

# Italian Pension Funds Struggling with Domestic Sovereign Risk

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## Abstract

The paper investigates the determinants of Italian pension funds' exposure to the domestic sovereign bonds through a panel analysis, over the time-period 2008-2014, on a sample of 70 funds and 230 investment lines. We investigate the drivers on sovereign home bias along two main explicative arrows: the familiarity theory, and the opportunity set theory. Results indicate that both factors are significant. However, from a quantitative point of view, the main determinant is the presence of restrictions in the investment mandate. The existence of a minimum guaranteed return increases on average by 11 per cent the weight of the Italian sovereign bonds on the European sovereign portfolio, while extending the investment spectrum outside Europe determines a decrease of 4.5 per cent on average. This finding suggests that exposures to the domestic-sovereign risk of Italian pension funds would probably reduce after specific mandate restrictions have loosened. Since sovereign home bias translates into concentration risk, it may weaken the soundness of the private pension pillar in case the Italian T-bonds suffer from a significant price reduction. Regulators should pay close attention to this issue to enhance the stability of the Italian pension fund industry, considering that such a large sovereign home bias could simultaneously undermine the private and public pension payments.

**Keywords:** foreign managers, home bias, investment mandate, pension funds, sovereign risk exposure

## 1. Introduction

Sovereign risk has currently become a sensitive topic, particularly in Europe, since the European sovereign debt crisis reminded that sovereigns are not exactly risk-free and can actually default.

During the crisis, spreads between core and peripheral countries opened up, offering the market a safe harbour to refuge, and at the same time risky investment opportunities. Nevertheless, it is known that, besides pure financial aspects and market expectations, investors, especially institutional, normally hold large amounts of their national public debt for several other reasons including the social role they play in supporting domestic government financial needs. As a consequence, financial intermediaries tend to be over exposed towards their national bonds and then suffer the so-called sovereign home bias. This is a quite widespread phenomenon around the world, and in times of crisis, it can foster the contagion between sovereigns and financial systems. For this reasons sovereign risk is currently under the spotlight to the extent that it might lose its favourable condition of risk-free asset and thus zero-risk weight with enormous potential impacts on financial intermediaries' capitalisation and bond market prices.

The significance of this topic calls for careful investigations, especially in the European countries with low creditworthiness and for an extension of the analysis beyond the banking system, which is, for the time being, the main financial sector under the spotlight (Eiopa, 2016, for insurers and pension funds). The pension fund industry in Italy represents a particularly interesting case study to analyse the sovereign home bias. In fact, since the Italian sovereign bonds are the most traded and liquid in Europe, and they offer relative interesting yields in times of low interest rates (Battistini et al, 2013; Bijlsma and Vermeulen, 2015; Dull et al, 2015), the incentive for fund managers to overweight the exposure towards home sovereign debt are particularly strong. Under this point of view Italy represents a sort of "natural experiment" which makes the phenomenon easier to observe and analyse compared to other markets.

Looking at the Italian pension funds, the Italian Supervisory Authority COVIP's annual report 2015 shows that 30 per cent of overall pension fund assets are invested in domestic Treasury bonds. This percentage rises up to

40-50 per cent, depending on the fund's nature, if we only consider the fixed income portfolio. The Italian bond market itself is unbalanced. Italy is the largest issuer of public debt securities in Europe. Thus, domestic government bonds dominate the market, covering 65 per cent of total issues, and are far more liquid than large corporate bonds, including financials. Moreover, Italy is currently evaluated BBB, due to persistent weak economic fundamentals, high public debt, high unemployment rate, high fiscal pressure and lack of competitiveness. Being at the border between investment and speculative grade, it is highly likely that a small increase in risk perception could lead to fire sales of Italian Treasury bonds and big drops in their market values. Considering that pension funds evaluate their assets at market price, large negative price movements in domestic sovereign bonds might compromise the performance and benefits offered by the whole pension fund sector. Solvency problems could even occur for lines that offer a minimum return guarantee and are obliged to keep their promises to investors.

Therefore, in this paper we empirically analyse the determinants of sovereign home bias in Italian pension funds. Our hypothesis is that the unbalanced allocation towards Italian Treasury bonds is mainly driven by two factors: the opportunity set defined by the investment mandates and the nationality of the investment firm. In fact, on one side, restricted boundaries set by the investment mandates shrink the type of asset classes and geographical areas, especially in pension fund lines with low risk profile, and force fund managers to shift their investment allocations towards a greater portion of domestic sovereign bonds. On the other side, the fund managers' nationality, which means better information about their own country and familiarity with domestic markets and instruments, could contribute to reduce diversification opportunities and benefits. Instead, we do not expect structural features of pension funds to explain their sovereign home bias attitude, given a kind of homogeneity in their portfolio management, as shown in a previous paper (De Vincentiis et al, 2016).

The first issue we need to address is how to measure the bias itself. The easiest way is to weight the domestic sovereign bond allocation on the overall portfolio invested in EU sovereign bonds. We then introduce another indicator of domestic sovereign bias that allow us to better isolate the effect of managers' allocation decisions and any other kind of external constraint. Following Manna et al. (2016), we create a neutral sovereign portfolio, where each country weights only according to the amount of its public debt with respect to the total EU public debts. Therefore, the sovereign home bias is evaluated comparing the allocation of each pension fund of our sample with the neutral portfolio.

