c} IIP^A_{t-1,DE} = (\tilde{r}_{t,DE} - \tilde{r}_{t,c}) IIP^A_{t-1,DE},$$

where $\tilde{r}_{t,\mathrm{DE}}$ is the nominal return on German foreign assets, $IIP^A_{t-1,DE}$ is the German gross foreign asset position, and $\tilde{r}_{t,\mathrm{c}}$ is the nominal return on the foreign assets of country c. Table 6 displays the resulting losses.

As can be seen, the amounts are substantial. Had Germany been as savvy an external investor as other countries, the country would be considerably richer today. The losses are

Table 6: Cumulated income losses due to low returns on German foreign assets

	1975-2020		1999-2020		2009-2020	
	bn 2015 €	% of GDP	bn 2015 €	% of GDP	bn 2015 €	% of GDP
Canada	-5327.30	-147.31	-3623.15	-112.84	-4523.68	-135.68
France	-743.81	-13.19	23.98	1.90	27.46	1.83
Finland	-587.01	-19.96	-1005.72	-29.54	-851.85	-26.36
Italy	-943.91	-16.47	399.89	10.25	-133.26	-3.34
Norway	-4808.51	-134.19	-3709.38	-111.74	-3333.07	-101.59
United Kingdom	-3045.04	-71.96	-1993.39	-54.99	-329.23	-10.74
United States	-6701.45	-176.76	-5344.55	-151.24	-4053.33	-119.50

Notes: This table quantifies the foregone income on Germany's foreign assets due to Germany's comparatively low investment returns abroad. Losses are computed as the difference between total income earned (yield plus valuation changes) on German assets and hypothetical income earned had Germany achieved the same return as the comparison country. Nominal losses are deflated using the CPI index with 2015=100 and then added up over time. In Columns 2, 4, and 6 the counterfactual losses are shown as a share of nominal German GDP of 2020.

largest when using Canadian and US returns as counterfactual, but the numbers are also substantial when comparing to other countries. Had Germany achieved the same return on investment as Finland since the introduction of the Euro (in 1999), the country would be 1006bn Euros richer today, according to these simple back-of-the-envelope calculations. By not achieving the returns that Italy achieved, Germany forgave wealth of about 133bn Euros in the decade since the financial crisis alone. More remarkably, since 2009, Germany would have gained an additional 3-4 trillion Euros of wealth (or 102% or 136% of its 2020 GDP) if its foreign investments had performed like those of Norway or Canada, respectively. In per capita terms, this amounts to about 41,000 and 54,000 Euros of foregone income for each German citizen in less than 10-years, a substantial wealth loss compared to Norway and Canada, respectively.[25]

4.2 International comparison: Mutual fund data

4.2.1 Descriptive evidence

The aggregate results point to portfolio investment as an asset classes contributing to poor German returns. In order to further assess this role, we replicate the same steps as

[25]Euro values are the real values from Table 6. German population size was 83.2 million in 2020 (German Statistical Office). GDP shares are obtained by dividing the nominal loss by German GDP in 2020.

above using an alternative dataset on the portfolio equity holdings by more than 50,000 mutual funds. We start with a descriptive comparison of the returns of German mutual funds relative to their foreign peers. Table 7 mirrors the results found in the aggregate data: the quarterly returns of German funds over a 20-year span rank 12th out of 14 total countries. We further distinguish the periods between 2000 to 2010, and the from 2011 to 2021 to evaluate whether the performance changes over time. Indeed the results suggest that the German underperformance was slightly more pronounced in the earlier period, although German funds still rank in the bottom half (9th) in the second half of the sample.

Table 7: Nominal return comparison, mutual funds, 1999 to 2021

	Rank	2000-2021	2000-2010	2011-2021
Japan	1	3.23	3.22	3.24
Sweden	2	2.48	1.83	3.05
Norway	3	2.47	1.99	2.88
Finland	4	2.46	1.98	2.86
United States	5	2.26	1.99	2.54
Portugal	6	2.25	1.82	2.60
United Kingdom	7	2.23	1.62	2.87
Canada	8	2.10	1.22	2.96
Italy	9	2.03	0.98	2.97
Denmark	10	1.82	0.70	2.87
France	11	1.74	0.76	2.68
Germany	12	1.73	0.78	2.65
Spain	13	1.64	0.71	2.48
Netherlands	14	1.57	0.31	2.77

Notes: This table shows average, nominal returns on foreign assets by mutual funds for various time samples. Countries are ranked by their average return. We compare nominal returns in domestic currency to abstract from different national inflation dynamics.

4.2.2 Regression results

The descriptive evidence suggests that Germany also underperforms comparable countries within in the mutual fund sector. Next, we formally test this hypothesis by adopting a similar procedure as in the aggregate data. Specifically, we estimate the following regression,

$$\tilde{r}_{ijt} = \alpha + \beta D_{jt} + \gamma_t + u_{ijt}, \tag{3}$$

where $\tilde{r}_{ijt}$ is the quarterly return of fund i from country j, D_{jt} is a dummy variable which equals 1 for German funds and 0 for funds from other countries. γ_t are quarter time fixed effects and u_{ijt} is an error term.

We find results that are consistent with those obtained in the aggregate data. Column 1 of Table 8 indicates a negative and significant coefficient for the German dummy variable. In quantitative terms, it implies that the returns of German mutual funds' returns underperform mutual funds from comparable countries by half a percentage point per quarter, on average.

Table 8: Germany fixed effects regression, mutual funds, 1999 to 2021

	(1)	(2)	(3)
	2000-2021	2000-2010	2011-2021
Germany dummy	-0.49***	-0.98***	-0.13***
	(0.02)	(0.03)	(0.02)
Constant	-0.32	-0.32	5.43***
	(1.40)	(1.40)	(0.06)
Observations	1,231,905	401,334	830,571
Adjusted R^2	0.56	0.58	0.54
No. countries	14	14	14
Quarter fixed effects	Yes	Yes	Yes

Notes: This table shows that rates of return on external equity holdings by German mutual funds are significantly lower than those of similar mutual funds from comparable advanced economies. This is true across different sub-samples (Columns 1-3). The dependent variable is the nominal rate of return on total foreign equity by fund and quarter. The regressions include quarter fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

This overall effect is mainly driven by the first half of the sample (Column 2), where the Germany dummy is estimated close to 1. By their own standards, German mutual funds perform better in the period between 2011 and 2021, albeit still attaining returns that are 0.13 percentage points lower than those of their foreign peers. Throughout, the German dummy is precisely estimated and statistically significant at the 1% confidence level.

4.2.3 International CAPM results

To assess the performance controlling for market risk, we estimate an international CAPM model using the quarterly excess return over the safe benchmark for the sample of German mutual funds. As market factor, we use the average excess return of the full sample of mutual funds in our dataset in each quarter. Although we do not report their

coefficients, all specifications include the developed market factors HML_t, SMB_t and MOM_t from Ken French's website, and $HML_{FX,t}$ from Lustig et al. (2011). Columns 1–2 of Table 9 present estimates at the fund-level, columns 3–4 use the mutual fund returns aggregated at the national level.

Consistent with the findings in the aggregate date, we document a negative and precisely estimated α for portfolio equity returns of German mutual funds on a risk-adjusted basis. Regardless of the unit of observation (fund or country) and choice of safe rate (Interbank or Bund rate), we estimate a statistically significant, negative coefficient. Moreover, the estimates of β are close to 1 which suggests high co-movement with the market, mirroring the results from the aggregate analysis.

Table 9: CAPM regressions, mutual funds, 1999 to 2021

	Fund-level		Country-level	
	(1)	(2)	(3)	(4)
	Interbank, 1-month	Bund, 10-year	Interbank, 1-month	Bund, 10-year
α	-0.22***	-0.23***	-0.70**	-0.72**
	(0.02)	(0.02)	(0.29)	(0.29)
β	0.96***	0.97***	0.92***	0.92***
	(0.00)	(0.00)	(0.04)	(0.04)
Observations	109,847	109,847	88	88
Adjusted R^2	0.70	0.69	0.91	0.91
4 factors	Yes	Yes	Yes	Yes

Notes: This table shows that excess rates of return on foreign equity holdings by German mutual funds are negative on a risk-adjusted basis. Columns 1-2 use fund-level returns, columns 3-4 the aggregated country-level returns. The dependent variable is the excess quarterly return on foreign equity over the risk-free rate. All specifications include the excess market return and the four risk factors described in equation (2). Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5 Why are German returns low?

We have established that German returns on foreign investments are considerably lower than the returns of other countries. In this section, we aim to understand the causes. More precisely, we decompose the return differential using cross-country data as far back as possible (mostly starting in 1985, when detailed data on the currency composition of foreign assets became available for most economies, see Section 2).

The negative German return differential may result from a range of factors linked to as-

set allocation (asset class selection, geography, risk profile). Based on the equity portfolios of mutual funds we further assess the role of market timing and explore stockpicking ability of equities from different countries and sectors. In addition, the differential could be due to exchange rate effects. In particular, exchange rate appreciations could have systematically lowered the "raw" returns achieved by German investors. Moreover, we discuss potential alternative explanations.

5.1 Decomposition: comparing exchange rate, asset class, and return effects

In this section, we systematically decompose the return differential into its components to analyze the effects of exchange rates and asset composition. We provide complementary descriptive evidence placing Germany's foreign asset composition by asset category in international comparison in Appendix A5. Indeed, in contrast to similar countries German foreign investments appear to be favoring relatively safer over riskier asset classes, including FDI and portfolio equity. Starting in 1990, we can more formally test for the relative importance of different components, since we need information on the returns for all asset categories separately. This is not available for most countries before the 1990s.

Our cross-country decomposition approach builds on and expands the exercise that Gourinchas and Rey (2007a) apply for the United States. Specifically, one can write the aggregate return to any portfolio p as the weighted average of the returns of the different portfolio components j using lagged weights:

$$r_t^p = \sum_{j=1}^{J} w_{j,t-1}^p r_{j,t}^p, \tag{4}$$

where $w_{j,t-1}^p$ is the weight of assets class j in the portfolio p, $r_{j,t}^p$ is the return to the respective asset class and J is the number of asset classes. Using equation (4) one can then rewrite the difference in aggregate returns of two portfolios p and q as

$$\begin{aligned} r_t^p - r_t^q = & \sum_{j=1}^{J} \frac{r_{t,j}^p + r_{t,j}^q}{2} (w_{t-1,j}^p - w_{t-1,j}^q) \\ & + \sum_{j=1}^{J} \frac{w_{t-1,j}^p + w_{t-1,j}^q}{2} (r_{t,j}^p - r_{t,j}^q). \end{aligned} \tag{5}$$

The first term of equation (5) captures the difference in returns resulting from the different weights of each asset class in the two portfolios and is labeled the *composition*

effect. The differences between weights are weighted by the average return of the respective asset class in both portfolios. The second term captures the effect of the return differential on the overall difference and is called the *return effect*.

Furthermore, we expand the exercise by subtracting valuation changes due to exchange rates from the returns before decomposing the difference.[26] This allows us to parse out the *exchange rate effect*.

Table 10 shows the decomposition results, which focuses on the comparison between Germany and other G7 members. The first column shows the difference between Germany's foreign returns vis-à-vis each comparison country, averaged for the full period 1990 to 2020. In line with our findings above, German returns are lower than those of the other G7 members, so that the sign is negative in each row.

The second column shows the contribution of valuation changes due to exchange rates. The positive values indicate that most countries' returns suffered more from exchange rate-driven valuation changes (appreciation effects) than Germany's return. The only exception is the United Kingdom, where exchange rate effects can help to explain more than half of the return differential with Germany (-0.9 of -1.4 percentage points overall). Taken together, however, the numbers in column (2) are small, so that exchange rate movements do not help much to explain the observed gap between German and other countries' returns.

The third column indicates that the asset composition is also not a major driver of the observed return differentials between Germany and the other countries. Only in the comparison with Canada and the US, the asset composition plays a non-trivial role, accounting for up to 25% of the return differences (-1 and -1.3 percentage points respectively, see column (3)).

The dominant part of the explanation are differences in returns within each asset class. This can be seen in column (4) which shows large negative numbers. The return effect explains more than three quarters of the differences in returns between Germany and other countries.

In sum, the main reason why German foreign investments produce lower returns is not the type of assets Germany holds (debt vs. equity vs. FDI) nor frequent exchange rate appreciations. Instead, Germany's foreign assets are less profitable within the same asset class, after controlling for exchange rate and composition effects. We now turn to understanding why this is the case.

[26] We adopt the approach of Lane and Shambaugh (2010) and Bénétrix et al. (2015) to compute valuation changes due to exchange rates. For more details, see Appendix A4.1.

Table 10: Decomposition of return differences: Germany vs other countries, 1990-2020

Comparison country	Difference in foreign returns (pp.) (1)	Difference due to: exchange rates (2)	composition (asset class) (3)	returns within asset class (4)
Canada	-4.108	0.052	-1.067	-3.093
France	-0.657	0.131	0.056	-0.854
Italy	-1.728	0.113	-0.367	-1.483
UK	-1.404	-0.914	-0.135	-0.355
US	-4.113	0.152	-1.351	-2.914

Notes: Decomposition splits the difference between return on German foreign assets and other country's foreign assets into three parts: (1) difference in valuation changes due to exchange rates, (2) different composition of asset position in the four broad asset categories, and (3) difference in returns within each asset classes (details in Section 5.1). Returns estimated as discussed in Section 2.1. For countries we compare nominal returns to abstract from the effects of different inflation dynamics across the countries.

5.2 Returns within asset classes

In this section, we want to understand what is driving the modest investment performance on the level of individual asset classes. For this purpose, we compare German returns to other countries' return for individual asset classes. We return to our regression model from equation (1) and include the geographical distribution of each country's assets as well as additional asset characteristics.

For each asset class j – portfolio equity and debt, foreign direct investment, and 'other investment' – we estimate the following regression:

$$\tilde{r}_{it}^{j} = \alpha_j + \beta_{1j} D_{it} + \sum_r \beta_{rj} S_{it}^{A,j,r} + \beta_{2j} \sigma_{it}^{j} + \delta Z_{it} + \gamma_t + u_{it}^{j},$$

where $S_{it}^{A,j,r}$ is the share of assets from region r in total assets of category j owned by country i in year t. Z_{it} are additional control variables and γ_t are yearly time fixed effects. In addition to the net foreign asset position and the financial account balance, Z_{it} now also includes the exchange rate effects estimated before, as these are an important driver of returns. We also include a measure of risk, σ_{it}^{j}. Specifically, following standard practice, we use the standard deviation of the respective return series, computed over 3-year rolling windows and centered around t.

Note that in this exercise we set the bar intentionally high. The foreign exchange exposure, geographic portfolio allocation, and risk are part of the investment decision of German savers or intermediaries. Investors can freely choose where and what to invest in. The regressions therefore test an even stricter version of the German returns puzzle. We ask, conditional on foreign exchange movements and other controls, did German investors receive worse returns *within* individual asset classes than other countries?

Table 11 and Table 12 present the results in four columns for each asset category. The regression in the first column only includes the controls from the baseline specification in Section 4. The next three columns control for exchange rate effects, geography, and risk, respectively.

We lack data on the geographic allocation of assets and on exchange rate valuation effects for the regressions on debt and equity, so that the sample is restricted to 2002-2020 in Table 11. For similar reasons, also the country sample varies across different panels.[27] In particular, for the 'other investment' category, data on the geographical distribution is relatively scarce (also see Table A9). Therefore, the number of observations and countries changes with the inclusion of geographical composition.

The tables deliver a clear finding. Germany's returns are consistently lower across asset classes. This means that returns are lower even when we zoom in to individual asset classes and control for risk characteristics. The effects are particularly pronounced for portfolio equity investment and FDI. Both stand out economically and statistically as markets in which German returns were substantially lower, even after accounting for the effects of other allocation choices (which can also be seen as part of investment performance). For debt and 'other investment' the mean effect remains negative at about 1 percentage point but is not significant.

[27] All results exclude Spain due to a lack of data on the geographical distribution by asset class. The results for debt and equity further exclude Norway due to a lack of data on geographic allocation for these assets. The results for 'other investment' exclude both Norway and Portugal for the same reason.

