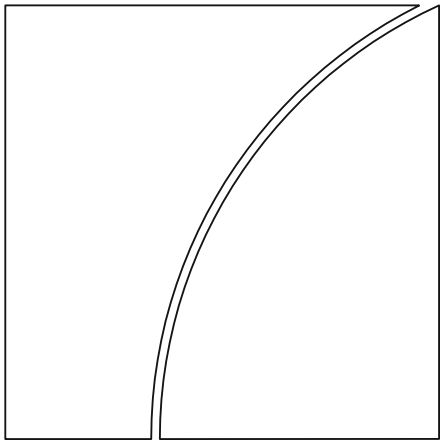

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Global pension asset allocations and debt markets

by Ding Ding, Xiang Fang, Bryan Hardy and Karen Lewis

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Global pension asset allocations and debt markets[1]

Ding Ding, Xiang Fang, Bryan Hardy and Karen Lewis

Abstract

The pensions sector is an important investor group in global financial markets and a key holder of government and corporate debt. This paper examines the evolution of pension fund asset allocations around the globe and documents important structural changes. Over time, pension investors have shifted from fixed income securities to mutual fund shares. In the meantime, they have also reallocated from traditional investments into alternative investments. Evidence from US pensions suggests that the decline in the fixed income share is due to both private and public debt. We hypothesise that a global decline in interest rates is one potential driver of this change. Using a global sample, we document that declining local currency government bond yields are associated with lower bond shares in pension portfolios and higher shares of mutual fund and foreign assets. We discuss the potential implications of these trends for borrowing costs.

Keywords: Pension funds, debt, interest rates, asset allocation, portfolio investment

JEL classification: G11, G15, G23

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1. Introduction

Government debt has rapidly expanded over the past several decades. This trend was given an extra boost by the policy response to the Covid-19 pandemic, notably in advanced economies (AEs). Alongside the increase in government debt, the total size of fixed income securities (including private debt) has significantly expanded worldwide. In the meantime, there has been a shift in the financial system towards non-bank financial intermediaries (NBFIs), who are also key investors in fixed income markets (BIS (2025)). As debt expands, the behaviour of investors becomes increasingly important to borrowers (Fang et al (2025)). Similarly, the stability and returns provided by debt holdings are of increasing importance to investors. This paper focuses on one particular type of NBFI investor: pension investors.

Fixed income is a crucial asset class held by the pensions sector. It provides pensions with stable returns and enables them to achieve their risk-return trade-off and liquidity needs to meet performance benchmarks and manage risks. Conversely, the pensions sector is also an important investor in the fixed income markets specifically. Moreover, pension investors are typically viewed as long-duration, buy and hold investors whose relatively stable demand compared with other investors exerts a stabilising influence on bond prices. While the link between pensions and fixed income markets remains important in both directions, the increasing scale of the fixed income market, the growth of other NBFIs and other cyclical developments may have impacted this relationship.

This paper documents the evolution of asset allocation in the pensions sector worldwide, with particular attention to debt markets. We use a number of different data sources around the globe to document the pension fund portfolio reallocation noted above and cover three main groups of countries: the United States, advanced European economies and emerging market economies (EMEs). We take an international perspective and examine common trends in portfolio allocation by pension investors around the world.

We first show that fixed income securities (eg bills and bonds) have declined as a share of pensions' asset allocations over time. In its place, pensions have shifted towards riskier assets, particularly holding shares in mutual funds. All country groups have witnessed a similar trend. US pension investors reduced their fixed income securities holdings from close to 40% in the early 1980s to around 10% in 2023, while the proportion of their total holdings held in mutual funds increased from negligible to a significant share, close to 30%. Fixed income securities holdings in advanced European economies also dropped from a 35% share in the early 2000s to less than 20% in recent years. In the early 2000s, EME pensions held a large proportion of fixed income securities, up to 80% of their total portfolios, but this ratio has declined to 50% in recent years. For advanced European economies, we further show that the increased holdings of mutual funds does not represent an expansion of bond exposures indirectly through the investments made by these funds. Generally, pension investments worldwide have shifted to riskier assets with higher potential returns, but they have done so mainly in an indirect manner, by holding shares in other investment funds.

In the meantime, the pensions sector has also experienced a shift from traditional investments to alternative investments, such as private equity, real estate, hedge funds

and other alternatives. This trend is shared by pension investors in multiple AEs, including the United States, Canada, the euro area, the United Kingdom, Switzerland and Australia. This shift coincides with the general growth and development of alternative investments in recent decades. These alternative asset investments, though often riskier than government bonds, expose pension investors to more diverse investment opportunities, help them diversify risks further and provide them with a chance of achieving higher returns.

It is not clear whether the documented declining share of fixed income securities allocation by pension investors is driven by a shift away from public debt, private debt or both. Although comparable international data over a sufficient time span to examine this in detail are not available, portfolio allocation data for US pension investors show that a shift away from both public and private debt have contributed to the decline. The ratio of pension investors' holdings of public debt to their overall holdings of fixed income securities has fluctuated over time and has experienced several cycles. This ratio reached its trough in the mid-2010s and reversed afterwards.

Another significant structural change in the pensions sector is a shift from defined benefit (DB) to defined contribution (DC) pension plans. As DB plans promise a fixed payout for life and longevity has increased, the funding required to honour those promises increases. Thus, population longevity creates balance sheet stress for plan sponsors (often employers or the public sector), making DB schemes more difficult to manage. By contrast, the transition to a DC-dominant pension market implies that asset allocation decisions and flow sensitivities become more market driven and less liability anchored. We therefore extend our cross-country data analysis to consider the differences in asset allocation patterns between DB and DC pension plans. We find that both DB and DC plans have seen the same trend of moving away from debt to mutual fund shares.

These large structural changes in financial markets happened in the midst of a variety of interest rate environments, including the low-rate period following the Great Financial Crisis (GFC) and the more recent return to high rates. These environments affect the rate of return on government debt and thus the demand from pensions and other investors to hold it. Therefore, we hypothesise that the decline of pension investors' fixed income securities allocation is driven by the secular decline in interest rates globally. As returns to fixed income securities fell, especially post-GFC and post-Covid, pensions needed to turn to other assets in order to maintain their performance. We explore this possibility with a cross-country data panel of pension holdings and country-level interest rates.