We then empirically test out hypothesis conducting an in-depth analysis across different investment lines and different periods. Our results support the hypothesis that restrictions on investment mandates increase the domestic sovereign bias, while exhibit a weaker link than expected with the presence of foreign portfolio managers.

Our results also suggest that removing some restrictions to the investment mandates – like in most of the European countries – and promoting a more international competition among asset management firms might lead to a better portfolio diversification and an overall risk reduction. In fact, sovereign home bias translates into concentration risk and in case the country suffers again from national or global financial turbulence, such asset allocation will further weaken the soundness of the private pension pillar exactly when it should work as parachute against the fall of the public pension system.

We trust that these results are important to shed some lights on these specialised but very important financial intermediaries that, given their large asset allocation in sovereign debt, are likely to be significantly affected by bond markets movements or specific measures on sovereign credit risk taken by regulators at global level (ESRB, 2015).

As far as we know, our work is the first paper on sovereign home bias in pension funds.

Surprisingly, despite the extensive literature on home bias, very few studies have researched the unexplored territory of pension funds, and none have specifically analysed the sovereign home bias. The most recent work to date that is closest to our analysis is conducted by Lippi (2016), who investigates the presence of country home bias in Italian occupational pension funds. He finds that the phenomenon is persistent over time and more pronounced when the risk profile is lower and the fund manager domestic. Only another two papers belong to this stream of literature, and both of them refer to a specific country. Lelyveld et al. (2010) provides empirical evidence on domestic bias in Dutch pension fund asset allocation, mainly driven by fund inexperience, measured in terms of operational age, and risk-aversion attitudes that persuade to invest in more familiar markets during periods of high volatility or financial crisis. Karlsson and Norden (2007) investigate the home bias in Swedish individual pension plans adopting a different point of view. They test the relationship between the demographic and socioeconomic features of adherents and the likelihood of home bias in order to identify a typical

home-biased candidate.

Enlarging the perimeter to all types of institutional and individual investors, the scientific production on home bias is rich and highly varied. Home bias is an old worldwide phenomenon and in the course of time many researchers have offered their contribution to explain the tendency to overweight domestic holdings at the expenses of foreign securities, especially in the fixed income portfolios. In brief, there are mainly two types of explanations, namely market constrictions and investor behaviour. As for the first category, many factors may reduce returns from investing abroad or limit investors' capability to hold foreign assets transaction costs (Glassman and Riddick, 2001; Coeurdacier and Rey, 2013), differences in tax treatment, limits on cross-border investment (French and Poterba, 1991), real exchange rate (Fidora et al., 2006), and market transparency (Giofrè, 2013). But, as French and Poterba say, such constraints are not binding and appear unable to fully explain limited international diversification. This implies that home bias is primarily the result of investor behaviour. Tesar and Werner (1995), Coval and Moskowitz (1999), Campbell and Kraussel (2007) and Dziuda and Mondria (2012)) demonstrate that asymmetric information is the main ingredient of domestic bias. Asymmetric information produces the familiarity theory (Chan et al., 2005; McQueen and Stenkrona, 2012; Pool et al., 2012), the optimism or overconfidence theory (Suh, 2005) and the geographic proximity theory (Campbell and Kraüssl, 2007; Giofrè, 2013; Coval and Moskowitz, 1999), which explain why investors consistently favour domestic securities.

In conclusion, the major strengths of our work are the following:

- It is the first analysis that focuses on exposure to sovereign risk in the pension fund sector, contributing to the current debate on sovereign risk prudential treatment by looking at intermediaries different from banks;
- It is the first analysis that empirically tests the relationship between fund managers' mandate perimeter and portfolio diversification-bias;
- It offers a new contribution to the previous specific literature on the assessment of foreign managers, introducing new indicators that more precisely capture the role and incidence of foreign fund managers with respect to domestic fund managers.

## 2. Sample Description and Methodology

Our analysis is based on a proprietary database of accounting and structural information concerning both closed (occupational) and open pension funds operating in Italy. Starting from the complete list of pension funds available at the website of the Commission supervising the sector (Commissione di Vigilanza sui Fondi Pensione – COVIP), we built a dataset based on information extracted from financial statements, statutes and informative notes for the period 2008-2014, considering all investment lines, both with and without a minimum return guarantee. The data summarised in Table 1 show that our sample coverage of the universe in analysis is more than satisfactory.

Table 1. Sample coverage – Number of investment lines and assets under management

All investment lines	Sample	Total	% coverage
No. funds	70	94	74.47
Closed funds	35	38	92.11
Open funds	35	56	62.50
No. of lines	230	361	63.71
Closed funds	86	108	79.63
Open funds	144	253	56.92
Net asset value	38	54	71.30
Closed funds	33	40	83.37
Open funds	5	14	37.08
Guaranteed lines	Sample	Total	% coverage
No. of lines	81	111	72.97
Closed funds	35	36	97.22
Open funds	46	75	61.33
Net asset value	7	8	91.00
Closed funds	6	6	99.75
Open funds	1,5	2	67.97

*Note.* The Table compares the sample used for the analysis of the paper to the universe of pension funds operating in Italy. The first section includes information on the number of pension funds; the total count of investment lines, differentiated by risk level and asset allocation limits, offered by the pension funds; the net asset value of the funds recorded in the balance sheet. The second section of the Table focus on the number and net asset value of guaranteed investment lines, offering a minimum return to adherents. All data refer to 31 December 2014 and are split for closed (occupational) funds and open funds.