Table 11: Determinants of returns by asset class, equity and debt, 2002-2020

	Equity returns				**Debt returns**			
	(1) Baseline	(2) Val. FX	(3) Risk	(4) Geo.	(5) Baseline	(6) Val. FX	(7) Risk	(8) Geo.
Germany dummy	-4.12***	-4.35***	-4.46***	-2.91*	-0.63	-0.94	-0.46	0.13
	(1.42)	(1.36)	(1.46)	(1.73)	(0.77)	(0.74)	(0.73)	(0.76)
Valuation ch. due to ex. rates, equity		0.99***	0.96***	0.98***				
		(0.12)	(0.12)	(0.13)				
3-year rolling std. dev., equity			0.25**	0.24*				
			(0.11)	(0.13)				
Valuation ch. due to ex. rates, debt						0.95***	0.96***	1.01***
						(0.15)	(0.15)	(0.15)
3-year rolling std. dev., debt							0.23	0.13
							(0.20)	(0.20)
Advanced Europe				-0.07				-0.16**
				(0.10)				(0.06)
Advanced Non-Europe				-0.01				-0.07
				(0.10)				(0.07)
Emerging&Developing				-0.16				-0.25**
				(0.15)				(0.10)
Constant	-20.38***	-17.64***	-22.28***	-17.05	8.82***	10.02***	8.52***	23.01***
	(2.00)	(1.87)	(3.24)	(11.71)	(2.98)	(2.27)	(2.02)	(6.69)
Observations	208	208	197	197	207	207	196	196
Adjusted R^2	0.81	0.87	0.87	0.88	0.12	0.38	0.41	0.47
No. countries	11	11	11	11	11	11	11	11
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Germany's returns on equity are significantly lower than other countries' returns even after controlling for exchange rate effects and risk. Debt returns are comparable, albeit the coefficients of the Germany dummy are negative as well. Sample restricted to 2002-2020 due to a lack of data on geographic allocation and exchange rate valuation effects by asset class (see Section 2). Spain and Norway dropped entirely due to a lack of data on the geographical distribution by asset class. Net foreign assets and financial account balance included in the regressions but not shown. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Determinants of returns by asset class, FDI and 'other investment', 1985-2020

	FDI returns				**Other investment returns**			
	(1) Baseline	(2) Val. FX	(3) Risk	(4) Geo.	(5) Baseline	(6) Val. FX	(7) Risk	(8) Geo.
Germany dummy	-3.04**	-2.22*	-1.76	-1.25	-0.78	-0.98	-0.48	0.04
	(1.18)	(1.17)	(1.18)	(1.26)	(0.93)	(0.69)	(1.10)	(1.07)
Valuation ch. due to ex. rates, FDI		0.41***	0.40***	0.41***				
		(0.10)	(0.10)	(0.10)				
3-year rolling std. dev., FDI			0.15	0.11				
			(0.19)	(0.20)				
Valuation ch. due to ex. rates, other						0.99***	1.02***	1.02***
						(0.08)	(0.11)	(0.13)
3-year rolling std. dev., other							0.07	0.13
							(0.27)	(0.30)
Advanced Europe				-0.18				-0.09*
				(0.14)				(0.05)
Advanced Non-Europe				-0.19				-0.13*
				(0.16)				(0.07)
Emerging&Developing				-0.17				-0.10
				(0.13)				(0.07)
Constant	9.76	12.02**	10.80**	29.05*	3.45	12.48***	11.12***	20.12***
	(5.99)	(5.06)	(4.96)	(15.78)	(3.26)	(1.39)	(1.98)	(4.75)
Observations	372	372	368	368	257	257	242	219
Adjusted R^2	0.14	0.19	0.19	0.19	0.26	0.49	0.50	0.47
No. countries	12	12	12	12	10	10	10	10
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Germany's returns on FDI are significantly lower than those of other countries even after controlling for exchange rate effects, risk and geographical allocation. Returns on other investments are lower but the effect is not always significant. Geographical distribution for the respective asset class. Net foreign assets and financial account balance included in the regressions but not shown. The results exclude Spain due to a lack of data on the geographical distribution by asset class. The results for 'other investment' further exclude Norway and Portugal for the same reason. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5.3 Heterogeneity by country and sector

The aggregate data do not allow to study whether the underperformance of German investors is driven by poor stock picking behavior or specific sectors. We therefore test both margins based on the international sample of mutual funds by complementing data on a firm's origin and sector. Methodologically we replicate the simple dummy regression in Section 4.1 for different country and sectoral groupings.

We start by asking whether the returns of German investors relative to their peers depend on the country of origin of the underlying firms. In Table 13 we first re-estimate the dummy regression for the whole sample, reproducing the result in Table 8. In columns 2–3 we split the sample into advanced and emerging market economy equities and separately estimate the model. In both cases we find a negative and precisely estimated Germany dummy, although the relative underperformance seems more pronounced for advanced, compared to emerging market economy stocks. We also restrict the sample to companies located in G7 economies (column 4) and find a less negative, though still statistically significant Germany dummy compared to the whole advanced economy group.

Table 13: Regression by destination, mutual funds, 1999 to 2021

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All stocks	AE	EME	G7	Europe	North Am.	Asia-Pacific
Germany dummy	-0.48***	-0.51***	-0.35***	-0.33***	-0.58***	-0.21***	-0.25***
	(0.02)	(0.02)	(0.10)	(0.02)	(0.02)	(0.05)	(0.06)
Constant	-0.32	0.71	1.36	-0.02	0.42	4.90	1.93
	(1.40)	(1.51)	(5.19)	(1.81)	(1.54)	(3.26)	(3.49)
Observations	1,244,536	1,217,040	557,553	1,041,534	1,118,346	614,854	434,567
R2	0.56	0.54	0.35	0.49	0.51	0.40	0.42
No. countries	14	14	14	14	14	14	14
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table shows that German mutual funds' returns on foreign equities are significantly lower than the foreign returns of other advanced economy mutual funds across different investment destinations. Columns 2–4 report estimates based on returns of advanced economy, emerging market economy and G7 economy equities, respectively. Columns 5–7 are based on returns for different geographical groups that include advanced and emerging market economies. All regressions include quarter fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Next, we assess heterogeneity among the performance in major geographic regions. Columns 5–7 contain results estimated separately on the set of European, North American and Asian and Oceanian equities, respectively. Once more the Germany dummies are all negative and statistically significant at the 1% confidence level. In quantitative terms, the

relative gap in returns of 0.58 percentage points per quarter estimated on the European sample is more negative compared to the other two regions, with the difference being statistically significant.

These findings are indicative of systemically lower equity returns by German mutual funds regardless of geographical regions. The poor relative returns across regions are further exacerbated by a large negative return gap when investing in firms from neighboring European countries. Unfortunately this is also where German mutual funds allocate the lionshare of their foreign equity investments (57% as of 2020).

If not due to firm's countries of origins, maybe German mutual funds' poor returns are driven by a specific sector? Once more we estimate the simple dummy regression, this time separately for the NAICS sectors in which German mutual funds have the largest equity exposures. As of 2020, these include manufacturing (43%), Finance & Insurance (19%), Information (13%), Mining, Quarrying, Oil and Gas extraction (6%), as well as Services, Retail Trade and Utilities (4% each).

Table 14: Regression by sector, mutual funds, 1999 to 2021

	(1) Finance &Insurance	(2) IT	(3) Manufacturing	(4) Mining, Oil&Gas	(5) Services	(6) Retail Trade	(7) Utilities
Germany dummy	-0.16***	-0.57***	-0.61***	0.50***	-0.42***	-0.60***	-0.12***
	(0.03)	(0.03)	(0.02)	(0.06)	(0.05)	(0.04)	(0.04)
Constant	-7.88***	-2.61	1.31	10.22***	11.05**	-0.02	-8.90***
	(2.96)	(2.39)	(1.25)	(3.59)	(5.14)	(2.00)	(1.44)
Observations	857,724	781,558	1,041,125	567,131	545,106	545,019	454,763
R2	0.56	0.41	0.51	0.51	0.39	0.33	0.40
No. countries	14	14	14	14	14	14	14
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table shows that German mutual funds' returns on foreign equities are significantly lower than the foreign returns of other advanced economy mutual funds across different sectors following the NAICS classification. Columns 1–3 report estimates based on returns attained in the three largest sectors, Finance and Insurance, Information and Manufacturing. Similar results for the four largest remaining sectors are contained in columns 4–7 All regressions include quarter fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The results are contained in Table 14. We find a negative and statistically significant German dummy for the three largest sectors German funds invest in (Columns 1–3). The relative underperformance is particularly pronounced in the manufacturing sector: German mutual funds attain returns that are 0.61 percentage points below their foreign peers each quarter, on average.

Turning to Services, Retail Trade and Utilities respectively (columns 5–7) we find comparable coefficients that are negative and statistically significant. The only sector where German mutual funds outperform foreign funds is in the Mining, Quarrying, Oil and Gas sector (column 4). However, this sector only makes up 6% of fund portfolios and does not offset the poor returns across the remaining major sectors.

5.4 Market timing

One alternative explanation for the low returns of German mutual funds is related to market timing. We formally test for the inability to time the stock market in the framework of an adjusted CAPM model in the spirit of Henriksson and Merton (1981) and Henriksson (1984). Conceptually, this amounts to testing whether the correlation of excess returns with the market factor are different during up- and down-market periods. To that end, we augment the CAPM from Section 4.1.3,

$$\tilde{r}_t - \tilde{r}_t^{safe} = a + \beta_1 Down_t + \beta_2 Up_t + \gamma_1 HML_t + \gamma_2 SMB_t + \gamma_3 MOM_t + \gamma_4 HML_{FX,t} + u_t, \quad (6)$$

where $Up_t = max\{0, \tilde{r}_t^m\}$ and $Down_t = min\{0, \tilde{r}_t^m\}$, with $\tilde{r}_t^m = \tilde{r}_t^{global} - \tilde{r}_t^{safe}$. β_1 and β_2 measure the correlation with the excess market return during market up- and down-market periods, respectively. A trading strategy that successfully times the market is characterized by a low β_1 and high β_2.

Across specifications, we find a higher down-market beta (β_1) than up-market beta for German mutual funds (Table 15). Intuitively, this suggests that their returns are more correlated with the market during periods when returns are negative as opposed to when returns are positive. In fact, the estimate of β_2 below 1 implies that German funds especially fail to time the market during periods of high returns. Controlling for this also flips the sign of α, compared to the results based on the simple CAPM model. In other words, market timing appears to be one of the main drivers of the poor performance of German mutual funds.

We use various risk-free rates in column 1–3, to ensure they do not drive our results. For comparison, column 4 estimates the same CAPM model, but for mutual funds from the remaining sample of 13 countries, excluding Germany. Especially the estimates for the up-market factor (β_2) stand in contrast to the German estimates: the poor timing during stock market expansions appears unique to German mutual funds. Indeed, a simple test of the two β_2 coefficients in columns 3 and 4 rejects the null hypothesis of zero differences

Table 15: CAPM market timing, mutual funds, 1999 to 2021

	German funds			Non-German funds
	(1) Interbank, 1-month	(2) Bund, 10-year	(3) FFR	(4) FFR
α	0.12***	0.11***	0.12***	-0.01
	(0.03)	(0.03)	(0.03)	(0.01)
β_1	1.00***	1.00***	1.00***	1.00***
	(0.00)	(0.00)	(0.00)	(0.00)
β_2	0.91***	0.91***	0.91***	1.01***
	(0.01)	(0.01)	(0.00)	(0.00)
Observations	109,847	109,847	109,847	1,086,980
Adjusted R^2	0.70	0.69	0.69	0.56
4 factors	Yes	Yes	Yes	Yes

Notes: This table shows that excess returns on foreign equity holdings by German mutual funds show a higher correlation with the market factor during periods where returns are negative (Columns 1-3). This is not true for mutual funds from other advanced economies (Column 4). The dependent variable is the quarterly excess return on foreign equity over the risk-free rate. All specifications include the excess market return and the four risk factors described in equation (6). FFR corresponds to the US federal funds rate. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(p=0.00).[28]

5.5 Further potential explanations

There are other explanations of Germany's low returns that are hard to test in the aggregate and fund-level data we have access to, and that go beyond the scope of this paper. One potential explanation is financial intermediation and the skill level within the financial industry. Maybe German finance professionals have lower skill levels and are less educated than their foreign peers, which seems unlikely but is nevertheless a possibility. One channel could be differences in wage levels, which are very high for finance professionals in anglo-saxon countries (Philippon and Reshef 2012) and less so in continental Europe. Alternatively, it is possible that a bank-centered financial system like that of Germany, with a dominant role of regional banks and frequent political interventions, is detrimental for foreign investment decisions (see e.g., Allen and Gale 2001; Calomiris and Haber 2015; Gropp, Gruendl, and Guettler 2014).

Another potential explanation are data biases due to profit shifting and the use of tax

[28]Specifically, $Z = \frac{0.914-1.008}{\sqrt{0.005^2+0.002^2}} = -16.78$.

havens, as explored in a growing body of literature (e.g., Coppola, Maggiori, Neiman, and Schreger 2021; Hebous, Klemm, and Wu 2021; Tørsløv, Wier, and Zucman forthcoming). For example, Bosworth, Collins, and Chodorow-Reich (2007) and Guvenen, Mataloni Jr, Rassier, and Ruhl (2022) show that an important part of US excess returns can be explained by US companies shifting their profits to low-tax jurisdictions abroad, distorting the measurement of FDI. If German capital exports are less biased due to profit shifting than those of the United States or Canada, this could help explain the comparatively lower German returns. However, the data by Tørsløv et al. (forthcoming) suggest that Germany has about the same level of "missing profits" abroad than other advanced economies. Moreover, profit shifting can hardly explain the much lower returns on portfolio equity. Relatedly, it is possible that German returns are low because the underlying investments have additional benefits, such as fostering German exports. In a similair vein, there could be differences in risk-taking within foreign direct investments across countries. Again, these points could be relevant channels with regard to FDI, but help little to explain the poor equity returns of Germany, which are lower across the board and for all sectors of investment.

More speculatively, it is possible that cultural and social factors play a role too (see e.g., Stulz and Williamson 2003). For example, investors from protestant, civil law countries like Canada may be more prone to invest in high-yielding assets abroad, due to their trust in asset markets and their experience with strong investor protection at home (e.g., Guiso, Sapienza, and Zingales 2006, 2008). Similarly, it is possible that kinship and ancestry ties, e.g. to Great Britain, help to explain the success of foreign investments (see e.g., Burchardi, Chaney, and Hassan 2019; Cohen, Gurun, and Malloy 2017). Also political factors could be relevant in explaining differences in foreign returns across different nations. One possibility is that international asset markets are not a level playing field after all, as investors from powerful countries or former empires, like the United States or the United Kingdom, may have superior access to investment opportunities abroad. Future research could explore these and other channels in more depth.

6 Consumption insurance and demographic risks

German returns are systematically lower than other countries' returns even after controlling for risk and other factors. One reason why Germans may accept these low returns is an insurance motive. If returns are counter-cyclical with respect to domestic consumption, they provide a hedge against volatility in consumption. Additionally, Germans may invest in regions with better demographic prospects. These might not yield high returns yet but potentially will in the future. In this section, we briefly touch upon these two potential channels.

6.1 Consumption insurance

There is a large literature on the potential of international investment to provide consumption insurance. The basic idea is that foreign investments can help to buffer shocks to domestic income. Suppose Germany undergoes an economic downturn while foreign countries do not. In this situation, German households that have invested into foreign assets will benefit from their (high) capital income from abroad to counterbalance their (lower) domestic income. The foreign capital income will thus help households to smooth their consumption over time, making them better off. Even low return investments could be welfare-enhancing if they provide insurance.

This being said, the literature on consumption based asset pricing is beset by a number of puzzles, both domestically and internationally. Empirical studies have found only very limited effects of investment income flows on consumption smoothing (see e.g., Lane 2001; Sørensen and Yosha 1998).