Consistent with our hypothesis, we find that as the local currency government bond yields fall in a country, pension investors in the country allocate wealth away from fixed income securities and towards other assets, such as equities, mutual fund shares and foreign assets. In particular, the substitution seems strongest for foreign assets, followed by mutual fund shares, while the substitution into direct equity holdings is less substantial. These substitution patterns are strongest for DB plans, consistent with having greater pressure to deliver returns.

Pension investments in AEs and EMEs could differ in response to changes in local government bond yields, given that the former's sovereign debt is typically viewed as more safe and liquid. Qualitatively, their portfolio allocation responses are similar, shifting away from bonds into mutual fund shares and foreign assets when domestic

bond yields are low. In terms of the magnitude, EME investors' domestic bond holdings are more sensitive to domestic bond yields. On the other hand, AE pension investors more aggressively shift to foreign assets when domestic interest rates are low, consistent with a "search for yield" motive.

These findings have important implications for the debt markets and financial stability. Pensions, with long-dated and relatively predictable liabilities, are commonly viewed as the natural "stable hands" for holding long-term government bonds. By contrast, open-ended funds and other NBFI investors stepping into the government and corporate bond markets offer daily liquidity and are more exposed to investor runs and procyclical flows.[2] The retreat of pensions from debt shifts the investor base for sovereign and corporate bonds towards other investors such as investment funds. This reallocation could change the demand at different maturities (as pensions disproportionately hold long-term bonds) and generally affect borrowing costs along the yield curve. These investors could also be more volatile during times of stress. For pensions themselves, our results suggest they have shifted to potentially riskier and less liquid investment strategies in order to maintain their returns. If pensions face sudden liquidity pressures (such as in the 2022 liability driven investment (LDI) crisis in the United Kingdom), they may have fewer high-quality liquid assets to sell to meet them, leading to fire sales in other asset classes. Such fire sales could also trigger redemption pressures in investment funds if pension funds redeem the shares they hold to meet immediate liquidity needs.

Literature

This paper relates to various strands of the literature. First, one line of research has noted the shift in pensions towards riskier assets. For example, the rising share of equities in US pension portfolios has been observed since the 1980s for both public and private plans, and both DB and DC plans (Munnell and Soto (2007)).[3] Part of this trend could be driven by the growth in the market value of equities. Consistent with this view, evidence from Bikker et al (2010) and Rauh (2009) suggests that such valuation changes are not fully rebalanced on average. We show that these trends have continued, providing evidence across countries and highlighting, in particular, the move to mutual fund shares and alternative assets. We further document an increase in pension holdings of (riskier) alternative assets (Ivashina and Lerner (2018), Begenau et al (2025)). Using more recent data and a broader country sample, we provide new evidence of their growing participation in private credit.

Another strand of the literature seeks to understand the reasons for the evolving pension asset allocations over the past four decades, including the role of funding status, accounting standards, fiscal constraints and regulatory rules. Focusing on the United States, Brown and Wilcox (2009), Novy-Marx and Rauh (2009), Pennacchi and Rastad (2011), Andonov et al (2017) and Giesecke and Rauh (2023) show that when liability discount rates are linked to expected returns, pension funds increase their exposure to risky assets. Mohan and Zhang (2014) and Lu et al (2019) document that

[2] See Zhou (2024), for example.

[3] Zhao and Sutcliffe (2021) find that pension asset allocation for DB funds in the United Kingdom follows a time trend, which could reflect structural factors or a persistent trend in returns on fixed income.

underfunded public plans increase risk exposure, potentially shifting risk to future taxpayers or state debt holders. Andonov et al (2025) further show that funds facing persistent negative cash flows adjust primarily through asset sales rather than portfolio de-risking. Jansen (2025) uses Dutch pension funds to highlight how regulatory changes can affect the portfolio holdings of government debt. We complement this literature by providing cross-country evidence on long-run reallocations across major asset classes and by relating them to long-term interest rates.

The shift towards increased holdings of mutual fund shares that we document links our results to analysis of fund of funds structures in retirement systems. Such structures shape asset allocation, fees, performance, mutual fund flows and asset prices (Madrian and Shea (2001), Pool et al (2016, 2025), Kronlund et al (2021), Yang (2025)). Particularly in the United States, a growing literature (Parker et al (2023), Fang and Goldstein (2025), Loseto and Yang (2025), Parker et al (2025)) studies the rise of target date funds (TDFs) as an important option in DC plan menus and their implications. While most of this work focuses on DC plans, our work analysis shows similar trends playing out across different countries and across different plan types, including DB plans.

Our paper further sheds light on the asset pricing implications of heterogeneous institutional investors in debt markets. Preferred habitat theory (Greenwood and Vayanos (2010, 2014), Vayanos and Vila (2021)), demand-based asset pricing frameworks (Koijen and Yogo (2019, 2023)) and models of institutional bond pricing (Bretscher et al (2025)) provide complementary perspectives on how investor clientele and heterogeneity shape bond prices, term structure and credit spreads. Da et al (2018), Aldunate et al (2025), Jansen (2025) specifically show how demand shifts by pensions move asset prices and affect yield curves. One key market is that of sovereign debt, in which pensions are key investors. Arslanalp and Tsuda (2014a,b) and Fang et al (2025) decompose aggregate government debt into different investor categories and document the evolution of the investor base. Fang et al (2025) show that the composition of investors (particularly their price sensitivity) impacts sovereign borrowing costs. This paper digs further into the behaviour of a particular investor (pensions), within the generic "non-bank" category. Further, by documenting systematic reallocations of pension portfolios in response to changes in long-term government bond yields, our findings contribute to understanding how liability-driven investors transmit interest rate fluctuations into sovereign and credit markets.

The remainder of this paper is structured as follows: Section 2 describes the data, Section 3 documents key patterns and trends in pension asset composition, Section 4 examines the links between government bond yields and pension asset allocation, Section 5 discusses the drivers of the structural shift and the implications for debt markets and Section 6 concludes.

2. Data sources

We draw on multiple data sources to document pension fund asset allocations. First, we use the Organisation for Economic Co-operation and Development (OECD) Global Pension Statistics, which provide annual cross-country information on pension

portfolios for 87 countries, including detailed breakdowns by asset class. The main asset categories include bills and bonds, equities and mutual fund shares. These data are used to describe global patterns in pension portfolios across countries.

For US pension funds, we leverage two additional data sources. First, we use data from the Financial Accounts of the United States (Z.1), published by the Board of Governors of the Federal Reserve System. The financial accounts provide time series information on US pension fund asset holdings by financial instrument and by plan type, which we use to analyse portfolio allocation patterns within the United States.