The sample includes 70 pension funds, subdivided into 230 investment lines. The database represents 63.71 per cent of the total in terms of investment lines count, whereas the coverage increases to 71.30 per cent when we look at the amount of assets under management (AUM). The sample represents a wider share of the universe in the sub-sector of the guaranteed lines, which is particularly interesting for our research question (see second section of Table 1). In this case, the sample includes above 70 per cent of the lines and 91 per cent of the net asset value.

Table 2 focuses on the distribution of investment lines by level of risk declared by the fund informative note. Data show that the sample is well balanced across this dimension with only a slight over-representation of the “low risk” class due to the presence of the guaranteed funds that often belong to this segment.

Table 2. Sample distribution by level of risk of the asset management

Level of risk	Number of lines	In %
Low	69	30.00
Medium-Low	32	13.91
Medium	49	21.30
Medium-High	42	18.26
High	33	14.35
Na (*)	5	2.17
<b>Total</b>	<b>230</b>	<b>100.00</b>

(\*) Data not available.

*Note.* The Table details the distribution of the investment lines included in the sample by risk level of the asset allocation. The classification refers to the level of the risk declared by the pension fund in the Informative notes to investors.

We want to explore the size of domestic sovereign exposure as a function of three main sets of determinants, described in detail in Table 3.

First, we introduce a set of regressors related to the composition and diversification of the asset management team. We consider the total number of intermediaries in charge of asset management, expecting a negative association with the domestic sovereign bias. A more numerous investment team could in fact include specialised intermediaries and thus increase diversification into particular sectors or market segments. We also consider the presence of foreign managers and the share of assets under management they are in charge of. In line with a strong stream of literature (Chan et al, 2005; McQueen and Stenkrona, 2012; Pool and al., 2012), fund managers are prone to choose domestic bonds, since they know their market better (familiarity theory) and are more confident in their choices (information theory). Therefore, we expect pension funds where foreign intermediaries manage a larger share of the investment portfolio to have a lower degree of domestic sovereign exposure. It is important to specify that we take into consideration the nationality of the investment firm in charge of portfolio management and not the nationality of the physical person in charge of the job. This methodological choice differentiates our work from others on similar topics. Considering the nationality of the investment firm, we can indirectly capture with this variable, alongside familiarity problems, also the weaker moral suasion to buy home sovereign bonds that can be exerted on non-domestic financial intermediaries by the national Treasury. As far as the role of foreign managers is concerned, our work contributes to existing literature by exploring the issue more in depth. To our knowledge, only Lippi (2016) deals with this issue for pension funds. Lippi, however, applies a set of dummies that overlook the share of assets actually managed by foreign intermediaries. We observe the presence of foreign managers alongside other Italian managers, and we note that, in several cases, the share of assets given to foreign managers is quite small, precisely 25 per cent on average and the median of the distribution is zero (see Table 3). In order to better represent the actual weight of foreign intermediaries inside the management pool of the pension fund, we consider two variables, namely the number of foreign managers to the total number of managers (No\_foreign\_managers), and the share of AUM managed by foreign managers (Relevance\_foreign\_managers).

Secondly, we use a few independent variables that account for the rigidity of the investment mandate to asset managers. We hypothesize that a narrower investment mandate can induce the fund manager to higher sovereign exposure, since the opportunities set available is more restricted (He and Xoing, 2013; Lippi, 2016). Especially

in the case of a country, like Italy, where sovereign bonds offer interesting yields due to the high weight of public debt, fund managers in search for returns could boost sovereign exposure when potential alternatives are precluded by the mandate, at the expense of sound risk diversification (Battistini et al., 2013). Thus, we expect all limitations to the investable domain to be associated with a greater home sovereign bias. The main constraints considered include the geographical extension of the area where securities can be chosen, the maximum amount of equity allowed in the asset allocation by the Statute of the fund and the presence of a minimum return guarantee. For the guaranteed lines, in particular, we expect domestic sovereign exposure to be heavier when the commitment to participants in terms of minimum return level becomes broader. A most controversial aspect is the effect of the extension of events covered by the guarantee. A wider commitment could increase the home bias representing a further rigidity of the investment mandate. On the other side, the inclusion of the voluntary change of pension funds among the events covered by the guarantee could push managers to keep more liquidity as a precautionary cushion, thus decreasing the weight of sovereign bonds on total assets. The expected sign of the variable is consequently uncertain.

Finally, the third set of regressors controls the structural features of the fund that could have an impact of asset allocation, like the size of assets under management, the juridical status (closed vs. open funds) and the amount of cash inflow/outflow on an annual basis for contributions received/benefits paid. Among these variables, the most discussed in literature is the size that we measure through the net asset value logarithm. The evidence of previous studies is mixed. Some authors find negative relations between size and home bias, explaining the phenomenon with the greater diversification opportunities offered by larger assets under management (Ni 2009, Dyck and Pomorski, 2011). On the contrary, Hau and Ray (2008) find a strong, though counter-intuitive, positive association. This mixed evidence explains the uncertain sign reported in Table 3.