Here, we test to what extent German foreign investments provide consumption insurance for German households. We again focus on total returns on the foreign assets, i.e., we combine yields and valuation changes. We base our empirical approach on the consumption capital-asset pricing model (CCAPM). The CCAPM assumes that the return of a risky asset is proportional to the consumption beta. Intuitively, this implies that assets with high payoffs in bad states of the world (when consumption is low) are more desirable. This can be formalized as follows:

$$\mathbb{E}[R_{it}] - \gamma_0 = \gamma_1 \beta_{ci}, \tag{7}$$

where R_{it} is the return to a risky asset, γ_0 is the return to a portfolio not correlated with consumption growth (the zero consumption beta portfolio), γ_1 is the price of risk, and $\beta_{ci} = \text{cov}(R_{it}, c_t)/\text{var}(c_t)$ with c_t as the growth rate of aggregate consumption per capita is

Table 16: Correlation of real consumption and real returns (lagged returns)

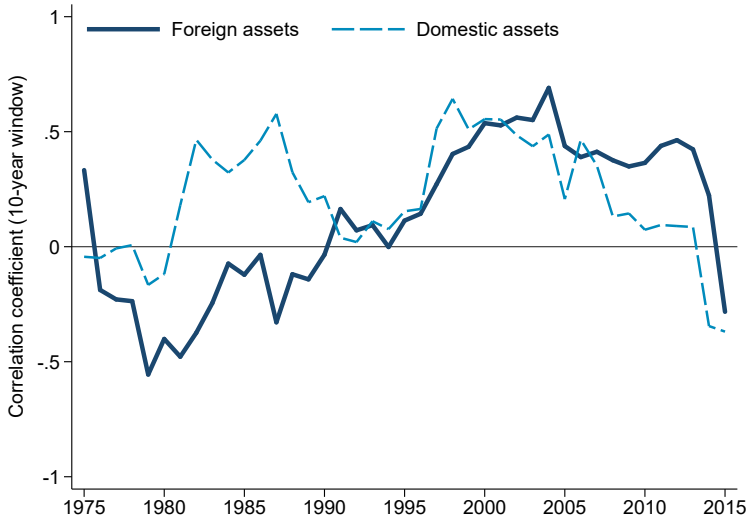
	1985-2020	1999-2020	2009-2020	2009-2018
Germany, foreign assets	0.117	0.122	-0.171	0.423
Germany, domestic assets	0.023	-0.004	-0.197	0.086
Canada	-0.002	0.001	0.053	0.495
Denmark	0.198	0.193	0.459	0.623
Finland	-0.189	0.151	0.231	0.739
France	0.067	0.131	-0.029	0.389
Italy	-0.010	0.136	-0.014	0.546
Netherlands	0.196	0.035	0.039	0.394
Norway	-0.015	-0.201	-0.457	-0.282
Spain	-0.047	0.047	0.119	0.798
Sweden	-0.072	0.182	0.000	0.778
United Kingdom	-0.066	-0.099	-0.205	-0.603
United States	0.200	0.122	0.062	0.628

Notes: This table shows that Germany's real returns on foreign assets are positively correlated with real domestic consumption growth per capita (little evidence for consumption insurance). The correlation coefficient between returns and consumption is higher for foreign assets than for domestic German assets. The coefficient is also higher than those for most other countries. Income smoothing effects are largest for the United Kingdom and Sweden that show a negative correlation coefficient. The returns and consumption growth series are deflated using each countries consumer price index. Portugal is omitted because data only starts in 1993.

the measure of risk (Breeden, Gibbons, and Litzenberger 1989). When the CCAPM holds, the expected return to an asset or portfolio is linear in its consumption beta. Therefore, a lower return on German foreign assets could be justified in terms of the CCAPM by a low consumption beta.

For this purpose, we compute the covariance between consumption growth and the investment returns discussed above. The CCAPM in equation (7) refers to spot consumption, yet empirically only period average consumption can be measured. In this study, we follow convention and choose the interpretation of consumption data as measuring consumption at the beginning of the period. Therefore, we compute consumption growth by dividing next period's consumption by current period consumption (Campbell 1999). The correlation between consumption growth and returns is calculated using the return in period t and consumption growth between period $t+1$ and t. Data on consumption growth

Figure 10: Correlation of real consumption and real return, Germany, 10 year rolling windows, 1971-2020



Notes: The correlation between Germany's returns on foreign assets and real consumption growth is positive in most years, especially since the 1990s. In recent years the correlation is higher for foreign returns compared to domestic returns. Correlation coefficients plotted at the 5^{th} year of the window. Correlation coefficient computed for consumption growth and real returns, both deflated using the German consumer price index.

is taken from the Macro History Database by Jordà et al. (2017).

Table 16 provides two crucial insights. First, the returns on German foreign assets are more strongly correlated with domestic consumption growth than a bundle of domestic German assets. In other words, they provide *less* consumption insurance than a domestic German portfolio and their low returns are not justified by the consumption insurance that the asset provides. Second, also in comparison with other countries, the correlation of the German portfolio with German consumption appears high, although in recent years they have become more similar. The key upshot is that low German returns compared to other countries are not justified by their consumption insurance properties.

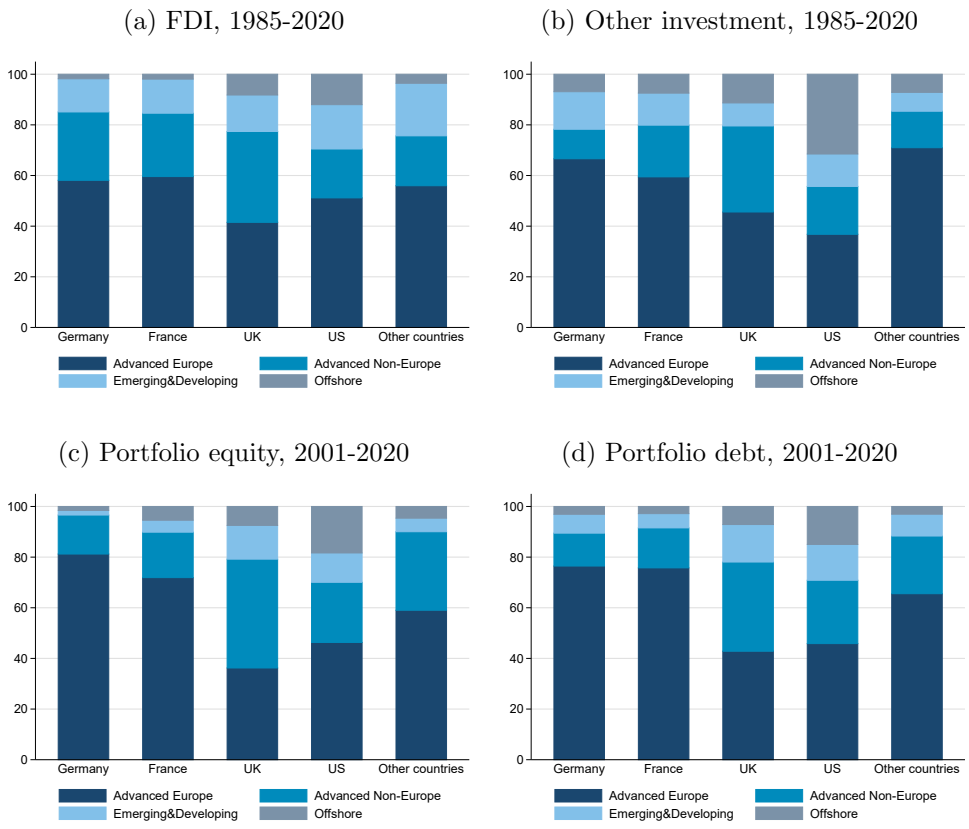
Moreover, if we take a closer look at the time path of the correlation between foreign asset returns and German domestic consumption, we find that the surge in German capital exports since the early 2000s has gone hand in hand with a loss of consumption insurance (Figure 10). The correlation of foreign returns with domestic consumption growth has increased in recent years, not decreased, at least until the very recent years. The decline of the correlation between both returns and consumption at the end of the sample is likely due

to the includes of the COVID-19 crisis in the sample. This large negative shock affected domestic and foreign returns similarly. German foreign assets do not only have low payoffs overall, they are also not helping to smooth consumption, and prior to COVID-19 these trends have become worse in the past decade of record capital exports.

6.2 A hedge against demographic risks?

Germany faces increasing demographic risk from an aging population. Investing in countries with younger populations may help to hedge this risk and facilitate inter-temporal income smoothing. However, the data show that German assets are predominantly invested in other advanced countries with aging populations, especially into other European countries, and increasingly so.

Figure 11: Geographical distribution of foreign assets by category



Notes: These graphs show that Germany's geographical allocation of foreign assets differs from that of other countries. Germany invests more in Advanced European countries and less in developing countries. Germany's bias towards European investments is especially large for portfolio holdings (Panels (c) and (d)). Offshore countries are classified following the Bundesbank's list of offshore banking centers.

It is particularly remarkable that the share of German investments to younger and more dynamic developing countries and emerging markets has decreased rather than increased, from 15-20% in the 1980s to about 10% in 2020. This drop has occurred despite the fact that developing countries such as China or India have seen record growth rates and that the emerging world now accounts for more than 50% of world GDP.[29] In other words, the "home-bias" of German investments in favor of European investments has intensified and the potential for demographic risk hedging has decreased accordingly.

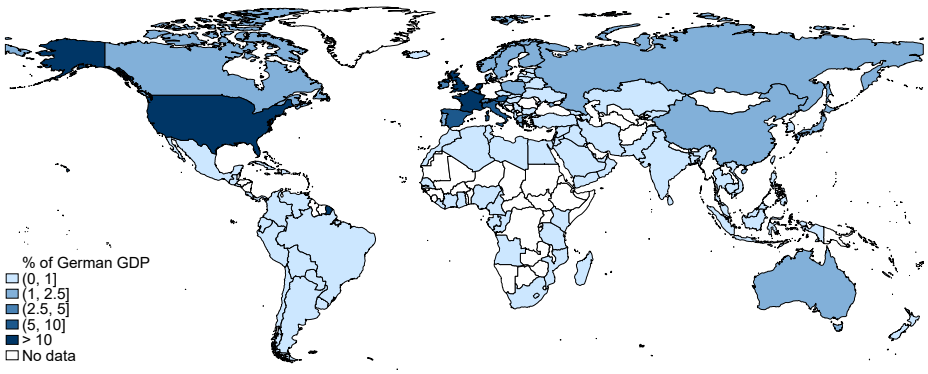
The preference for investing into aging economies is more pronounced in Germany than in other countries. This can be seen in Figure 11 which compares the geographical allocation of foreign assets. While Germany's preference for European investments is observable for all asset categories, the focus on the euro area is especially strong for portfolio equity and debt (Panels (c) and (d)). Specifically, the majority of Germany's equity assets are located in Northern euro-area countries, while the majority of debt securities were in Southern euro-area countries until recently. Now debt securities are distributed roughly equally across all member states.

Another way to explore the relevance of demography is to plot world maps. Figure 12 shows the geographic distribution of Germany's foreign assets across the world between 1985 and 2020. It is estimated as discussed in Section 2. Assets are scaled by German GDP.

The map reveals once more that Germany's foreign investments flow predominantly to Europe and other advanced countries. These are also the countries with a population structure most similar to Germany. Figure 13 shows the average share of the people aged 65 and older in total population between 1985 and 2020. It is clearly visible that the two maps overlap, as Germany has almost no investments in countries with a younger population structure. This illustrates that Germany's large stock of foreign assets does little for hedging against demographic risks.

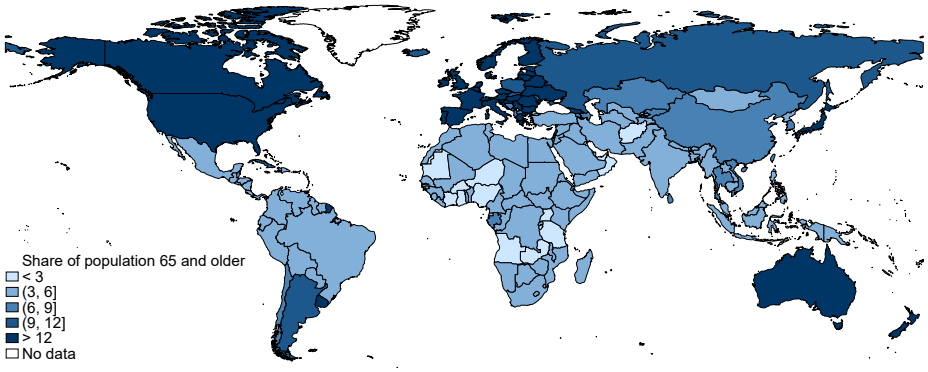
[29]Note that before 2001 no data for portfolio assets is available and that both portfolio asset types have a low exposure to emerging and developing markets. However, this does not affect the overall dynamics because the share of portfolio investment in the total position was relatively small before 2000. When assuming a 1% exposure of equity assets and a 5% exposure for debt assets (based on the averages in the early 2000s), the exposure of total assets is still 15%. For FDI exposure to emerging markets actually increased over time but this effect is outweighed by the increase in portfolio investment in the aggregate .

Figure 12: Geographical distribution of German foreign assets, 1985-2020



Notes: This map shows the geographic distribution of German foreign assets. The stock is expressed in % of German GDP held in each country and averaged between 1985 and 2020.

Figure 13: Old age population (% above 64 years), average, 1985-2020



Notes: This map shows the share of each country's population aged 65 years and older, averaged between 1985 and 2020. Data from the UN Population Division.

7 Conclusion

Germany has long been the world champion when it comes to exporting savings. In this paper, we study the financial returns on German foreign investment in international perspective. Our analysis builds on a new, comprehensive dataset on foreign returns for 13 countries that is comparable across countries. We find that the reputation of German households, firms, and banks for being bad foreign investors is mostly justified. German returns are substantially lower than those of other countries across asset classes. Moreover, foreign returns are consistently lower than domestic returns and the geographic distribution does not support the argument that the country's foreign investments hedge against demographic trends. The overwhelming share of German foreign investments is located in other industrial countries with similar demographic profiles.

We find that the underperformance of German foreign investment is particularly pronounced for equity and foreign direct investments. Indeed, we also find notably lower equity returns of German investors when using data on more than 50,000 mutual funds worldwide. The data show that German investors do poorly in timing the market, especially during equity market upswings.

Overall, the results of the paper are puzzling. Why do some countries, like Germany, perform so much worse than others when investing abroad, both in aggregate and at the level of mutual funds? Future research could shed light on this open question, including on the role of financial intermediation as well as culture or political factors that might affect global investment choices and opportunities.

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Appendix

Contents

A1 Returns on German foreign and domestic assets

In this section, we provide complementary analyses on the returns on Germany's foreign investments. First, we present long run descriptive statistic of Germany's foreign asset returns and show that these are lower than returns on domestic investments. We carry out these analyses separately for nominal and real rates of returns. Moreover, we put Germany's real returns on foreign assets in international comparison.

A1.1 Germany's foreign investment returns 1950-2020

Table A1 summarizes the German return, yield, and valuation changes since 1950. For the comparison over time it is more informative to focus on real returns (deflated by national CPI), but we also show nominal returns for the main tables and figures.

Table A1: Returns on German foreign assets, 1950-2020

	Panel (a): Real returns			Panel (b): Nominal returns		
	1950-20	1999-20	2009-20	1950-20	1999-20	2009-20
Return, all assets	1.63	2.30	2.57	3.96	3.76	3.82
Yield, all assets	1.73	1.88	1.60	4.12	3.34	2.84
Valuation changes, all assets	-2.38	-0.98	-0.23	-0.16	0.42	0.98
Return, FDI	0.04	3.87	4.75	2.55	5.36	6.03
Return, equity portfolio hold.	8.03	3.17	7.17	10.71	4.59	8.45
Return, debt portfolio hold.	5.51	3.09	3.18	8.18	4.56	4.43
Return, other inv.+ reserves	1.15	1.18	0.43	3.46	2.62	1.65

Notes: This table shows average real and nominal returns on German foreign assets. Returns are split by components and asset category. Returns estimated using Bundesbank data as discussed in Section 2.1. Real returns deflated using German consumer price index from Macro history Database and Eurostat.

The average real annual return between 1950 and 2020 was 1.63%. The yield was 1.73% while valuation changes were negative on average at -2.38%. Recall that the real return equals the sum of the real yield and real valuation changes plus some adjustment for inflation. Average real returns increased in the more recent periods to around 2% depending on the time horizon. This is mainly due to lower valuation losses, albeit they remain negative. The lower part of Table A1 reveals large differences between the asset categories.[30] Over the full sample, portfolio equity investments saw the highest returns on average, followed by portfolio debt. FDI and 'other investment' had much smaller

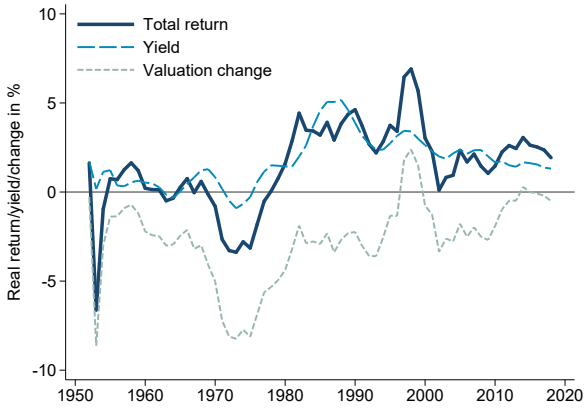
[30] As discussed in the data section, we need to combine 'other investment' and reserves when computing returns since investment income data is not available separately for those two categories.

real returns. However, since 1999 the relationships changed: equity returns fell and FDI increased so that now they are roughly similar.

