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Working Paper No. 698

De Nederlandsche Bank NV
P.O. Box 98
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The Netherlands

December 2020

The impact of trustees' age and representation on strategic asset allocations

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ABSTRACT

A board of trustees has the fiduciary duty to invest a pension fund's assets in the best interest of its beneficiaries. Trustees' characteristics should not affect their investment decisions. We find two counterfactual artefacts for corporate pension funds. First, a higher average board age lowers the strategic allocation to equity by 7 percentage points after controlling for the pension fund's characteristics. This way the strategic asset allocation does not fully reflect the beneficiaries' characteristics. Second, pension funds with a greater representation of employers on the board allocate more to equities. This fosters a principal-agent problem between employer trustees and beneficiaries.

JEL classification: G11, G23.

Key words: Pension Funds, Asset Allocation, Pension Fund Governance, Agency Problems

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An occupational pension fund pools the retirement savings of a large group of participants (active workers) and retirees (former workers). Together the participants and retirees are the pension plan's beneficiaries.[1] An occupational pension plan is often one of the most important financial products of an employee, and these plans come in two broad configurations: defined benefit and defined contribution. In a defined benefit (DB) plan, an employee's salary and years of service are the basis of the pension benefit level. In a defined contribution (DC) plan, contributions and investment returns determine the benefit levels. The DB pension plans, the focus of our study, typically offer beneficiaries limited scope for making individual investment choices. Instead, a board of trustees is responsible for making investment decisions in the best interest of beneficiaries. This responsibility is known as the "prudent person rule" and is found in many jurisdictions. This rule is of crucial importance because individual beneficiaries are largely constrained to self-insure against the unfavorable outcomes of investment decisions made by the board of trustees.

In this study, we investigate whether the characteristics of trustees and the stakeholder group that they represent affect their investment decisions. First, we examine whether the age and gender of trustees influence the strategic asset allocations (SAAs) of the pension funds in which they are appointed. The justification for this analysis comes from the observation that boards on average deviate substantially from the beneficiaries that they represent. The average trustee is for instance much older than the average participant and much younger than the average retiree (see Figure 1). Furthermore, most trustees are male. These peculiar board characteristics might therefore affect their investment decisions (Falk et al. (2018)). Second, we assess if the representation of stakeholders by trustees influences SAAs. Trustees might safeguard the interests of their constituencies to justify their appointments or to preserve their positions (Goyal and Wahal (2008); Lakonishok et al. (1992)).

However, we hypothesize that there is neither a relation between trustees' characteristics and SAAs nor one between their representation of stakeholders and SAAs. We study these

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[1] A third group of beneficiaries are the so-called dormant participants. These former workers who have not retired yet are also known as "sleepers".

Electronic copy available at: https://ssrn.com/abstract=3743962

hypotheses for occupational pension plans in the Netherlands that are subject to the prudent person rule (Article 135 of the Dutch Pension Act). In our analysis, we rely on a unique database with detailed information on the investments and trustees of all DB pension funds in the Netherlands from 2007 through 2016. The database comprises proprietary, supervisory data from the De Nederlandsche Bank (DNB) and data from LinkedIn. There are different types of pension funds in the Netherlands: corporate pension funds and non-corporate pension funds. The latter group consists of industry-wide pension funds that cover all employees in the respective industry, and professional group pension funds that serve workers with a dedicated profession. In the Netherlands, the pension fund's stakeholders elect or select most trustees. However, there is a key difference between the types of pension funds that is relevant to our study. In corporate pension funds, employees typically elect or select their trustees from among themselves. Thus, these trustees are beneficiaries themselves. By contrast, in industry-wide pension funds, a labor union in that specific industry will typically select trustees to represent the employees. Thus, these trustees are not an employee of a corporation in the industry and therefore are not a beneficiary themselves. Further, independent trustees on a board are possible. Independent trustees do not represent a specific stakeholder group and are not beneficiaries themselves.

In contrast to what we hypothesize, our first main finding is that pension funds with more board members of a higher age invest less in equity after controlling for pension funds' characteristics. A one standard deviation higher average age of the board of trustees translates into a 1.5 percentage point lower strategic equity allocation. We then identify pension funds with a large age-representation gap as those with more than a 10-year difference between the average age of the board members and the average age of the active participants. These pension funds display, on average, a 2.5 percentage point lower equity allocation compared to pension funds with a low age-representation gap. Therefore, a "gray board" favors a low equity allocation despite the fact that the presence of "green participants" predicts a high equity allocation (Campbell and Viceira (2002)). However, we also find that young trustees

3

provide a countervailing power to a gray board. Pension funds with a gray board and one trustee below the age of 40 years old on average allocate 2.1 percentage points more to equity compared to pension funds that have no young trustees on their gray board.

A possible explanation for these findings is that trustees base their decisions on their own optimal life-cycle investment strategies. From an individual perspective, old trustees have low human capital and prefer a lower equity allocation than young trustees who are endowed with high human capital (Bodie et al. (1992)) and Cocco et al. (2005)).[2] In addition, the willingness to take risk decreases with age (Morin and Suarez (1983); Calvet et al. (2007); Malmendier and Nagel (2011); Dohmen et al. (2017)). These arguments become even more prominent if a trustee is also a plan beneficiary. In line with this potential explanation, we find that the trustee-age effect exists in corporate pension funds whose trustees are typically also beneficiaries. The effect is economically significant. For the participants in a corporate pension fund, the high average age of the board lowers the equity allocation by 7 percentage points. By contrast, we find no age effect in non-corporate pension funds whose trustees come from a labor union and therefore are not beneficiaries themselves. These trustees have no incentive to pursue their own optimal life-cycle investment strategies. Moreover, as trustees of industry-wide funds are generally labor union trustees, their decisions might be coordinated at the union level and therefore be less dependent on the features of the specific pension fund in which they are a trustee. Furthermore, non-corporate pension funds have more independent trustees. In fact, 6.55 percent of the trustees in non-corporate pension funds are independent. For corporate pension funds this percentage is only 1.83 percent. Finally, non-corporate pension funds on average also have larger boards so that individual board members have less influence on the investment policy. A non-corporate pension fund has on average 8.14 board members, while a corporate pension fund has 6.74 board members.

We also find, albeit less strong, evidence of a trustee-gender effect. Boards with a greater

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[2]Crucial to the optimal asset allocation over the life cycle is the correlation between equity returns and human capital returns, see also Benzoni et al. (2007). Age is typically considered a proxy for human capital with low risk, as in our analysis.

4

share of female trustees allocate less to equity. Pension funds that have one female trustee allocate 0.8 percentage points less to equity than similar pension funds with no female trustees on their boards. The trustee-gender effect on the equity allocation is statistically weaker than the trustee-age effect. However, we must take into consideration that females are substantially under-represented in boards. In 2016, on average boards had less than one female member, and 40 percent of pension funds even had no female trustees at all. Therefore, the evidence of a gender effect indicates that female trustees are not a silent minority. Our finding is in line with the empirical evidence that shows females are more risk averse than males (Vieider et al. (2015); Falk et al. (2018)).

Our second main finding is that corporate pension funds with a stronger employer (i.e. the plan's sponsor) representation on the board allocate more to equity than corporate pension funds with a balanced representation of stakeholders. One additional board member that represents the employer leads to 1.6 percentage points higher strategic equity allocation. An explanation for this is that employers have a claim on the pension funds' assets in case of overfunding (Treynor (1977)). Conversely, in the event of underfunding, the employers are not liable for the funding shortfall. At least not in the jurisdiction that we analyze. In fact, in a situation of severe underfunding pension funds are required by law to reduce the accrued pension benefits to restore full funding. Because of this asymmetry, employer trustees have an incentive to safeguard the interests of their constituencies by selecting a riskier asset allocation that increases the value of the employers' claim on surplus assets. Increasing the value of this claim can, in turn, translate into career benefits for trustees (Cocco and Volpin (2007)). If employer trustees consider their own career in the SAA, then this consideration fosters a principal-agent problem between themselves and the beneficiaries. Principal-agent problems in pension funds arise if the interests of the decision-makers are not aligned with the interests of the beneficiaries (Lakonishok et al. (1992)).

In many jurisdictions, principal-agent problems are mitigated through regulations on pension fund governance. These regulations typically clarify the rights and the responsibilities

of the different stakeholders involved. These rules often contain requirements for internal supervision, for example, the agents (trustees) are controlled by a supervisory board that is itself accountable to the principals (beneficiaries) (Boeri et al., 2006).[3] The aim of such rules is to promote that investment decisions are made in the best interests of plan beneficiaries. In the Netherlands, one of these rules establishes that each board of trustees should have an equal number of beneficiaries' trustees and employer trustees. This equality still generates dispersion in stakeholder representation because the objectives of participants and retirees are not necessarily aligned. As a consequence, the employer trustees are often in a dominant position compared to the fragmented representation of beneficiaries. To create a balance of power, independent trustees can be added to a board. These are external experts that are competent and that compete in a job market for trustees (Besley and Prat (2003)). Furthermore, the balance of power can be enhanced through an even age and gender representation. This balance helps to counterbalance the diverging preferences and interests among groups of beneficiaries and trustees and in turn strengthens the governance of pension funds. Our results indicate that Dutch pension funds have room to improve both age and gender diversity on their boards. Moreover, few pension funds have at least one independent trustee on their boards, although the average share of independent trustees grew from 1.6 in 2007 to 9.0 percent in 2016.

We contribute to the literature by showing that key trustee characteristics, such as age and gender, and stakeholder representation influence the investment decisions that the trustees make on behalf of pension plan beneficiaries. Moreover, our unique data facilitates us to examine the relation between the trustees' characteristics and their strategic investment decisions across pension funds with different governance structures. Despite the extensive

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[3]In the US, corporate pension funds are regulated by the Employee Retirement Income and Security Act (ERISA) that was introduced in 1974. The US public-sector pension plans are largely regulated by state and local laws. See Brown (2008) and Brown and Wilcox (2009) for a detailed description of US pension plan regulation. In the European Union (EU), the directive on the activities and supervision of institutions for occupational retirement provision (IORP) was passed in 2003 and subsequently implemented by all member states. In 2016, the EU passed the IORP II directive to reaffirm common standards that ensures the soundness of occupational pension plans and better protects beneficiaries. See full text `https://www.pensionseurope.eu/iorp-ii-directive`.

corporate finance literature on board diversity and corporate decision-making (Adams and Ferreira (2009); Adams et al. (2010); Ahern and Dittmar (2012); Matsa and Miller (2013)), and despite the importance of institutional investors governance (Andonov et al. (2017); Rauh (2009)), a limitation on data has prevented extensive research on the relation between board characteristics and pension fund investments.[4] The few exceptions are Pennacchi and Rastad (2011) and Bradley et al. (2016) who show how US public pension funds with a higher fraction of politically affiliated trustees report higher allocations to risky assets, or Cocco and Volpin (2007) who show that UK pension funds with a higher proportion of employer trustees have a higher equity allocation.

We also contribute to the literature on pension funds governance and performance (Andonov et al. (2018); Ammann and Ehmann (2017); Phan and Hegde (2013)) by studying the relation between the dynamics in trustees' appointments and investment performance. We hypothesize that if young trustees favor riskier SAAs they can also do so by increasing the investments in active equity mandates with the aim of earning a higher benchmark-adjusted return. However, we show that pension funds that hire young trustees do not experience higher benchmark-adjusted equity returns. But we do find that the share of financially knowledgeable trustees is positively correlated with the benchmark-adjusted equity returns of pension funds. Logically, trustees' turnover can improve performance, if it is associated with an increase in investment expertise that is not necessarily captured by the age of a newly hired trustee (Clark (2004)). Finally, we show that pension funds with larger boards allocate more to alternative asset classes, such as private equity, real estate, hedge funds, and commodities. This result is independent from the expertise of trustees, as the strategic allocation to alternatives is not affected by the share of trustees with a financial background.

The remainder of the study proceeds as follows: In Section I, we describe the institutional setting in which we carry out our study. Section II introduces our data. In Section III, we

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[4]Verma and Weststar (2011); Swinkels and Ziesemer (2012) and Shi et al. (2017) study the diversity of pension fund boards that relies on survey data without assessing any interaction between diversity and the SAAs given the difficulties in finding a reliable data source on pension funds' investment portfolios.

summarize our hypotheses and our empirical strategy. Section IV presents the results of our analysis on board characteristics. Section V presents the results of our analysis on stakeholder representation. In SectionVI, we analyze the effect of board characteristics on the strategic allocation to alternative asset classes and also the effect on equity returns. Section VII concludes.

I.   The institutional setting

Our study takes place in the well-established Dutch occupational pension system. In this section, we describe the prudent person rule, the governance of Dutch pension funds, and how different stakeholders are represented within the board of trustees. Then, we discuss how the trustees' characteristics can influence the decision-making by pension funds.

A.   The prudent person rule

Article 135 of the Dutch Pension Act rules that a pension fund should invest its assets in the best interests of all beneficiaries. The prudent person rule is an open norm and does not contain quantitative investment restrictions. Nonetheless the Pension Act does specify the prudent person rule in a qualitative way. Showing that the trustees in principle should have little room to adjust the SAA towards their own preferences. The retirement savings must be invested in such a way as to guarantee the security, quality, liquidity, and return of the portfolio as a whole. Further, the investment policy needs to be in line with the structure and the duration of the pension benefits. The board of trustees also needs to verify the risk aversion level of its plan beneficiaries. The prudent person rule requires a pension fund to diversify its investments and invest the larger part of the assets in regulated markets. Furthermore, the board of trustees needs to disclose its stance with respect to sustainable investing.

The Pension Act also contains requirements with respect to the implementation of the

investment policy. Specifically, for determining and implementing the investment policy, a pension fund establishes a clear organizational structure in which risk management is adequately and independently structured to support careful and transparent decision-making. In addition, there must be a balance between the nature and complexity of the investment portfolio on the one hand and the available knowledge, experience and level of risk management on the other.

B.   Pension fund governance

Pension funds in the Netherlands are organized as stand-alone, non-profit organizations whose goal is to execute the pension contract that representatives of employers and workers have negotiated. The pension funds are legally set up as independent trusts. A board of trustees is responsible for managing the pension fund's assets and administrating the beneficiaries' benefits. A supervisory board, a visitation committee, or non-executive trustees exercise internal supervision. The legislator delegates external supervision to two independent supervisory agencies: De Nederlandsche Bank (DNB) that exercises prudential supervision, and the Authority for the Financial markets (AFM) that is responsible for supervising the fund's market conduct.

When it makes decisions concerning matters of everyday policy, the Pension Act requires the board of trustees to balance the interests of all stakeholders (Article 105 of the Dutch Pension Act). However, when it makes decisions concerning the investment policy, the act requires the board of trustees to invest the pension fund's assets in the best interests of the beneficiaries: both the participants and the retirees (Article 135 of the Dutch Pension Act).[5] Especially the participants need to feel that the pension fund represents their interests, as the Dutch pension system does not allow them to exit (see Hirschman (1970)). Employees have in fact no freedom to choose their own pension fund. They automatically enroll in the plan that

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[5]The act defines active participants as persons who contribute to the pension plan and who have not yet retired, and passive participants (sleepers) as persons who do not contribute to the pension plan and who have not yet retired. These are people who have changed employers and have not transferred their accrued pension benefits from one pension plan to another (Article 1 of the Dutch Pension Act).

is offered by their employer. The barriers to exit from the pension fund are high. An employee would have to resign, start working for a different employer, and then transfer any accrued pension benefits. This is known as "voting by feet", and it is a common feature in private and public pension funds in several other countries such as the US, the UK, and Canada (Dyck and Pomorski (2011)). Differently, in countries where participants have freedom of choice, the market acts as an external means of control, because participants can decide to opt out of a pension plan if they are not satisfied with the conditions provided (Kowalewski (2012)). Retirees cannot exit from the pension fund whatsoever. Pensions are an important part of compensation and therefore important to employers for labor market competition. For these reasons, and in contrast to many other financial sectors, all stakeholders (participants, retirees, and employers) are represented on the board of trustees.

C. Representation within the board of trustees

Article 100 of the Dutch Pension Act establishes that each board of trustees should have an equal number of trustees for the beneficiaries and for the employer(s). Each pension fund's statutory requirements may also foresee some independent trustees. Furthermore, each pension fund can decide how many of the trustees it allocates to the participants and to the retirees. However, retirees cannot be represented by more than 25 percent of the trustees on the board.[6] This rule for retirees' representation may cause imbalances in the stakeholders' representations across pension funds. The more trustees are split between the participants and the retirees, the higher the effective power of the trustees who represent the employer(s). This is caused by the fact that the interests of participants and those of the retirees do not necessarily align. Participants may want to invest more in risky assets, while retirees may prefer to invest in safe assets. Participants are interested in low contributions, and retirees may push for higher contributions.

The law does not contain requirements on age or gender representation. In fact, senior

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[6]If the participants are less than 10 percent of the total number of beneficiaries, then retirees can be represented by up to 50 percent of the trustees on the board.