Table 3. Explanatory variables: definitive, expected sign and descriptive statistics

Variables	Description	Exp. Sign	Mean	Median	Std Dev.	Max	Min	Obs
<b>Inv_area</b>	Dummy = 1 if the investment area extends to all OECD countries.	-	0.75	1	0.43	1	0	1.40
<b>Max_Equity</b>	Maximum share of equity investment resulting from the investment mandate.	-	0.37	0.35	0.29	1	0	1.11
<b>Guarantee</b>	Dummy = 1 if there is a minimum guaranteed return.	+	0.36	0	0.48	1	0	1.43
<b>Guarantee_type</b>	Dummy = 1 if the minimum guaranteed return is greater than a capital guarantee.	+	0.67	1	0.47	1	0	518
<b>Discretionary_choice</b>	Dummy = 1 if the guarantee operates in case of voluntary changes of fund or investment line.	+	0.29	0	0.46	1	0	511
<b>No_managers</b>	Number of investment firms in charge of portfolio management.	-	1.45	1.11	0.25	9	1	1.42
<b>No_foreign_managers</b>	Number of foreign investment firms as a percentage of total managers.	-	0.28	0	0.43	1	0	1.42
<b>Relevance_foreign_managers</b>	Assets under management (AUM) by foreign investment firms to total AUM.	-	0.25	0	0.41	1	0	1.31
<b>Fund_type</b>	Dummy = 1 for closed funds.	+	0.40	0	0.49	1.00	0	1.4
<b>Nav</b>	Natural logarithm of the fund's NAV.	-/+	16.97	17	1.88	22.29	10.02	1.42
<b>Net_contribution</b>	Annual net contribution to NAV.	-	0.26	0.20	0.210	2.86	-1.36	1.40
<b>Benefits</b>	Annual pension benefits to NAV.	+	0.012	0.006	0.020	0.33	0	1.40

*Note.* The Table presents a few descriptive statistics on the independent variables used in the multivariate analysis. For each variable column 2 summarises the computation methodology and column 3 indicates the expected sign on the basis of the theoretical explanations and assumptions explained in the text. The columns from 4 to 9 present the usual descriptive statistics for each variable i.e. the mean and median values, the standard deviation, the maximum and minimum values recorded in the entire sample (2008-2014) and the number of available observations.

As already explained in the previous paragraph, we measure the size of the domestic sovereign exposure for each investment line using two alternative dependent variables. The first one represents the share of sovereign bond portfolio invested in Italian Treasury bonds (Y1). The other variable compares the actual weight of Italian sovereign exposure to the relative share of Italian public debt over the total outstanding of European sovereign bonds on a yearly basis (Y2):

$$Y(2) = \frac{IT\ Sov\ Bonds}{Total\ Sov\ Bonds_{Fund(i);Year(t)}} - \frac{Italian\ Sov\ Bonds\ Out}{European\ Sov\ Bonds\ Out_{Year(t)}}$$

Where:

IT Sov Bonds: total amount of Italian sovereign bonds held by fund (i) at the end of year (t);

Total Sov Bonds: total amount of sovereign bonds held by fund (i) at the end of year (t);

Italian Sov Bonds Out: total outstanding sovereign bonds issued by Italian Treasury at the end of year (t);

European Sov Bonds Out: total outstanding of sovereign bonds issued by European countries at the end of year (t).

This latter variable allows us to estimate how much over- or under- represented is Italian sovereign risk in the investment portfolio of each investment line, using as a benchmark a “neutral” asset allocation, which simply mirrors the current structure of European sovereign market.

Table 4, 5 and 6 provide some univariate statistics concerning our two dependent variables considering the main explicative factors described above.

Table 4. Descriptive statistics on the share of domestic sovereign bonds

	Entire sample	Guaranteed lines
Y(1): Share of Italian sovereign bonds on UE sovereign exposure		
Mean	0.5431	0.6474
Median	0.5056	0.6333
Standard deviation	0.3040	0.2731
Max	1	1
Min	0	0
N. Obs.	1426	519
Mean difference (All - Guaranteed)	-0.1043***	
Y(2): Y(1) - Share of Italian debt on total UE area sovereign debt		
Mean	0.3571	0.4620
Median	0.355	0.4447
Standard deviation	0.3035	0.2723
Max	0.8240	0.8240
Min	-0.2108	-0.2108
N. Obs.	1414	518
Mean difference (All - Guaranteed)	-0.1049***	

*Note.* The Table presents a few descriptive statistics on the dependent variables: Y(1) = ratio between the value of Italian sovereign bonds and the total value of UE sovereign bonds in the portfolio of the fund. The ratio is computed for each investment line and for each year, based on the data provided by the asset side of the fund's balance sheet; Y(2) = difference between Y(1) variable and the ratio of the total amount of sovereign bonds issued by the Italian State on the total amount of sovereign bonds issued by all countries belonging to the EU. The data on the total amount of sovereign debt, at the end of each year, are published by Eurostat. For each variable the table details a few usual descriptive statistics i.e. the mean and median values, the standard deviation, the maximum and minimum values recorded in the entire sample (2008-2014) and the number of available observations. Column 2 and 3 present the data respectively for the entire sample and for the subsample of investment lines offering to participants a minimum guaranteed return. The last row of each section, devoted to each of the three dependent variables, reports the mean difference between the entire sample and the guaranteed lines, together with an indication of its statistical significance: \* = significant at 10% two-tailed confidence level; \*\* = significant at 5% two-tailed confidence level; \*\*\* = significant at 1% two-tailed confidence level.