Second, we use data from the Public Plans Database (PPD) to study pension participation in alternative investments. This data set includes detailed information on asset allocations of US state and local pension systems. These data allow us to document the evolution of pension exposures to private market vehicles, including private equity, real estate and other alternative investments.

We additionally use Preqin Investor data to obtain fund-level information on pension investments in alternative assets across countries. The data cover both public and private pension funds and provide breakdowns of alternative asset classes, including private equity, private credit, real estate, infrastructure, natural resources and hedge funds.[4] In our sample, the data set includes 2,431 US pension funds with total assets under management (AUM) of $9.9 trillion, as well as 274 funds in Canada, 446 in the euro area, 361 in the United Kingdom, 160 in Switzerland and 60 in Australia, among others. This coverage allows us to construct cross-country evidence and to directly observe pension participation in specific private market segments that are not separately identified in other sources. Government bond yield data for each country used in the regressions are obtained from the Finaeon database.

3. General trends in pension asset allocations

This section presents facts on the evolution of pension fund asset allocations globally. We compare trends across three groups of countries: the United States, advanced European economies and EMEs. We keep a balanced sample of countries in the figures.

Pension funds have been pivotal investors in many countries. As of late 2025, data from the Financial Accounts of the United States (Z.1) show that US pension funds manage approximately $29.6 trillion in assets, equivalent to around 96% of US GDP. In data for the euro area from the European Central Bank, pension funds manage approximately €3.6 trillion of assets, representing about 24% of the region's GDP.

In conjunction with their continued importance, the past several decades show important trends in pension funds' portfolio allocation that significantly impact these asset markets. As we show below, pension funds around the globe have been shifting away from fixed income securities to mutual fund shares, including alternative investments such as private equity and real estate. Within fixed income securities, we

[4] This data set relies on a number of sources including self-reports and imputed amounts from asset providers, and therefore may not accurately capture all pension portfolio holdings. Despite this caveat, we use these data to get a sense of investment trends given limited information on holdings of alternative investments.

utilise more detailed US data and document that US pension funds have been substituting public debt securities with private debt.

3.1. From fixed income securities to mutual fund shares

One key development of the pensions sector has been a shift away from holding fixed income securities to corporate equities and mutual fund shares. This shift is illustrated for our three country groups in Graph 1, which plots the time series of pension fund portfolio shares in four asset classes: cash and deposits; bills and bonds; equities; and mutual fund shares and other collective investment schemes (eg exchange-traded funds (ETFs), money market funds and real estate investment trusts (REITs)).

There is a pronounced long-run decline in the share of bills and bonds over the past half century for US pension funds, which fell from over 35% of the total portfolio in the 1980s to below 15% in recent years (Graph 1.A). Over the same period, mutual fund shares rose sharply from negligible levels to more than 25% of the total portfolio, becoming one of the largest asset categories. The portfolio shares in equities experienced some fluctuations, rising from about 30% to more than 40% in the mid-2000s and dropping to the 1980 level after the GFC in 2007–08.

Advanced European economies show a similar pattern to the United States (Graph 1.B). Pension funds shift away from direct holdings of fixed income securities and towards greater exposure to mutual fund shares. The share of mutual fund holdings in pension portfolios rose steadily from below 20% in the early 2000s to more than 50% by 2023. Over the two decades the share of fixed income holdings fell from 35% to 20% of the total portfolio, while equities declined from 20% to 10%.

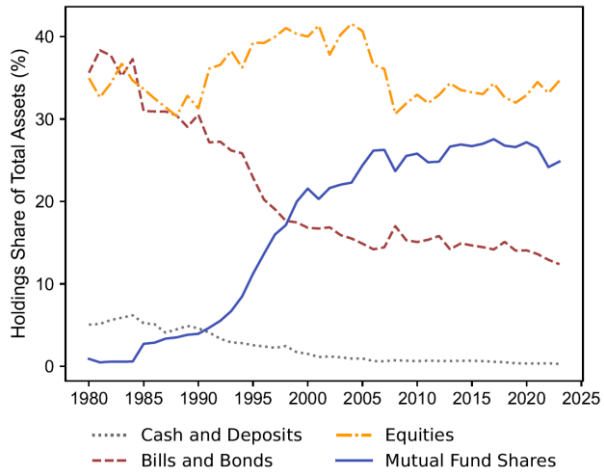
EME pension funds display a similar pattern (Graph 1.C). They mostly held fixed income securities in the early 2000s, accounting for close to 80% of their total portfolios. In the two decades since, this ratio dropped to around 50%, replaced by a significantly increased proportion of mutual fund shares.

The previous analysis treats mutual fund shares as a separate investment asset class. In recent years, pension funds' equity or fixed income holdings have increasingly been held through mutual funds, which implies that the true exposure of pension funds to fixed income and equity securities may be masked under the mutual fund shares. We will discuss this point next.

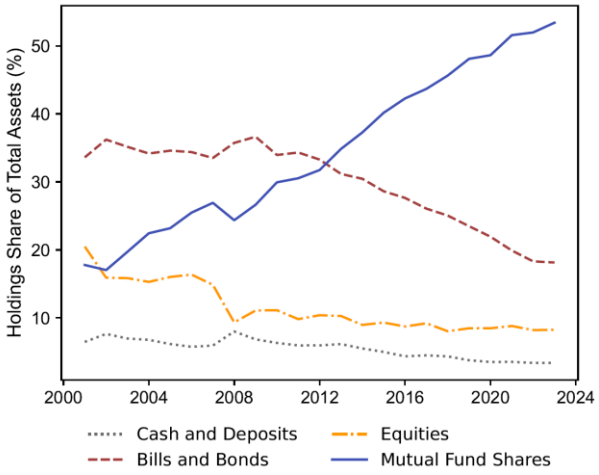
Pension fund asset allocation around the globe