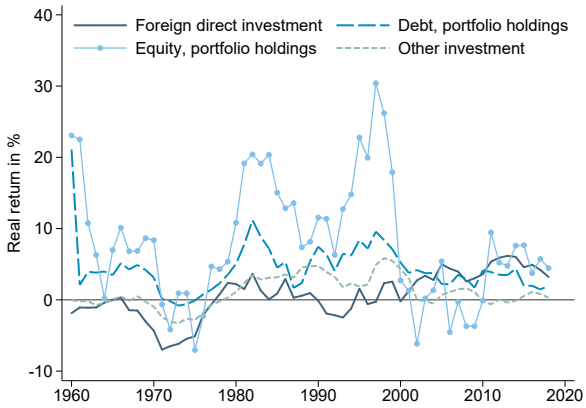
To visualize developments over time, Figure A1 plots 5-year rolling averages of our measures of returns. Panel (a) shows the real return, yield, and valuation changes on total assets. Panel (b) plots the real returns by asset category. Several observations stand out.

Figure A1: Real returns on German foreign assets, 5-year rolling means, 1950-2020

(a) Returns on all assets



(b) Returns by asset class



Notes: This graph shows real returns on German foreign assets as a rolling arithmetic mean computed over a 5-year windows and plotted at the third year of the window. Panel (a) shows returns on all assets and the decomposition into yield and valuation changes. Panel (b) shows total return series by asset category. Returns are estimated using Bundesbank data as discussed in Section 2.1. The series are deflated using the German consumer price index from the Macro History Database (Jordà et al. 2017) and Eurostat.

First, valuation changes are more volatile than yields and drive the volatility in returns (as should be expected). Average real valuation changes were almost always negative. The improvement in average returns on German foreign assets since the 1980s was driven mainly by a significant increase in the yield, i.e., the direct income earned on investments. Average real valuation changes, however, have remained in negative territory even over much of the last decades, which is surprising as global asset markets have performed exceptionally well since the 1970s.

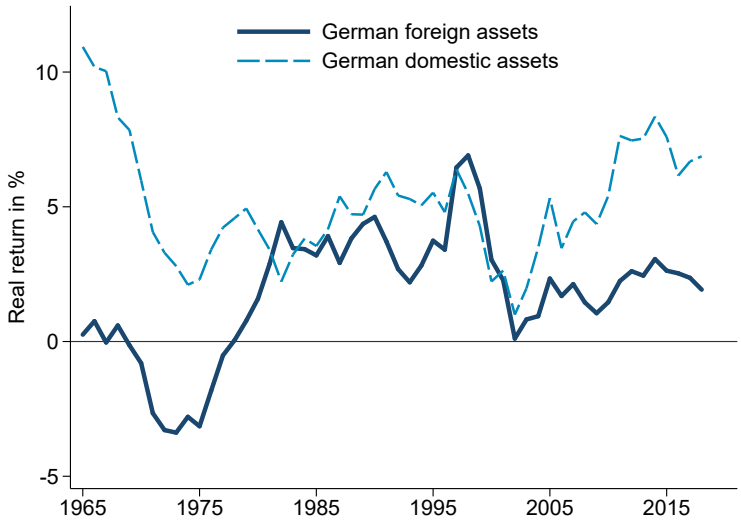
Second, the average return to IIP assets hides diversity across asset classes. The returns vary strongly across these asset categories, as shown in Panel (b) of Figure A1. Returns to foreign direct investment were low for many decades but increased in the 2000s. Portfolio investment generated larger returns than the aggregate asset position in most periods. This is mainly due to high returns on foreign equity. Finally, the 'other investment' category that, among others, includes bank loans saw returns comparable to the aggregate return.

A1.2 Comparison to domestic returns

The focus of this paper is on the international comparison of Germany's foreign asset returns. Here we also take domestic returns into account. How do Germany's external returns compare to returns on domestic capital? There are two main options to address this question. Many studies compare the return earned abroad to the return earned on domestic capital markets. Others compare it to the return earned on the other side of international balance sheet, i.e., on inward investments by foreigners. As explained above, the comparison with liability returns is not necessarily insightful regarding the quality of foreign investment. Foreign liabilities do not cover all investment opportunities available to German investors in their own country and the returns reported by foreigners can be downward biased due to tax shifting, especially in a high-tax country like Germany. For these reasons, we focus on the first option – the comparison of foreign returns with returns on the aggregate capital stock in Germany.

Despite our emphasis on domestic portfolio returns, we also compute the return on IIP liabilities in Appendix A6. In line with earlier studies, we find that the difference between asset and liability returns in Germany was negative for a long time but decreased in the past 20 years and recently turned positive. This trend is mainly driven by decreasing yields on FDI liabilities and debt liabilities. The latter is not surprising given the flight to safety compressing German bond returns after 2008. The former may be related to tax incentives leading to the increased leverage on inward FDI, which in turn leads to relatively

Figure A2: Foreign vs. domestic returns, real, 5-year rolling means, 1963-2020



Notes: This graph shows that the return on German foreign assets (dark blue line) is lower than the domestic return on German assets at home (dotted line) for most years. The series are rolling means computed over 5 year windows and shown at the third year. The return on German domestic assets is from Jordà et al. (2019) and available 1963-2020. Both series are deflated using the German CPI.

low reported yields (see Appendix A6 for a discussion).

The return on Germany's capital stock (held by both foreigners and Germans) is taken from the dataset of Jordà et al. (2019). We make use of the return to capital, which is computed as the return to a portfolio consisting of equity, housing, bonds, and bills. To compute the return to capital, the authors compute returns for all asset categories using various data sources. The returns also include both valuation changes and direct income flows.

In the case of Germany since World War II, the authors use money market rates for the bills returns, the performance index for the Bund bond market return, the German stock market index for equity, and housing returns based on the rent-price approach. Then they aggregate individual returns to arrive at an aggregate return on capital using appropriate portfolio weights. These weights are stock market capitalization for equity returns, housing wealth for housing returns, and public debt split equally between bonds and bills. Unfortunately, the return to capital series starts only in 1963.

Figure A2 plots five-year rolling averages of the foreign and domestic returns. It reveals that domestic returns were significantly higher than the return earned abroad for the

majority of the time observed. On average, the difference was more than 3 percentage points. Only in the early 1980s and in the early 2000s until the financial crisis average returns were roughly equal. Moreover, while the average domestic return computed by Jordà et al. (2019) rose significantly in the past decade, foreign returns did not increase.

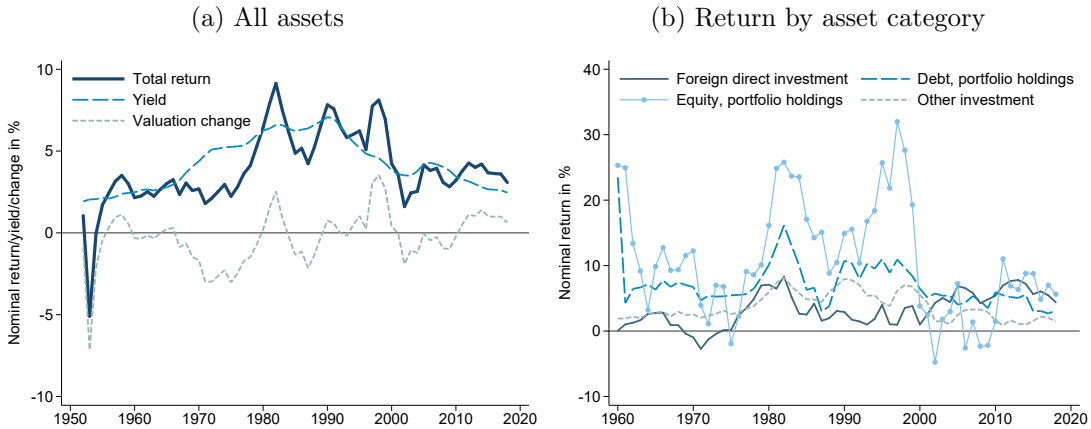
A1.3 Nominal returns on German foreign assets and domestic assets

When analyzing German returns on foreign assets and comparing them to domestic assets, we focused on real returns. Here, we also show nominal returns over time.

Figure A3 plots the nominal return, yield, and valuation changes (in Panel (a)) as well as returns by asset categories (in Panel (b)). Panel (a) confirms that Germany saw many years of valuation losses not just in real terms, as shown in the man text, but also in nominal terms. Panel (b) reveals that average nominal returns on FDI were positive but close to zero in contrast to the negative real returns before the 2000s. The other patterns in returns by category are similar for nominal and real returns.

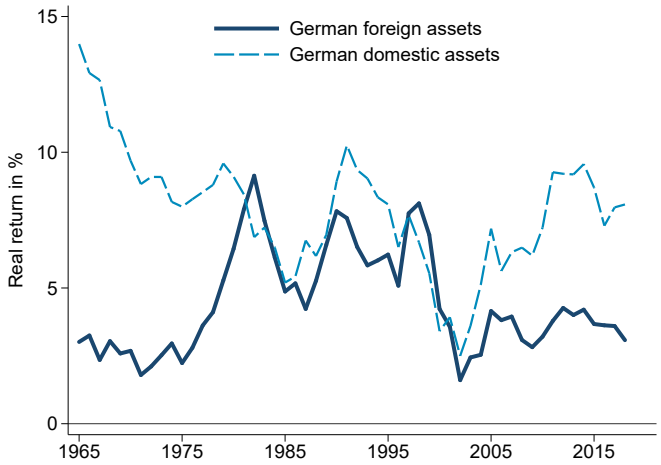
Figure A4 shows the comparison of the return on German foreign assets to the return on German domestic assets as measured by Jordà et al. (2019) for the nominal case. Compared to Figure A2 in the main text, the gap between nominal returns on foreign vs. domestic assets is larger than that with real returns in the 1960s and 1970s, mainly due to higher inflation. The overall picture, however, is similar for the real and nominal series.

Figure A3: Nominal returns on German foreign assets, 5-year rolling means, 1950-2020



Notes: Figure shows same results as Figure A1 for nominal returns. Also, in nominal terms Germany saw absolute losses in many periods. Rolling arithmetic averages computed over 5-year windows and plotted at the third year of the window. Returns estimated as discussed in Section 2.1.

Figure A4: Nominal returns in comparison, 5-year rolling means, 1975-2020



Notes: Figure shows the same comparison as Figure A2 for nominal returns. Given that both series are deflated using the same price index, the same results emerge. Rolling means computed over 5 year windows and plotted at the third year of the window. Return on foreign assets estimated as discussed in Section 2.1. Return on German domestic assets from Jordà et al. (2019).

A1.4 Real returns on other countries' foreign assets

When comparing German returns to other countries' returns in Section 4, we focus on nominal returns to abstract from different inflation dynamics across countries. Our use of nominal returns is motivated by the idea that we want to compare investment performance on the same global level playing field – before country-specific factors (such as inflation) are taken into account. Using nominal returns, Germany ranked 11$^{\text{th}}$ among the 13 countries we consider. For completeness, we now also show results for real returns.

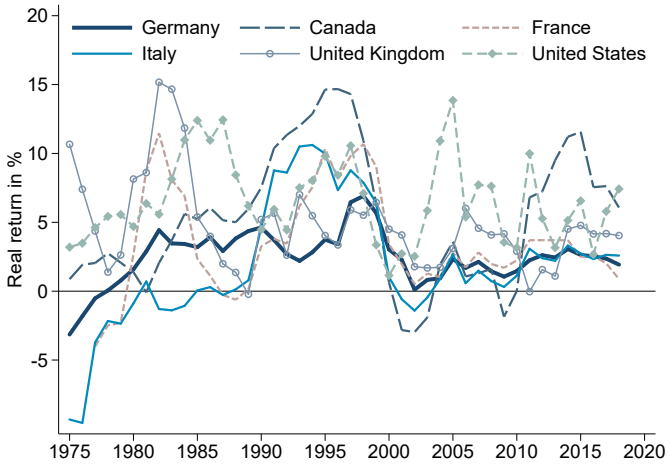
Table A2 shows that Germany ranks 9$^{\text{th}}$ when considering real returns. The higher ranking is due to countries like Italy or Spain experiencing much higher rates of inflation especially in the earlier part of the sample. Therefore, in terms of their own price level, foreign returns for Italy and Spain appear lower than Germany's real returns abroad. Figure A5 confirms that Germany compares more favorably when looking at real returns, owing to the country's relatively low domestic inflation rates.

Table A2: Real returns on foreign assets, 1975-2020

	Rank	1975-2020	1999-2020	2009-2020
Denmark	1	6.96	3.70	5.45
United States	2	6.58	5.82	7.29
Canada	3	5.41	3.75	7.61
United Kingdom	4	4.61	3.39	2.00
Sweden	5	4.59	5.06	4.44
Netherlands	6	3.81	3.14	4.49
Norway	7	3.74	4.06	5.46
France	8	3.21	2.44	2.93
Germany	9	2.55	2.30	2.57
Portugal	10	2.23	0.67	1.03
Italy	11	1.92	1.65	3.02
Spain	12	1.20	-0.08	1.65
Finland	13	0.86	3.17	3.67

Notes: This table shows the same results as Table 1 for real returns instead of nominal returns. Nominal domestic currency returns are deflated using each country's own consumer price inflation (from Macro History Database (Jordà et al. 2017) and World Bank.) Data for Denmark starts in 1981 and data for Portugal starts in 1993.

Figure A5: Real returns in comparison, 5-year rolling means, 1975-2020



Notes: This graph shows the same comparison as Figure 8 for real returns instead of nominal returns. Nominal domestic currency returns are deflated using each country's own consumer price inflation (from Macro History Database Jordà et al. 2017 and World Bank.) Also in real terms German returns are low compared to the other G7 members (excluding Japan due to data availability). Rolling means computed over 5 year windows and plotted at the third year of the window. For more details see Section 2.

A2 Comparison to earlier work on German foreign returns

A2.1 Overview of the literature

Several earlier studies have computed returns on German foreign assets. In this appendix, we provide an overview of this work and compare the results to ours.

The overall take away is that all studies, including ours, use similar data sources and methodology. Moreover, all earlier papers use a more limited time sample compared to our study and no previous paper conducts decomposition exercises or international comparisons as we do. Most existing papers also focus on the return differential, i.e., the difference between the return on assets and liabilities.

Table A3: Results of other studies and comparison with our results

Authors	Data	Other valuation changes included?	Return measures and sample used	Results	Our results with same sample
Lane and Milesi-Ferretti (2007a)	External Wealth of Nations for assets, BOP	Yes	Real return on assets, 1995-2000	5.4%	6.1%
Habib (2010)	BOP and IIP before most recent revision in data	Yes	Real return differential, 1981-2007	-1.07	-1.04
Bundesbank (2014), Frey et al. (2014)[1]	BOP and IIP before most recent revision in data	No	Nominal return on assets, 2005-2013	4.0%	3.8%
Baldi and Bremer (2015) (DIW Berlin)	BOP and IIP before most recent revision in data	Yes	Nominal return differential, 1993-2012	-1.5	-0.5
Bundesbank (2018)	BOP and IIP based on BPM6	No	Nominal return on assets, 2008-2017	3.7%	3.2%
Fiedler, Görg, Hornok, Jannsen, Kooths, Marchal, and Potjagailo (IfW Kiel)	BOP and IIP based on BPM6	No	Nominal return on assets, 2005-2016	3.9%	3.9%

Notes: This table provides an overview of studies that have produced estimates of Germany's return on foreign assets. It describes the data and methodology used, and compares the other authors' results to our results. One reason for differing results is the treatment of "Other valuation changes" as discussed in the following Appendix A2.2.

[1] Frey et al. (2014) is a more extensive version of Bundesbank (2014).

Table A3 provides a concise summary of earlier estimates. For transparency, we compare the result of each study to our own using the exact same sample and variables used in the respective earlier study.

The table reveals that our results are very similar overall. There are two main reasons for any remaining discrepancies. The first is differences in the data, since we use the most updated and cleaned series provided by the Bundesbank. Papers published before 2015 use data based on the old balance of payments manual, meaning prior to the many revisions that came with the introduction of the new manual (BPM6). The second reason is the treatment of valuation changes due to other adjustments. In particular, the more recent studies (like Bundesbank 2018) exclude these changes, while we include them, since there is no strong argument not to do so and since we lack a data breakdown to exclude these changes before 2005. We discuss the impact of this choice in more detail in the following section and conclude that the inclusion or exclusion of "other valuation changes" does not affect the overall results much, especially not for our international comparisons.