Starting from Table 4, we can first observe that the exposure to domestic Treasury bonds is substantial for Italian pension funds, being on average 54.31 per cent of total sovereign portfolio. This weight is much higher than it

should be in a neutral portfolio allocation. The mean over-exposure compared amounts to 35.71 per cent. The share of domestic sovereign bonds is even more significant in the subsample of guaranteed lines that normally have narrow investment mandates and very conservative portfolio allocation (De Vincentiis et al., 2016). In this case, in fact, the average weight of Italian Treasury bonds is 64.74 per cent and the mean over-exposure rises to 46.20. These data clearly indicate that sovereign portfolio allocation is substantially distorted towards domestic public debt.

In Table 5 we can observe the average share of domestic sovereign exposure as a function of two core features of the investment mandate, namely the maximum amount of equity allowed in the asset allocation and the geographical extension of the investment spectrum, with particular reference to the possibility of buying securities outside Europe. The Table also reports the mean level of our two dependent variables by risk level of the investment line, as declared in the fund Statute, both for the entire sample and the subsample of guaranteed compartments. The data confirm once again the greater domestic sovereign exposure that characterises the investment lines with a minimum return guarantee. Furthermore, we can observe how the presence of stricter constraints in the investment mandate are associated with a higher degree of home sovereign exposure and over-exposure compared to a neutral portfolio. Indeed, funds who can invest only in the European area have on average a higher share of domestic securities in their sovereign portfolios, compared to the investment lines that are not geographically constrained. The difference in the mean values of the dependent variables is highly significant from a statistical point of view. Similarly, the funds that can invest less than 25 per cent in equities tend to overweight their domestic sovereign exposure. In this case the evidence is somewhat weaker, but the sign of the mean difference is consistent with our expectations. The domestic sovereign exposure and over-exposure is negatively correlated to the risk level of the investment line. This evidence is coherent with the weaker investment constraints that normally characterise the riskier compartments of pension funds.

Table 5. Descriptive statistics on the share of domestic sovereign bonds by type of investment mandate (values in percentage)

	Entire sample		Guaranteed lines	
<b>Y(1): Share of Italian sovereign bonds on UE sovereign exposure</b>	Mean	Obs	Mean	Obs
<b>Only Europe</b>	0.6472	349	0.6778	263
<b>All world</b>	0.5077	1053	0.6207	233
<b>Max equity &lt;25%</b>	0.6193	457	0.6575	337
<b>Max equity &gt;25%</b>	0.4923	658	0.6209	110
<b>Low and medium-low risk</b>	0.6012	614	0.6491	424
<b>Medium-high and high risk</b>	0.5093	435	0.6322	93
<b>Y(2): Y(1) - Share of Italian debt on total UE area sovereign debt</b>	Mean	Obs	Mean	Obs
<b>Only Europe</b>	0.4600	349	0.4908	263
<b>All world</b>	0.3220	1053	0.4373	233
<b>Max equity &lt;25%</b>	0.4338	457	0.4723	337
<b>Max equity &gt;25%</b>	0.3061	658	0.4350	110
<b>Low and medium-low risk</b>	0.4156	614	0.4641	424
<b>Medium-high and high risk</b>	0.3227	435	0.4452	93

*Note.* The Table presents the mean values of the two dependent variables (computed as described in Table 4) for different subsamples of observations defined as follows: Only Europe: Investment lines in which the asset manager cannot buy securities negotiated outside the European Union; All world: investment lines in which the asset manager is not geographically constrained in portfolio composition; Max equity < 25%: investment lines in which the asset manager cannot increase the amount of equity securities above the limit of 25% of total portfolio value; Max equity > 25%: investment lines in which the asset manager can increase the amount of equities above the limit of 25% of portfolio value; Low and medium-low risk: investment lines that are characterised by low or medium-low level of risk according to what declared by the Informative note distributed to investors; Medium-high and high risk: investment lines that are characterised by medium-high or high level of risk according to what declared by the Informative note distributed to investors. Column 2 and 3 detail the mean value and the number of observations for each subsample. Column 4 and 5 present the mean value and the number of observations restricting further the perimeter to the investment lines offering a minimum return to investors alongside the restrictions described above.

Table 6 offers a time distribution of the domestic sovereign exposure. The share of domestic sovereign bond in

portfolio increases until 2010 and then slightly reduces its magnitude. Two interacting factors can explain this reduction. On one hand, during the European sovereign debt crisis, the Italian T-bonds suffered from a significant price reduction, thus reducing their weight on the market value of the investment portfolio recorded at year-end in the balance sheet of the pension funds. On the other hand, the same crisis may have acted as a strong reminder of sovereign risk, pushing investment manager to reconsider their portfolio allocation and increase diversification. However, the data in Table 6 show that those funds that can invest only in Europe experienced a new growth in the sovereign home bias in 2014. In the empirical analysis the empirical evidence shown in Table 6 is captured by the fixed time effects.