Graph 1

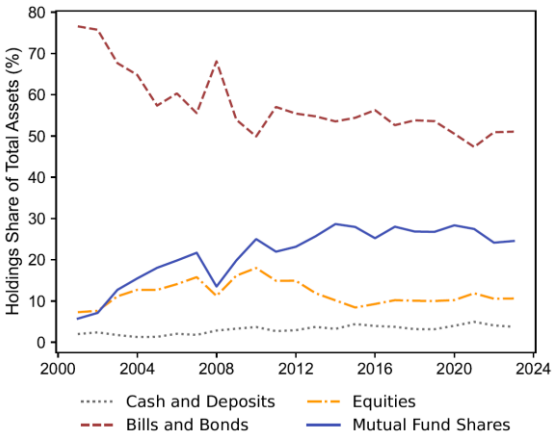
A. United States



B. Advanced European Economies



C. Emerging Market Economies



The graph shows aggregate pension fund asset holdings for the United States (in panel A), advanced European economies (panel B) and emerging market economies (panel C). Data are from the OECD Global Pension Statistics that span 1980–2023 for US, and 2001–23 for advanced European economies and emerging market economies. The sample includes only countries with continuous time coverage and no missing observations in any asset category (cash, bonds, equities and mutual fund shares). Advanced European economies include Denmark, Germany, Italy, Portugal, Spain and Switzerland. Emerging market economies include Bulgaria, Chile, Colombia, Estonia, Israel and Peru. Asset values are aggregated across countries within each group in nominal USD.

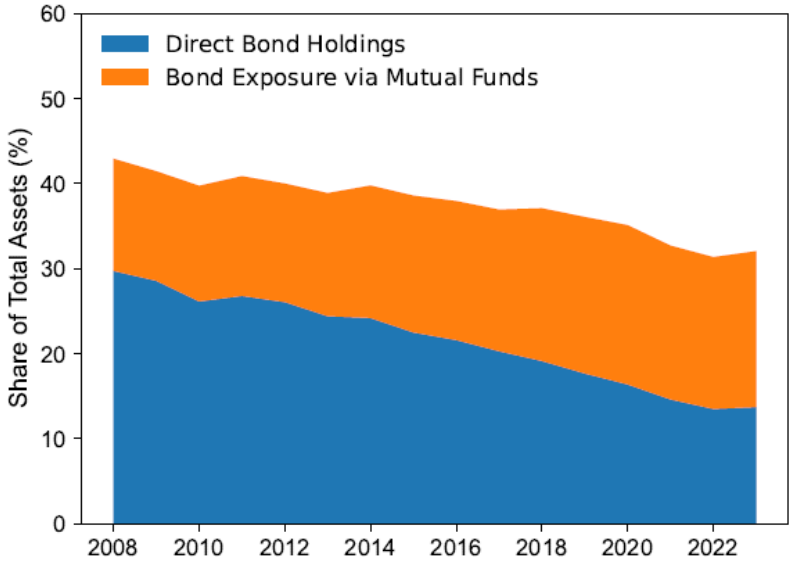
3.2. Direct versus indirect holdings

The trends we document above reinforce a broader shift away from direct fixed income securities (especially sovereign debt) towards mutual funds as intermediated investment vehicles, implying a rising prevalence of fund of funds structures. This evolution suggests a lengthening of the intermediation chain between the borrower and the investor. This raises important questions about pension funds' ultimate exposures. While there could be a shift away from government bonds and other fixed income assets, the shift to investment funds could reflect indirect holdings of fixed income securities.

Fully uncovering the ultimate exposure of pension funds to different types of securities requires information about the portfolio allocation of the mutual funds that are held by pensions. While detailed cross-country level information for these funds does not exist, the OECD data set provides a breakdown of pension fund holdings of bond mutual funds for a limited number of countries from 2008. Using these data for advanced European economies, Graph 2 shows direct holdings of fixed income alongside such securities held via their shares in bond mutual funds.[5] As this graph highlights, there is some substitution of direct bond holdings in favour of indirect bond holdings through mutual fund shares. Nevertheless, the rise in indirect bond exposure is too small to compensate for the overall decline in direct bond holdings.

Pension fund direct and indirect bond exposure in advanced European economies

Graph 2



The graph reports pension fund exposure to bonds through direct holdings and through mutual funds. The sample includes advanced European economies with available breakdown data (Germany, Italy, Portugal and Switzerland) over the period 2008–23. Direct bond holdings correspond to debt securities held outright by pension funds. Indirect bond exposure is calculated as pension fund holdings of mutual funds multiplied by the reported bond share within those funds. Asset shares are expressed as a percentage of total pension fund assets.

Source: OECD Global Pension Statistics.

3.3. From public to private debt securities

Section 3.1 documents that pension funds across the globe have been reallocating their portfolios from fixed income portfolios to mutual fund shares. Since the OECD data combine the bonds issued by the private and public sectors, we cannot tell how the composition of private versus public debt holdings changes and which drives the decline in total debt securities held by pensions.

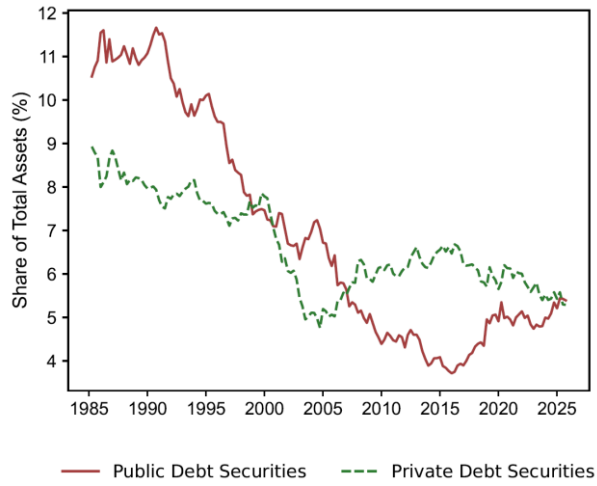
[5] The share reported is a weighted average across the four countries of Germany, Italy, Portugal and Switzerland.

The literature has shown that pension funds play an important role in both government debt (Fang et al (2025)) and corporate bond markets (Bretscher et al (2025), Koijen and Yogo (2023)). Documenting the relative importance of private and public debt in pension funds' portfolios has important implications for the operation of pension funds as well as for understanding these two markets.