A2.2 Treatment of "other" valuation changes

As discussed in Section 2.1, one challenge in the computation of foreign returns concerns the treatment of valuation changes due to other adjustments, meaning residual valuation changes, which can neither be attributed to exchange rate nor price movements. There are basically two options. First, one can simply exclude all residual valuation changes (see e.g., Bundesbank 2014, 2018; Frey et al. 2014). Second, one can include all or parts of these changes. Lane and Milesi-Ferretti (2009), for example, suggest including valuation changes due to other adjustments for FDI but not for portfolio investment. For 'other investment', in turn, they suggest adding it to the initial asset position.

Unfortunately, in countries other than the US data availability prevents us from adopting either approach over a sufficiently long time span. Most countries publish data on valuation changes due to other adjustments only in recent years, were stock-flow discrepancies could be less severe compared to historic episodes due to improvements in data collection. To alleviate this concern, we carry out a robustness exercise using only the measurable capital income (e.g. dividends and interest payments) and valuation changes due to exchange rate movements (based on Bénétrix et al. (2015)) to compute returns.

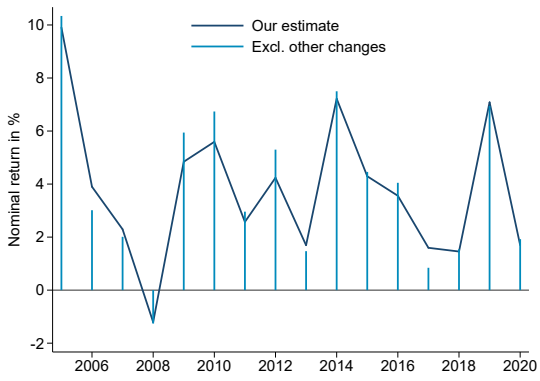
$$r^A_{IIVX,t} = \frac{II^A_t}{IIP^A_{t-1}} + \frac{VX^A_t}{IIP^A_{t-1}}$$

In other words, we exclude both valuation changes due to price and other valuation changes, as they can not be separated in our data. This ensures that other adjustments do not bias our returns and permits more plausible cross-country comparisons. Further, the decomposition allows us to separately compare returns based on valuation changes due to prices and other adjustments, as the difference between our original and the newly constructed returns, i.e. $r_t^A - r_{IIVX,t}^A$. Below, we illustrate that our results are robust to using these conservative returns.

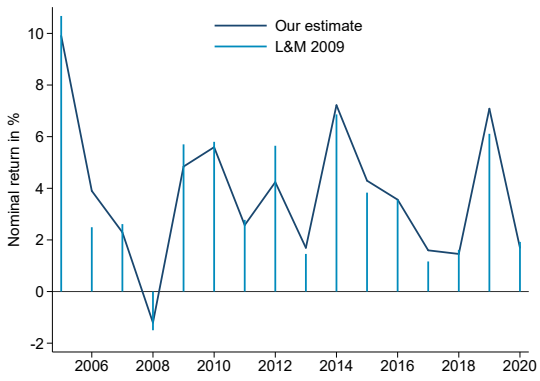
Since the Bundesbank does not provide a data breakdown for the period before 2005, we generally include valuation changes due to other adjustments in our baseline results for Germany and other countries alike but directly adjust for known statistical breaks and discrepancies (see Section 2). We choose this option because the valuation changes due to other adjustments only pose a problem as far as they are due to statistical issues instead of actual changes in the position. However, we now check what impact the complete or partial exclusion would have on our results. Specifically, using Bundesbank data on the split of valuation changes after 2005, we can illustrate the effect of including or partly including these other changes compared to other methods.

Figure A6: Robustness of estimated nominal returns, 2005-2020

(a) Excluding other changes

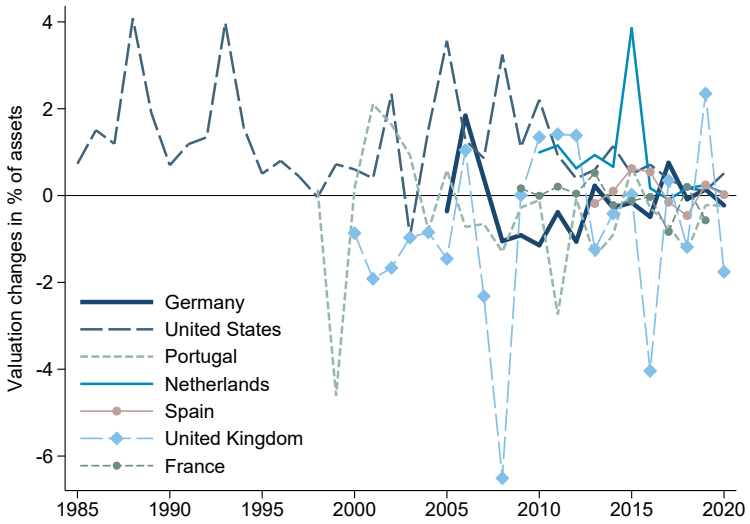


(b) Lane and Milesi-Ferretti (2009)



Panel (a) of Figure A6 shows that excluding valuation changes due to other adjustments for the period after 2005 does not make much of a difference when appropriately adjusting for known issues. The size of the change depends on the time period covered. In the pre-crisis years 2005-2007, for example, you get *lower* German returns if you exclude 'other adjustments', while the returns are *higher* in the crisis years 2008-2010 without those changes. Panel (b) of Figure A6 follows the recommendation of Lane and Milesi-Ferretti

Figure A7: Valuation changes due to other adjustments, 1985-2020



Notes: This graph shows valuation changes due to "other changes" for Germany and other countries. Data retrieved from the statistical institutions responsible for the IIP (Bundesbank (DE), Bureau of Economic Analysis (US), Banco de Portugal (PT), Dutch Central Bank (NL), Banco de Espana (ES), Office of National Statistics (UK), Banque de France (FR)). For the US, we additionally use data from Gohrband and Howell (2015) and Lane and Milesi-Ferretti (2009). The UK estimate includes financial derivatives.

(2009) of excluding 'other adjustments' only for some asset categories. The takeaway is the same. In some years, the estimates are higher, while in others, they are lower. In aggregate, for all years for which there is comparison data (2005-2020), Germany's nominal returns are 0.19 percentage points lower when excluding other valuation changes (3.99% with valuation changes due to other adjustments versus 3.80% without).

Does the choice make a difference for the international comparisons? To assess this, we retrieved data on valuation changes due to other adjustments for several countries and check how much their exclusion affects the results in comparison to Germany.

Figure A7 illustrates the impact of valuation changes due to other adjustments in percent of assets since 1985 for Germany, the US, the UK, the Netherlands, Portugal, Spain and France. Except for the United States, where figures can be constructed going back to 1985, data are only available for the most recent period. The Bundesbank reports on valuation changes due to other adjustments starting in 2005. On average, German valuation changes were slightly below zero, at -0.18%. The averages for the US and the Netherlands are positive while the averages for the United Kingdom and Portugal is negative. The

Table A4: Test for zero mean of VOT_t^A

Sample	Mean	T-Stat.	P-value	N
Non-US	-0.18	-0.62	0.54	98
US	1.24	5.74	0.00	38
US post-2005	1.11	4.28	0.00	16

Notes: This table shows descriptive statistics of the VOT_t^A term and the results of a t-test. We report results separately for the United States and the remaining countries. T-Stat. and P-value denote the test statistic and p-value of the t-test with a null hypothesis of zero mean.

Spanish and French averages over the short time span available are roughly equal to zero.

Table A4 confirms the visual differences between the US and the remaining countries. The average valuation change due to other adjustment was -0.18% for the non-US sample, compared to 1.24% for the United States (1.11% in the years after 2005). The result of a simple t-test confirms that valuation changes statistically differ from zero only in the US, even in the recent period after 2005. To ensure that systematic discrepancies in the US do not affect our results, we perform a robustness check excluding the country below.

Next, we use the available data on valuation changes due to other adjustments to estimate 95% confidence bands for our computed returns. Specifically, we compute $\overline{r_i^A} - \overline{VOT_{it}^A} \pm 2 \times SE(VOT_{it}^A)$, where $\overline{VOT_{it}^A}$ and $SE(VOT_{it}^A)$ denote the mean and standard error of the other valuation change distribution, and $\overline{r_i^A}$ is the average nominal return of country i over the sample period. We estimate confidence bands separately for the US and the remaining countries. Furthermore, we compute returns excluding other valuation changes, where the data is available as $\hat{r_{it}^A} = r_{it}^A - VOT_{it}^A$.

In the United States, stock-flow discrepancies arise in large part due to challenges in measuring direct investment positions in official statistics (see e.g., Curcuru et al. 2013). Zucman (2013) argues this issue also applies to other advanced economies due to unrecorded flows to tax havens. To ensure that potentially mismeasured FDI positions do not drive our result, we also report returns excluding FDI.

Further, we adopt two alternative approaches to compute returns from the previous literature. The first is in the spirit of Curcuru et al. (2009), and allocates half of the financial account to the investment position in year $t-1$. The second uses the average investment position in year t and $t-1$ following Gohrband and Howell (2015) to limit the influence of potentially misreported positions between two periods.

Table A5 reports the various estimations for each country, ranked based on our main

estimates in column 2. The 95% confidence bands for the rates of return do not overlap for 11th place Germany and Netherlands (9th). Germany ranks 9th out of 13 countries when computing returns using only investment income and valuation changes due to exchange rates (column 5). The average return of 4.21% is slightly lower than our main estimate of 4.89%. Taking the residual return component due to prices and other changes, Germany also ranks in 11th place (column 6). When excluding foreign direct investment, we find that Germany's returns only exceed Finland's and Denmark's. Finally, Germany ranks 11th among the countries in our sample when computing returns based on Curcuru et al. (2009) and Gohrband and Howell (2015), respectively.

We also replicate the dummy regression in Table A6, starting with the baseline specification. Reassuringly the Germany dummy remains negative and statistically significant at the 5% confidence level across specifications. Even when considering returns only based on investment income and valuation changes due to foreign exchange rates, German investors underperform the returns of their international peers by almost 1% per year.

Table A5: Robust returns on foreign assets, 1975 to 2020

	(1) Rank	(2) 1975-2020	(3) Confidence Interval	(4) No VOT	(5) II, VX	(6) VP, VOT	(7) No FDI	(8) CTW	(9) GH
United States	1	10.48	(8.80 , 9.68)	7.33	4.33	5.09	5.69	10.09	7.16
Denmark	2	9.94	(9.54 , 10.70)	.	7.06	1.93	3.20	9.46	7.85
United Kingdom	3	9.79	(9.31 , 10.37)	6.20	5.43	1.29	8.08	9.41	6.92
Canada	4	9.25	(8.49 , 9.65)	.	4.52	4.60	5.58	8.91	6.06
Sweden	5	8.76	(8.00 , 9.16)	.	6.18	1.65	5.77	8.32	6.45
Norway	6	8.02	(7.26 , 8.42)	.	4.69	3.44	7.41	7.62	5.95
Italy	7	7.65	(6.89 , 8.05)	.	3.33	2.92	5.84	7.19	5.17
Spain	8	7.43	(6.67 , 7.83)	2.75	2.79	-1.21	6.56	7.05	4.91
France	9	7.06	(6.20 , 7.46)	4.32	3.31	2.25	5.06	6.80	4.93
Netherlands	10	6.63	(5.87 , 7.03)	5.35	4.40	0.98	4.17	6.33	5.88
Germany	11	4.89	(4.13 , 5.29)	3.97	4.21	0.68	4.09	4.66	4.74
Finland	12	4.73	(3.97 , 5.13)	4.36	4.22	0.29	4.10	4.45	4.48
Portugal	13	4.59	(3.83 , 4.99)	2.70	2.97	1.03	3.94	4.26	3.60

Notes: This table shows average, nominal returns on foreign assets for various return computations. Countries are ranked by their average return. It highlights that Germany ranks towards the bottom of countries irrespective of what returns are used. Columns 1-2 cover our baseline estimates. In column 3, we report 95% confidence bands, separately constructed from the available data on valuation changes due to other adjustments for the US and remaining countries, as $CI_i^A = \overline{r_{it}^A} - \overline{VOT_{it}^A} \pm 2 \times SE(VOT_{it}^A)$. Column 4 ("No VOT") adjusts returns by substracting VOT_{it}^A, where data are available from 2005. Returns that only use capital income and valuation changes due to exchange rates ("II, VX") are reported in column 5, column 6 uses the residual return component due to prices and other adjustments ("VP, VOT"), constructed as $r_t^A - r_{IIVX,t}^A$. Column 7 excludes foreign direct investment ("No FDI") to compute returns. In column 8, we adopt the alternative approach of Curcuru et al. (2009) ("CTW") to use $\frac{VC_t^A}{IIP_{t-1}^A + FA_t^A/2}$. Column 9 follows Gohrband and Howell (2015) ("GH") by using $\frac{VC_t^A}{(IIP_t^A + IIP_{t-1}^A)/2}$ instead of $\frac{VC_t^A}{IIP_{t-1}^A}$, to limit the influence of mismeasured positions. Data for Denmark and Portugal starts in 1999 and 1993, respectively. In column 5 data for Denmark starts in 1992 and for Portugal in 1996 while in column 6 data for Denmark starts in 1999. No data is available for Japan.

Table A6: Determinants of returns on foreign assets (all assets), robustness 1985-2020

	Baseline (all assets)	Robustness					
	(1) Baseline	(2) No US	(3) II, VX	(4) VP, VOT	(5) Excl. FDI	(6) CTW	(7) GH
Germany dummy	-2.32***	-2.14***	-0.85**	-1.59***	-1.02**	-2.24***	-0.92***
	(0.58)	(0.57)	(0.40)	(0.56)	(0.46)	(0.56)	(0.20)
Constant	4.31*	2.85	2.21	2.49**	3.27**	4.18*	6.31***
	(2.25)	(1.90)	(2.49)	(1.23)	(1.42)	(2.21)	(0.76)
Observations	459	423	424	423	444	459	459
Adjusted R^2	0.37	0.41	0.17	0.39	0.41	0.36	0.39
No. countries	13	12	13	13	13	13	13
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table shows that German returns on foreign assets are significantly lower than the foreign returns of other advanced economies. This is true irrespective of what returns are used. The dependent variable is the nominal rate of return on total foreign assets by country and year. All regressions include control variables for net foreign assets and the financial account balance (coefficients not shown). Column 1 reports our baseline estimation. Column 2 excludes the US ("No US"), where valuation changes due to other adjustments are more likely to lead to mismeasurement, from the sample. Estimates based on returns that only use capital income and valuation changes due to exchange rates ("II, VX") are reported in column 3, column 4 uses the residual return component due to prices and other adjustments ("VP, VOT"), constructed as $r^A_t - r^A_{IIVX,t}$. Column 5 excludes foreign direct investment to compute returns ("No FDI"). In column 6, we adopt the alternative approach of Curcuru et al. (2009) ("CTW") to use $\frac{VC^A_t}{IIP^A_{t-1}+FA^A_t/2}$. Column 7 follows Gohrband and Howell (2015) ("GH") by using $\frac{VC^A_t}{(IIP^A_t+IIP^A_{t-1})/2}$ instead of $\frac{VC^A_t}{IIP^A_{t-1}}$, to limit the influence of mismeasured positions. Data for Denmark and Portugal starts in 1981 and 1993, respectively. In column 3 data for Denmark starts in 1992 and for Portugal in 1996 while in column 4 data for Denmark starts in 1999. No data for Japan available. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A3 Data sources and data quality

A3.1 Data coverage and sources

This appendix lists the data sources used for (i) estimating returns across countries (Table A7), to compute (ii) valuation changes due to exchange rates (Table A8), as well as on (iii) the geographical distribution of assets (Table A9). The tables also provide information on data availability and country specific data issues. Finally, Table A10 shows how our country groups are defined.

Table A7: Data sources for return computation of other countries

Country	Coverage	IIP sources	Notes
Canada	1970–2020	EWN until 1989; IMF	
Denmark	1981–2020	IMF	Data on asset class only available from 1999 on. Earlier data available but with gaps.
Finland	1975–2020	EWN until 1989; IMF	
France	1975–2020	EWN until 1993; IMF	PF not part of return before 1988 (no capital income data); capital income on PF debt in 1993 reported in Franc instead of Euro; jumps due to category changes in FDI in 1999 removed from change in assets.
Italy	1972–2020	EWN until 2003; IMF	FDI and PF not part of return before 1980 (no capital income data).
Netherlands	1970–2020	EWN until 1981; IMF	No PF assets data in EWN. No return in 2003 due to break in data.
Norway	1975–2020	EWN until 2006; IMF	PF not part of return before 1992 (no capital income data).
Portugal	1993–2020	EWN until 1995; IMF	Earlier data available but with gaps.
Spain	1975–2020	EWN until 2000; IMF	PF not part of return before 1990 (no capital income data).
Sweden	1970–2020	EWN until 1981; IMF	PF not part of return before 1997 (no capital income data).
United Kingdom	1970–2020	EWN until 1981; IMF	PF not part of return before 1984 (no capital income data).
United States	1970–2020	EWN until 1981; IMF	PF not part of return before 1986 (no capital income data).