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males mostly occupy board seats. Young and female trustees are much less common. Panel A of Figure 2 shows that in 2007, only 40 percent of the pension funds had at least one trustee younger than 40 years old on their board, and 40 percent of the pension funds had at least one woman on their board. Therefore, the fact that board diversity has been an object of discussion within the pension sector for many years is not surprising. As a result of that discussion, in January 2014 the Code of Dutch Pension Funds came into effect as an instrument of self-regulation.[7] The code contains a guideline that the board is to have at least one member under and at least one member over the age of 40 years old. Furthermore, the code states that at least one woman and one man should hold a seat in the board of trustees. Pension funds follow the code under the comply-or-explain principle. This principle means that pension funds comply with the code's standards or, alternatively, they must explain and justify in their annual report why they deviated from this standard. The non-mandatory nature of the code indicates that many pension funds find it difficult to comply with it. In 2016, only 40 percent of the pension funds had at least one trustee younger than 40 years old on their board (Panel A of Figure 2). But the percentage of pension funds with at least one woman on the board increased to 60 percent. However, this percentage means that 40 percent of the pension funds still had no female trustee.

Another way to express the characteristics of the boards of trustees is in Panel B of Figure 2. The panel shows the time series of the average share of young trustees and the average share of female trustees across pension funds. The average share of trustees under the age of 40 has decreased over time. This is also the case for the average share of trustees under the age of 46.[8] The introduction in 2014 of the Pension Fund Governance Act may be an explanation for this decreasing trend because, among other things, it requires a higher expertise to be hired as a trustee. Expertise is related to experience through age and therefore hiring of

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[7]See the English version of the Code of Dutch Pension Funds: `https://www.pensioenfederatie.nl/stream/codeofthedutchpensionfundsenglish2017.pdf`.

[8]We use 46 years of age because it corresponds to the 25th percentile of the age distribution of all individual trustees in the sample. Thus, in this statistic we look at the share of trustees that are in the youngest quartile of the age distribution. We provide more details in Section II.B.

young trustees might have lagged. The act has the objective of strengthening governance by requiring higher expertise of trustees and stronger internal supervision.[9]

Panel B of Figure 2 shows an increasing trend in female trustees. Yet, in 2016 on average only 15 percent of the trustees on a board were women, which means that the pension fund sector is still far from equal representation. Women count for 46 percent of the labor force in the Netherlands.[10] Given that occupational pension funds cover nearly the entire population of Dutch employees, a fair representation of women on pension funds' boards means that the share of female trustees should be much higher.

D. Board characteristics and decision-making

We observe that boards on average deviate substantially from the beneficiaries that they represent. The average trustee is much older than the average participant and much younger than the average retiree (see Figure 1). Furthermore, most trustees are male. Despite these striking board compositions, the trustees' characteristics should not influence a board's investment decisions. Yet, the fact that older males dominate boards can influence their dynamics and the discussions that lead to the final decisions. For example, a subgroup of trustees can form an alliance to ensure that a particular board's decisions are in line with the subgroup's opinions. Similarly, highly respected and experienced trustees may put soft pressure on the other board members by expressing their personal opinions on the investment strategy. Although we cannot observe the decision-making of the board, we can observe some characteristics of trustees that can be more (or less) dominant on a board. These predominant characteristics might influence the board's decision-making (Falk et al. (2018)).

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[9]Moreover, the act offers three governance models. The first is the standard joint model that requires equal representation of employer and beneficiaries, with a maximum of two independent trustees. This model was the only possible governance structure of pension funds until the 2014 reform. In that year, the act introduced the independent model. In this model, the entire board consists of independent professionals. In 2014, the act also introduced the mixed model. The mixed model consists of executive and non-executive directors. The non-executive directors are not direct trustees of the stakeholders in the pension fund.

[10]Data on the Dutch labor force are available at: `https://www.cbs.nl/en-gb`.

To illustrate this influence, in Figure 3 we plot the average strategic equity allocation of two groups of pension funds: pension funds with at least one young trustee on their board and pension funds that have none. The figure shows that pension funds with young trustees systematically allocate more to equity than pension funds that have none. This result is robust to different definitions of a young trustee. In Panel A we use the age of 40 years old as the threshold and in Panel B 46 years old. The difference in SAA persists, if we compare pension funds with an average board age above and below the median (Panel C). This univariate analysis indicates a relation between the SAA and the age distribution of the boards. However, this relation might result from fundamental differences in the characteristics of pension funds with or without young trustees. For example, some pension funds might not have a young trustee because their population of beneficiaries is relatively old and therefore the trustee's age would just reflect the average age of participants.[11] In the next sections, we address this point and we show that difference in SAAs persist after controlling for pension funds' characteristics.

II. Data

In this section, we present the data that we use to test the relation between board characteristics and pension funds' SAAs. We then continue by providing summary statistics for the pension funds' investment portfolios and trustees' characteristics.

A. Data description

Our analysis is based on an unbalanced panel of 437 occupational pension funds that reflect almost the entire population of DB pension funds in the Netherlands over the period from 2007 through 2016. With 1,230 billion euros in assets under management at the end

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[11]The correlation between average age of the board and the average age of active participants is indeed positive, although not high (0.191). Similarly, the correlation between the average age of the board and the average age of all beneficiaries is 0.028. The correlation matrix is displayed in Table X in the Supplementary Tables.

of 2016, these pension funds were worth 175 percent of the national GDP. A mix of mandatory industry-wide pension plans and a long tradition for corporate pension plans make the Dutch pension fund system one of the largest in the world, despite a country's population of only 17 million citizens (OECD (2019)).[12] Professional orders such as pharmacists and general practitioners save for retirement via professional group pension funds. The data are proprietary and provided by the prudential supervisor of pension funds, De Nederlandsche Bank (DNB). The data are also free from reporting biases, because all pension funds are obliged to report to DNB.

Pension funds report their strategic and actual asset allocations; the total net return of fees in each asset class; together with the corresponding benchmark return, their funding ratio, durations of liabilities, and total assets under management on a quarterly basis. They report the information on the board of trustees on a yearly basis that includes the name, gender, age, and tenure of each individual trustee. The database also includes the stakeholder group that each trustee represents. A trustee can represent the participants (current or former employees), the retirees, or the employer (sponsor). In addition, a trustee can be appointed because of their expertise without representing a specific stakeholder. This is referred to as an independent trustee. Moreover, we have collected information about the education and previous employments of individual trustees through the social media website LinkedIn.com.

B. Summary statistics

Table I shows that on average, pension funds allocate 30 percent of their portfolio to equity, 60 percent to fixed income, and the remaining 10 percent to real estate, private equity, hedge funds, and commodities. These allocations are relatively stable over the sample period. An exception is during the Euro Sovereign Debt Crisis in 2011 when pension funds reduced their strategic allocation to fixed income assets in favor of equity and alternatives,

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[12]Roughly three-quarters of all employees participate in an industry-wide pension fund and the vast majority of these pension funds are made mandatory by the Dutch government.

see Panel A of Figure 4. Pension funds display an average funding ratio of 114 percent. Panel B of Figure 4 shows that in the early years of the sample the average funding ratio was around 140 percent, while after the Global Financial Crisis it fluctuated between 100 and 115 percent. Pension funds report an average annual equity return of 5.3 percent. However, the benchmark-adjusted return is close to zero that indicates pension funds on average do not outperform or underperform their benchmarks. Some 74 percent of the pension funds in our sample are corporate pension funds, 22 percent are industry-wide pension funds, and 4 percent are professional group pension funds. The average assets under management is close to 3 billion euros. The sample contains a small number of very large pension funds.

The population of participants is as follows: On average 34 percent are active participants, and 42 percent are former participants. The large group of former participants shows that many employees that change jobs do not transfer their accrued pension benefits to a new pension fund.[13] The retirees represent 24 percent. The average age of active participants is 45 years old while the average age of all beneficiaries (participants and retirees) is 52 years old. The average age of board members is 54 years old; thus, it is higher than the average ages of both active participants and the total beneficiaries. The average share of board members younger than 40 years is 9 percent, which is less than one trustee per board. The age of 40 corresponds to the code of Dutch pension funds. The percentage of board members that is younger than 46 years old is only 19 percent. The age of 46 years corresponds to the 25th percentile of the age distribution of all individual trustees in the sample.[14] Given that an average board has seven members, this percentage means that approximately one out of seven trustees on an average board is young. The average share of female trustees is 11 percent. These statistics provide evidence of the fact that both the young and female populations are under-represented. The average share of trustees representing employers on

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[13]Transferring accrued pension benefits requires active decision-making by individuals. A great deal of research has shown that people procrastinate when making complex financial decisions (Madrian and Shea (2001), Frederick et al. (2002)).

[14]This distribution is not observable from Table I that provides summary statistics at the pension fund level. Summary statistics at the trustee level are available in the Supplementary Table IX.

the board is 45 percent, the share of trustees representing active participants is 39 percent, and the share of trustees representing retirees is 11 percent. The average share of independent trustees on the board grew from 1.6 percent in 2007 to 9 percent in 2016. Some 36 percent of trustees has a university degree, 7 percent has a public sector background, and 18 percent has a financial background. We consider a trustee as having a financial background if they work or have worked in fields such as finance and accounting, or at an economics related institution. A trustee has a public sector background if they have worked for government institutions, municipalities, labor unions, or at other social institutions as well as in health care.

III. Hypotheses and model

In this section, we summarize the hypotheses and the model that we use to test the hypotheses.

A. *Hypotheses*

The boards in our sample have the fiduciary duty to invest in the best interest of the plan beneficiaries and to do this in a highly regulated environment. First, we hypothesize that their characteristics, in particular their age and gender, should not matter in designing the SAA. Hence, no relation should exist between trustees' characteristics and their investment decisions. Although there is empirical evidence that indicates young investors have preferences for riskier allocations (Calvet et al. (2007); Dohmen et al. (2017)) and females are more risk averse than males (Bruce and Johnson (1994); Sunden and Surette (1998); Bernasek and Shwiff (2001); Faccio et al. (2016)), these characteristics should not matter for the investment decisions made by trustees on behalf of others. If trustees consider their own characteristics in making these decisions, they might design SAAs that do not reflect the characteristics and preferences of the pension plan's beneficiaries.

16

Second, we hypothesize that stakeholder representation should not affect the SAA. Even though trustees are elected by a stakeholder group, once elected, they must act in the best interest of the pension plan's beneficiaries. Therefore, we expect to find no relation between the share of the different stakeholder trustees on the board and strategic investment decisions. Yet, in pension funds in which employer trustees have more power than the trustees of active participants, board decisions might be tilted towards the interests of the employer. For example, a higher equity exposure increases the value of the employer's claim on excess assets in cases of overfunding. Safeguarding the interests of their constituencies can ultimately be beneficial to trustees' career paths. Hence, if they value their own career paths over beneficiaries' interests, trustees can generate a principal-agent problem between themselves and the beneficiaries (Cocco and Volpin (2007)).

We complement these two hypotheses by studying the effect of board characteristics on the strategic allocation to alternative asset classes and on equity portfolio returns. Following Figure 3, we hypothesize that young trustees favor riskier SAAs. Therefore, we expect the strategic allocation to alternative asset classes to be positively correlated with the share of young trustees on the board. Another way in which pension funds could take more risk is by allocating more to active equity mandates. Provided that skilled equity managers are selected, this allocation will translate into higher benchmark-adjusted performance. Therefore, we expect to observe a positive correlation between the equity benchmark-adjusted performance and the hiring of young trustees, which is the only factor that makes the share of young trustees increase over time.

B. Model

To test our hypotheses, we rely on the following pooled OLS model:

$$y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t} \tag{1}$$

17

where the dependent variable $y_{i,t}$ is the strategic equity allocation of pension fund i at the end of year t, and $Z_{i,t}$ is a set of board characteristics. Specifically we consider several measures of the board's average age, size, and tenure of its members as well as the percentage of female trustees, percentage of employer trustees, the percentage of retirees' trustees, and the percentage of independent trustees. The percentage of trustees who represent the participants is the omitted category.[15] We also include the percentage of trustees holding a university degree and the percentage of trustees having a public sector background and the percentage of trustees with a finance background.

Variable $X_{i,t}$ comprises a number of pension fund characteristics that are key determinants of the SAA, such as the average age of active participants, the percentage of retirees over the total number of beneficiaries, the natural logarithm of the total assets under management, and the funding ratio. The funding ratio is related to the pension fund's risk profile and to the portfolio performance, and it is therefore lagged by one year to avoid endogeneity concerns. We also take into consideration the level of interest rate risk hedging for each pension fund through the so-called swap ratio. Pension funds typically hedge a part of interest rate risk using interest rate swaps. The interest rate risk is inherent to the present value of a pension benefit that is being determined by discounting the accrued pension benefits against the prevailing market interest rates. The swap ratio is the fraction of interest rate risk that is being hedged using interest rate swaps. We need to calculate the swap ratio because it is not a variable in regulatory reporting. In Appendix A we provide a detailed derivation of how we approximate the swap ratio in a similar fashion as in Broeders et al. (2020). We also correct for the type of pension fund by including dummies for professional group pension funds and industry-wide pension funds. Corporate pension funds are the omitted category. Finally, θ_t in (1) is a set of year dummies that control for the economic conditions that might affect investment decisions in a given year.

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[15]Note that we sum the percentage of trustees who represent active participants with the percentage of trustees who represent former participants. Only very few pension funds have these trustees representing former participants.

We expect pension funds to follow a life-cycle investment strategy(Campbell and Viceira (2002)). Thus, we expect the strategic equity allocation to be negatively related to the average age of active participants. Young plan participants have a high implicit exposure to fixed income via their human capital and prefer to invest a large part of their financial capital in equities.[16] We expect large pension funds to invest more in equities due to economies of scale that allows them to attract skilled asset management firms (Bikker and De Dreu (2009); Dyck and Pomorski (2011); Broeders et al. (2016)). The relation between the funding ratio of pension funds and their allocation to equity can be twofold. On the one hand, underfunded pension funds may decide to manage their risk and hence reduce their exposure to equity. On the other hand, pension funds with a low funding ratio may shift the risk of underfunding to the beneficiaries and increase the allocation to equity (Rauh (2009)), that is, gamble for resurrection. In line with Broeders et al. (2020), we expect that the hedging of interest rate risk does not affect the strategic equity allocation. This non-effect comes from two opposing mechanisms that roughly cancel each other out. On the one hand, pension funds that hedge interest rate risk using interest rate swaps have a lower exposure to interest rate risk. This hedging means that they can increase their exposure to other risk factors such as equity. On the other hand, pension funds that hedge interest rate risk using interest rate swaps have a higher liquidity demand from collateral requirements. This demand means that these pension funds can invest less in risky assets.

IV. Board characteristics and strategic equity allocation

In this section, we present our key results for board characteristics. First, we run a baseline model with only pension fund characteristics. Second, we show that trustees consider their own age when they design the strategic equity allocation of the pension funds in which

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[16]Hereby, we implicitly assume that human capital is an asset with low risk.

they are appointed. Third, we report that other trustees' characteristics such as gender and financial background impact the strategic equity allocation. Fourth, we document that the impact of age is present mainly in corporate pension funds. This suggests that some of the governance features of corporate pension funds might encourage trustees to value their own characteristics.

A.   Baseline model

We present the results of Equation (1) for all pension funds in Table II. We begin with a baseline model in Column (1) in which only the pension funds' characteristics are included. In line with our predictions, we observe that the average age of active participants is negatively related with the strategic equity allocation. Pension funds with, on average, one year older active participants allocate 0.36 percentage points less to equity than pension funds with younger participants. This is in line with Bikker et al. (2012) who find a coefficient of 0.39. Our finding indicates that on average, pension funds indeed apply a life-cycle investment strategy. The coefficient for the fraction of retirees is not statistically different from zero. We argue that this insignificance follows from the fact that the average age of active participants is also informative about the fraction of retirees. In Appendix B we provide a technical explanation of this argument. Large pension funds allocate more to equity than small pension funds, which follows our economies of scale argument. We also show that the lagged funding ratio is positively related to the strategic equity allocation. This relation indicates that pension funds with a high funding ratio take more investment risk. The swap ratio has no effect on the strategic equity allocation. This is in line with our expectation. Hedging interest rate risk with swaps has two effects that roughly cancel each other out. On the one hand this hedging creates the opportunity to take more risks elsewhere, on the other hand using swaps to hedge this risk requires a pension fund to hold more risk-free assets such as cash and short-term government bonds for collateral purposes. Finally, we find that industry-wide pension funds and professional group pension funds invest less in equities

20

compared to corporate pension funds.