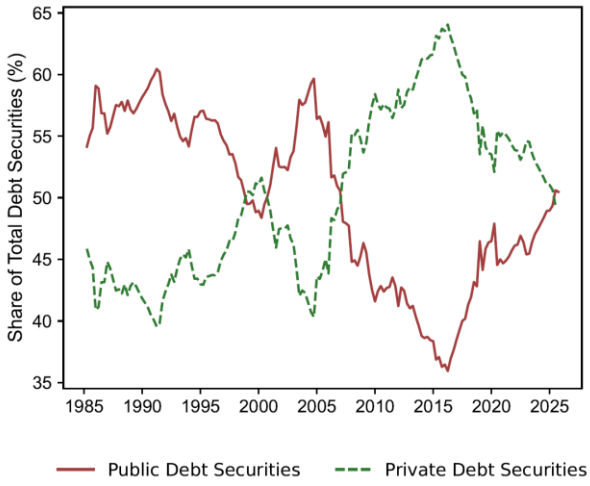
We rely on flow of funds data in the United States to examine the relative holdings of private and public debt by US pension funds. Graph 3.A shows that the share of both public and private debt has experienced a significant decline. Notably, the decline is more pronounced for public debt, which fell from about 11% in the late 1980s to around 5% of total assets by 2025. Private debt decreased more moderately, reaching a trough in 2005 at 5% and slightly increasing afterwards. The relative share of public debt within the fixed income portfolio declined significantly, as shown in Graph 3.B, although this trend reversed slightly after 2015.

Public vs private debt securities in US pension portfolios — Graph 3

A. Share of total assets



B. Share of total debt securities



This graph shows the evolution of US pension fund holdings of public and private debt securities. Public debt securities include Treasury securities, agency and government sponsored enterprise (GSE) securities, and municipal securities. Private debt securities include commercial paper, corporate and foreign bonds. Panel A reports each category as a share of total pension fund assets. Panel B reports each category as a share of total debt securities.

Source: Financial Accounts of the United States (Z.1), Board of Governors of the Federal Reserve System.

3.4. Defined benefit and defined contribution plans

A significant change that has occurred in recent decades in the pensions industry is that more countries are shifting from DB plans to DC plans. In a DB plan, the pension fund promises a fixed retirement income, often based on the worker's salary and years of service. The employer (or the public pension sponsor) is responsible for making sure that there is enough money to meet those payments, no matter how markets perform. This means that the investment risk ultimately lies with the sponsor, typically the employer or public sector entity, even though the pension fund manages the assets. Compared with DC plans, DB funds often invest more in long-term government and corporate bonds to match the long-term nature of their future payments. In

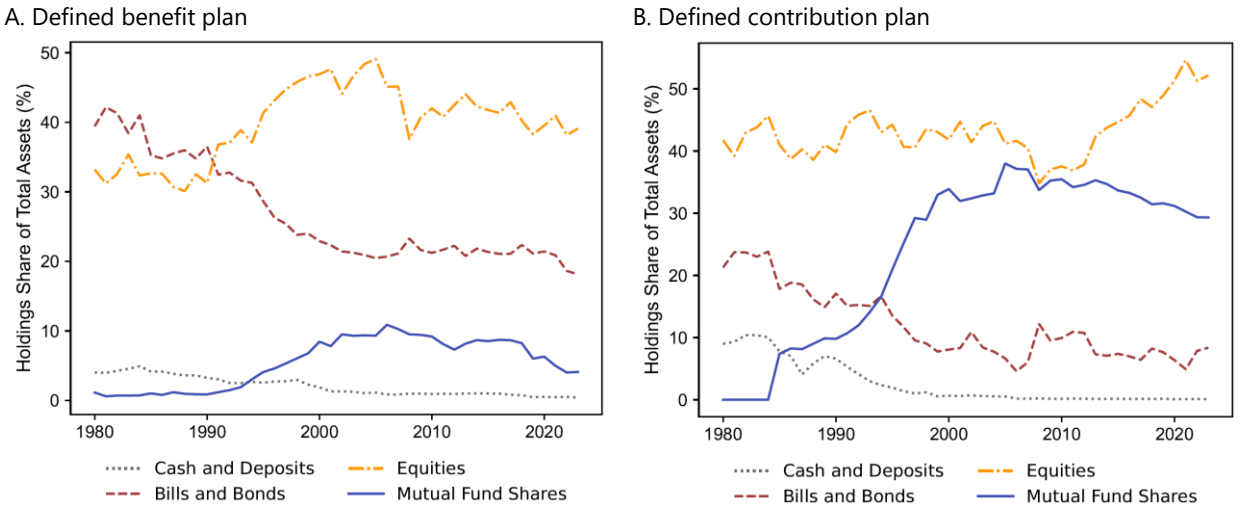
contrast, a DC plan does not have a guaranteed pension amount. Instead, workers contribute to individual accounts, and the final retirement income depends on how well the investments perform over time. In this case, the individual bears the investment risk, not the employer.

Graph 4 shows the changes of portfolio allocation into the same four asset classes as in Graph 1 for DB and DC plans in the United States. Similar to the aggregate trend, both DB and DC plans exhibit a gradual decline in direct fixed income security holdings and a corresponding increase in mutual fund shares, though their magnitudes differ. The decline of fixed income security share is larger for DB plans while the increase of mutual fund shares is higher for DC plans. Generally, DC plans have a higher share of investments in both equities and mutual fund shares.

Graph 5 provides a similar plot for pension funds in advanced European economies.[6] Similar to the aggregate trend and the trend in the United States, both DB and DC plans show a strong and sustained increase in mutual fund shares over time, accompanied by a steady decline in fixed income security holdings. Unlike the US trend, the decline of fixed income share is similar in DB and DC plans, but the shift by DB plans towards mutual fund shares is starker because it starts from a lower level.

Pension fund asset allocation by plan type: United States

Graph 4



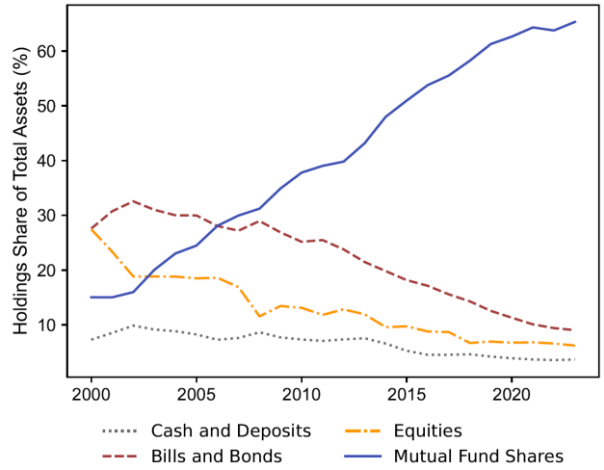
The graph shows asset allocation for US pension funds separately for defined benefit and defined contribution plans.

Source: OECD Global Pension Statistics.