Notes: EWN = External Wealth of Nations database by Lane and Milesi-Ferretti (2007b).

Table A8: Data sources on the currency composition of assets

Country	OECD FDI	CPIS (currency[1])	LBS	Reserves
Canada	1985–2019	2014–2020	1977–2020	1999–2020, Bank of Canada, USD
Denmark	1991–2019	2001–2020	1977–2020	2005–2020, Danmarks Nationalbank
Germany	1985–2019	2007–2020	1977–2020	1949–2020, Bundesbank, only USD until 1999
Finland	1992–2012, 2016–2019	2013–2020	1983–2020	2002–2020, Bank of Finland
France	1987–2019	2001–2020	2007–2020	2001–2020, IMF, (based on Banque de France reports assume all in USD)
Italy	1985–2019	2001–2020	2011–2020	2005–2020, Banca d'Italia
Netherlands	1985–2019	2009–2020	2014–2020	1997–2020, Dutch central bank
Norway	1988–2019	only countries	2014–2020	1997–2020, Norges Bank
Portugal	1995–2019	2001–2020	2009–2020	2001–2017, Banco de Portugal (2011–2017 data, 2001–2010 assume 90% of reserves is in USD)
Spain	2000–2019	2007–2020	2014–2020	1999–2020, Banco de Espana
Sweden	1986–2019	2003–2014	1977–2020	1999–2020, Swedish Riksbank
United Kingdom	1987–2019	only countries	1977–2017[2]	1997–2020, Bank of England
United States	1985–2019	2003–2020	1998–2020	1999–2020, except 2001, US Department of the Treasury (US International Reserve Position report)

Notes: CPIS = Coordinated Portfolio Investment Survey LBS = Locational Banking Statistics.
[1] Country breakdown always available starting in 2001.
[2] Data for 1982 is missing.

Table A9: Data sources on the geographical distribution of assets

Country	OECD FDI	CPIS	LBS
Canada	1985–2019	2001–2020	2007–2020
Denmark	1991,1994,1998,1999–2019	2001–2020	1977–2020
Germany	1985–2019	2001–2020	1977–2020
Finland	1992–2012, 2016–2019	2001–2020	1983–2020
France	1987–2019	2001–2020	1977–2020
Italy	1985–2019	2001–2020	2014–2020
Netherlands	1985–2019	2001–2020	1977–2020
Norway	1988–2019	2001–2020	no data
Portugal	1995–2019, 2006 missing	2001–2020	no data
Spain	2003–2019	2001–2020	2014–2020
Sweden	1986–2019	2001–2020	1977–2020
United Kingdom	1987–2019	2001–2020	1977–2020, 1982 missing
United States	1985–2019	2001–2020	1977–2020

Notes: CPIS = Coordinated Portfolio Investment Survey, LBS = Locational Banking Statistics.

Table A10: Country groups used for geographical distribution

Group	Countries			
Advanced Europe	Austria	Belgium	Cyprus	Czech Rep.
	Denmark	Estonia	Finland	France
	Germany	Greece	Iceland	Ireland
	Italy	Latvia	Lithuania	Luxembourg
	Malta	Netherlands	Norway	Portugal
	San Marino	Slovak Rep.	Slovenia	Spain
	Sweden	Switzerland	United Kingdom	
Advanced Non-Europe	Australia	Canada	Japan	New Zealand
	Rep. of Korea	Macao	Taiwan	United States
Offshore	Antigua and Barbuda	Bahrain	Barbados	Belize
	Dominica	Grenada	Hong Kong	Lebanon
	Liberia	Marshall Isl.	Mauritius	Panama
	Philippines	Samoa	Seychelles	Singapore
	St. Kitts and Nevis	St. Lucia	The Bahamas	Vanuatu
	St. Vincent and the Grenadines			
Emerging&Developing	Remaining countries			

Notes: Choice of offshore countries based on Bundesbank list of offshore banking centers.

A3.2 Results when using IMF and EWN data only

In our main analysis we employ Bundesbank data for Germany and use EWN and IMF data for the remaining advanced economies. For Germany, we cleaned Bundesbank data while for the other countries we mostly use EWN and IMF data. To alleviate concerns that differences in data sources and quality are the driver of our results, we reproduce the headline results, based on equation (1)) using IMF and EWN data for all countries, including Germany. The estimates remain almost identical, as shown in Table A11. The German dummy remains of similar size and statistical significance across specifications and for different sample periods. This provides reassurance that differences in data sources are not driving our results.

Table A11: Returns on foreign assets using IMF and EWN data, 1950-2020

	Baseline (all assets)				Excluding Target2	
	(1) 1985-2020	(2) 1985-1998	(3) 1999-2020	(4) 2009-2020	(5) 1999-2020	(6) 2009-2020
Germany dummy	-2.43***	-3.11**	-1.47***	-1.91***	-1.30**	-1.55**
	(0.56)	(1.32)	(0.51)	(0.62)	(0.50)	(0.62)
Constant	4.15*	3.99*	14.33***	7.36***	14.35***	7.35***
	(2.25)	(2.18)	(1.24)	(1.78)	(1.24)	(1.78)
Observations	459	174	285	156	285	156
Adjusted R^2	0.38	0.25	0.42	0.27	0.42	0.27
No. countries	13	13	13	13	13	13
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table replicates our main results but replaces the German Bundesbank data series with data on Germany using IMF data. Thus, for this exercise, we only use IMF and EWN data. The dependent variable is the nominal rate of return on total foreign assets by country and year. The regressions include control variables for net foreign assets and the financial account balance (coefficients not shown). Data for Denmark and Portugal starts in 1981 and 1993, respectively. No data for Japan available. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A4 The role of exchange rates

This appendix lays out our estimation procedure for valuation changes due to exchange rates. Based on these estimates, we assess the importance of exchange rates and show that they do not explain the observed differences in returns between Germany and other countries. Furthermore, we benchmark our estimates of valuation changes due to exchange rates with official data for several countries and find few discrepancies.

A4.1 Estimation of valuation changes due to exchange rates

To understand the role of exchange rates in driving low German returns, we need information on the valuation changes due to exchanges rates. The newest edition of the BPM requires countries to publish a decomposition of valuation changes into the three components exchange rates, prices and other adjustments. However, most countries either publish this breakdown only for recent years or have not started publishing it yet. Therefore, we estimate the valuation changes due to exchange rates ourselves.

In order to do this, we modify the approach of Lane and Shambaugh (2010) and Bénétrix et al. (2015). These authors show that data on the currency composition of assets is sufficient to estimate valuation changes due to exchange rate movements. To see this, first note that valuation changes due to exchange rates are the changes in the valuation of all foreign currency assets valued in the domestic currency neither due to transaction nor due to price or other changes:

$$VX_t^A = \sum_c \left(IIP_t^{A,c} E_t^c - IIP_{t-1}^{A,c} E_{t-1}^c - FA_t^{A,c} \bar{E}_t^c - (VP_t^{A,c} + VOT_t^{A,c}) \bar{E}_t^c \right), \qquad (1)$$

where the superscript c indicates a variable, which is expressed in a different currency than the German one. E_t^c and $\bar{E}_t^c$ are the end of period and average exchange rates in year t between the Euro or DM and currency c, respectively. Here, we follow the recommendation of the IMF's balance of payments manual and use average exchange rates to value transactions and valuation changes due to a lack of data on the timing of the two. Finally, note that the last part of the expression in equation (1) equals all changes in the value of the foreign currency assets not due to transactions when valued in the respective currency since there can be no valuation effects within the same currency, i.e.,

$$VP_t^{A,c} + VOT_t^{A,c} = IIP_t^{A,c} - IIP_{t-1}^{A,c} - FA_t^{A,c}.$$

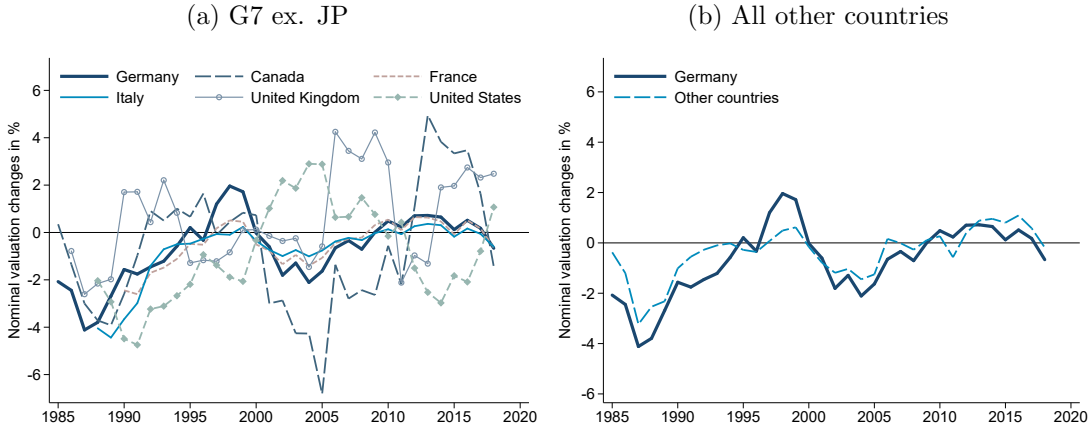
Plugging this expression into equation (1) yields the following simple expression for VX_t^A after some manipulation:

$$VX_t^A = \sum_c \left(IIP_t^{A,c} E_t^c - IIP_{t-1}^{A,c} E_{t-1}^c - (IIP_t^{A,c} - IIP_{t-1}^{A,c}) \bar{E}_t^c \right).$$

Now we only need data on the currency composition of assets. As discussed in Section 2.4, this is not available directly from the countries. However, we are able to use other data sources to estimate currency shares. Despite the several approximations involved in the estimation procedure, our estimates are very close to the ones published by the Bundesbank for Germany as well as those published by other countries' statistical institutions (see Appendix A4).

Panel (a) of Figure A8 shows that German valuation changes due to exchange rates did not differ significantly from that of other countries. All countries experience both gains and losses due to exchange rates.[31]

Figure A8: Valuation changes due to exchange rates, 1985-2020, rolling 5 year means



Notes: Graphs show that Germany's valuation changes due to exchange rates are not significantly different from those of other countries. The lines represent rolling means computed over 5 year windows across countries and plotted at the third year of the window. Valuation changes computed using estimated currency shares from additional data sources, see Appendix A3. "Other countries" in Panel (b) refers to CA, DK, ES, FI, FR, GB, IT, NL, NO, PT, SE and US.

Before the introduction of the Euro, exchange rate effects tended to be relevant in

[31]The observation of negative valuation changes due to exchange rates raises a more fundamental point about international adjustment. The intertemporal approach to the current account implies that valuation changes matter for the external solvency constraint and via this constraint may be a potential channel for external adjustment (Gourinchas and Rey 2007b, 2014).

Germany, with valuation effects being among the larger ones within the G7 group. In the period since then, German valuation changes due to exchange rates were rather average. We can also compare Germany to the average of all other 12 countries (as included in the regression in the previous section). Panel (b) of Figure A8 confirms that German valuation changes do not stand out relative to these other countries. In sum, exchange rate effects do not help explain the observed differences in returns between Germany and other countries.

A4.2 Comparisons with other data sources

In this section, we compare our estimates of valuation changes due to exchange rate movements (as discussed in Section 2.1) with official data for several countries. In addition, we also contrast our estimates to an alternative set of estimates that is based on the currency composition data provided for total assets (not asset categories) by Bénétrix et al. (2015). The comparisons focus on the period after 2002 when the CIPS portfolio data become available, so that all asset classes can be included. The main take away from this exercise is that the estimates are similar across sources.

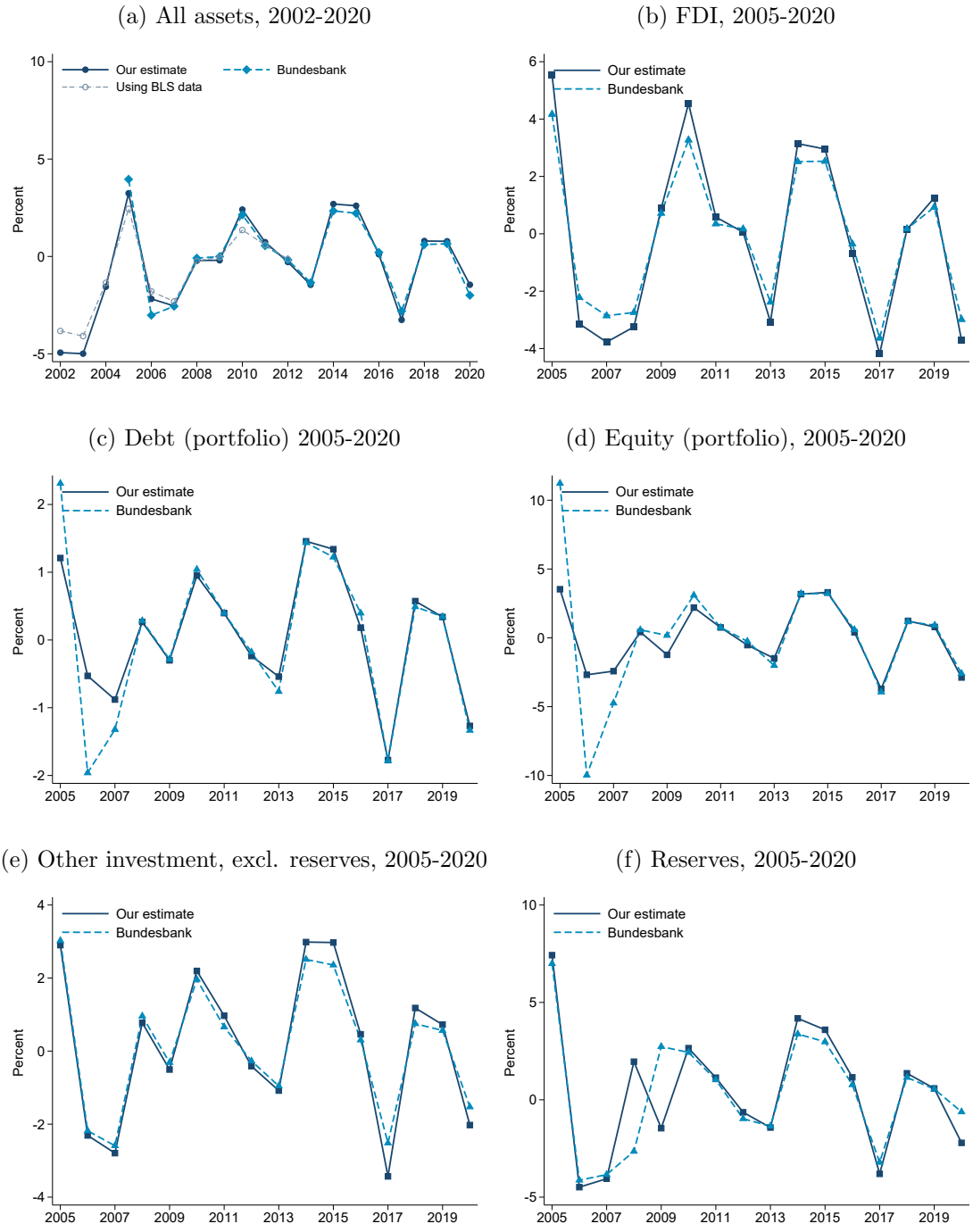
A4.2.1 Germany

Figure A9 shows the comparison of valuation changes due to exchange rates for all asset classes for Germany. As explained, our aggregate comparison starts in 2002 (Panel (a)). Panels ((b)-(f)) start in 2005, which is when Bundesbank estimates by asset class become available. Overall the results are very similar, except for the reserves category in 2008 and 2009. This result suggests that the publicly available data on the currency composition of reserves is not complete or that the Bundesbank uses detailed non-public data, which allows for much more precise estimate. In any case, reserves only make up a small part of total assets, so the effect of this mismatch is not large.

A4.2.2 Netherlands

The Dutch Central Bank (DNB) publishes a breakdown of valuation changes starting in 2010. Panel (a) of Figure A10 shows that also for the Netherlands our approach delivers fairly similar estimates despite the lack of CPIS currency data before 2009 and the lack of any LBS data before 2014.