B. Relation between board age and strategic equity allocation

Next, we add board characteristics to the model. Columns (2) - (5) in Table II contain our main results about the effect of board age on the strategic equity allocation. In contrast to our main hypotheses, we find a statistically significant age effect. Based on Column (2), pension funds with more older trustees allocate less to equity compared to pension funds with younger trustees on the board. A one standard deviation higher average age of the board of trustees is related to a 1.5 percentage point lower strategic equity allocation. We also assess the impact of the median board age in Column (3). Pension funds make decisions on a majority basis, and the median voter on the board plays a decisive role in approving any decision (Hotelling (1929)). In Appendix C, we describe how the so-called median-voter theorem applies to the decision-making of pension fund boards. Furthermore, the median age is less affected by outliers than the average age. Column (3) displays the results. In line with the previous finding, pension funds with a one standard deviation higher median board age make a 1.5 percentage point lower equity allocation.

Not only the mean or median age of the board matters, but also the age distribution of the board. Young trustees may be able to provide countervailing power in a board of a generally high average age. Column (4) displays the estimation results of a model that includes the fraction of trustees younger than 46 years old on the board. Pension funds with an average board size of seven members of which one trustee is younger than 46 years old display a strategic equity allocation that is 0.7 percentage points higher than pension funds that have no young trustees on their boards.[17] If we use the fraction of trustees younger than 40 years old, the strategic equity allocation is 0.8 percentage points higher, although the latter effect is only borderline significant.

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[17]One trustee out of 7 corresponds to 14 percent of the board members in an average board. Therefore, pension funds that have one trustee younger than 46 years old display a 14 percent higher share of young trustees with respect to pension funds that have none ($14 \times 0.05 = 0.7$).

To investigate the distribution of board age further, we use the observation from Table I that the difference between the average age of board members and the average age of active participants can be large. On average this difference, in fact, is almost eight years. Therefore, we test how this difference affects the strategic equity allocation by adding one additional variable to Equation (1) that we call the age-representation gap. This variable equals one if the difference between the average age of board members and the average age of the active participants exceeds 10 years, and zero otherwise.[18] In practice, the age-representation gap captures the effect of having a relatively old board vis-a-vis the active participants. Therefore, the age-representation gap highlights pension funds in which the characteristics of the average trustee are very distinct from the characteristics of the average participant.

Table III presents the results for the age-representation gap. Column (1) shows that pension funds that have more than 10 years difference between the average age of the board and the average age of active participants allocate 2.4 percentage points less to equity than pension funds with a smaller age-representation gap. Furthermore, adding the age-representation gap to the regression eliminates the effect of the fraction of young trustees in the board. This elimination follows from the fact that board members are generally older than the average active participant, and it is further evidence that supports the finding that board members value their own age while carrying out their fiduciary duty.

In column (2), we add an interaction term between the age-representation gap and the share of young trustees on the board. The results show that pension funds with a large age-representation gap and one additional trustee younger than 46 years old allocate 1.4 percentage points more to equity than other pension funds with a large age-representation (1.4=(0.001+0.097)*14). Therefore, young trustees on relatively old boards support investment strategies that are more in line with participants' characteristics. This partially offsets the negative effect of the age-representation gap on the strategic equity allocation. Given

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[18]We use 10 years because it corresponds to the 66th percentile of the distribution of the difference between the average board age and the average age of active participants.

that the age of young trustees is closer to the average age of active participants, young trustees are more likely to act in line with their own characteristics when executing their fiduciary duty. We are not able to distinguish whether young trustees just execute their fiduciary duty, value their own age, or a mix of the two. After all, we show that young trustees attenuate the distortion that old boards have on the strategic equity allocation of pension funds with relatively young active participants. Columns (3) - (4) display the analysis carried out with the share of trustees younger than 40 years old. The results are similar to the analysis that relies on the share of trustees younger than 46 years old.

C. Relation between gender and financial background and strategic equity allocation

In addition to the age effect, we also find some evidence of a gender effect. In all specifications in Table II, we find that pension funds with a higher share of female trustees allocate less to equity. However, the evidence of a gender effect is not conclusive, as the coefficients are only significant at the 10 percent level. However, we must consider that, on average, boards display less than one female member, and many pension funds have no female trustees over the entire sample period. Therefore, the existence of a gender effect indicates that female trustees might not be a silent minority.

We also find in Table II and Table III that the share of trustees with a financial background is negatively related to the strategic equity allocation. This relation indicates that trustees with more financial expertise prefer to match assets and liabilities by investing more in fixed income. In line with this, Table XIII in the Supplementary Tables shows that the share of trustees with a financial background is positively related to the strategic allocation to fixed income.[19]

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[19]Supplementary Table XIV tests the effect of the age-representation gap on the fixed income allocation. Supplementary Tables XV and XVI show the relation between board characteristics and fixed income allocations in corporate and non-corporate pension funds.

D.   Corporate versus non-corporate pension funds

Our empirical analysis so far indicates that trustees consider their age in designing the SAAs of pension funds. Yet, why trustees would act in such a way is not clear. For example, trustees may have a direct stake in the pension fund, hence they might try to design a SAA that is more in line with their own life cycle. One way to identify this effect is through the type of pension fund. Trustees can be appointed to manage a pension fund in which they are themselves beneficiaries. In this case, there is a direct incentive for them to pursue their own optimal life-cycle investment strategy. In our data, we identify trustees who are also the plan's beneficiaries in the following way. In corporate pension funds, both the trustees of the beneficiaries and of the employer are employees of the same company, and therefore also the plan's beneficiaries. In industry-wide pension funds, by contrast, there can be a large group of corporations that sponsor the plan, in some cases tens of thousands of small companies. Therefore, trustees are typically selected from the labor union that is active in the specific industry or are professionals not employed by any of the sponsors. It follows that trustees in industry-wide pension funds are for the most part not beneficiaries of the pension funds to which they are appointed.

In Table IV and Table V, we test the effect of board characteristics on the strategic equity allocation of corporate pension funds and non-corporate pension funds separately.[20] We find evidence of a trustee-age effect in corporate pension funds, but no evidence of this effect in non-corporate pension funds. Trustees who are also beneficiaries of the plan consider their own age while designing the SAAs of pension funds. Conversely, trustees that are not beneficiaries of the plan do not exhibit the same behavior. The average age of trustees is associated with lower equity allocations in corporate pension funds, while it is not in non-corporate pension funds (see Columns (2), (3), and (5) in Table IV and Table

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[20]We analyze professional group pension funds together with industry-wide pension funds because their trustees are often union members as well. In addition, there is no clear separation between employer and employees for the professional groups and therefore there are no diverging interests between the two groups. Professional pension funds represent only 4 percent of the institutions in our sample.

V). The effect of the age-representation gap is strong in corporate pension funds, while it is nonexistent in industry-wide and professional group pension funds (Columns (4) and (6)). Moreover, young trustees in the presence of a large age-representation gap promote a riskier allocation in corporate pension funds, while this behavior is not observed in non-corporate pension funds (Columns (4) and (6)). The latter effect is both statistically and economically significant. Take two corporate pension funds with an average board of seven trustees.[21] Both pension funds display a large age-representation gap. Pension fund A has no young trustees, while pension fund B has one trustee younger than 40 years old. On average, pension fund B will allocate 3 (=(-0.001+0.215)*14) percentage points more to equity than pension fund A, ceteris paribus. Conversely, no difference is detected between A and B if both are non-corporate pension funds.

The economic effect of the difference between the average board age and the average participant age on the strategic equity allocation is sizeable. Figure 5 displays the equity allocation predicted by the baseline model and by the model with board characteristics for the average corporate pension fund (based on Columns (1) and (2) of Table IV). All variables are kept at their sample mean, except for the average age of active participants. The figure shows that including board characteristics in the model lowers the predicted equity allocation by 7 percentage points for any average age of active participants. Therefore, the effect of board characteristics on SAAs is sizable and moves the allocation to equity away from the value predicted by the pension fund characteristics. We attribute this result to the fact that trustees are generally older than the average participant. Considering an average equity return of 6 percent per year and a contribution period of 40 years, the participants of a corporate pension fund with a 7 percentage points lower allocation than the average pension

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[21]Table XI and Table XII in the Supplementary Tables provide the summary statistics of corporate and non-corporate pension funds. There are some differences in the average age of beneficiaries and in the age of board members. However, these differences are not very large.

fund will have a 9 percent lower terminal wealth.[22]

The results from this section indicate that in corporate pension funds, trustees design the SAAs in such a way that they are more in line with their life-cycle investment objectives. The fact that we do not observe similar results for pension funds in which trustees are not necessarily beneficiaries themselves indicates that the incentive of being a beneficiary encourages trustees to value their own characteristics when they design the SAAs. Nevertheless, we cannot exclude that some trustees might unknowingly project their own preferences (Dohmen et al. (2017); Falk et al. (2018)) onto beneficiaries and as a result make biased decisions. This type of decision is known as the interpersonal empathy-gap in the social-psychology literature (Loewenstein (2005)). Despite the underlying motivation, by valuing their own preferences trustees design SAAs that do not reflect the average characteristics of all beneficiaries.

Column (1) of Table V shows that the strategic equity allocation is not correlated to any of the characteristics of non-corporate pension funds. This striking result could be the consequence of a lack of power due to the reduced number of observations: the clustered standard error reduces the significance of all variables. For example, the magnitude of the coefficient associated with the non-corporate pension funds' log size is similar to the magnitude of the coefficient for the corporate pension funds' log size, although the former is not significant. Moreover, a univariate regression of the equity allocation of industry wide pension funds on the average age of active participants shows a significant coefficient of -0.174 (t-stat =2.09).[23]

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[22]We compute terminal wealth X as follows:

$$X = \frac{(1 + wR)^{T+1} - (1 + wR)}{wR} \tag{2}$$

where w is the strategic equity allocation, R is the expected equity return, and T is the contribution period. We assume that the return on bonds is negligible.

[23]See Figure 8 in the Supplementary Tables.

V. Stakeholder representation and strategic equity allocation

Next, we turn to the effect of stakeholder representation on the strategic equity alloca-tion. In Table II and in Table III we did not find evidence of a representation effect in the full sample of pension funds. Neither the fraction of employer trustees nor the fraction of retiree trustees affects the strategic equity allocation. In contrast to these findings, Table IV indicates the presence of a representation effect in corporate pension funds. The fraction of employer trustees is positively correlated with the strategic equity allocation. Corporate pension funds with a higher fraction of employer trustees relative to participant trustees invest more in equity than corporate pension funds that have a lower fraction of employer trustees. One additional trustee that represents the employer means a 1.6 percentage point higher strategic equity allocation, if the trustee is gained at the expense of a participant trustee. There are two possible explanations for this imbalance of power. First, beneficiaries can have both participants' and retirees' trustees. The more retirees' trustees there are, the less powerful the trustees of the active participants are vis-a-vis the employer trustees. From Table I we indeed learn that there is such an imbalance: the fraction of trustees who represent the employer is 46 percent, while the fraction of trustees who represent active participants is only 38 percent. Second, trustees that leave a board or whose term ends create vacancies. It might be the case that pension funds can more easily fill the vacancies for employer trustees because these persons are selected rather than appointed via a lengthy election process.

The question is why employer trustees would safeguard the interests of their constituen-cies by pushing for riskier asset allocations. Our answer is that higher strategic equity exposure will increase the value of the claim that the employer has on the assets in case of overfunding. In the event of substantial overfunding, employers can reduce contributions or even withdraw assets from their pension funds.[24] Conversely, in the event of severe un-

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[24]Article 129 of the Dutch Pension Act describes under what conditions assets can go back from the pension fund to the employer.

derfunding, the employers have a claim against the beneficiaries, because in such a case a pension fund is required by law to reduce the accrued pension benefits.[25] This reduction can be seen as an implicit put option on the pension fund's assets (Treynor (1977)). By safeguarding their constituencies' interests, employer trustees can in turn receive career benefits (Cocco and Volpin (2007)) or justify their appointments (Goyal and Wahal (2008)).

Employer trustees may be motivated to act in this way to support their personal career. They may logically think that if they do good by the employer, the employer will do good by them. If trustees consider their own career when they design the SAAs, they create a principal-agent problem. A principal-agent problem in pension funds exists because the interests of the plan's beneficiaries are not fully aligned with the interests of the trustees (Lakonishok et al. (1992)). Through their trustees, an employer can exercise influence on the investment decisions of the pension fund. Furthermore, in corporate pension funds (public) scrutiny is low due to their small size and the low number of social partners involved. By contrast, because trustees are less likely to be employees of a sponsor in an industry-wide pension fund, the incentives to consider their own career concerns are also lower. Furthermore, as trustees of industry-wide pension funds are generally union representatives, their decisions might be coordinated at the union level. These pension funds are on average larger than corporate pension funds and involve a greater number of social partners such as the employers' federation and the employees and retirees' union. As a result, industry-wide pension funds face greater scrutiny that discourages trustees from valuing individual characteristics when they make investment decisions.

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[25]Article 134 of the Dutch Pension Act describes under what conditions pension funds are required to reduce accrued benefits to restore full funding.

VI. Board characteristics, alternative allocations, and returns

Corporate pension funds with young trustees or with more employer trustees allocate more to equity. Next to a higher equity allocation, there are two other ways in which pension funds can pursue a riskier investment strategy. First, pension funds can increase their allocation to alternative asset classes that are riskier than equity. Second, they can opt for an active equity mandate. This decision to "go active" has a potential effect on the performance of the equity portfolio. In this section, we test whether board characteristics are related to the allocation to alternative asset classes in the same way they are related to the strategic equity allocation. Then, we explore the relation between board characteristics and pension fund benchmark-adjusted performance as a proxy for active equity mandates.

A. Board characteristics and alternative allocations

We estimate the model in Equation (1) to test the correlation between board characteristics and the strategic allocations to private equity, hedge funds, real estate, and commodities pooled together. Table VI shows the results. We find no relation between the allocation to alternatives and age-related board characteristics. However, we do find that board size has an important effect on the strategic allocation to alternatives. Large boards allocate more to alternative asset classes. This allocation shows that large boards are driven to more complex and sophisticated asset classes. Furthermore, large boards have more capacity to invest in asset classes that involve more management time.[26] However, the fraction of board members with a financial background strikingly does not have an effect on the allocation to alternatives. This is remarkable because alternatives are more sophisticated investments. Therefore, modifying the allocation to these asset classes requires a more careful assessment

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[26]The correlation between the board size and the log assets of pension funds is positive but not very high (0.58). We test for multicollinearity by regressing the alternative allocation on the board size and log assets separately and then together, and no major change in the level of the coefficients were recorded.

from trustees and the sophistication of a pension should primarily drive these decisions.

B. *Board characteristics and equity performance*

Pension funds can also enter into a riskier investment strategy via an active equity mandate. The hypothesis is that young trustees can push pension funds to increase risk via active mandates, hence taking more risk relative to the risk of the benchmark in a particular asset class. The objective of an active mandate is to have higher benchmark-adjusted returns. Conversely, if young trustees favor passive mandates, this preference will not lead to a higher benchmark-adjusted return. Whether pension funds invest in active or passive mandates is not observable in the data. However, we can study the relation between the board characteristics and the absolute equity portfolio returns and the benchmark-adjusted returns. We are interested in studying if the changes in board characteristics that are driven by trustee turnover influence both measures of performance. If young trustees - who might favor higher within-asset class risk - are newly appointed to the board, this presence could correlate with higher (benchmark-adjusted) performance in the equity portfolio. Looking at newly appointed young trustees allows us to capture the effect of a decrease in the board age.

We rely on the following within-effect regression that facilitates the assessment of the correlation between board characteristics and the performance of each pension fund over time. This model also allows us to capture unobservable pension fund-specific characteristics that affect performance such as equity manager skills

$$y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \mu_i + \epsilon_{i,t} \tag{3}$$

The dependent variable in Equation (3) is the total return, net of fees, for the equity portfolio of pension fund i in year t. $X_{i,t}$ and $Z_{i,t}$ are pension fund and board characteristics, as in Equation (1). θ_t and μ_i indicate year and pension fund fixed effects. In this analysis, we are

mainly interested in the time variation in the returns and the effect of the variation in some board characteristics such as hiring young trustees on the equity performance.[27] Thus, we include a variable that equals one when a young trustee is hired at the beginning of the year and zero otherwise. A trustee is classified as young if he or she is younger than 46 or 40 years old, as in the previous sections.[28]

Table VII present the results. Columns (1) and (2) show that board characteristics are not related with the absolute returns on the equity portfolio. Specifically, pension funds that hire young trustees do not report either higher or lower returns over time. Similarly, if the employer trustees share increases with respect to the share of participant trustees, the equity performance remains unaffected. The same holds for variations in the trustees' backgrounds. In Columns (3) and (4), we test the effect of board characteristics on benchmark-adjusted returns. The results indicate that the benchmark-adjusted returns are higher for pension funds with a higher fraction of trustees with a financial background. One additional trustee with a financial background corresponds to a 30 basis point higher benchmark-adjusted return on the equity portfolio of a pension fund with an average of seven members on the board. This return indicates that trustees' financial expertise and experience contribute to the design of more profitable equity allocations. Conversely, the hiring of a young trustee is not related to the benchmark-adjusted returns. Thus, trustee turnover can be beneficial to benchmark-adjusted performance, if it increases the financial expertise on the board. Logically, improving the financial expertise on the board might not necessarily require hiring young trustees (see, e.g., Clark (2004)).