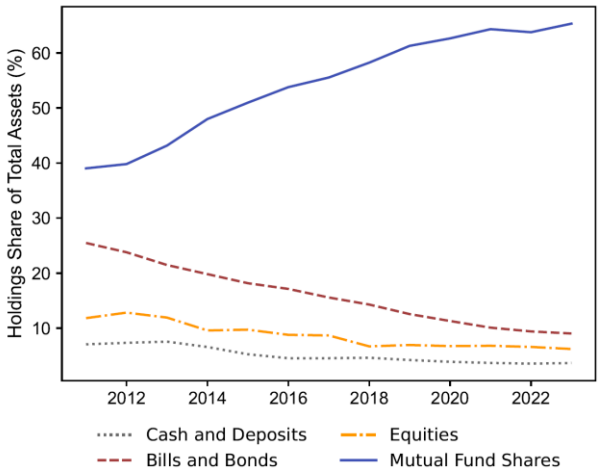
[6] The time coverage of DC plans is shorter than that of DB plans for advanced European countries in the OECD database.

Pension fund asset allocation by plan type: advanced European economies Graph 5

A. Defined benefit plan



B. Defined contribution plan



The graph reports asset allocation by plan type for advanced European economies (Denmark, Germany, Italy, Portugal, Spain and Switzerland). Asset shares are aggregated across countries within the group.

Source: OECD Global Pension Statistics

3.5. From traditional to alternative investment

The last pattern we document is that pension funds around the globe are shifting their portfolio shares from traditional assets of equities and bonds to alternative investments of private equity, real estate, hedge funds and others.

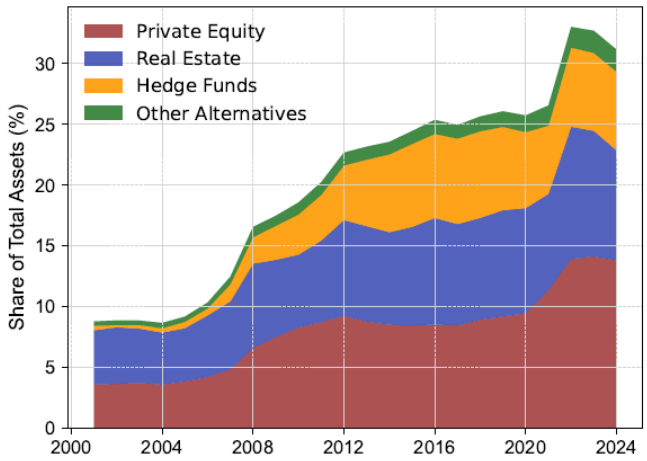
Graph 6 plots the time series of US state and local pension funds' holdings of the four types of alternative investments as a share of their total assets from the early 2000s to now. The graph shows a pronounced and persistent increase in allocations to alternative assets by these US state and local pension funds. The portfolio share of alternative investments rose from below 10% in the early sample to above 30% in 2024. This portfolio reallocation may have important implications for the operation of pension funds, as alternative assets tend to be less liquid and transparent. These features of alternative assets may thereby affect both the liquidity profile and aggregate risk exposure of pension portfolios.

The shift towards alternative assets is not a US-specific pattern. Data from Preqin illustrates such investments in an early 2026 cross-section covering the subset of pension funds in the United States, Canada, the euro area, the United Kingdom, Switzerland and Australia that hold some alternative assets.[7] Graph 7 plots the portfolio share and dollar value for alternative assets held by these funds. Across these six jurisdictions, the total amount of alternative investments for these funds is $0.5–2.5

[7] The Preqin data cover only pension funds that invest in alternatives, but may not include all such funds. Thus, total pension AUM in this sample does not represent the full universe of pension assets in each country, and the reported alternative shares are calculated relative to the AUM of pension funds covered by Preqin.

trillion, depending on the size of the pension fund sector in different countries. This amounts to 15–30% of their total assets. While the data set is not comprehensive for all pension funds in each jurisdiction (Preqin covers about 35% of the total pension assets in the United States), it is nevertheless suggestive of significant investment in alternative assets by pension funds in multiple jurisdictions.

US state and local pension alternative asset allocation Graph 6



This graph shows the evolution of alternative investment holdings of US state and local pension funds. Alternative assets include private equity, real estate, hedge funds and other alternative investments. Asset shares are expressed as a percentage of total assets managed by the pension funds.

Source: US Public Plans Database.

These patterns of significant and increasing pension investment in alternative assets are consistent with evidence documented elsewhere. Ivashina and Lerner (2018) document a broad-based expansion of pension allocations to alternative asset classes across countries between 2008 and 2017, spanning both public and private pension systems. These patterns are also aligned with recent evidence on pension participation in private markets. Ivashina (2025) surveys the growing role of pension funds as central investors in private credit markets and shows that pension funds have become increasingly important providers of capital to private firms and have expanded their role beyond traditional bank lending and public bond markets.

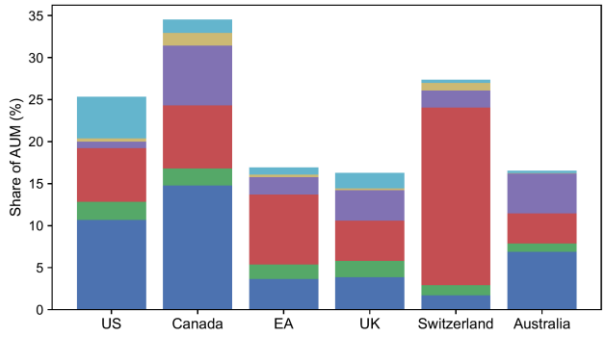
4. Pension portfolios and government bond yields

The trends documented in Section 3 raise important questions about the underlying forces and economic mechanisms behind this trend. This section examines one potential driver: the secular decline in interest rates in recent decades. Intuitively, when interest rates decline, pension investors seek higher-yielding investment opportunities to ensure better retirement income. In general, the literature has shown plenty of evidence that investors' portfolio allocations respond to changes in the price of debt (Bretscher et al (2025), Jansen et al (2025), Fang et al (2025)). This section provides

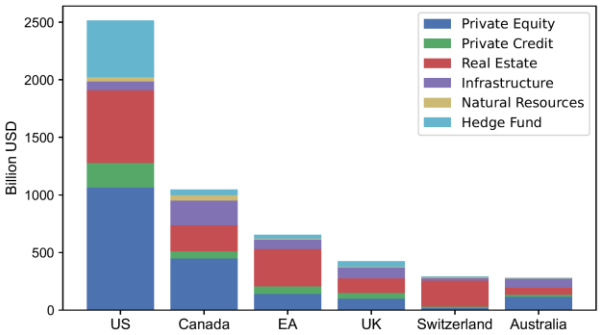
more systematic evidence on pension investors' portfolio allocation decisions in response to changing returns on fixed income investments.

