



Newton meets Van Leeuwenhoek: Identifying international investors' common currency preferences[☆]



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ABSTRACT

Using a novel security-by-security dataset, this paper distinguishes investor preferences for euro-denominated debt securities from investor preferences for debt securities issued by euro area residents. We estimate a gravity model and show that investors have a preference for securities in their home country and countries close to their home country. Furthermore, investors have a strong preference for holding debt securities denominated in euros. Whether a security is issued by a euro area resident or a non-euro area resident is of secondary importance. These results are important for the literature on international investment positions for identifying investors' currency preferences.

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1. Introduction

Recent empirical studies show that investors have a strong preference for assets in countries that share a common currency. For example, euro area investors overweight intra-euro area positions compared to an internationally well-diversified benchmark portfolio (Balli et al., 2010; De Moor and Vanpée, 2013). To estimate common currency area effects researchers often include a dummy variable which is equal to one if the country of the investor belongs to the same currency area as the destination country of the investment (see e.g. Lane and Milesi-Ferretti, 2008). As a result, such studies (implicitly) assume that countries that belong to a common currency area issue all their securities in the same currency. Consequently, securities issued by countries outside the currency area are treated as being denominated in a foreign currency. Assuming that all securities in a country are denominated in the same currency is too restrictive. Many securities, in particular bonds, are issued in a different currency than the currency of the issuer's country of residence (Avdjiev et al. (2014)). For example, 13.3% (2.2 trillion euro) of all outstanding debt securities issued by euro area residents were not denominated in euros at the end of 2014, according to ECB statistics.

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Table 1
Euro currency vs. Euro area country debt securities.

Currency	Issuer residency					
	Frequency			Value (in EUR billions)		
	Non euro area	Euro area	Total	Non euro area	Euro area	Total
Not euro denominated	102,265	28,725	130,990	542	145	687
	15.6%	4.4%	20.0%	5.0%	1.3%	6.4%
Euro denominated	54,424	469,503	523,927	894	9,229	10,123
	8.3%	71.7%	80.0%	8.3%	85.4%	93.6%
Total	156,689	498,228	654,917	1,436	9,374	10,810
	23.9%	76.1%	100%	13.3%	86.7%	100%

Note: This table shows the number and market value of debt securities that are denominated in euros or another currency and the securities issued by euro area residents or non-euro area residents.

In making optimal international portfolio choices, investors may have a preference for bonds denominated in their home currency irrespective of the issuer's country of residence. However, most studies in the international portfolio investment literature do not take currency preferences into account.¹ Instead, most papers rely on aggregated data with information from investors of country i holding positions in country j ; typically with data taken from the IMF Coordinated Portfolio Investment Surveys (CPIS) (see [Okawa and Van Wincoop, 2012](#)). Hence, these studies are unable to assess whether a euro area country bias may be confounded with a preference for euro currency investments.

By using granular data on the debt holdings of euro area investors, we distinguish between their debt holdings in euros and debt holdings in foreign currencies. In particular, we investigate to what extent the debt holdings of euro area investors are tilted towards debt denominated in euros rather than other currencies. This how our paper contributes to the literature on the importance of common currency preferences for international portfolio choices (see e.g. [Fidora et al., 2007](#); [De Santis and Gérard, 2009](#)). We estimate a gravity model in the spirit of [Portes and Rey \(2005\)](#) to factor in the well-known distance effects, i.e. the investors' tendency to hold fewer assets further away from the home country.

The results show the importance of the currency denomination of debt securities for international portfolio allocations. In particular, we document that euro area investors have a strong preference for fixed income securities denominated in euros. This currency effect is significant after controlling for investors' preference to invest in a country that is part of the same currency area. In addition, whether such securities are issued by a euro area resident is of secondary importance after accounting for the gravitational forces of mass and distance and the securities' currency denomination. This finding has implications for researchers estimating gravity models to explain international investment patterns: they should exercise due care when using and interpreting a common currency area dummy in these models.

2. Data

The European System of Central Banks (ESCB) provided highly granular confidential data on money market and bond holdings of euro area residents for the end of 2014. Security-by-security level data was collected by all 19 euro area national central banks under a uniform and mandatory European reporting scheme (see [European Central Bank, 2015](#)), which ensures high data coverage and quality. We enriched reported debt holdings based on the International Security Identifier Number (ISIN) to obtain information on the currency and issuer country.² Our final sample included 654,917 observations across 119 destination countries with a total market value of about EUR 10.8 trillion.