In sum, we cannot directly observe if pension funds with more board members of a young age increase the equity allocation by investing more in active or passive mandates. However, we observe that the additions of young trustees to a board are not associated with significant

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[27]The results are unchanged if we use the share of young trustees as in the previous sections.

[28]In Equation (1) we are interested in explaining the cross-sectional differences in the strategic equity allocations of pension funds with their board characteristics. Instead, in Equation (3) we are interested in explaining the evolution of the equity performance of each pension fund with the evolution of its board characteristics.

differences in absolute or relative equity returns. However, adding more financial expertise to the board appears to be beneficial.

VII.   Conclusion

We use a unique database on the SAAs and the board of trustees of Dutch pension funds to study if pension fund trustees consider their own characteristics when they make investment decisions. Trustees have the fiduciary duty to invest pension fund assets in the best interests of the plan beneficiaries. Therefore, their own characteristics should not affect their decision-making. In contrast to these hypotheses, we find that the age, gender, and the employers affect the SAAs of pension funds.

Pension funds with more trustees of a high age allocate strategically less to equity. The effect of the trustees' age is strong in corporate pension funds, that is, in those pension funds in which trustees are also plan beneficiaries; while it is absent in pension funds in which trustees are more likely not to be beneficiaries. These findings have two non-mutually exclusive interpretations. On the one hand, trustees try to align the SAAs of pension funds with their own life-cycle investment objectives. On the other hand, trustees might unknowingly project their own preferences onto beneficiaries and as a result make biased decisions. Both explanations indicate that by considering their own age, trustees design SAAs that do not reflect the characteristics of all plan beneficiaries. We also find that pension funds with more females on their boards allocate less to equity.

Next, we find that corporate pension funds with a higher share of employer trustees in relation to participant trustees invest more in equity than corporate pension funds that have a lower share of employer trustees. Hence, the SAAs of pension funds in which the trustees of the employer have more power than the trustees of the participants tend to be riskier. This risk can be favorable to the employer, as the higher risk exposure increases the expected value of the assets, which the employer has a claim on. By safeguarding the interests of the

employer, the trustees of the employer can receive career benefits. This behavior generates a principal-agent problem between the trustees and the beneficiaries, as a riskier allocation might not be in the beneficiaries' best interests. In the event of underfunding, beneficiaries may in fact face contribution increases or benefit reductions. A representation effect is not found in industry-wide pension funds that generally face greater scrutiny from the public that discourages trustees from valuing individual characteristics when they make investment decisions.

Trustees must act in the best interest of the plan beneficiaries and should not consider their own characteristics in making decisions on their behalf. The fact that trustees' characteristics correlate with the strategic equity allocation of pension funds indicates that trustees consider their own characteristics while carrying out their fiduciary duty. As a consequence, trustees might design SAAs that do not fully reflect beneficiaries' characteristics, hence possibly breaching their fiduciary duty. Our research shows the importance of pushing for greater diversity and better beneficiary representation on the pension funds' boards.

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Table I: **Summary statistics**

Panel A presents the information about pension funds' strategic asset allocation, Panel B about pension funds' characteristics, and Panel C about the boards of trustees. The mean and standard deviation are measured across pension funds and over time for each variable. All numbers are expressed as percentages unless otherwise stated and are computed relying on yearly information. Quarterly returns are compounded to obtain yearly returns. The strategic asset allocation, funding ratio, and the assets under management figures are based on the reported values in the last quarter of each year. For some of the variables, e.g., assets under management, the allocation to hedge funds and private equity, the mean is outside the 25-75 percent interval. This is due to the skewness of the distribution. In column Max exceptionally high values are reported for hedge funds, commodities, other assets, and cash. These are special cases of pension funds that are in a process of liquidation or a merger. These temporary high values are not persistent over time and do not affect the results of our analysis.

	Obs	Mean	Std. Dev.	Min	25th	75th	Max
A. Strategic Asset Allocation							
Fixed Income	2,857	60.38	14.37	9.00	50.00	70.00	100.00
Equity	2,857	29.82	11.59	0.00	22.40	36.80	80.00
Real Estate	2,857	5.74	5.91	0.00	0.00	10.00	51.82
Private Equity	2,857	0.68	1.71	0.00	0.00	0.00	12.20
Hedge Funds	2,857	1.11	2.78	0.00	0.00	0.00	40.00
Commodities	2,857	1.02	2.04	0.00	0.00	1.30	22.50
Other Assets	2,857	0.51	2.04	0.00	0.00	0.00	38.30
Cash	2,857	0.70	3.60	0.00	0.00	0.00	90.60
B. Pension Funds' Characteristics							
Funding Ratio	2,831	113.83	28.87	83.60	100.20	117.40	323.80
Assets Under Management (Million)	2,850	2,837	18,142	0.00	91.83	916.46	380,976
Corporate Pension Funds	2,857	0.74	0.44	0.00	0.00	1.00	1.00
Industry-Wide Pension Funds.	2,857	0.22	0.41	0.00	0.00	0.00	1.00
Professional Group Pension Funds.	2,857	0.04	0.19	0.00	0.00	0.00	1.00
Total Yearly Return	2,857	5.70	8.02	-21.82	1.80	11.00	21.40
Total Bmk. Adj. Return	2,857	0.02	2.73	-9.20	-0.90	0.80	9.30
Equity Yearly Return	2,857	5.28	20.73	-55.79	0.00	16.30	36.40
Equity Bmk. Adj. Return	2857	0.06	3.11	-12.10	-0.90	0.92	13.20
Average Age Active Participants	2,759	45.02	4.44	32.72	42.39	47.45	63.21
Average Age Retirees	2,817	69.80	5.40	35.45	67.44	73.28	87.67
Average Age Former Participants	2,800	47.31	4.56	30.21	44.35	50.19	67.50
Average Age Tot. Participants	2,822	52.20	7.68	33.33	46.78	56.96	82.89
Liablity Duration	2,781	17.55	4.21	6.10	15.00	19.80	30.10
% Active Participants	2,759	34.37	17.50	0.00	22.62	45.03	99.91
% Retirees	2,817	24.40	18.43	0.02	10.93	34.42	100.00
% Former Participants	2,800	42.37	17.41	0.01	30.76	53.77	100.00
C. Board of Trustees							
Board Size	2,794	7.10	2.49	1.00	6.00	8.00	20.00
Board Average Age	2,736	53.02	5.65	26.00	49.75	56.83	73.00
Board Median Age	2,736	53.00	6.45	26.00	49.00	57.50	73.00
Diff. Age Board vs. Participants	2,669	7.89	6.43	-27.36	4.18	12.18	30.21
Board Average Tenure	2,764	5.27	2.88	0.00	3.25	6.73	22.75
% Female Trustees	2,794	11.09	13.42	0.00	0.00	18.18	100.00
% Employer Trustees	2,794	45.59	13.63	0.00	42.86	50.00	100.00
% Retirees Trustees	2,794	11.58	12.25	0.00	0.00	20.00	100.00
% Employees Trustees	2,794	38.65	15.16	0.00	33.33	50.00	100.00
% Independent Trustees	2,794	3.05	12.36	0.00	0.00	0.00	100.00
% Former Employees Trustees	2,794	0.60	5.24	0.00	0.00	0.00	100.00
% Young Trustees (Age < 40)	2,736	8.97	12.50	0.00	0.00	16.67	100.00
% Young Trustees (Age < 46)	2,736	19.00	17.12	0.00	0.00	28.57	100.00
% University Degree	2,794	36.23	26.01	0.00	16.67	50.00	100.00
% Public Background	2,794	7.48	15.21	0.00	0.00	0.00	100.00
% Finance Background	2,794	18.23	18.98	0.00	0.00	28.57	100.00

Table II: The effect of board characteristics on the strategic equity allocation

The table shows the results for the pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the strategic equity allocation of pension fund i in year t. $X_{i,t}$ is a set of pension fund characteristics, $Z_{i,t}$ is a set of board characteristics, and θ_t is the year fixed effect. Column (1) displays the results for the baseline model in which only pension funds' characteristics are included. Columns (2) - (5) display the model estimated including the board characteristics. We consider four different specification of the age distribution in the board of trustees, namely the average age among the trustees, the median age of the board, the share of trustees younger than 46 years old, and the share of trustees younger than 40 years old. Standard errors are clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)
Board Average Age		-0.265***			
		(-3.29)			
Board Median Age			-0.237***		
			(-3.37)		
% Young Trustees (Age < 46)				0.051**	
				(2.08)	
% Young Trustees (Age < 40)					0.060*
					(1.90)
Board Size		0.220	0.218	0.226	0.236
		(0.97)	(0.97)	(0.99)	(1.04)
Board Average Tenure		0.167	0.161	0.138	0.132
		(1.02)	(0.98)	(0.84)	(0.80)
% Female Trustees		-0.055*	-0.056*	-0.051*	-0.049*
		(-1.91)	(-1.92)	(-1.79)	(-1.72)
% Employer Trustees		0.046	0.046	0.054	0.054
		(1.34)	(1.33)	(1.53)	(1.52)
% Retirees Trustees		0.013	0.009	0.005	0.005
		(0.31)	(0.20)	(0.12)	(0.12)
% Independent Trustees		0.007	0.008	0.009	0.010
		(0.27)	(0.27)	(0.32)	(0.35)
% University Degree		0.024	0.024	0.024	0.026
		(0.94)	(0.92)	(0.92)	(0.98)
% Public Background		0.002	0.004	-0.001	-0.002
		(0.04)	(0.10)	(-0.02)	(-0.05)
% Finance Background		-0.082**	-0.084***	-0.079**	-0.076**
		(-2.51)	(-2.61)	(-2.40)	(-2.31)
Average Age Active Participants	-0.361***	-0.324**	-0.326**	-0.335**	-0.334**
	(-2.62)	(-2.41)	(-2.44)	(-2.50)	(-2.51)
% Retirees	0.034	0.025	0.023	0.017	0.015
	(0.76)	(0.57)	(0.54)	(0.39)	(0.35)
Log Size	0.752***	0.753**	0.748**	0.724**	0.687*
	(2.69)	(2.15)	(2.16)	(2.05)	(1.92)
Lag Funding Ratio	0.058***	0.061***	0.060***	0.058***	0.059***
	(2.81)	(2.87)	(2.87)	(2.74)	(2.82)
Swap Ratio	0.031	0.029	0.030	0.029	0.030
	(1.50)	(1.34)	(1.39)	(1.38)	(1.44)
Professional group Pension Funds	-4.378**	-3.611	-3.633	-3.388	-3.264
	(-2.39)	(-1.59)	(-1.60)	(-1.49)	(-1.41)
Industry-Wide Pension Funds	-3.578***	-4.086**	-4.089**	-4.304**	-4.316**
	(-2.71)	(-2.35)	(-2.34)	(-2.47)	(-2.47)
Constant	33.972***	41.508***	40.525***	28.637***	29.354***
	(4.93)	(5.35)	(5.36)	(3.91)	(3.96)
Time Dummies	Yes	Yes	Yes	Yes	Yes
Observations	2,456	2,392	2,392	2,392	2,392
R^2	0.07	0.096	0.097	0.090	0.089

41

Table III: The effect of young trustees on the strategic equity allocation

The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of equity for pension fund i in year t. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t is the year fixed effect. We add a control variable, namely the age representation gap. This is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board to capture their behavior in funds with a large age-representation gap. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)
Age Representation Gap	-2.418***	-3.699***	-2.503***	-3.318***
	(-2.79)	(-3.11)	(-2.87)	(-3.31)
% Young Trustees (Age < 46)	0.022	0.001		
	(0.85)	(0.05)		
Age Representation Gap × % Young Trustees (Age < 46)		0.097*		
		(1.76)		
% Young Trustees (Age < 40)			0.032	0.007
			(0.96)	(0.20)
Age Representation Gap × % Young Trustees (Age < 40)				0.141*
				(1.70)
Board Size	0.219	0.218	0.223	0.232
	(0.98)	(0.98)	(1.00)	(1.05)
Board Average Tenure	0.155	0.149	0.158	0.147
	(0.95)	(0.93)	(0.97)	(0.92)
% Female Trustees	-0.051*	-0.050*	-0.051*	-0.050*
	(-1.82)	(-1.78)	(-1.81)	(-1.78)
% Employer Trustees	0.048	0.049	0.048	0.048
	(1.39)	(1.40)	(1.40)	(1.37)
% Retirees Trustees	0.013	0.013	0.015	0.016
	(0.31)	(0.30)	(0.34)	(0.38)
% Independent Trustees	0.012	0.011	0.013	0.013
	(0.44)	(0.39)	(0.47)	(0.47)
% University Degree	0.024	0.026	0.025	0.025
	(0.93)	(1.01)	(0.95)	(0.98)
% Public Background	-0.000	-0.005	-0.001	-0.004
	(-0.01)	(-0.11)	(-0.01)	(-0.08)
% Finance Background	-0.081**	-0.081**	-0.081**	-0.080**
	(-2.48)	(-2.50)	(-2.46)	(-2.47)
Average Age Active Participants	-0.482***	-0.465***	-0.483***	-0.471***
	(-3.55)	(-3.51)	(-3.50)	(-3.51)
% Retirees	0.021	0.019	0.020	0.016
	(0.50)	(0.46)	(0.47)	(0.40)
Log Size	0.710**	0.698**	0.707**	0.699**
	(2.03)	(2.00)	(2.00)	(1.98)
Lag Funding Ratio	0.060***	0.058***	0.060***	0.057***
	(2.84)	(2.80)	(2.87)	(2.81)
Swap Ratio	0.027	0.026	0.027	0.025
	(1.28)	(1.24)	(1.30)	(1.20)
Professional Pension Funds.	-3.359	-3.192	-3.308	-3.177
	(-1.49)	(-1.39)	(-1.46)	(-1.36)
Industry Pension Funds.	-3.855**	-3.743**	-3.828**	-3.692**
	(-2.23)	(-2.18)	(-2.21)	(-2.16)
Constant	36.374***	36.503***	36.541***	36.794***
	(4.88)	(4.91)	(4.79)	(4.84)
Time Dummies	Yes	Yes	Yes	Yes
Observations	2392	2392	2392	2392
R^2	0.096	0.099	0.096	0.100

Table IV: Board characteristics and equity allocation in corporate pension funds
The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of equity for pension fund i in year t. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t is the year fixed effect. We add a control variable to columns (4) and (6), namely the age-representation gap. The age-representation gap is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board to capture their behavior in funds with a large age-representation gap. The table displays the results when limiting the sample to corporate pension funds only. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
Board Average Age		-0.325***				
		(-3.55)				
% Young Trustees (Age < 46)			0.057**	-0.006		
			(2.02)	(-0.19)		
Age Representation Gap				-5.296***		-4.461***
				(-3.73)		(-3.71)
Age Representation Gap×%Young Trus.(<46)				0.170**		
				(2.56)		
% Young Trustees (Age < 40)					0.062*	-0.001
					(1.79)	(-0.01)
Age Representation Gap×%Young Trus.(<40)						0.215**
						(2.29)
Board Size		0.319	0.317	0.318	0.327	0.323
		(1.06)	(1.05)	(1.08)	(1.08)	(1.10)
Board Average Tenure		0.190	0.160	0.165	0.149	0.168
		(0.97)	(0.80)	(0.86)	(0.75)	(0.88)
% Female Trustees		-0.050	-0.046	-0.042	-0.042	-0.043
		(-1.22)	(-1.13)	(-1.06)	(-1.04)	(-1.09)
% Employer Trustees		0.106**	0.117**	0.103**	0.116**	0.101**
		(2.09)	(2.31)	(2.06)	(2.26)	(2.03)
% Retirees Trustees		0.026	0.010	0.020	0.008	0.024
		(0.54)	(0.19)	(0.41)	(0.15)	(0.49)
% Independent Trustees		0.038	0.040	0.034	0.040	0.037
		(0.68)	(0.70)	(0.58)	(0.68)	(0.62)
% University Degree		0.026	0.025	0.032	0.027	0.030
		(0.81)	(0.77)	(0.99)	(0.84)	(0.93)
% Public Background		0.064	0.052	0.042	0.048	0.048
		(0.63)	(0.51)	(0.43)	(0.46)	(0.47)
% Finance Background		-0.104***	-0.096**	-0.106***	-0.092**	-0.104***
		(-2.73)	(-2.50)	(-2.78)	(-2.40)	(-2.73)
Average Age Active Participants	-0.465***	-0.444***	-0.454***	-0.623***	-0.449***	-0.630***
	(-2.77)	(-2.74)	(-2.81)	(-3.93)	(-2.78)	(-3.94)
% Retirees	0.039	0.023	0.012	0.020	0.010	0.014
	(0.84)	(0.52)	(0.29)	(0.49)	(0.22)	(0.35)
Log Size	0.803**	0.782*	0.756	0.641	0.707	0.683
	(2.09)	(1.68)	(1.62)	(1.40)	(1.48)	(1.46)
Lag Funding Ratio	0.068***	0.074***	0.072***	0.070***	0.073***	0.069***
	(3.28)	(3.67)	(3.57)	(3.71)	(3.70)	(3.73)
Swap Ratio	0.028	0.025	0.025	0.026	0.026	0.025
	(1.05)	(0.96)	(0.94)	(0.99)	(1.00)	(0.99)
Constant	35.281***	42.199***	26.489***	37.871***	27.304***	37.871***
	(4.05)	(4.40)	(2.95)	(4.16)	(2.97)	(4.00)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1816	1761	1761	1761	1761	1761
R^2	0.077	0.118	0.108	0.126	0.106	0.125