Pension fund alternative asset allocation by country — Graph 7

A. Share AUM (%)



B. Total dollar amount



This graph shows alternative investment holdings of pension funds by country. The sample includes only public and private pension funds; for Australia, the sample corresponds to superannuation funds. Alternative assets include private equity, private credit, real estate, infrastructure, natural resources and hedge funds. Panel A reports asset shares as a percentage of total pension fund AUM. Panel B reports total alternative investment amounts in USD billions.

Source: Prequin Investor data.

4.1. Pension investors' portfolio allocation and interest rates

We examine the relation between pension funds' portfolio allocations and interest rates by using annual data from the OECD Pension Statistics, covering 87 countries from 1980 to 2023. We focus on the four asset categories highlighted in Section 3: domestic debt securities (including both public and private bonds), domestic equities, domestic mutual fund shares and foreign assets.[8]

Our objective is to assess how pension portfolio shares vary with the domestic interest rate environment. We measure the latter using each country's 10-year local-currency government bond yield, as pension funds typically hold long-maturity fixed income securities and discount long-duration liabilities at long-term rates. We estimate the following specification:

$$Share_{i,t} = \beta_0 + \beta_1 GovBondYield_{i,t} + \alpha_i + \varepsilon_{it} \quad (4.1)$$

where $Share_{i,t}$ denotes the portfolio share of a given asset class held by pension funds relative to their total AUM in country i in year t. α_i denotes country fixed effects that absorb time-invariant institutional and structural differences across countries. Standard errors are clustered at the country level.[9]

[8] The OECD Pension Statistics data do not break down debt securities into public and private.

[9] Including year fixed effects yields similar results.

Pension investors' portfolio allocation and government bond yields Table 1

	Bonds	Equities	MF shares	Foreign assets
Gov bond yield (%)	1.065***	–0.468*	–1.493***	–3.368***
	(0.361)	(0.246)	(0.397)	(1.054)
Observations	1005	1025	868	582
R^2	0.754	0.726	0.817	0.663

This table reports β_1 estimates of equation (4.1) for each asset class share. Standard errors are clustered at the country level and are reported in parentheses. ***, **, * indicates significance at 1%, 5%, 10% level.

Table 1 reports the results. As expected, shares of domestic bond holdings are positively correlated with domestic government bond yields, suggesting that investors increase holdings when yields rise. The first column indicates that a 1 percentage point decrease in the domestic 10-year yield is associated with roughly a 1 percentage point decline in the share of bonds in pension portfolios. This suggests that when domestic yields are low, pension investors rebalance away from fixed income securities.

A decrease in one share naturally leads to an increase in another. The next three columns show that pension fund investments shift into (away from) foreign assets, and to a lesser extent into domestic mutual fund shares and equities, as government bond yields fall (rise). For equity holdings, a 1 percentage point decrease in the 10-year yield corresponds to an increase in the equity share of around 0.5 percentage points, on average. For mutual fund shares, one sees a larger response than for equities (1.5 percentage points). Pension investors increase their holdings of foreign assets the most, with the coefficient being strongly negative and significant. A 1 percentage point decline in local currency government bond yields is associated with approximately a 3.4 percentage point rise in foreign asset holdings.

Together, these results suggest that low rates drive a search for yield among pension funds. The long period of low rates after the GFC and again after Covid could thus be linked to the shift away from government bonds and towards investment fund shares and other assets, among other drivers.

4.2. Defined benefit versus defined contribution plans

Section 3 documents differences in portfolio composition between DB and DC plans over time. We exploit the DB/DC classification provided in the OECD Pension Statistics and analyse portfolio shares separately by plan type. While some countries' pension systems are dominated by either DB or DC plans, others operate both types simultaneously. This variation allows us to compare the sensitivity of portfolio allocations to 10-year government bond yields across plan types within a unified framework. To examine this, we expand our panel so that the unit of observation is at the country-type-year level. Type has four categories: traditional DB; hybrid/mixed DB (which includes both a minimum DB and some benefits that depend on fund performance); protected DC (which protects the individual participant's pensions from some of the return risk); and unprotected DC (risks borne fully by the individual). We estimate the following specification:

$$Share_{i,type,t} = \beta^{DB}\left(DB_{type} * GovBondYield_{i,t}\right)$$

$$+\beta^{DC}\left(DC_{type} * GovBondYield_{i,t}\right) + \alpha_{i,type} + \varepsilon_{i,type,t} \qquad (4.2)$$

$Share_{i,type,t}$denotes the portfolio share of a given asset class held by pension funds of the four different types relative to the total AUM of each type in country i in year t. DB_{type} is a dummy variable equal to one for the two types of DB plans, and DC_{type} is likewise a dummy variable for the two types of DC plans. $\alpha_{i,type}$ are country-type fixed effects, which controls for time invariant differences in asset allocations for the four different plan types in different countries. The results are reported in Table 2.[10]

The first column suggests that DB plans' bond portfolio shares are more sensitive to changes in government bond yields, declining by 1.3 percentage points (pp) for a 1pp decline in the 10-year yield. DC plans also decrease their bond holdings when local currency bond yield is lower, but the magnitude is smaller and the statistical significance is much weaker.

Both DB and DC plans substitute away from domestic bonds into foreign assets when domestic bond yield is low, although the magnitude is much larger for DB plans. The final columns shows that a 1pp decrease is government bond yield is associated with 3.2pp increase in DB plans' share of foreign assets and a corresponding 1.4pp increase for DC plans. Holdings of mutual shares likewise rise as a share of the total, with DB plans having a larger rise. The portfolio share changes in equity have different signs for both DB and DC plans, though they are statistically insignificant.