[Table 1](#) shows that investors from the euro area hold a significant amount of non-euro-denominated securities in euro area countries as well as euro-denominated securities issued outside the euro area. In fact, of the nearly 655 thousand observations in our sample, 4.4% consist of non-euro-denominated assets issued by a euro area resident and 8.3% are euro-denominated securities issued by a non-euro area resident. These figures are quite sizable, also in terms of value. Out of the EUR 10,810 billion in debt holdings EUR 145 billion consist of non-euro-denominated assets issued by a euro area resident and EUR 894 billion are euro-denominated securities issued by a non-euro area resident. Not taking the currency denomination into account in the estimation of a gravity model may lead to biased results because of misspecification. Specifically, two assumptions used in most gravity models do not hold, i.e. that (i) all debt securities in a euro area country are denominated in euros, and (ii) all debt securities in non-euro countries are not denominated in euros.

¹ Notable exceptions are [Lane and Shambaugh \(2010\)](#) and [Bénétrix et al. \(2015\)](#), who investigate the importance of currency denomination on international investment positions. However, in contrast to this paper these authors do not observe the currency denomination directly, but rely on estimates of international currency exposures using inferential techniques.

² For data cleaning purposes, we dropped all observed short-positions and holdings from issuers from financial centres and offshore destinations. In particular, we excluded the euro area countries Ireland and Luxembourg as holder and destination countries from the sample, in line with the literature (e.g. [Lane and Milesi-Ferretti, 2008](#)).

Table 2
Regression results gravity model fixed income securities.

	(1)	(2)	(3)	(4)	(5)
log(market value)	0.374*** (0.045)	0.382*** (0.045)	0.374*** (0.045)	0.381*** (0.045)	0.380*** (0.045)
log(distance)	−0.380*** (0.046)	−0.226*** (0.048)	−0.377*** (0.053)	−0.288*** (0.054)	−0.251*** (0.050)
Home	0.833*** (0.226)	0.907*** (0.228)	0.833*** (0.225)	0.912*** (0.223)	0.980*** (0.224)
Euro currency		0.872*** (0.152)		0.970*** (0.163)	1.282*** (0.118)
Euro area country			0.012 (0.097)	−0.336*** (0.092)	0.166 (0.206)
Euro currency * euro area country					−0.682** (0.213)
R2	0.626	0.633	0.626	0.633	0.634
# observations	654917	654917	654917	654917	654917

Note: This table shows the estimation of Eq. (1) at the holding country–holding sector–security level with not-reported dummies. *, ** and *** denote significance at the 5%, 1% and 0.1% level, respectively.

3. Gravity model

In order to explain international portfolio holdings we used a gravity model similar to [Portes and Rey \(2005\)](#) and [Andrade and Chhaochharia \(2010\)](#), specified by the following equation:

$$\log(\text{Holdings}_{i,s,j,d}) = \beta_1 * \log(\text{MktVal}_{j,d}) + \beta_2 * \log(\text{Dist}_{i,j}) + \beta_3 * \text{Home}_{i,j,d} + \beta_4 * \text{EuroCurrency}_{j,d} + \beta_5 * \text{EuroArea}_{i,j,d} + \mu_{i,s} + \epsilon_{i,j,d}, \quad (1)$$

where $\log(\text{Holdings}_{i,s,j,d})$ represents the log of the market value in euros of the holdings of investors from a holder sector s in country i in a debt security d issued by a resident from country j . The detail of the data allows us to study the debt holdings of investors from 190 holder country/holder sector combinations in over 270,000 fixed income securities issued by residents from 119 countries.

To explain the holdings of individual securities we include the market value of each of these securities as the attractor variable ($\log(\text{MktVal}_{j,d})$) in line with the International Capital Asset Pricing Model, which predicts that all investors hold a fraction of each asset that is equal to their share in global wealth. In addition, we include the log of the distance between two countries ($\log(\text{Dist}_{i,j})$). Note that the distance between a domestic investor and a domestic security is not zero because we used a measure of internal distance developed by the CEPII.³ Next, we include a dummy equal to one if a security was issued by a domestic resident ($\text{Home}_{i,j,d}$). We add a dummy equal to one if a security is denominated in euros ($\text{Euro}_{j,d}$) and a dummy equal to one if a security was issued by a euro area resident ($\text{EuroArea}_{i,j,d}$). We include dummies for each holding country/sector combination and destination country/debt type to capture common unobserved effects. We distinguish between the following two types of debt: money market instruments and bonds. We estimated the regressions using ordinary least squares (OLS) with clustered standard errors by holding country/sector combinations.