Table V: Board characteristics and equity allocation in non-corporate pension funds

The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of equity for pension fund i in year t. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t is the year fixed effect. We add a control variable to columns (4) and (6), namely the age-representation gap. The age-representation gap is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board to capture their behavior in funds with a large age-representation gap. The table displays the results when limiting the sample to non-corporate pension funds only. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
Board Average Age		-0.094				
		(-0.49)				
% Young Trustees (Age < 46)			0.052	0.071		
			(0.86)	(0.97)		
Age Representation Gap				0.026		-0.857
				(0.01)		(-0.43)
Age Representation Gap×%Young Trus.(<46)				-0.069		
				(-0.67)		
% Young Trustees (Age < 40)					0.067	0.074
					(0.73)	(0.64)
Age Representation Gap×%Young Trus.(<40)						-0.061
						(-0.39)
Board Size		0.211	0.212	0.204	0.225	0.206
		(0.65)	(0.66)	(0.63)	(0.70)	(0.64)
Board Average Tenure		0.303	0.289	0.294	0.283	0.298
		(1.13)	(1.07)	(1.09)	(1.04)	(1.11)
% Female Trustees		-0.063	-0.059	-0.060	-0.058	-0.061
		(-1.61)	(-1.52)	(-1.54)	(-1.53)	(-1.57)
% Employer Trustees		-0.027	-0.028	-0.036	-0.027	-0.032
		(-0.49)	(-0.51)	(-0.72)	(-0.49)	(-0.63)
% Retirees Trustees		0.056	0.057	0.051	0.063	0.055
		(1.08)	(1.14)	(1.00)	(1.23)	(1.03)
% Independent Trustees		-0.001	-0.001	-0.003	0.000	-0.001
		(-0.02)	(-0.04)	(-0.08)	(0.00)	(-0.04)
% University Degree		0.002	0.003	0.001	0.003	-0.000
		(0.05)	(0.07)	(0.02)	(0.08)	(-0.01)
% Public Background		-0.011	-0.013	-0.011	-0.012	-0.011
		(-0.26)	(-0.30)	(-0.26)	(-0.27)	(-0.26)
% Finance Background		-0.000	-0.003	0.002	-0.000	0.006
		(-0.01)	(-0.06)	(0.05)	(-0.00)	(0.11)
Average Age Active Participants	-0.083	-0.067	-0.047	-0.090	-0.066	-0.110
	(-0.33)	(-0.27)	(-0.19)	(-0.36)	(-0.26)	(-0.43)
% Retirees	-0.008	-0.031	-0.036	-0.043	-0.031	-0.040
	(-0.07)	(-0.27)	(-0.32)	(-0.38)	(-0.28)	(-0.35)
Log Size	0.600	0.485	0.511	0.518	0.465	0.511
	(1.50)	(0.86)	(0.90)	(0.90)	(0.83)	(0.91)
Lag Funding Ratio	0.013	0.009	0.006	0.008	0.007	0.009
	(0.32)	(0.21)	(0.14)	(0.19)	(0.16)	(0.22)
Swap Ratio	0.045	0.037	0.036	0.034	0.036	0.035
	(1.28)	(1.05)	(1.02)	(0.93)	(1.04)	(0.94)
Constant	27.896**	33.029**	26.807*	28.872**	28.199**	30.183**
	(2.21)	(2.29)	(1.97)	(2.12)	(2.11)	(2.23)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	640	631	631	631	631	631
R^2	0.067	0.087	0.090	0.094	0.089	0.092

44

Table VI: Board characteristics and strategic alternative allocation

The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of alternative asset classes for pension fund i in year t. Alternatives are real estate, hedge funds, private equity, and commodities. $X_{i,t}$ are pension fund characteristics, $Z_{i,t}$ are board characteristics, and θ_t is the year fixed effect. We add a control variable to columns (4) and (6), namely the age-representation gap that is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
Board Average Age	0.082					
	(1.37)					
Board Median Age		0.044				
		(0.86)				
% Young Trustees (Age < 46)			-0.020	-0.004		
			(-1.28)	(-0.24)		
Age Representation Gap				1.203*		1.306**
				(1.65)		(2.04)
Age Representation Gap×%Young Trus.(<46)				-0.033		
				(-0.95)		
% Young Trustees (Age < 40)					-0.020	0.004
					(-0.90)	(0.17)
Age Representation Gap×%Young Trus.(<40)						-0.077
						(-1.44)
Board Size	0.461***	0.460***	0.460***	0.463***	0.456***	0.456***
	(2.73)	(2.72)	(2.73)	(2.75)	(2.71)	(2.72)
Board Average Tenure	0.198	0.209	0.203	0.200	0.208	0.205
	(1.54)	(1.61)	(1.57)	(1.54)	(1.59)	(1.59)
% Female Trustees	0.026	0.024	0.025	0.025	0.024	0.024
	(1.19)	(1.13)	(1.14)	(1.14)	(1.09)	(1.09)
% Employer Trustees	-0.038	-0.039	-0.041	-0.039	-0.041	-0.038
	(-1.40)	(-1.40)	(-1.49)	(-1.44)	(-1.49)	(-1.43)
% Retirees Trustees	0.016	0.019	0.018	0.016	0.019	0.015
	(0.56)	(0.66)	(0.62)	(0.54)	(0.64)	(0.50)
% Independent Trustees	0.027	0.026	0.026	0.025	0.026	0.025
	(0.99)	(0.98)	(0.96)	(0.95)	(0.94)	(0.91)
% University Degree	-0.017	-0.017	-0.017	-0.018	-0.018	-0.017
	(-0.98)	(-0.98)	(-0.97)	(-1.00)	(-1.00)	(-1.00)
% Public Background	0.028	0.029	0.029	0.030	0.029	0.031
	(1.01)	(1.02)	(1.02)	(1.08)	(1.05)	(1.10)
% Finance Background	0.001	-0.000	0.001	0.002	-0.001	0.001
	(0.05)	(-0.00)	(0.04)	(0.08)	(-0.04)	(0.04)
Average Age Active Participants	-0.230***	-0.225***	-0.230***	-0.189**	-0.228***	-0.183**
	(-2.92)	(-2.86)	(-2.91)	(-2.42)	(-2.94)	(-2.44)
% Retirees	0.047*	0.048*	0.050*	0.049*	0.050*	0.050**
	(1.76)	(1.79)	(1.88)	(1.88)	(1.92)	(2.00)
Log Size	1.620***	1.641***	1.617***	1.626***	1.638***	1.636***
	(7.04)	(7.14)	(7.03)	(7.11)	(7.09)	(7.15)
Lag Funding Ratio	0.018	0.019	0.020	0.020	0.019	0.020*
	(1.48)	(1.50)	(1.58)	(1.60)	(1.56)	(1.76)
Swap Ratio	0.036***	0.035***	0.036***	0.037***	0.035***	0.037***
	(2.83)	(2.78)	(2.81)	(2.91)	(2.77)	(2.98)
Professional Pension Funds.	0.142	0.102	0.084	0.017	0.035	-0.022
	(0.07)	(0.05)	(0.04)	(0.01)	(0.02)	(-0.01)
Industry Pension Funds.	0.369	0.415	0.423	0.244	0.438	0.196
	(0.32)	(0.36)	(0.38)	(0.21)	(0.39)	(0.17)
Constant	-12.162**	-10.871**	-7.835	-10.313**	-8.344*	-10.949**
	(-2.17)	(-1.97)	(-1.54)	(-2.02)	(-1.66)	(-2.18)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2392	2392	2392	2392	2392	2392
R^2	0.308	0.307	0.307	0.309	0.307	0.310

Table VII: Board characteristics and the performance of the equity portfolio

The table shows the results for the within-effect regression in Equation 3: $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \mu_i + \epsilon_{i,t}$. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t and μ_i are the time and pension fund fixed effects. The dependent variable $y_{i,t}$ in columns (1) - (2) is the net-of-fees yearly return on the equity portfolio in year t for pension fund i. In columns (3) - (4) $y_{i,t}$ is the benchmark-adjusted yearly return on the equity portfolio. The benchmark-adjusted return is obtained by subtracting the benchmark return indicated by each pension fund from the net-of-fees yearly return on the equity portfolio. The board characteristics also include a dummy variable that equals one when a young trustee is hired and zero otherwise. A trustee is considered young if he or she is younger than 46 or 40 years old. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

|	Equity Year Return		Bmk. Adj. Return	
	(1)	(2)	(3)	(4)
New Trustee (Age < 46)	0.592		0.108	
	(1.41)		(0.46)	
New Trustee (Age < 40)		0.726		-0.075
		(1.30)		(-0.25)
Board Size	-0.121	-0.120	-0.040	-0.039
	(-1.23)	(-1.21)	(-0.69)	(-0.67)
Board Average Tenure	0.107	0.105	0.024	0.020
	(1.29)	(1.26)	(0.56)	(0.46)
% Female Trustees	-0.015	-0.015	0.004	0.004
	(-0.97)	(-0.96)	(0.48)	(0.51)
% Employer Trustees	-0.019	-0.019	-0.016	-0.016
	(-0.98)	(-0.97)	(-1.39)	(-1.36)
% Retirees Trustees	-0.025	-0.024	-0.004	-0.004
	(-1.33)	(-1.28)	(-0.38)	(-0.38)
% Independent Trustees	0.003	0.003	-0.003	-0.003
	(0.20)	(0.20)	(-0.36)	(-0.34)
% University Degree	-0.010	-0.010	-0.006	-0.006
	(-0.69)	(-0.71)	(-0.91)	(-0.91)
% Public Background	-0.006	-0.005	0.008	0.008
	(-0.33)	(-0.28)	(0.62)	(0.63)
% Finance Background	0.012	0.013	0.021***	0.021***
	(0.78)	(0.82)	(2.64)	(2.65)
Average Age Active Participants	-0.103	-0.101	0.022	0.023
	(-0.74)	(-0.73)	(0.52)	(0.54)
% Retirees	0.022	0.021	0.015	0.014
	(0.44)	(0.42)	(0.59)	(0.56)
Log Size	1.395*	1.416*	0.823*	0.822*
	(1.82)	(1.84)	(1.70)	(1.70)
Lag Funding Ratio	-0.044**	-0.044**	0.002	0.002
	(-2.05)	(-2.05)	(0.18)	(0.18)
Swap Ratio	0.011	0.011	0.002	0.002
	(1.37)	(1.38)	(0.50)	(0.53)
Constant	-51.917***	-52.261***	-12.415*	-12.420*
	(-5.13)	(-5.20)	(-1.88)	(-1.88)
Time Dummies	Yes	Yes	Yes	Yes
Pension fund FE	Yes	Yes	Yes	Yes
Observations	2,331	2,331	2,331	2,331
R^2	0.944	0.944	0.066	0.066
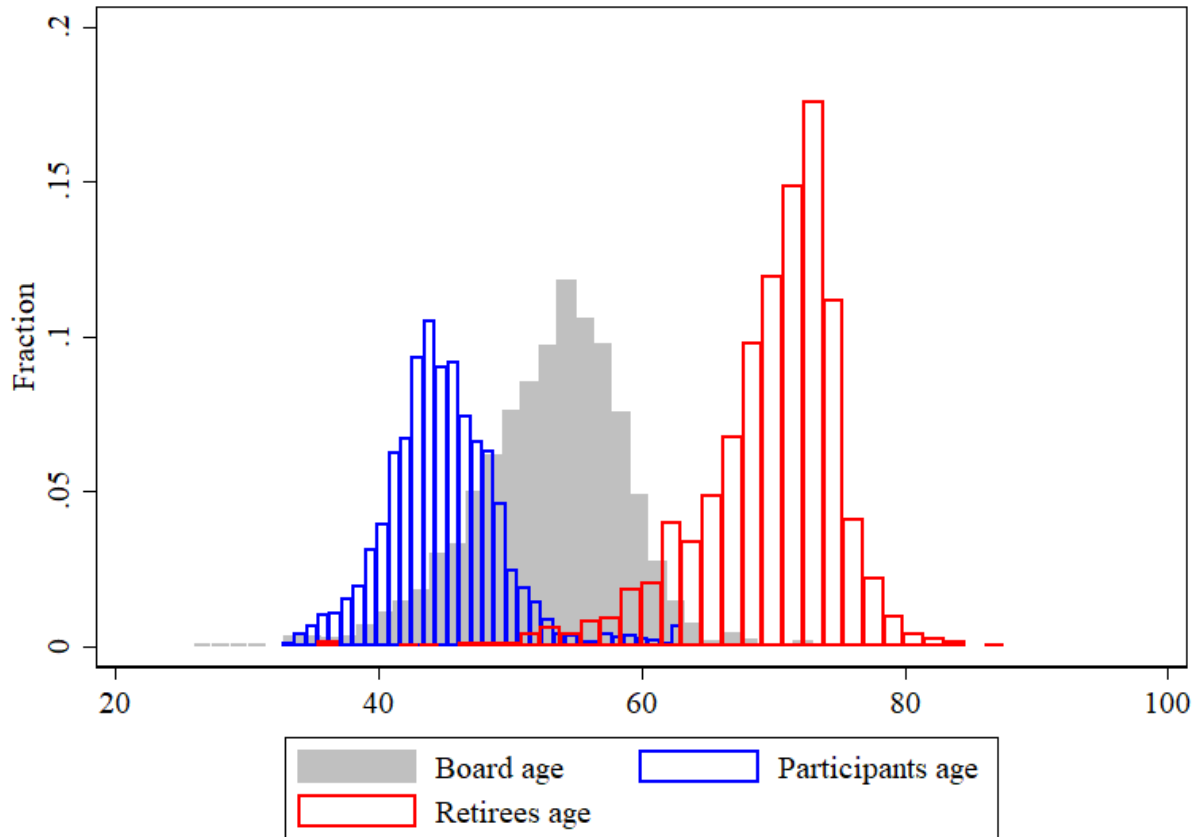
Figure 1. Age distribution of board members and beneficiaries
The figure shows the age distribution of the active participants in blue, of the retirees in red and of the board members in gray.

47
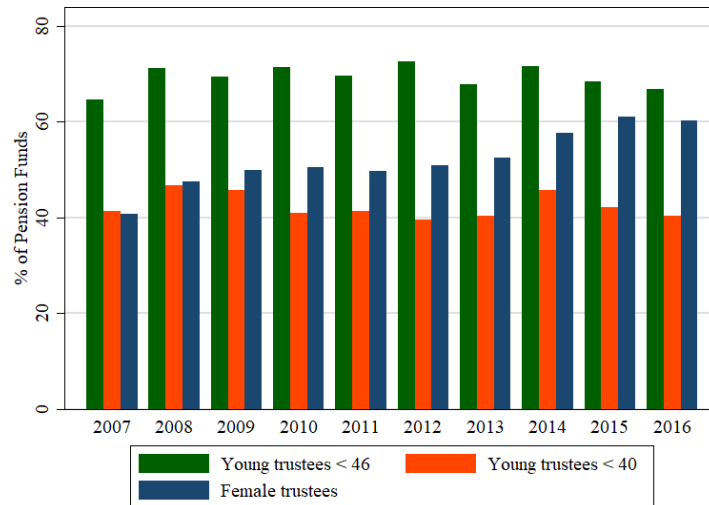
A. Board of trustees composition
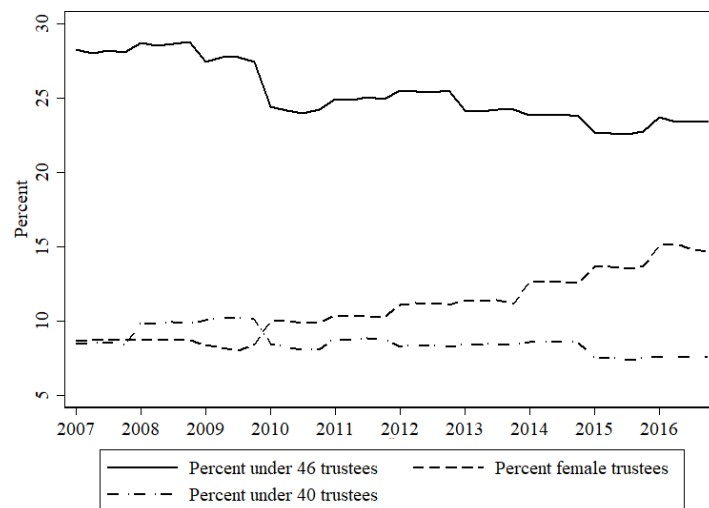
B. Percent of young female trustees over time

**Figure 2. Board of trustees characteristics over time**
Panel A displays for each year the percentage of pension funds that report at least one young or one woman trustee in their boards. A trustee is classified as young if he or she is younger than 40 years old(in line with the Code of Dutch Pension Funds) or younger than 46 years old. The latter is the 25th percentile in the age distribution of trustees. Panel B shows the evolution of the average share of young and female trustees across pension funds.