DB vs DC: pension investors' portfolio allocation and government bond yields Table 2

	Bonds	Equities	MF shares	Foreign assets
DB x gov bond yield (%)	1.267**	0.322	–1.793***	–3.252***
	(0.557)	(0.390)	(0.651)	(0.810)
DC x gov bond yield (%)	0.209	–0.378	–0.763	–1.385**
	(0.289)	(0.293)	(0.492)	(0.576)
Observations	1091	1085	994	630
R^2	0.697	0.742	0.704	0.784

This table reports β^{DB} and β^{DC} estimates of equation (4.2) for each asset class share. Standard errors are clustered at the country level and are reported in parentheses. ***, **, * indicates significance at 1%, 5%, 10% level.

The results show that DB and DC plans similarly tend to rebalance portfolios from bonds to other asset classes when the domestic interest rate declines. The coefficients across the two plan groups are statistically different from each other for bond and foreign asset shares. However, the magnitudes are starkly different across all asset classes. The larger shifts in DB plans might be natural because the plan needs to generate enough return to support workers' predetermined benefits after retirement, while DC plans face no such constraints.

[10] Data are available on asset class shares separately by plan type for 67 out of 87 countries.

4.3. Advanced economies versus emerging market economies

In Section 4.1, we combine the pension investors in AEs and EMEs together. However, debt in AEs has different characteristics and dynamics from debt in EMEs. For example, many AE government bonds are considered safe or even reserve assets, while EME debt may be viewed as much riskier. Thus, pension investors located in AEs compared with EMEs may respond differently to changes in the interest rate environment. With observations again at the country-year level, we compare the portfolio allocation responses of pension investors in subsamples of AEs and EMEs as follows:

$$Share_{i,t} = \beta^{AE}\left(AE_i * GovBondYield_{i,t}\right) + \beta^{EME}\left(EME_i * GovBondYield_{i,t}\right) + \alpha_i + \varepsilon_{i,t} \quad (4.3)$$

AEs vs EMEs: pension investors' portfolio allocation and government bond yields Table 3

	Bonds	Equities	MF shares	Foreign assets
AE x gov bond yield (%)	0.899*	0.016	–2.083**	–6.715***
	(0.475)	(0.332)	(0.797)	(2.232)
EME x gov bond yield (%)	1.226**	–0.945**	–0.851***	–1.919**
	(0.529)	(0.378)	(0.307)	(0.758)
Observations	1005	1025	868	582
R^2	0.745	0.730	0.822	0.693

This table reports β^{AE} and β^{EME} estimates of equation (4.3) for each asset class share. Standard errors are clustered at the country level and are reported in the parentheses. ***, **, * indicates significance at 1%, 5%, 10% level.

Table 3 presents the results. The AE and EME pension investors exhibit similarity in their portfolio allocation behaviours in response to changes in government bond yields. When the yield is lower, they reduce their holdings in bonds and generally shift into equity, mutual fund shares and foreign assets. In terms of magnitude, EME pension investors are more responsive to changes in government bond yields with respect to their bond holdings. A 1pp decline in local currency 10-year bond yield is associated with a 1.23pp reduction in bond holdings for EME pension investors, while this number is 0.9 pp for AE pension investors. When domestic bond yield decreases, AE investors exhibit a strong substitution into foreign assets (6.72 pp) and mutual fund shares (2.08 pp). On the contrary, in response to a 1pp domestic interest rate drop, EME pension investors shift into foreign asset holdings by 1.92 pp, together with a 0.95pp higher share in equities and a 0.85pp higher share in mutual fund shares.

5. Implications for the debt markets

The shift of pension funds away from fixed income securities has important implications for both sovereign and corporate borrowers. As pension funds step back, other non-bank financial institutions, which have been rapidly expanding in size, step in as investors. Take government debt as an example, this trend moves the composition of investors away from more stable buy and hold investors with

potentially lower demand elasticities to more volatile investors with higher price elasticities. Fang et al (2025) find that non-bank investors have the highest price elasticities for sovereign debt, a result primarily driven by investment funds rather than insurance companies and pensions. Having an investor base with high price elasticities benefits the sovereign in terms of their borrowing costs, as it requires a smaller increase in yield to recruit these investors to purchase more debt (Fang et al (2025)). However, if these investors are also more flighty in the face of local or global risk, then their presence creates financial stability concerns for the sovereign. In effect, these funding sources could dry up when they need them the most.

The structural shift away from DB pension plans and towards DC plans may have similarly unintended consequences for financial stability. DC plans hold a lower share of debt and higher proportions of equities and mutual fund shares. If the pensions sector is dominated by DC plans, the debt market would lose a long-term stable source of funding. These patterns suggest a shift to flightier investors at a time when sovereign debt has expanded to recent highs relative to GDP.

Further, the shift to holding mutual fund shares means pension investor behaviour is important for the stability and liquidity of mutual funds. A substantial literature documents that bond mutual funds are vulnerable to flow-induced price pressure and fragility (Vissing-Jorgensen (2021), Ma et al (2022), Coppola (2025), Fang and Goldstein (2025)). Thus sudden adjustments in pension portfolios or redemption demands (eg the LDI crisis in the United Kingdom) can put outflow pressure on mutual funds, which may in turn amplify or transmit those shocks to the bond markets they invest in.

As a result, the evidence in this paper relates to the literature on retirement systems under changing macroeconomic and institutional developments, including population aging (Cocco and Gomes (2012), Poterba (2004, 2014)), sponsorship (Friedman (1982)) and differences between public and private pension plans (Lucas and Zeldes (2009), Munnell and Soto (2007)). For example, Poterba et al (2007) studies how DB and DC plans affect household wealth accumulation, while Rauh (2009) examines cost shifting associated with the transition from DB to DC plans. Our work above documents structural shifts in pension asset allocation and shows that both plan types have shifted more towards mutual funds and away from bonds. Therefore, this evidence suggests areas of future research to study how these shifts may impact bond markets.

6. Conclusion

Over the past decades, pension investors around the globe have been shifting away from fixed income securities into mutual fund shares and other potentially riskier assets. This shift occurs across countries and plan types. The declining share of fixed income holdings applies to both private and public debt and is not offset by indirect bond holdings through mutual funds.

These changes likely reflect both structural and cyclical drivers. Pensions use mutual funds to increase their exposure to riskier assets. We document evidence that supports the conclusion that a search for yield motive is contributing to this change.

These shifts have important financial stability implications for both the pension fund sector and the markets in which it is a large player (eg sovereign debt). Understanding these portfolio shifts is key for understanding the demand for debt and the consequent implications for borrowing costs. It is also crucial because stock market volatility may have important implications for pension fund viability as a greater share of the population ages towards retirement.

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