Table 6. Descriptive statistics on the share of domestic sovereign bonds by year and type of investment mandate (values in percentage)

<b>Y(1): Share of Italian sovereign bonds on total sovereign exposure</b>							
	2008	2009	2010	2011	2012	2013	2014
<b>Whole sample</b>	0.57	0.58	0.59	0.54	0.53	0.50	0.49
<b>Only Europe</b>	0.55	0.68	0.74	0.65	0.64	0.62	0.67
<b>All world</b>	0.58	0.53	0.53	0.49	0.49	0.46	0.46
<b>Low and medium-low risk</b>	0.59	0.66	0.68	0.60	0.58	0.56	0.55
<b>medium-high and high risk</b>	0.57	0.54	0.49	0.51	0.53	0.48	0.42
<b>Y(2): Y(1) - Share of Italian debt on total UE area sovereign debt</b>							
	2008	2009	2010	2011	2012	2013	2014
<b>Whole sample</b>	0.36	0.38	0.40	0.36	0.36	0.33	0.31
<b>Only Europe</b>	0.34	0.49	0.55	0.47	0.47	0.44	0.49
<b>All world</b>	0.37	0.33	0.34	0.32	0.32	0.28	0.28
<b>Low and medium-low risk</b>	0.39	0.46	0.50	0.43	0.39	0.38	0.37
<b>medium-high and high risk</b>	0.36	0.34	0.31	0.33	0.35	0.30	0.24

Note. The Table presents the mean values of the two dependent variables by year on subsamples of observations defined according to the criteria detailed in Table 5.

To conclude our sample description, Table 7 analyses the other potential driver of domestic sovereign bias i.e. the composition and diversification of the pension fund's pool of asset managers. First, we can note the strong negative correlation between the total number of intermediaries involved in the portfolio management and the degree of sovereign domestic exposure. When the management team is more numerous, it is more likely that specialised intermediaries may be involved, thus enhancing portfolio diversification. A strong negative relation is also evident between the domestic sovereign bias and the weight of foreign intermediaries in the asset management team. This is true both when we look at the number of foreign managers and at the share of portfolio under their responsibility.

Table 7. Composition of the asset management team (values in percentage)

	Mean Y(1)	Mean Y(2)
<b>Total number of fund managers</b>		
<b>1,00</b>	0.5589	0.3728
<b>2,00</b>	0.5383	0.3531
<b>3,00</b>	0.4498	0.2634
<b>4,00</b>	0.4884	0.3004
<b>5,00</b>	0.4384	0.2542
<b>&gt;5</b>	0.3389	0.1562
<b>N. of foreign managers (in %)</b>		
<b>0%</b>	0.5998	0.4202
<b>Between 0 and 50%</b>	0.4939	0.3082
<b>Greater than 50%</b>	0.4186	0.2340
<b>% of AUM managed by foreign managers</b>		
<b>0%</b>	0.6012	0.3963
<b>Between 0 and 50%</b>	0.4508	0.2663
<b>Greater than 50%</b>	0.4113	0.2265



*Note.* The Table presents the mean values of the two dependent variables by year on subsamples of observations defined as follows: Total number of fund managers: number of financial intermediaries involved in the asset management of each investment line; Number of foreign managers in percentage: percentage of the financial intermediaries involved in the asset management whose headquarter is not located in Italy; Percentage of AUM managed by foreign managers: quota of each investment line's portfolio that is managed by a financial intermediary whose headquarter is not located in Italy. Univariate evidence is consistent with our hypothesis that home sovereign bias may depend not only on market familiarity of asset managers but also on mandate constraints, suggesting that an important aspect may have been overlooked in literature so far.

### 3. Empirical analysis

Using the dependent variables described in paragraph 2, we first perform a panel analysis, over the time-period 2008-2014, on the whole sample of 70 pension funds and 230 investment lines.

As baseline equation (1), we consider a set of explanatory variables related to the features of the investment mandates, the characteristics of the management team, fund-specific controls and investment lines, and time fixed effects.

$$Y = F(\text{Inv\_area}_{it}, \text{Guarantee}_{it}, \text{No\_managers}_{it}, \text{Relevance\_foreign\_managers}_{it}, \text{Fund\_type}_{it}, \text{Nav}_{it}, \text{Net\_contribution}_{it}, \text{Benefits}_{it}, \text{Investment-Line}_{it}, \text{Year}_t) \quad (1)$$

In equation (2) we simply test the role of foreign managers, no longer considering the share of their assets under management to the total AUM (Relevance\_foreign\_managers), as in the baseline model, but computing how many foreign investment firms are included in the fund management team (No\_foreign\_managers).

In Equation (3) we test results stability by dropping from the previous model investment lines and time fixed effects.

Table 8 reports our results and shows that the two main factors that affect the sovereign bond holding are a more rigid mandate in terms of minimum guaranteed return and the presence of foreign managers. They are significant in all model specifications and for both dependent variables.