48

A. Avg. strategic equity allocation of pension funds with trustees younger than 40

B. Average strategic equity allocation of pension funds with trustees younger than 46
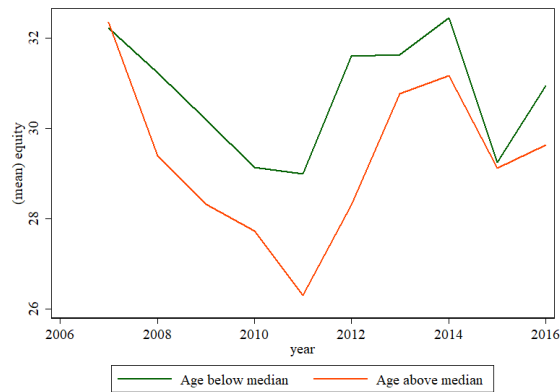
C. Avg. strategic equity allocation by median board age

Figure 3. Strategic Equity Allocation by Board Age
Panel A (B) shows the average strategic equity allocation of pension funds that at the end of each year, have or do not have at least one trustee younger than 40 (46) years old on their board. Panel C shows the average strategic equity allocation of pension funds that at the end of each year, have an average age on the board above or below the median value of the cross-sectional average board age in that year.

49
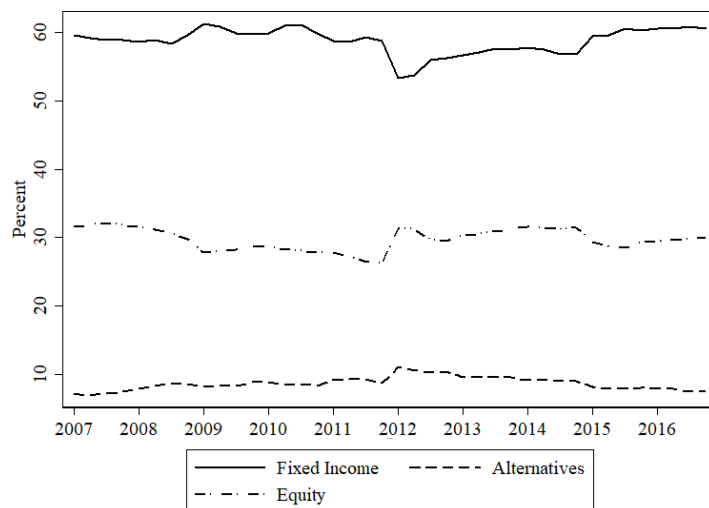
A. Avg. strategic asset allocation over time
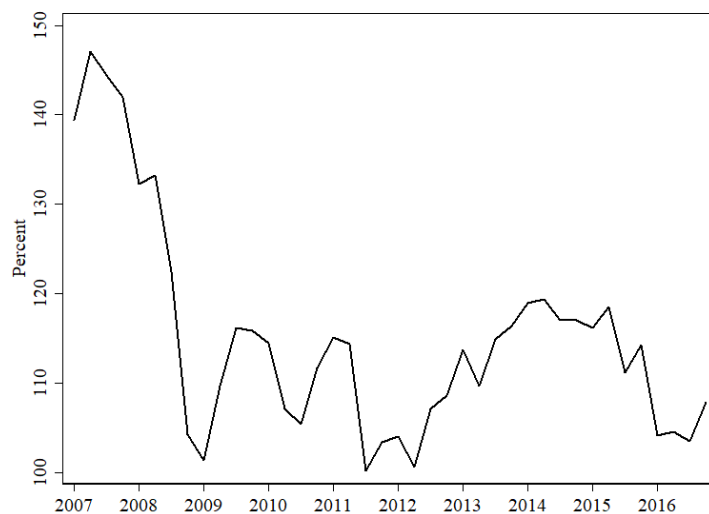
B. Avg. funding ratio over time

Figure 4. Pension fund asset allocation and funding ratio over time
Panel A in the figure shows how the average SAA to equity, alternative assets, and fixed income has evolved over time. Alternative assets include real estate, private equity, hedge funds, and commodities. Panel B shows the evolution of the average funding ratio across pension funds.

50
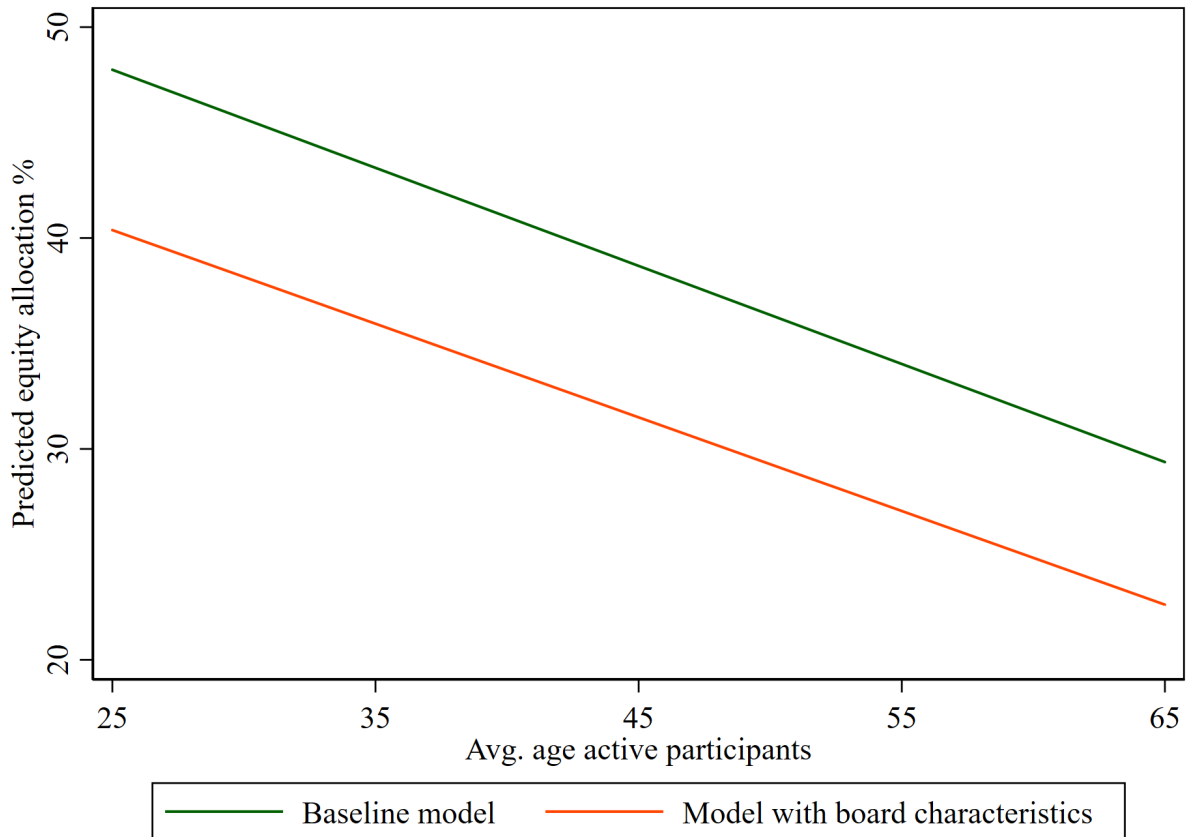
Figure 5. Predicted equity allocation of corporate pension fund
The figure shows the equity allocation of the average pension fund predicted by the baseline model in column (1) in Table IV and by the model augmented with board characteristics in column (2).

Appendix A.   Swap Ratio

Pension funds hedge interest rate risk using receiver swaps; however, the amount of interest risk that is hedged by each pension fund in this way is unobservable. Following Broeders et al. (2020), we model the total share of interest rate risk that is hedged via swaps: the so called swap hedge ratio. First, we assume that a pension fund with defined benefit liabilities invests only in equities and bonds. Second, we model the pension liabilities as follows: Suppose we have a homogeneous group of beneficiaries that receive an annual pension payment of P. Each period a fraction of the beneficiaries dies. We express this by the annual mortality λ. These deaths lower the annual pension payments. Therefore, the level of pension payments in year t is given by

$$P \exp(-\lambda t). \tag{A1}$$

Third, we assume a flat term-structure of market interest rates r. We need this assumption to do the duration analysis later on. The present discounted value of all future pension liabilities equals:

$$V = \int_0^\infty P \exp(-(r+\lambda)t)dt = \frac{P}{r+\lambda}. \tag{A2}$$

The duration of the present discounted value of all future pension liabilities V equals:

$$D_V = -\frac{1}{V}\frac{dV}{dr} = \frac{1}{r+\lambda}. \tag{A3}$$

This liability duration measures two things: (1) the weighted average time to maturity of the pension payments and (2) the sensitivity of the present discounted value of the pension

liabilities to changes in market interest rates. Given that pension benefits stretch many decades, the duration is typically high.

Relative to its liabilities, a pension fund invests a fraction $\phi^E = \frac{E}{V}$ in equities and a fraction B/V in bonds. The bonds have a duration of D_B. The fraction of interest rate risk embedded in the liabilities that is hedged with bonds is denoted by ϕ^B. This bond hedge ratio is defined as:

$$\phi^B = \frac{B}{V}\frac{D_B}{D_V}. \tag{A4}$$

In addition, the pension fund hedges interest rate risk through a portfolio of interest rate swaps. For simplicity we treat this hedging portfolio as a position in a single receiver swap in which the pension fund receives the swap rate (fixed leg) and pays a floating rate (floating leg) over a notional amount. We denote this notional of the receiver swap by N and the duration of its fixed leg by D_R. The fraction of interest rate risk hedged via the receiver swap, relative to the total value of liabilities V, is the swap hedge ratio and is given by:

$$\phi^R = \frac{N}{V}\frac{D_R}{D_V}. \tag{A5}$$

Pension funds have a capital requirement S that is calculated such that the probability that the funding ratio falls below 100 percent on a one-year horizon equals 2.5 percent. This capital requirement translates into a funding requirement of $\frac{S+V}{V}$. Pension funds in the Netherlands determine the capital requirement by applying a method that is prescribed by law. For the purpose of this study we only consider how much capital is required for interest rate risk and equity risk. These two are the dominant risk factors in practice.

The interest rate risk is embedded in the present value of the future pension liabilities. If a pension fund hedges all interest rate risk, the capital requirement for this risk factor will

be negligible. Therefore, the capital requirement is based on the part of the interest rate risk in the liabilities that is not hedged with swaps and bonds. To determine this part, we consider a decrease in the interest rate Δr^-. This decrease is prescribed by law. An interest rate decrease will typically lower the funding ratio. The increase in the value of the liabilities exceeds the increase in the value of fixed income assets.

The change in interest rates depends on the interest rate level, which in turn depends on the maturity. For our analysis we take the interest rate level for each pension fund with a maturity equal to the duration of its liabilities. Let us call this interest rate r_{t,D_V}. Second, the new interest rate level is equal to $r'_{t,D_V} = \kappa r_{t,D_V}$. So that the absolute change in the interest rate is $\Delta r^- = r'_{t,D_V} - r_{t,D_V} = \kappa r_{t,D_V} - r_{t,D_V}$. The multiplication factor κ is described by law. Suppose the current market interest for a duration of 20 years is 4 percent and the multiplication factor is 0.76. The absolute change in the interest rate is $0.76 * 0.04 - 0.04 = 0.01$ or 1 percent. The factors for κ can be found here `http://wetten.overheid.nl`. The capital requirement for interest rate risk is given by:

$$S_1 = -(1 - \phi^R - \phi^B)D_V\Delta r^-. \tag{A6}$$

To keep the capital requirement from interest rate risk positive (A6), we assume that pension funds never over-hedge, so that $\phi^R + \phi^B \leq 1$. This assumption is realistic as the value-weighted average of hedged interest rate risk across Dutch pension funds equals 40 percent, which means $\phi^R + \phi^B = 0.40$.

We are now be able to derive the swap hedge ratio ϕ^R. Rewriting (A6) gives

$$\phi^R = 1 - \phi^B + \frac{S_1}{D_V\Delta r^-} \tag{A7}$$

The swap hedge ratio that we derive for each pension fund from Equation (A7) is used as

54

an additional control variable in our analysis. For the sake of completeness, we also provide the capital requirement for equity risk as a fraction of V that is given by:

$$S_2 = \phi^E \Delta E \tag{A8}$$

where ΔE is a negative return on equity markets. This decrease is prescribed by law and equals -0.3 or minus 30 percent. We do not use this capital requirement for equity risk in our analysis.

Appendix B. Average age of active participants and fraction of retirees

In this appendix we show that the average age of active participants and the fraction of retirees are interrelated. To show this relation we assume that the age distribution of beneficiaries follows a Gamma probability distribution. Figure 6 shows a hypothetical example of such an age distribution that assumes a Gamma distribution with shape parameter $\alpha = 15.3$ and scale parameter $\beta = 3.5$. The mean age of all beneficiaries is $(\alpha * \beta =)$ 52.4 years old and the standard deviation is $(\beta\sqrt{\alpha} =)$ 13.5 years. The mean age of active participants follows from numerically evaluating:

$$\int_0^z x \frac{e^{\frac{-x}{\beta}} x^{-1+\alpha} \beta^{-\alpha}}{\Gamma(\alpha)} \, \mathrm{d}x \tag{B1}$$

where $\Gamma(\alpha)$ is the Gamma function. If we assume the retirement age to be $z = 65$, the mean age of active participants equals 39.7 years old. Thus, the fraction of active participants follows from the cumulative distribution function. Consequently, the fraction of retirees is one minus the fraction of active participants. In the numerical example the fraction of retirees is 17.3 percent.

Next, we analyze the effect of a younger or an older population of beneficiaries. We let the shape parameter α in the Gamma distribution range from 13 to 17 and keep the scale parameter fixed at $\beta = 3.5$. By changing the shape parameter, the mean beneficiaries' age will vary from 45.5 to 59.5 years old. Figure 7 plots the mean age of active participants (solid line, left hand y-axis) and the fraction of retirees (dashed line, right hand y-axis), both as a function of the mean age of all beneficiaries. The mean age of active participants (mostly) goes down if the beneficiaries as a group get older. This is due to the fact that we measure the conditional probability distribution below the retirement age. The fraction of retirees
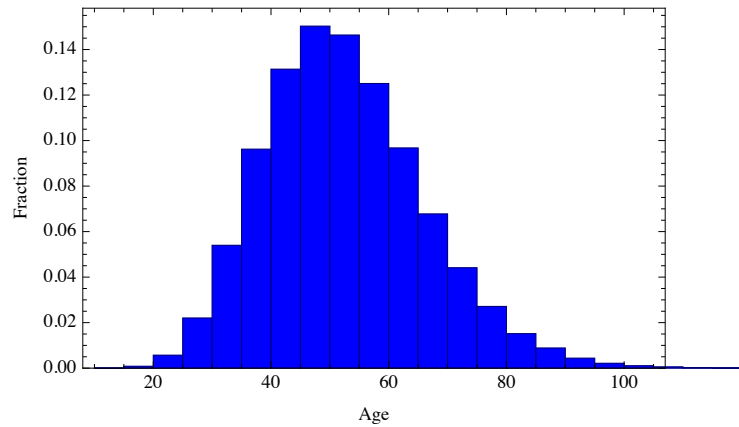
Figure 6. Age distribution beneficiaries
The figure shows the age distribution of the beneficiaries taking 200,000 random drawings from a Gamma distribution $\Gamma(15, 3.5)$

goes up with the mean age of all beneficiaries. The correlation between the mean age of active participants and the fraction of retirees is -0.96. This correlation therefore shows that the mean age of active participants is also informative about the fraction of retirees.
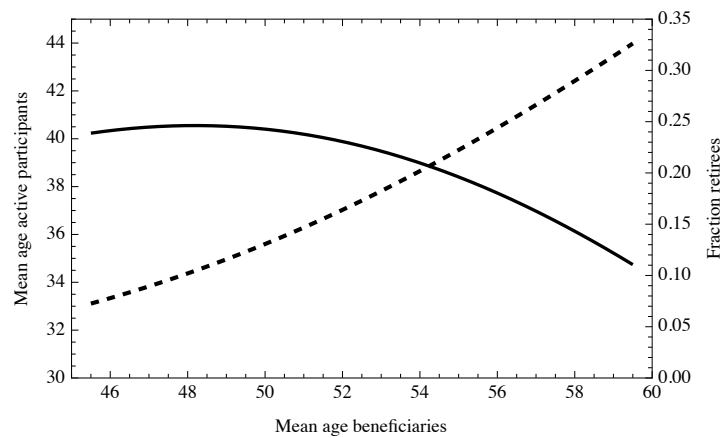
Figure 7. Average age active participants and fraction of retirees

The figure shows the mean age of active participants (solid line, left hand y-axis) and the fraction of retirees (dashed line, right hand y-axis) as a function of the mean age of all beneficiaries. We assume a Gamma distribution $\Gamma(\alpha, 3.5)$ where α ranges from 13 to 17. This is equivalent to a mean beneficiaries' age ranging from 45.5 to 59.5 years old.