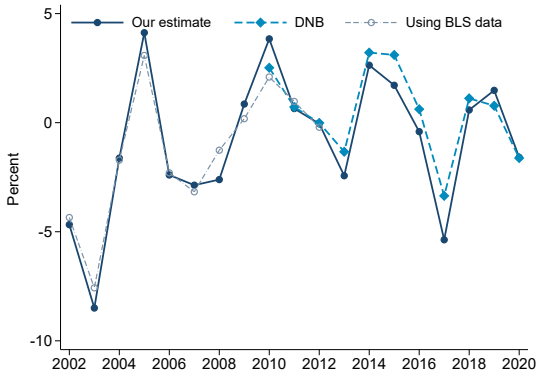
Figure A9: Germany: valuation changes due to exchange rates, result comparison



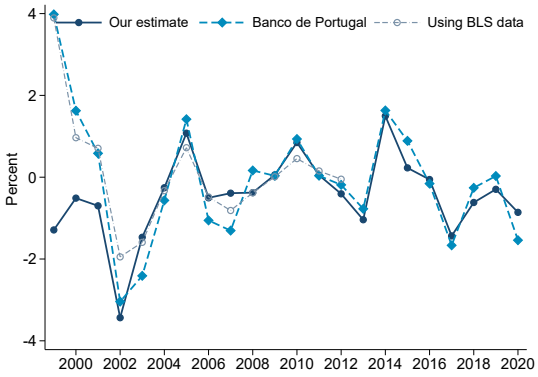
Notes: This graph compares our estimates of valuation changes due to exchange rates to those published by the Bundesbank. We find few discrepancies. The estimates using the aggregate data on total assets from Bénétrix et al. (2015) are also fairly similar. BLS refers to Bénétrix et al. (2015).

Figure A10: Other countries: valuation changes due to exchange rates, result comparison

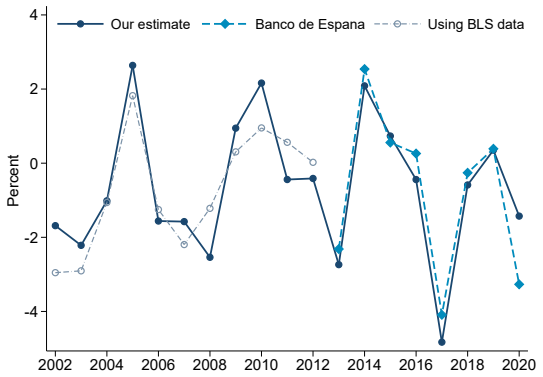
(a) Netherlands, all assets, 2002-2020



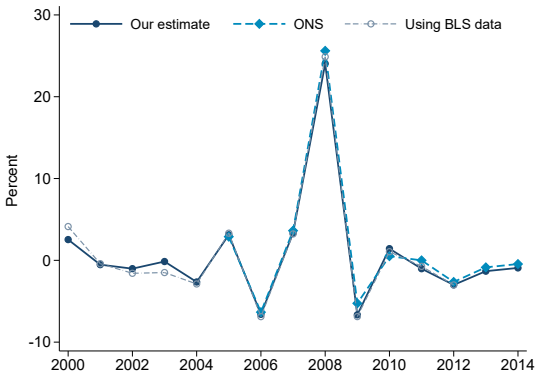
(b) Portugal, all assets, 1999-2020



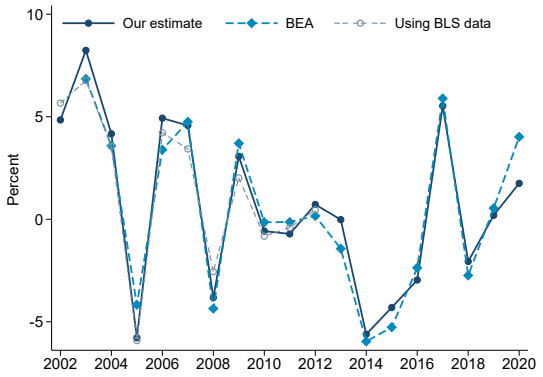
(c) Spain, all assets, 2002-2020



(d) United Kingdom, all assets, 2000-2014



(e) United States, all assets, 2002-2020



Notes: This graph compares our estimates of valuation changes due to exchange rates to the official estimates published by the respective central bank or related country authority. We conduct this comparison for all countries for which this data breakdown is made publicly available. Overall, we find few discrepancies. The estimates using data from Bénétrix et al. (2015) also produces similar results for aggregate assets. BLS refers to Bénétrix et al. (2015). DNB=Dutch Central Bank, ONS=Office of National Statistics, and BEA=Bureau of Economic Analysis.

A4.2.3 Portugal

The Banco de Portugal publishes a breakdown of valuation changes since 1999. Panel (b) of Figure A10 shows that our approach delivers fairly similar estimates despite the lack of any LBS data before 2009. However, in the first three years when no CPIS data is available the estimates differ substantially since our aggregate measure includes only FDI in this period.

A4.2.4 Spain

The Spanish Banco de Espana (BdE) publishes time series starting only in 2014. For the four overlapping years our estimate is only slightly lower than the published series, see Panel (c) of Figure A10. The result using BLS data is quite similar.

A4.2.5 United Kingdom

In an article titled "Analysis of the UK's international investment position: 2016"[32] the Office of National Statistics (ONS) published estimates of the valuation changes due to exchange rate effects for 2000 to 2014. The estimation is based only on US Dollar, Euro and Japanese Yen exchange rates, uses country shares to approximate currency shares and includes financial derivatives. Panel (d) of Figure A10 shows that this yields similar results as our more detailed approach as well as the estimates using BLS data.

A4.2.6 United States

For the US, the Bureau of Economic Analysis (BEA) publishes data on the valuation changes due to exchange rate movements since 2002. Panel (e) of Figure A10 shows that also the estimates for the US are very close to the published series. This is reassuring since we need to interpolate the US currency composition of 'other investment' between 1998 and 2012.

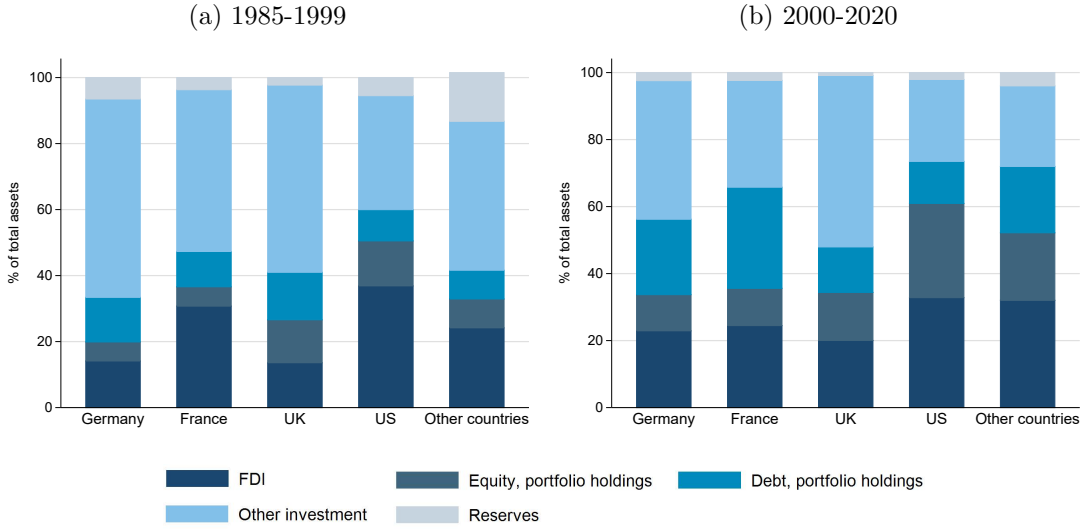
[32]The article is available on the ONS website: `https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/articles/analysisoftheuksinternationalinvestmentposition/2016`.

A5 The Composition of External Assets: Germany vs Other Countries

Lower German returns could be the result of a more conservative investment strategy that favors less risky asset classes such as bonds over equities. Figure A11 shows that there are indeed notable differences in the composition of foreign assets between Germany and the other countries. We show the periods 1985-1999 and 2001-2020 separately to account for the large compositional changes in the 1990s as documented in Section 3.

The figure reveals that Germany's large share of 'other investment' in the 1980s and 1990s was atypical compared to other countries. In addition, the shift towards more FDI and portfolio in recent decades was sizeable but other countries increased their investment in these positions even more. As a result, in the past two decades Germany invested significantly less in FDI and equities than the other countries. This provides an indication of the potential relevance of compositional differences. However, the detailed decomposition discussed in Section 5.1 reveals that differences within each asset category are even more relevant.

Figure A11: Composition of IIP assets, 1985-2020



Notes: These graphs show that Germany holds a lower share of FDI and equity assets than other countries. This is true both in the earlier part of the sample (Panel a), and in recent years (Panel b). Data from Bundesbank, IMF and Lane and Milesi-Ferretti 2007b. 'Other countries' includes CA, DK, ES, FI, IT, NL, NO, PT and SE.

Other than the asset composition, the geographical allocation of foreign investments could affect performance. Unfortunately, no data is available on the returns by geographical

location, so that we cannot include geography in our decomposition exercise[33]. However, as explained, we can estimate which share of Germany's assets is located in which country (see Section 2.4). This allows us to include geography controls in our regression analysis in Section 5.2. Moreover, we know that the large bulk of Germany's investments goes to other European high-income countries, while the share of investments in the rest of the world is small and shrinking. In international comparison, Germany stands out as a country with a particularly strong "home bias" in favor of European investments.

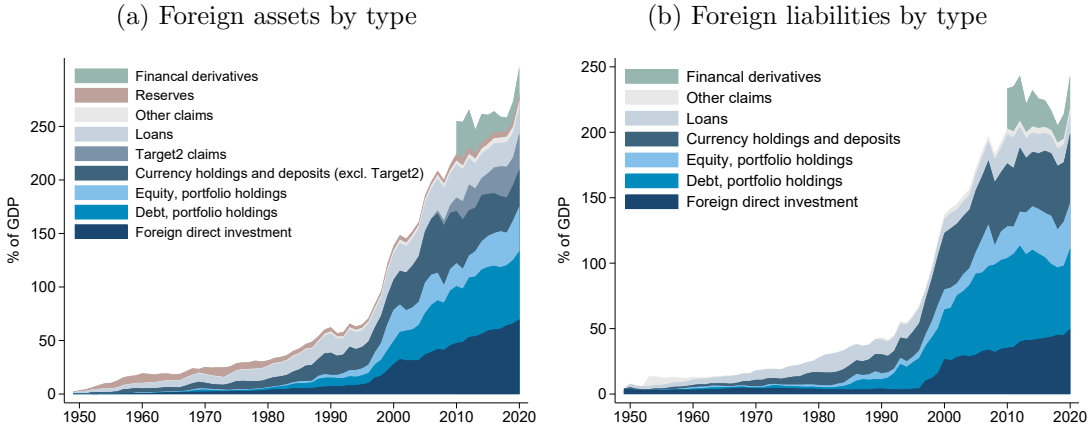
[33]We analyze the geographical composition of assets in the mutual fund dataset.

A6 Return differential between German assets and liabilities

To gauge the profitability of foreign investments, many earlier studies compare the returns on foreign assets to those earned by foreigners in the respective country (on foreign liabilities). While we prefer the comparison to other countries' returns and a broader measure of domestic returns, we also want to provide estimates of liability returns here. We will see that the difference between asset and liability return decreased in recent years. Indeed, it has turned positive over the past decade. This has led some commentators to argue that German investment performance abroad improved in recent years (Bundesbank 2014, 2018). Here we show that changes in the German differential is not the result of better foreign returns, but mainly driven by a reduction returns on liability FDI and liability portfolio debt. Both categories saw specific developments in the past decade, which complicate the comparison further.

To set the stage, Figure A12 shows the composition of German foreign assets and liabilities. As can be seen, the asset composition of liabilities (Panel (b)) is rather similar to that of Germany's foreign assets (Panel (a)).

Figure A12: Composition of Germany's international investment position, foreign assets vs. liabilities, 1949–2020

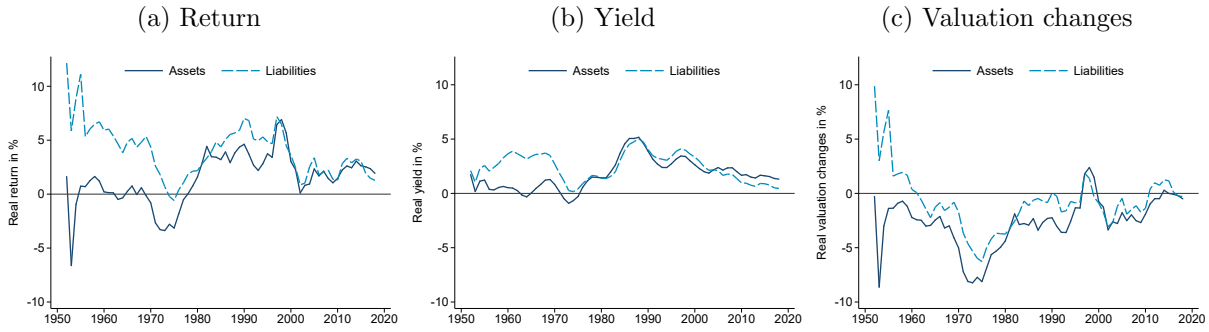


Notes: Data from Bundesbank. Detailed split of firms and households only available since 2012.

Panel (a) of Figure A13 compares the returns on Germany's assets abroad to those on foreign liabilities since the 1950s. As can be seen, the return on assets was lower throughout the entire post-WW2 period, and until the 2000s. The past few years are the first time in which the difference turns (slightly) positive, on average.

For a more detailed comparison, Panels (b) and (c) of Figure A13 show breakdowns into yields vs. valuation changes. The graphs reveal that the most recent shift is driven

Figure A13: Real return, yield and valuation changes on German foreign assets vs. liabilities, 1950-2020



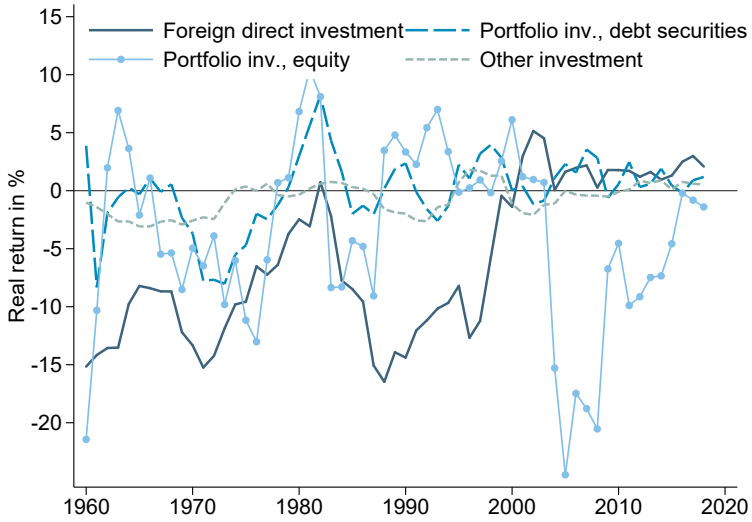
Notes: Rolling means computed over 5 year windows and plotted at the third year of the window. Return on foreign assets and liabilities estimated as discussed in Section 2.1 and deflated using the consumer price index.

by yields and not by valuation changes. Generally, there are only very few years in which the valuation changes on assets were larger than valuation changes on liabilities.

Finally, Figure A14 displays a breakdown by asset class. To facilitate interpretation, we show the difference between asset and liability returns instead of both returns separately for each asset class. The figure shows that before the 2000s, the return differential was especially negative for FDI, but this differential has improved notably over the past two decades, with German FDI abroad showing higher returns that foreign FDI in Germany. In addition, the relative performance of portfolio debt has shifted since the early 2000s, with German portfolio assets yielding higher returns compared to German debt securities held by foreigners. In contrast, the differential remains negative for equity investments, often strongly so.

To understand the drivers of these differences, we now perform the same decomposition exercise as we did for foreign returns across countries (Section 5.1). Table A12 shows that the differences within each asset class explain the overall difference, both historically and today. Table A13 also illustrates the decomposition over time. It highlights that the difference due to composition did not decrease a lot since the 1970s while the within-asset class differences decreased substantially and turned positive since the 2000s. Finally, Figure A15 shows the contribution of each type of assets, again differentiating by differences due to asset composition and differences due to returns within asset classes. The table shows that the negative values in the early sample are mainly driven by FDI and 'other investment'. The recent switch to positive differences was largely driven by FDI and portfolio debt.