Table 8. Result of the analysis

	Y(1)			Y(2)		
	(1)	(2)	(3)	(1)	(2)	(3)
<b>Inv_area</b>	-0.046 (1.80)*	-0.045 (1.86)*	-0.045 (1.93)*	-0.045 (1.86)*	-0.045 (1.88)*	-0.045 (1.86)*
<b>Guarantee</b>	0.116 (2.63)***	0.112 (2.69)***	0.113 (3.15)***	0.116 (2.60)***	0.113 (2.63)***	0.119 (3.27)***
<b>No_managers</b>	-0.026 (1.51)	-0.021 (1.58)	-0.025 (1.86)*	-0.027 (1.97)**	-0.021 (2.13)**	-0.025 (2.63)***
<b>No_foreign_managers</b>		-0.001 (4.47)***	-0.001 (5.37)***		-0.001 (4.51)***	-0.001 (5.40)***
<b>Relevance_foreign_managers</b>	-0.001 (4.77)***			-0.001 (4.90)***		
<b>Fund_type</b>	-0.027 (0.63)	-0.016 (0.42)	0.030 (0.8)	-0.027 (0.67)	-0.016 (0.45)	0.022 (0.62)
<b>Nav</b>	0.018 (2.05)**	0.018 (2.21)**	-0.002 (-0.280)	0.019 (1.87)*	0.019 (1.99)**	0.004 (-0.430)
<b>Net_contribution</b>	-0.070 (2.66)***	-0.073 (2.95)***	-0.034 (-1.470)	-0.071 (2.24)**	-0.074 (2.47)**	-0.049 (1.65)*
<b>Benefits</b>	0.000 (0.01)	0.000 (0.1)	0.002 (0.45)	0.000 (0.01)	0.000 (0.11)	0.002 (0.52)
<b>Intercept</b>	0.414 (2.76)***	0.411 (2.94)***	0.633 (5.15)***	0.201 (1.19)	0.199 (1.24)	0.353 (2.54)**
<b>Line-FE</b>	YES	YES	NO	YES	YES	NO
<b>Time FE</b>	YES	YES	NO	YES	YES	NO
<b>Prob&gt;Chi2</b>	0.000	0.000	0.000	0.000	0.000	0.000
<b>R-squared</b>	0.160	0.160	0.118	0.158	0.156	0.126
<b>Observatios</b>	1221	1331	1363	1220	1330	1362

*Note.* Panel analysis with Y1 (Share of Italian sovereign bonds on UE sovereign exposure), Y2 (Y(1) - Share of Italian debt on total UE area sovereign debt. Huber-White heteroscedasticity-consistent standard errors for specifications (4), (5), (6). \* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

More in details, the weight of Italian sovereign bonds increases by 11 per cent, if the fund provides a minimum return guarantee, while decreases when foreign managers count more. This evidence is in line with the study of Lippi (2016). However, we note that the dimension of this reduction is quite small. In fact, a 1 per cent increase in the share of AUM allocated to foreign managers generates roughly a 0.1 per cent reduction in the asset invested in Italian sovereign bonds. Thus, we conclude that, as far as the exposure of domestic credit risk is concerned, the influence of foreign managers is not incisive, except for the case they manage a relevant share of fund's assets.

The variable *Inv\_area*, shows that extending the investment spectrum outside Europe leads to a 4.5 per cent decrease in the share of assets allocated to domestic sovereign bonds, even if the statistical significance of the relation is quite weak.

We then observe that funds with larger sizes are more overexposed towards their national debt, while funds with more substantial net contributions, that means cash flows to be invested, diversify more their asset allocation reducing the weight of the Italian sovereign bonds in their portfolios. These evidences are coherent with the role played by institutional investors in supporting public financing demand and, at the same time, with their need of risk diversification.

A second step of the analysis consists in investigating in depth the guaranteed lines since the presence of a guarantee commitment is the more significant factor that increases the share of domestic sovereign bonds in the European sovereign portfolio. On a sub-sample of 81 guaranteed-investment lines belonging to 70 funds, we estimate equation (4), which adds to equation (1) controls for the guarantee commitment. Firstly, we test the influence of the type of guarantee provided between a capital guarantee and a higher minimum guaranteed return (*Guarantee\_type*). Secondly, we investigate the influence of the dummy *Discretionary\_choice*, which is equal to one, if the guarantee also applies when the adherent exercises his discretionary option of leaving the guaranteed line, i.e. changing risk-profile inside the same fund or moving to another pension fund.

Outcomes in Table 9 show that both guarantee-specific controls are significant. A guarantee commitment higher than the zero nominal rate increases the domestic sovereign bias by 6 per cent. It is worth noting that more than half of the guaranteed lines offers a minimum guaranteed return higher than the capital guarantee. Conversely, the extension of the guarantee obligation to circumstances that entail a discretionary exit from the fund by adherents reduces the share of Italian bonds by 6.6 per cent. Actually, it is likely that in this case a greater cash flow instability induces managers to keep a higher share of deposits and other liquid assets, such as sovereign bonds of high-rated issuers. It is interesting to notice that reducing the sample to the guarantee lines that have a stronger commitment to portfolio returns, the geographic limits of investment mandates acquire explicative power. Enlarging the opportunity set helps funds manager to go shopping for yields in different countries and asset classes, and thus better diversify their portfolios.

We finally observe the same influence of foreign managers we have found for the whole sample (Table 8). A one per cent increase in the share of assets managed by foreign managers reduces by 0.1 per cent the weight of Italian sovereign bonds in portfolio.