Appendix C. The role of the median voter in the board

The "median voter" plays a key role in majoritarian decision-making. We therefore test the effect of the median age of the board on investment decisions. There is no rule in the Dutch Pension Act that prescribes how decisions are made by the board. The decision-making is arranged in the statute of each pension fund. However, many pension funds have a majoritarian decision-making. In practice, trustees normally entertain some discussions to reach a consensus among all the members.

Within the framework of majoritarian decision-making, one basic way of modeling the decisional process is represented by the median voter theorem (Hotelling (1929); Black (1948); Downs (1957)). The median voter model is typically used by political theorists and political economists to explain the political outcomes in a democracy as a reflection of the median voter preferences (Alesina and Cukierman (1990); Alesina et al. (1993) Wijnbergen (1992)). In its weak form, the median voter theorem means that in a two party system, the winning party is the one that is closer to the median voter preference (Congleton (2004)).

To understand the logic of the median voter model and its application to the board of trustees of a pension fund, we consider a simplified setting with three trustees: Anna, Bart, and Carl that have to make a decision on the strategic equity allocation. Moreover, assume that even though they are required to represent all beneficiaries, they also have personal investment preferences related to their age. It follows that their age will affect their voting preferences. Anna is relatively young, say 40 years old, and she prefers to allocate 40 percent of the portfolio to equity. Bart is middle age, say 50 years old, and prefers a more conservative 25 percent allocation. Carl is older, say 60 years old, and given that his retirement is approaching he wants to have a safe portfolio. He prefers to allocate only 20 percent of the portfolio to equity. In this example, Bart is said to be the median voter because exactly the same number of individuals prefer a more aggressive SAA than him as

Table VIII: **Voting outcomes under the median voting theorem**

Options	Pattern of votes			Results
40 vs. 25	A: 40	B: 25	C: 25	25
40 vs. 30	A: 40	B: 30	C: 30	30
40 vs. 20	A: 40	B: 20	C: 20	20
35 vs. 10	A: 35	B: 35	C: 10	35
33 vs. 12	A: 33	B: 33	C: 12	33

prefer a more conservative SAA than him. Each of the three trustees prefers the equity allocation that is closest to their preferred allocation. Table VIII presents the majority decision in different scenarios using purely arbitrary numbers. The choices between two equity allocations that the board has to decide on are listed in the first column. The vote of each trustee (in line with their preference) is listed in the second column. The equity allocations that are selected by the board are listed in the third column.

In line with the weak form of the median voter theorem, the median voter (Bart) always casts his vote for the allocation to equity that is eventually approved. If this is known to the other two board members, both of them will converge to the median vote position. It follows that at the limit both young and old trustees will propose the same equity allocation, which is the one preferred by the median voter. Given that the median voter always succeeds in having his or her preferred option approved, then anything that affects the median voter's assessment can also affect the final outcome of the board's decision (Congleton (2004)). For example, if the age of the median voter can affect the median voter's assessment of the investment policy discussed in a board meeting, then it can consequently affect the board's decision.

Appendix D.   Supplementary Tables

Appendix A.   *Summary statistics at the trustee level*

In this section, we present the summary statistics of the characteristics of trustees. The unit of observation is an individual trustee rather than pension funds, as in the study. Next, we present the correlation between the demographics of board members and the demographics of participants.

Table IX: **Summary statistics at trustees level**

	Obs	Mean	Std. Dev.	Min	25th	75th	Max
Trustee Age	20,625	53.59	10.24	19.00	46.00	61.00	85.00
Female Trustee	26,708	0.11	0.31	0.00	0.00	0.00	1.00
Tenure	26,243	5.30	5.44	0.00	1.00	8.00	41.00
University Degree	12,913	0.68	0.47	0.00	0.00	1.00	1.00
Public Background	12,987	0.15	0.35	0.00	0.00	0.00	1.00
Finance Background	13,007	0.34	0.47	0.00	0.00	1.00	1.00
Employer Representative	26,708	0.45	0.50	0.00	0.00	1.00	1.00
Pensioners Representative	26,708	0.11	0.32	0.00	0.00	0.00	1.00
Employees Representative	26,708	0.39	0.49	0.00	0.00	1.00	1.00
Independent Trustee	26,708	0.03	0.17	0.00	0.00	0.00	1.00
Former Employees Representative	26,708	0.01	0.09	0.00	0.00	0.00	1.00

Table X: **Correlation matrix age board and participants age**

	Average Age Active Part.	Average Age Tot. Part.	Board Average Age	% Young Trustees (<40)	% Young Trustees (<46)	Board Median Age
Average Age Active Part.	1					
Average Age Tot. Part.	0.636***	1				
Board Average Age	0.191***	0.279***	1			
% Young Trustees (<40)	-0.147***	-0.112***	-0.572***	1		
% Young Trustees (<46)	-0.151***	-0.151***	-0.648***	0.714***	1	
Board Median Age	0.162***	0.225***	0.936***	-0.521***	-0.639***	1

Appendix B.   *Summary statistics corporate vs non-corporate pension funds*

Table XI: **Summary statistics corporate pension funds**
Panel A. presents information about pension funds' asset allocation, Panel B about pension funds' characteristics, and Panel C about the boards of trustees. The mean (standard deviation) indicates the average (standard deviation) across pension funds and over time for each variable. All numbers are expressed as percentages unless otherwise stated and are computed relying on yearly information. Quarterly returns are compounded to obtain yearly returns. Strategic asset allocation, funding ratio, and assets under management figures are based on the reported values in the last quarter of each year. For some of the variables, e.g., assets under management, allocation to hedge funds, and private equity, the mean is outside the 25%-75% interval. This is due to the skewness of the distribution. In column Max, the exceptionally high values are reported for hedge funds, commodities, other assets, and cash. These are special cases of pension funds under the process of liquidation or merger. The values are not persistent over time and do not affect the results of our analysis.

	Obs	Mean	Std. Dev.	Min	25th	75th	Max
A. Asset Allocation							
Fixed Income	2124	61.31	14.34	9.00	50.45	70.00	100.00
Equity	2124	30.15	12.00	0.00	22.50	37.50	80.00
Real Estate	2124	4.81	5.28	0.00	0.00	8.00	50.00
Private Equity	2124	0.52	1.61	0.00	0.00	0.00	12.20
Hedge Funds	2124	1.16	3.02	0.00	0.00	0.00	40.00
Commodities	2124	0.87	2.03	0.00	0.00	0.00	22.50
Other Assets	2124	0.46	2.01	0.00	0.00	0.00	25.00
Cash	2124	0.70	3.88	0.00	0.00	0.00	90.60
B. Pension Fund Characteristics							
Funding Ratio	2101	114.24	29.34	83.60	100.70	118.10	323.80
Assets Under Management (Million)	2117	897.78	2609.76	0.00	70.17	573.92	27461.16
Total Yearly Return	2124	5.75	8.00	-21.82	1.80	11.10	21.40
Total Bmk. Adj. Return	2124	-0.02	2.81	-9.20	-1.00	0.86	9.30
Equity Yearly Return	2124	5.22	20.81	-55.79	0.00	16.50	36.40
Equity Bmk. Adj. Return	2124	0.10	3.31	-12.10	-1.07	1.00	13.20
Average Age Active Participants	2055	45.48	4.14	33.97	43.03	47.92	62.50
Average Age Retirees	2088	69.61	5.73	35.45	66.76	73.43	87.67
Average Age Former Participants	2073	47.36	4.40	30.21	44.54	50.37	67.50
Average Age Tot. Participants	2093	52.81	7.73	33.33	47.54	57.74	82.89
Liablity Duration	2055	17.11	3.95	6.10	14.80	19.10	30.10
% Active Participants	2055	35.54	17.69	0.18	24.06	45.77	99.87
% Retirees	2088	26.14	18.62	0.02	11.98	37.29	100.00
% Former Participants	2073	39.41	14.78	0.04	30.22	47.98	100.00
C. Board of Trustees							
Board Size	2070	6.74	2.36	1.00	5.00	8.00	20.00
Board Average Age	2023	52.50	5.87	26.00	49.00	56.40	73.00
Diff. Age Board vs. Participants	1,981	6.87	6.26	-27.36	3.22	11.00	29.45
Board Average Tenure	2044	5.32	2.97	0.00	3.20	6.80	22.75
% Female Trustees	2070	10.08	12.35	0.00	0.00	16.67	100.00
% Employer Trustees	2070	46.17	11.57	0.00	42.86	50.00	100.00
% Retirees Trustees	2070	13.92	12.00	0.00	0.00	20.00	100.00
% Employees Trustees	2070	36.96	12.98	0.00	30.00	50.00	100.00
% Independent Trustees	2070	1.83	8.22	0.00	0.00	0.00	100.00
% Former Employees Trustees	2070	0.53	4.94	0.00	0.00	0.00	100.00
% Young Trustees (Age < 40)	2023	10.18	13.24	0.00	0.00	16.67	100.00
% Young Trustees (Age < 46)	2023	20.76	17.85	0.00	0.00	33.33	100.00
% University Degree	2070	36.71	26.15	0.00	16.67	54.55	100.00
% Public Background	2070	1.13	5.35	0.00	0.00	0.00	71.43
% Finance Background	2070	20.69	19.78	0.00	0.00	33.33	100.00

Table XII: **Summary statistics non-corporate pension funds**

Panel A presents information about pension funds' asset allocation, Panel B about pension funds' characteristics, and Panel C about the boards of trustees. The mean (standard deviation) indicates the average (standard deviation) across pension funds and over time for each variable. All numbers are expressed as percentages unless otherwise stated and are computed relying on yearly information. Quarterly returns are compounded to obtain yearly returns. Strategic asset allocation, funding ratio, and assets under management figures are based on the reported values in the last quarter of each year. For some of the variables, e.g., assets under management, allocation to hedge funds, and private equity, the mean is outside the 25%-75% interval. This is due to the skewness of the distribution. In column Max, the exceptionally high values are reported for hedge funds, commodities, other assets, and cash. These are special cases of pension funds under the process of liquidation or merger. The values are not persistent over time and do not affect the results of our analysis.

	Obs	Mean	Std. Dev.	Min	25th	75th	Max
A. Asset Allocation							
Fixed Income	733	57.69	14.10	16.50	47.00	68.00	100.00
Equity	733	28.86	10.24	0.00	21.80	35.10	61.00
Real Estate	733	8.42	6.76	0.00	4.00	12.00	51.82
Private Equity	733	1.14	1.90	0.00	0.00	1.50	11.20
Hedge Funds	733	0.96	1.95	0.00	0.00	0.50	10.87
Commodities	733	1.44	2.02	0.00	0.00	2.70	10.00
Other Assets	733	0.64	2.12	0.00	0.00	0.00	38.30
Cash	733	0.70	2.62	0.00	0.00	0.50	34.90
B. Pension Fund Characteristics							
Funding Ratio	730	112.66	27.46	83.60	99.10	114.20	323.80
Assets Under Management (Million)	733	8439.03	34914.68	0.07	261.33	3026.28	380976.00
Total Yearly Return	733	5.54	8.10	-21.82	2.00	11.00	21.40
Total Bmk. Adj. Return	733	0.11	2.45	-9.20	-0.50	0.80	9.30
Equity Yearly Return	733	5.45	20.49	-55.79	1.14	15.80	36.40
Equity Bmk. Adj. Return	733	-0.06	2.44	-12.10	-0.60	0.77	13.20
Average Age Active Participants	704	43.68	4.99	32.72	40.99	45.46	63.21
Average Age Retirees	729	70.34	4.28	36.13	68.43	72.91	82.45
Average Age Former Participants	727	47.15	4.97	37.08	43.75	49.63	67.50
Average Age Tot. Participants	729	50.46	7.24	36.48	45.74	54.26	82.03
Liablity Duration	726	18.81	4.67	6.10	16.20	21.40	30.10
% Active Participants	704	30.95	16.46	0.00	20.10	40.20	99.91
% Retirees	729	19.43	16.93	0.09	8.51	24.84	98.19
% Former Participants	727	50.82	21.17	0.01	35.67	65.49	97.42
C. Board of Trustees							
Board Size	724	8.14	2.56	2.00	6.00	10.00	20.00
Board Average Age	713	54.52	4.69	33.75	52.00	57.56	69.00
Diff. Age Board vs. Participants	688	10.83	5.99	-21.06	7.87	14.46	30.21
Board Average Tenure	720	5.15	2.60	0.00	3.33	6.59	17.63
% Female Trustees	724	13.97	15.77	0.00	0.00	22.22	100.00
% Employer Trustees	724	43.94	18.17	0.00	40.83	50.00	100.00
% Retirees Trustees	724	4.91	10.36	0.00	0.00	8.33	100.00
% Employees Trustees	724	43.47	19.34	0.00	37.50	50.00	100.00
% Independent Trustees	724	6.55	19.49	0.00	0.00	0.00	100.00
% Former Employees Trustees	724	0.80	5.99	0.00	0.00	0.00	80.00
% Young Trustees (Age < 40)	713	5.53	9.29	0.00	0.00	11.11	60.00
% Young Trustees (Age < 46)	713	13.99	13.71	0.00	0.00	20.00	80.00
% University Degree	724	34.88	25.57	0.00	15.38	50.00	100.00
% Public Background	724	25.63	19.15	0.00	12.50	37.50	100.00
% Finance Background	724	11.19	14.28	0.00	0.00	16.67	80.00

63

Appendix C.   Effect of board characteristics on the fixed income portfolio

Table XIII: **Board characteristics and the strategic fixed income allocation**
The table shows the results for the pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. $y_{i,t}$ is the portfolio share of fixed income for pension fund i in year t. $X_{i,t}$ and $Z_{i,t}$ are pension fund and board characteristics. Standard errors are clustered at the pension fund level.

	(1)	(2)	(3)	(4)
Board Average Age	0.223**			
	(2.53)			
Board Median Age		0.189**		
		(2.37)		
% Young Trustees (Age < 46)		-0.046*		
		(-1.78)		
% Young Trustees (Age < 40)			-0.047	
			(-1.39)	
Board Size	-0.329	-0.327	-0.333	-0.341
	(-1.36)	(-1.36)	(-1.37)	(-1.41)
Board Average Tenure	-0.042	-0.034	-0.020	-0.010
	(-0.23)	(-0.18)	(-0.11)	(-0.06)
% Female Trustees	0.045	0.045	0.041	0.039
	(1.46)	(1.45)	(1.37)	(1.29)
% Employer Trustees	-0.036	-0.035	-0.042	-0.042
	(-0.90)	(-0.90)	(-1.06)	(-1.05)
% Retirees Trustees	-0.003	0.001	0.003	0.004
	(-0.07)	(0.03)	(0.07)	(0.09)
% Independent Trustees	0.006	0.006	0.004	0.004
	(0.23)	(0.23)	(0.17)	(0.15)
% University Degree	-0.025	-0.024	-0.024	-0.026
	(-0.97)	(-0.97)	(-0.96)	(-1.01)
% Public Background	0.011	0.009	0.012	0.014
	(0.24)	(0.20)	(0.28)	(0.31)
% Finance Background	0.093***	0.095***	0.091***	0.088***
	(2.83)	(2.90)	(2.75)	(2.64)
Average Age Active Participants	0.302**	0.306**	0.309**	0.313**
	(2.26)	(2.29)	(2.30)	(2.33)
% Retirees	-0.028	-0.027	-0.022	-0.021
	(-0.66)	(-0.63)	(-0.50)	(-0.48)
Log Size	-1.477***	-1.466***	-1.461***	-1.416***
	(-3.59)	(-3.58)	(-3.60)	(-3.42)
Lag Funding Ratio	-0.092***	-0.091***	-0.089***	-0.090***
	(-4.35)	(-4.36)	(-4.27)	(-4.31)
Swap Ratio	-0.040*	-0.041*	-0.041*	-0.042*
	(-1.83)	(-1.87)	(-1.85)	(-1.91)
Professional Pension Funds.	0.715	0.718	0.536	0.424
	(0.26)	(0.26)	(0.19)	(0.15)
Industry Pension Funds.	3.991**	4.010**	4.165**	4.193**
	(2.12)	(2.13)	(2.21)	(2.22)
Constant	70.950***	72.122***	82.015***	80.981***
	(8.49)	(8.80)	(10.56)	(10.29)
Time Dummies	Yes	Yes	Yes	Yes
Observations	2392	2392	2392	2392
R^2	0.127	0.127	0.124	0.122