4. Results

Table 2 shows different specifications of Eq. (1). The results for the baseline model as shown in column (1) lead to three conclusions. First, investors tend to invest more in securities with a larger market value. If the market value of a debt security increases by 1%, ceteris paribus, investors increase their holdings by 0.37%. Such an increase can be achieved by either revaluations of existing positions or active trading. Second, investors tend to hold fewer securities issued by residents of more distant countries, i.e. if the distance doubles, investors reduce their holdings by about 38%. Third, investors prefer securities located in their home country (home bias). So, when a security is issued by a domestic entity from the investor's home country, the investor will be inclined to hold 83% more of this security compared with an otherwise identical security from a non-resident entity.

Column (2) includes a euro currency dummy whose coefficient is economically large and statistically significant. Ceteris paribus, if a debt security is denominated in euros, investors from the euro area will increase their holdings of this security by 87%. Naturally, since other euro area countries are closer to euro area investors, the coefficient on distance decreases. A dummy indicating if a security is issued by a euro area resident turns out to be insignificant when added to the benchmark specification (Column (3)). This suggests that there is no particular preference for investing in a euro area country as such, apart from it being close to the home country. Putting both indicators for euro area currency and euro area residency in a

³ See [Head and Mayer \(2002\)](#) for details about the methodology to calculate this internal distance.

single regression, results suggest that investors attach a high value to a security being denominated in euros (Column (4)). The euro area country dummy is even significantly negative.

Column (5) adds an interaction term euro currency * euro area country. This implies that the baseline security is a non-euro denominated security issued by a non-euro area country resident. Compared to this baseline, investors hold 128% more of an asset if it is denominated in euros and issued by a resident outside the euro area. Next, the coefficient on euro area country origin is insignificant, which suggests that, conditional on the other variables, investors do not distinguish between non-euro denominated securities issued by a euro area resident or a non-euro area resident. Finally, if the security is denominated in euros and issued by a euro area country resident, then investors would hold about 76.6% (=128.2% + 16.6% – 68.2%) more of the security compared to the baseline. These results confirm that euro area investors have a strong preference for international investments in debt denominated in euros.

As a practical example, consider a German institutional investor who can choose to invest in (i) A non-euro denominated bond issued by a UK resident (baseline), (ii) A euro denominated bond issued by a UK resident, (iii) A non-euro denominated bond issued by a French resident or (iv) A euro denominated bond issued by a French resident. Let us assume that except for the residency of the issuer and the currency denomination, all other characteristics of these bonds are equal. Furthermore, in terms of distance, the UK and France are about equally distant from the German investor's perspective according to our measure of distance. Suppose German investors would invest EUR 1 million in bond (i). The estimated coefficients in column (5) of Table 2 suggest that the German investor would accordingly hold EUR 2.282 million of bond (ii), EUR 1.166 million of bond (iii) and 1.766 million of bond (iv). Note that we cannot distinguish the holdings of bond (i) from bond (iii) when taking statistical significance into account. So, as the example illustrates, the German investor highly values the bond being denominated in euros.

We carried out several unreported robustness exercises. Results were tested with mid-2012 data with virtually the same outcomes. Similar results were obtained when equity holdings were included. Aggregation of the security-by-security holdings data across all sectors in a holding country and re-estimating the benchmark gravity model also yielded very similar results. Finally, excluding the distance variable or adding common border and common language variables yielded similar results to those reported in Table 2.

5. Concluding remarks

The results of our study confirm that, on top of the well-known home bias effect, gravitational forces - in the spirit of Newton - can be used to explain investors' investment allocations. In general, euro area investors tend to overweight their positions in euro area countries compared with non-euro area countries, in part because other euro area countries are close. However, the gravitational pull is only part of the story. Our findings suggest that portfolio investments are strongly driven by the desire to hold debt securities denominated in euros. An effect that can be identified by using security-by-security data, hence the reference to Antoni Van Leeuwenhoek, one of the key inventors of the microscope. The common currency effect mitigates the distance effect and thus the euro area country bias. The strong preference for positions in common currency assets is intuitive, yet our study is the first to examine this in more depth. The results of this study may have implications for researchers using gravity models because not taking the currency composition of assets in a certain country into account may lead to biased estimates.

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