Figure A14: Differences between real returns on foreign assets and liabilities by asset class, 1960-2020



Notes: This figure shows differences between real returns (or yields or valuation changes) between German foreign assets and foreign liabilities. Rolling arithmetic means computed over 5 year windows and plotted at the third year of the window. Returns estimated as discussed in Section 2.1.

To summarize, we find that the recent decrease in the gap between returns on foreign assets and foreign liabilities is mainly due to the relative changes in yields on FDI and debt portfolio holdings, especially because the return of foreigners investing in Germany went down. This finding is consistent with the observation that the outflows of debt and FDI investments from Germany (both gross and net) have increased notably over the past 20 years, possibly due to a search-for-yield effect.

At the same time, there are important idiosyncratic effects that complicate the comparison of FDI and debt returns on assets versus liabilities. First, it is well known that, during and after the global financial crisis and the eurozone crisis, foreigners have purchased record amounts of German Bunds and other highly rated German debt securities, despite the fact that these had almost zero yields (Bundesbank 2017). This safe-haven effect improved the differential for debt securities. Second, inward FDI in Germany has become highly leveraged over the past two decades, mostly for tax shifting reasons. Today, many foreign companies load their German subsidiaries with debt to reduce the (high) effective tax rate on profits after interest. In comparison, German outward FDI is significantly less leveraged (Graf and Grimme 2017). This mismatch biases down the aggregate yields and returns reported by foreign-owned firms in Germany, even if the profitability of German firms has

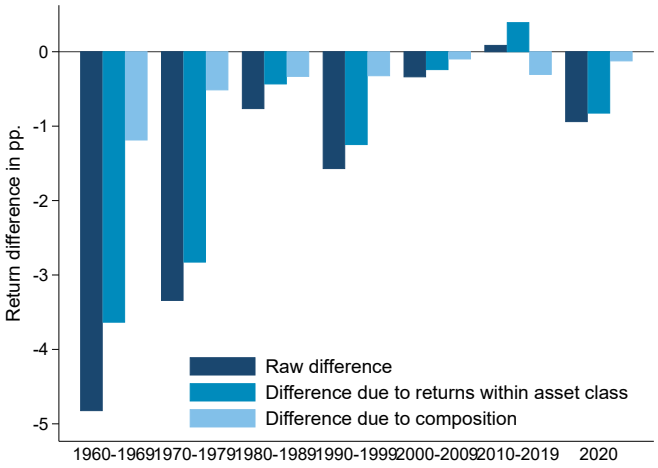
stayed the same (Ramb and Weichenrieder 2005). The increased within-firm tax shifting activities makes it hard to interpret the recent increase in relative yields on German FDI as improved investment performance. More research is needed to examine these effects in detail, ideally using micro-data on FDI and portfolio debt flows.

Table A12: Decomposition of real return differential between foreign assets and liabilities, 1960-2020

		Difference due to	
	Difference in returns (pp.)	composition (asset class)	returns within asset class
1960-2020	-1.778	-0.454	-1.323
1985-2020	-0.896	-0.259	-0.637
1999-2020	-0.043	-0.103	0.060
2009-2020	0.042	-0.420	0.462
1960-1969	-4.823	-1.186	-3.634
1970-1979	-3.342	-0.513	-2.826
1980-1989	-0.764	-0.331	-0.433
1990-1999	-1.570	-0.322	-1.247
2000-2009	-0.337	-0.097	-0.240
2010-2020	0.085	-0.305	0.391

Notes: This decomposition splits the difference between returns on German foreign assets and German foreign liabilities into two parts: (1) asset class composition (using the same four broad asset categories used above), and (2) difference in returns within each asset classes. More details in Section 5.1.

Figure A15: Decomposition of real return differential between foreign assets vs. liabilities, 1960-2020



Notes: Decomposition splits difference between return on German foreign assets and German foreign liabilities into two parts: (1) different composition of asset position in the four broad asset categories, and (2) difference in returns within each asset classes (details in Section 5.1).

Table A13: Contributions of different assets to differential between foreign assets and domestic assets (IIP), 1960-2020

	Total effect	FDI	Equity	Debt	Other inv.
Panel (a): Differences due to composition					
1960-2020	-0.454	-0.094	-0.203	-0.294	0.138
1985-2020	-0.259	0.157	-0.186	-0.439	0.209
1999-2020	-0.103	0.100	-0.053	-0.268	0.118
2009-2020	-0.420	0.140	-0.333	-0.242	0.015
Panel (b): Differences due to returns within class					
1960-2020	-1.323	-0.761	-0.203	0.111	-0.471
1985-2020	-0.637	-0.291	-0.346	0.206	-0.207
1999-2020	0.060	0.457	-0.566	0.310	-0.141
2009-2020	0.462	0.438	-0.471	0.332	0.163

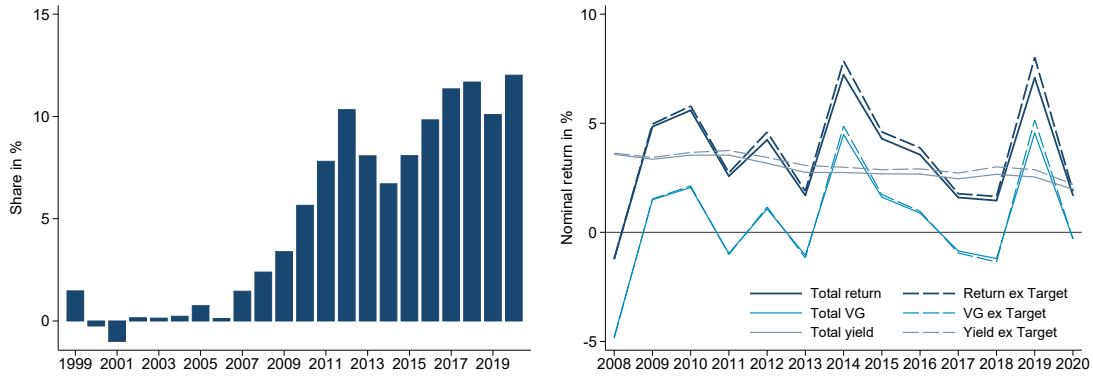
Notes: This table shows contributions of individual asset classes to each of the components of the return differential. Components are (1) different composition of asset position in the four broad asset categories, and (2) difference in returns within each asset classes (details on decomposition in Section 5.1).

A7 Impact of Target2 balances on German foreign returns

Germany's Target2 balances have been growing fast since 2007. The crisis in the euro area led to large inflows of deposits into Germany and, thus, to higher Target2 claims. In recent years, the asset purchases by the European Central Bank (ECB) are also believed to have contributed to the growth of Target2 balances. Many of the purchased securities are sold by banks outside of the euro area, which tend to have their Target2 accounts registered with the German Bundesbank. If these investors sell their securities to the ECB, Target2 assets in Germany increase (see e.g., Bundesbank 2017).

Figure A16: Foreign asset returns and Target2 balances: Germany

(a) Share of Target2 in total assets, 1999-2020 (b) Impact of Target2 on returns, 2007-2020



Notes: Panel (a) shows the increasing share of Target2 balances in total foreign assets. Panel (b) shows that the effect of Target2 balances for aggregate returns is not very large.

Target2 balances are remunerated at a benchmark interest rate (the "main refinancing rate") that currently stands at zero. Target2 claims enter both German foreign assets as well as the financial account. Therefore, they do not lead to any valuation changes or yields. However, they do lower the returns (in absolute terms) by increasing the denominator.

Figure A16 plots the share of Target2 balances in total assets, and total returns, yields and valuation changes including and excluding Target2 balances. We plot returns since 2008 because 2007 is the first year Target2 balances amounted to more than 1% of total assets. This share increased to 12% of total assets (excluding financial derivative) in 2020 with some fluctuations, see Panel (a) of Figure A16.

Taken together, including Target2 lowers the yearly nominal return on total German foreign assets by 0.29 percentage points, on average, since 2008. The return effect was largest in 2019, with -0.93 and in 2014 with -0.63 percentage points. In the remaining

years it varied between 0.02 and -0.36 percentage points.[34]

[34]The positive difference occurs in 2008 when the nominal return was negative because excluding Target2 increases the absolute size of the returns.

A8 Book values for FDI assets

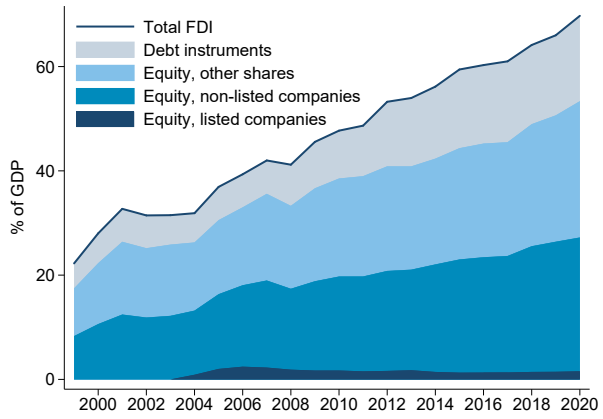
As discussed in Section 2.3, German FDI assets are recorded at book value before 2004, which could bias our results. This is mainly relevant for equity in listed companies because for equity in non-listed companies there is no direct estimate of market prices available anyways. Figure A17 shows that equity in listed companies only makes up a small part of German FDI assets. Instead, the equity assets are roughly equally split between equity in non-listed companies and other equity, which includes real estate. Since market prices are less relevant for the non-listed shares and are applied to real estate assets, the valuation at book values should not affect our results too much.

Nevertheless, we now check our results for sensitivity to these valuation effects for FDI. For this purpose, we consider the counterfactual where there are only valuation changes due to exchange rates. Technically when assets are recorded at book value there can be no price adjustments, this means that if we record valuation changes other than those due to exchange rate movements these must be write-offs or due to mismeasurement. Now we can assume that all other changes observed are due to mismeasurement and set total valuation changes to the valuation changes due to exchange rates for all countries.

Table A14 shows the regression using the returns on FDI as dependent variable from Section 4. We compare results with the standard return measure to those with the adjusted return, measured as described above.

The baseline effect is quite similar for both return measures. This indicates that mismeasurement of market price effects does not seem to drive the overall difference between

Figure A17: Detailed composition of FDI assets, 1999-2020



Notes: Composition of German FDI assets. Data from Bundesbank.

Table A14: FDI returns with adjusted valuation changes

	Standard return				Adjusted return			
	(1) Baseline	(2) Val. FX	(3) Risk	(4) Geo.	(5) Baseline	(6) Risk	(7) Geo.	(8) Val. FX
Germany dummy	-3.04**	-2.22*	-1.76	-1.25	-2.47***	-2.53***	-3.08***	-0.37
	(1.18)	(1.17)	(1.18)	(1.26)	(0.89)	(0.87)	(0.95)	(0.36)
Valuation ch. due to ex. rates, FDI		0.41***	0.40***	0.41***				1.09***
		(0.10)	(0.10)	(0.10)				(0.03)
3-year rolling std. dev., FDI			0.15	0.11				
			(0.19)	(0.20)				
3-year rolling std. dev. adj. return						-0.11	-0.14	0.04
						(0.20)	(0.21)	(0.06)
Advanced Europe				-0.18			0.04	-0.03
				(0.14)			(0.09)	(0.03)
Advanced Non-Europe				-0.19			0.08	-0.03
				(0.16)			(0.12)	(0.04)
Emerging&Developing				-0.17			-0.03	-0.07**
				(0.13)			(0.10)	(0.03)
Constant	9.76	12.02**	10.80**	29.05*	0.42	0.85	-2.43	10.36***
	(5.99)	(5.06)	(4.96)	(15.78)	(3.07)	(3.10)	(10.71)	(3.84)
Observations	372	372	368	368	373	369	369	369
Adjusted R^2	0.14	0.19	0.19	0.19	0.14	0.14	0.15	0.86
No. countries	12	12	12	12	12	12	12	12
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Columns 1-4 reproduce the results of Table 12 in Section 4. These are compared to the results using adjusted returns in Columns 5-8 (excluding any valuation changes not due to exchange rates). Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Net foreign assets and financial account balance included in the regressions, but not shown.

Germany and the other countries. In particular, Germany does not strongly undervalue its assets relative to the other countries.[35]

In addition, we again control for risk, geographical allocation and the effect of exchange rate movements. Because now all valuation changes are due to exchange rates, we change the order in which we add the additional control variables. Results are similar in that risk and geographical allocation do not explain much of the difference in German return.

[35]Note that the total assets in the denominator of the return calculation still include the market price adjustments. Thus if Germany underestimates the market price value of its FDI assets while other countries overestimate it, the German return will now be inflated relative to the other countries returns (assuming the German estimation leads to a too low valuation, which is general the case considered). This could explain the less positive coefficient.

Controlling for valuation changes due to exchange rates reveals that in fact these seem to be one major driver of the difference (when other valuation change are not considered).

A9 Computing a quarterly global equity return

The methodology of computing a quarterly global equity return closely follows the approach for the annual global equity return by Jordà et al. (2019). However, due some issues with data availability, we have to revert to some different sources for some countries and years. The global return is based on the equity returns in 15 advanced economies (the returns for Sweden are excluded due to some data issues). The sources are listed below. To global return is computed using GDP as weights. GDP data is the OECD volume index, which is available at quarterly frequency since 1985 for all countries considered.

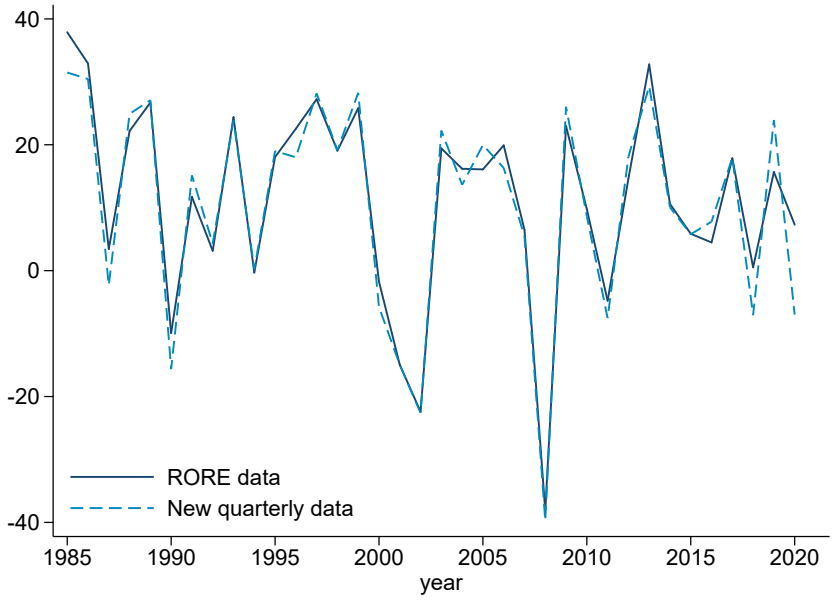
The data sources for the countries' equity returns are listed below. If not otherwise indicated, the series are available since 1985Q4 or earlier.

- Australia: MSCI total return index from Datastream
- Belgium: MSCI total return index from Datastream
- Denmark: MSCI total return index from Datastream
- Finland: OMXH total return index from Datastream, available since 1991Q1
- France: CAC-40 total return index from Datastream, available since 1987Q4
- Germany: DAX total return index from Datastream until 1995q4, CDAX total return index from Datastream since 1996Q1
- Italy: MSCI total return index from Datastream
- Japan: MSCI total return index from Datastream
- Netherlands: MSCI total return index from Datastream
- Norway: MSCI total return index from Datastream
- Portugal: MSCI total return index from Datastream, available since 1987Q4
- Spain: IGBM price index from Datatstream
- Switzerland: MSCI total return index from Datastream
- United Kingdom: FTSE all shares total return index from Datastream

- United States: Capital gain + dividend return from Shiller (2000), up-to-date data from `http://www.econ.yale.edu/~shiller/data.htm`

We can also compare the quarterly returns obtained using the sources above to the original annual series by Jordà et al. (2019) by annualizing the quarterly returns. Figure A18 below shows that the return series is very similar despite some differences in the underlying data. In the update for recent years the data used by Jordà et al. (2019) changes. Therefore the series differ slightly for the last 4 years.

Figure A18: Global and country-level equity returns, our quarterly estimates vs. Jordà et al. (2019) estimates



Notes: Figure compares annualized quarterly global equity return computed by us using the sources listed in Appendix A9 to the annual global return from Jordà et al. (2019) which is available until 2015.

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