Table XIV: The effect of young trustees on fixed income allocation. The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of fixed income for pension fund i in year t. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t is the year fixed effect. We add a control variable to columns (2) - (3) and (5) - (6), namely the age-representation gap. The age-representation gap is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board to capture their behavior in funds with a large age-representation gap. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
% Young Trustees (Age < 46)	-0.046*	-0.025	-0.003			
	(-1.78)	(-0.93)	(-0.11)			
Age Representation Gap		1.717*	3.085**		1.918**	2.724***
		(1.95)	(2.58)		(2.17)	(2.69)
Age Representation Gap×%Young Trus.(<46)			-0.103*			
			(-1.90)			
% Young Trustees (Age < 40)				-0.047	-0.026	-0.001
				(-1.39)	(-0.72)	(-0.02)
Age Representation Gap×%Young Trus.(<40)						-0.139*
						(-1.76)
Board Size	-0.333	-0.328	-0.327	-0.341	-0.332	-0.341
	(-1.37)	(-1.36)	(-1.36)	(-1.41)	(-1.38)	(-1.42)
Board Average Tenure	-0.020	-0.032	-0.026	-0.010	-0.030	-0.019
	(-0.11)	(-0.18)	(-0.15)	(-0.06)	(-0.17)	(-0.11)
% Female Trustees	0.041	0.042	0.041	0.039	0.041	0.039
	(1.37)	(1.38)	(1.35)	(1.29)	(1.35)	(1.31)
% Employer Trustees	-0.042	-0.038	-0.039	-0.042	-0.037	-0.037
	(-1.06)	(-0.96)	(-0.97)	(-1.05)	(-0.95)	(-0.93)
% Retirees Trustees	0.003	-0.003	-0.002	0.004	-0.003	-0.005
	(0.07)	(-0.06)	(-0.05)	(0.09)	(-0.07)	(-0.11)
% Independent Trustees	0.004	0.002	0.004	0.004	0.002	0.002
	(0.17)	(0.09)	(0.14)	(0.15)	(0.06)	(0.06)
% University Degree	-0.024	-0.024	-0.026	-0.026	-0.025	-0.025
	(-0.96)	(-0.96)	(-1.05)	(-1.01)	(-0.99)	(-1.02)
% Public Background	0.012	0.012	0.017	0.014	0.013	0.016
	(0.28)	(0.27)	(0.37)	(0.31)	(0.29)	(0.35)
% Finance Background	0.091***	0.093***	0.093***	0.088***	0.092***	0.091***
	(2.75)	(2.80)	(2.82)	(2.64)	(2.75)	(2.75)
Average Age Active Participants	0.309**	0.414***	0.396***	0.313**	0.427***	0.415***
	(2.30)	(2.94)	(2.86)	(2.33)	(3.01)	(2.98)
% Retirees	-0.022	-0.025	-0.023	-0.021	-0.024	-0.021
	(-0.50)	(-0.57)	(-0.53)	(-0.48)	(-0.57)	(-0.49)
Log Size	-1.461***	-1.451***	-1.438***	-1.416***	-1.431***	-1.423***
	(-3.60)	(-3.58)	(-3.54)	(-3.42)	(-3.46)	(-3.44)
Lag Funding Ratio	-0.089***	-0.090***	-0.089***	-0.090***	-0.091***	-0.088***
	(-4.27)	(-4.32)	(-4.25)	(-4.31)	(-4.35)	(-4.29)
Swap Ratio	-0.041*	-0.039*	-0.038*	-0.042*	-0.040*	-0.037*
	(-1.85)	(-1.79)	(-1.74)	(-1.91)	(-1.81)	(-1.71)
Professional Pension Funds.	0.536	0.515	0.336	0.424	0.457	0.328
	(0.19)	(0.19)	(0.12)	(0.15)	(0.16)	(0.11)
Industry Pension Funds.	4.165**	3.847**	3.727**	4.193**	3.819**	3.684**
	(2.21)	(2.05)	(2.00)	(2.22)	(2.03)	(1.98)
Constant	82.015***	76.522***	76.383***	80.981***	75.473***	75.222***
	(10.56)	(9.49)	(9.50)	(10.29)	(9.19)	(9.19)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2392	2392	2392	2392	2392	2392
R^2	0.124	0.126	0.129	0.122	0.126	0.129

Table XV: The effect of young trustees on the fixed income allocation in corporate pension funds. The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of fixed income for pension fund i in year t. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t is the year fixed effect. We add a control variable to columns (2) - (3) and (5) - (6), namely the age-representation gap. The age-representation gap is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board to capture their behavior in funds with a large age-representation gap. The table displays the results for corporate pension funds. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	(1)	(2)	(3)	(4)	(5)	(6)
% Young Trustees (Age < 46)	-0.051*	-0.021	0.010			
	(-1.72)	(-0.67)	(0.31)			
Age Representation Gap		2.646**	5.081***		2.878***	4.082***
		(2.48)	(3.60)		(2.70)	(3.39)
Age Representation Gap×%Young Trus.(<46)			-0.191***			
			(-2.93)			
% Young Trustees (Age < 40)				-0.044	-0.014	0.014
				(-1.20)	(-0.38)	(0.36)
Age Representation Gap×%Young Trus.(<40)						-0.213**
						(-2.52)
Board Size	-0.448	-0.444	-0.450	-0.457	-0.447	-0.455
	(-1.41)	(-1.43)	(-1.46)	(-1.45)	(-1.44)	(-1.48)
Board Average Tenure	0.003	-0.014	0.003	0.024	-0.007	0.009
	(0.02)	(-0.06)	(0.01)	(0.11)	(-0.03)	(0.04)
% Female Trustees	0.037	0.035	0.034	0.032	0.033	0.033
	(0.86)	(0.82)	(0.78)	(0.74)	(0.77)	(0.77)
% Employer Trustees	-0.103*	-0.092*	-0.090	-0.101*	-0.090*	-0.087
	(-1.87)	(-1.69)	(-1.64)	(-1.82)	(-1.66)	(-1.61)
% Retirees Trustees	-0.011	-0.021	-0.019	-0.007	-0.020	-0.021
	(-0.20)	(-0.40)	(-0.38)	(-0.13)	(-0.39)	(-0.42)
% Independent Trustees	-0.011	-0.011	-0.004	-0.009	-0.010	-0.006
	(-0.20)	(-0.20)	(-0.07)	(-0.17)	(-0.19)	(-0.11)
% University Degree	-0.034	-0.036	-0.041	-0.036	-0.037	-0.038
	(-1.07)	(-1.13)	(-1.31)	(-1.14)	(-1.17)	(-1.23)
% Public Background	-0.011	-0.007	-0.000	-0.005	-0.004	-0.004
	(-0.11)	(-0.07)	(-0.00)	(-0.05)	(-0.04)	(-0.04)
% Finance Background	0.117***	0.123***	0.126***	0.112***	0.122***	0.123***
	(3.08)	(3.25)	(3.34)	(2.95)	(3.21)	(3.24)
Average Age Active Participants	0.460***	0.634***	0.593***	0.461***	0.650***	0.619***
	(2.93)	(3.80)	(3.64)	(2.93)	(3.85)	(3.77)
% Retirees	-0.033	-0.042	-0.038	-0.032	-0.043	-0.035
	(-0.80)	(-1.05)	(-0.97)	(-0.78)	(-1.06)	(-0.89)
Log Size	-1.062**	-1.008*	-0.952*	-0.993*	-0.975*	-0.971*
	(-2.01)	(-1.92)	(-1.81)	(-1.82)	(-1.79)	(-1.79)
Lag Funding Ratio	-0.107***	-0.107***	-0.104***	-0.108***	-0.108***	-0.104***
	(-6.18)	(-6.14)	(-6.22)	(-6.16)	(-6.12)	(-6.35)
Swap Ratio	-0.049*	-0.050*	-0.050*	-0.051*	-0.050*	-0.050*
	(-1.80)	(-1.84)	(-1.86)	(-1.85)	(-1.86)	(-1.85)
Constant	78.730***	69.126***	69.100***	77.285***	67.665***	67.937***
	(8.47)	(7.09)	(7.14)	(8.06)	(6.69)	(6.77)
Pension Fund Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1761	1761	1761	1761	1761	1761
R^2	0.145	0.151	0.160	0.142	0.150	0.156

66

Table XVI: The effect of young trustees on the fixed income allocation in non-corporate pension funds. The table shows a pooled OLS in Equation (1): $y_{i,t} = \alpha + X_{i,t}\beta + Z_{i,t}\gamma + \theta_t + \epsilon_{i,t}$. The dependent variable $y_{i,t}$ is the portfolio share of fixed income for pension fund i in year t. $X_{i,t}$ is the set of pension fund characteristics, $Z_{i,t}$ is the set of board characteristics, and θ_t is the year fixed effect. We add a control variable to columns (2) - (3) and (5) - (6), namely the age-representation gap. The age-representation gap is a dummy variable that equals one when pension funds display a difference of 10 years or more between the average age of the active participants and the average age of the board. This dummy is then interacted with the share of young trustees on the board to capture their behavior in funds with a large age-representation gap. The table displays the results for non-corporate pension funds. The estimation relies on standard errors clustered at the pension fund level to correct for serial correlation. t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
% Young Trustees (Age < 46)	-0.041	-0.029	-0.056			
	(-0.61)	(-0.44)	(-0.62)			
Age Representation Gap		0.865	-0.035		1.088	0.827
		(0.53)	(-0.01)		(0.62)	(0.41)
Age Representation Gap×%Young Trus.(<46)			0.057			
			(0.47)			
% Young Trustees (Age < 40)				-0.043	-0.027	-0.044
				(-0.40)	(-0.25)	(-0.32)
Age Representation Gap×%Young Trus.(<40)						0.041
						(0.21)
Board Size	-0.304	-0.298	-0.298	-0.314	-0.303	-0.299
	(-0.83)	(-0.81)	(-0.81)	(-0.85)	(-0.83)	(-0.81)
Board Average Tenure	-0.176	-0.186	-0.180	-0.170	-0.184	-0.184
	(-0.60)	(-0.64)	(-0.62)	(-0.58)	(-0.63)	(-0.63)
% Female Trustees	0.050	0.052	0.050	0.050	0.052	0.052
	(1.08)	(1.11)	(1.09)	(1.10)	(1.14)	(1.14)
% Employer Trustees	0.042	0.043	0.048	0.040	0.042	0.044
	(0.65)	(0.67)	(0.81)	(0.62)	(0.66)	(0.73)
% Retirees Trustees	0.000	0.000	0.005	-0.004	-0.002	0.001
	(0.00)	(0.01)	(0.08)	(-0.06)	(-0.04)	(0.02)
% Independent Trustees	0.021	0.021	0.022	0.020	0.020	0.021
	(0.55)	(0.55)	(0.60)	(0.51)	(0.52)	(0.56)
% University Degree	0.025	0.028	0.027	0.025	0.029	0.028
	(0.62)	(0.70)	(0.66)	(0.61)	(0.71)	(0.70)
% Public Background	0.030	0.030	0.029	0.029	0.029	0.029
	(0.63)	(0.63)	(0.61)	(0.62)	(0.62)	(0.61)
% Finance Background	-0.010	-0.014	-0.014	-0.012	-0.017	-0.017
	(-0.14)	(-0.20)	(-0.20)	(-0.17)	(-0.24)	(-0.25)
Swap Ratio	-0.038	-0.036	-0.036	-0.038	-0.035	-0.037
	(-1.01)	(-0.93)	(-0.94)	(-1.03)	(-0.93)	(-0.96)
Average Age Active Participants	-0.056	-0.014	-0.021	-0.037	0.008	0.003
	(-0.20)	(-0.05)	(-0.08)	(-0.14)	(0.03)	(0.01)
% Retirees	0.073	0.076	0.078	0.068	0.074	0.076
	(0.59)	(0.61)	(0.63)	(0.56)	(0.60)	(0.61)
Log Size	-1.913***	-1.932***	-1.918***	-1.873***	-1.912***	-1.913***
	(-2.97)	(-2.98)	(-2.96)	(-2.93)	(-2.96)	(-2.95)
Lag Funding Ratio	-0.028	-0.029	-0.029	-0.028	-0.030	-0.030
	(-0.58)	(-0.61)	(-0.62)	(-0.60)	(-0.63)	(-0.64)
Professional Pension Funds.	-3.060	-3.082	-2.869	-3.132	-3.134	-3.100
	(-0.93)	(-0.94)	(-0.92)	(-0.97)	(-0.97)	(-0.98)
Constant	93.323***	91.190***	91.673***	92.020***	89.815***	90.179***
	(6.26)	(6.33)	(6.23)	(6.32)	(6.30)	(6.19)
Pension Fund Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	631	631	631	631	631	631
R^2	0.149	0.149	0.150	0.147	0.149	0.149
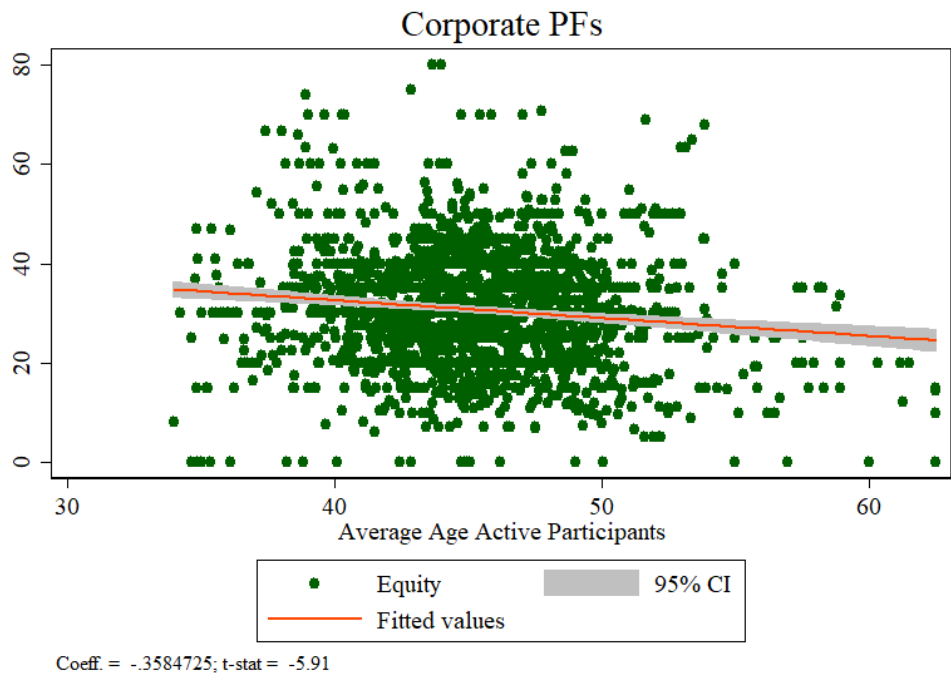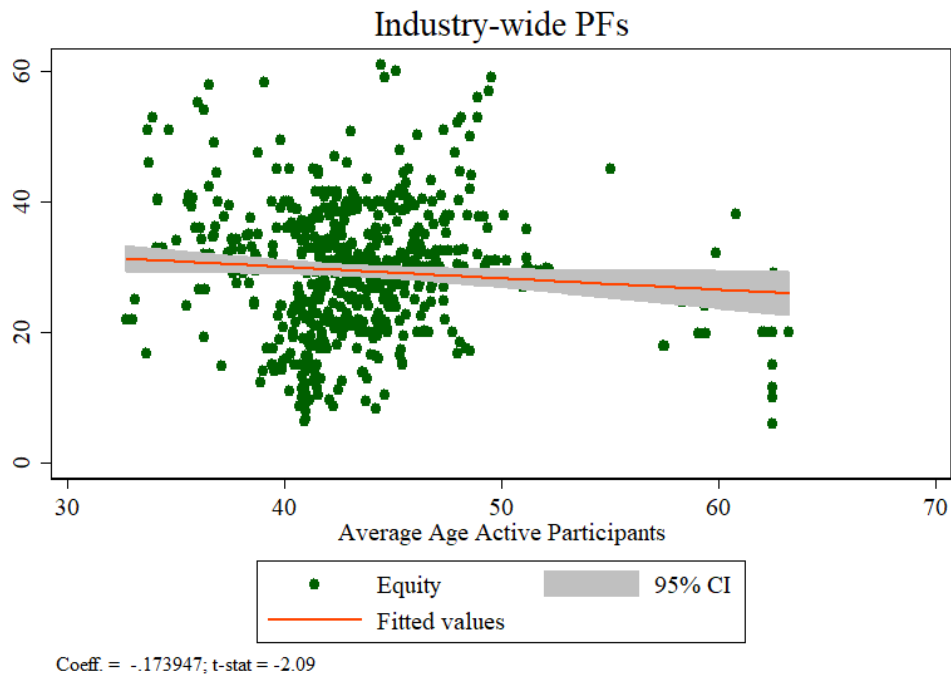
Figure 8. Relation equity allocation and average participants age
The figure shows the relation, together with the regression line, between the equity allocation and the average age of active participants for industry-wide and corporate pension funds.

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