Table 9. Results of the analysis on guaranteed lines

	Guaranteed lines	
	Y1	Y2
	-1	-2
<b>Inv_area</b>	-0.061 (2.36)**	-0.06 (2.34)**
<b>Guarantee_type</b>	0.067 (1.90)*	0.066 (1.86)*
<b>Discretionary_choice</b>	-0.069 (1.87)*	-0.068 (1.84)*
<b>No_managers</b>	-0.108 (1.55)	-0.108 (1.55)
<b>Relevance_foreign managers</b>	-0.001 (2.52)**	-0.001 (2.49)**
<b>Fund_type</b>	-0.022 (0.36)	-0.021 (0.35)

<b>Nav</b>	0.011 (0.73)	0.011 (0.75)
<b>Net_contribution</b>	-0.152 (3.13)***	-0.154 (3.13)***
<b>Benefits</b>	0.003 (0.61)	0.003 (0.62)
<b>Intercept</b>	0.747 (3.20)***	0.532 (2.28)**
<b>Line FE</b>	YES	YES
<b>Time FE</b>	YES	YES
<b>Prob&gt;Chi2</b>	0	0
<b>R-squared</b>	0.151	0.144
<b>Observations</b>	475	474

Note. Panel analyses with Y1 (Share of Italian sovereign bonds on UE sovereign exposure), Y2 (Y(1) - Share of Italian debt on total UE area sovereign debt). In column (1), (2), Huber-White heteroscedasticity-consistent standard errors in parenthesis. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

In summary, the sovereign home bias in Italian pension funds is mainly due to the rigidity of the investment mandate to asset managers, in particular to the presence of minimum guarantee return and the available investment area. The foreign nationality of the investment team helps to lighten the weight of Italian debt holdings, but the effect is smaller than expected. The structural features of the funds, instead, do not strongly influence the overexposure towards domestic sovereign bonds, with the partial exception of the size of the fund.

#### 4. Conclusion

The paper investigates the determinants of Italian pension funds' exposure to the domestic sovereign bonds during the period 2008-2014. The analysis focuses on a sample of 70 funds, which represents more than 70 per cent of the market in terms of NAV. In order to avoid endogeneity problems, we compute our dependent variables adopting two alternative methods that allow a proper evaluation of the exposure toward Italian sovereign bonds among funds with different risk-profiles. To this end, we consider the share of Italian sovereign bonds over the European sovereign portfolio and we compare this measure with the weight of Italian sovereign bond in a risk-neutral portfolio. This way, we obtain a measure of sovereign home-bias that we apply in a panel analysis.

We investigate the drivers on sovereign home bias along two main explicative arrows: the familiarity or information theory, which focus on the greater knowledge investment firms have of their domestic markets, and the opportunity set theory, which focus on the degrees of freedom characterising the investment mandate and in the consequent richness of alternatives available for the portfolio managers.

The empirical work is focused on the Italian pension funds sector which is interesting for the combination of a large and liquid domestic sovereign bonds market coupled to a relevant level of return premium over risk-free benchmarks. The familiarity of investment managers and the restriction to the opportunity set could in this peculiar environment particularly boost the exposure to home sovereign risks, decreasing portfolio diversification.

Results indicate that both factors are significant in explaining the extent of domestic bias. However, from a quantitative point of view, the main determinant of an increase in the weight of Italian sovereign bonds is the presence of restrictions in the investment mandate. The existence of a minimum guaranteed return determines on average an 11 per cent increase in the share of the European sovereign portfolio allocated to Italian bonds. Those guaranteed lines offering a commitment greater than the zero nominal rate show, on average, a share of sovereign portfolio invested in domestic treasury bonds 7 per cent higher than that of lines providing only a capital guarantee. Extending the investment spectrum outside Europe the share of Italian sovereign bond decreases by 4.5 per cent on average, but the benefits are greater for guaranteed lines (a 6 per cent reduction).

In line with previous empirical literature on home bias, which however does not investigate the specific issue of the domestic-sovereign-bias, we find evidence of a lower concentration of the Italian sovereign risk as the share of AUM to foreign managers increases. However, the intensity of this association does not appear incisive.

This paper contributes to shed some light on the sovereign risk-exposure of financial institutions that have received far less attention than banks, such as pension funds. Since pension funds evaluate their assets at market

price, large price movements in domestic sovereign bonds may have a substantial impact on their performance and on the benefits offered to adherents. Solvency problems are also likely to occur for pension funds that offer minimum return guarantees. Our empirical analysis suggests that the level of sovereign risk exposure, which characterises Italian pension funds, is not only a matter of experience, familiarity or geographical proximity of the management team, since it appears related to the perimeter of the investment mandate. Adherents should be aware and properly informed about such concentration risk especially when they decide to join low-risk investment lines that offer capital protection and/or minimum return. Regulators should better address the effects of investment mandate restrictions on the stability of the Italian pension fund industry, considering that such a large sovereign home bias could eventually undermine the adherents' private pension payments in case the worsening of the country's financial conditions affects the public pension system.

This finding suggests that exposure to the domestic-sovereign risk of Italian pension funds would probably reduce after specific mandate restrictions have loosened and international competition among asset management firms increased. Based on our results, a useful stream for future research could be an in depth investigation of the relationship between mandate restrictions and asset allocation biases in the mutual fund industry.

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