Performance Capital Flows in DC Pensions

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Abstract

Are defined contribution (DC) pension funds capital flows sensitive to performance? In many countries, employees have the discretion to choose and switch their pension managers. However, given the widespread evidence on inertia in individual household financial choice, the answer is not clear. Using novel data on retirement accounts for nearly 10 million individuals, we look at the employee pension-manager switching behavior conditional on plan risk-profile. We see that switching across managers even within the same pension product is not uncommon, and switching propensity increases over time. We also show that these capital flows across managers are sensitive to and convex in fund performance. This account flow to performance sensitivity is an important pressure that is tied to managers incentives and portfolio allocation. Relatedly, we find that an increase in competitive pressure among pension providers is conducive to shift to higher-yielding bond holdings conditional on risk of the plan.[1]

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1 Introduction

Pension funds liabilities tend to be long-term as employees and/or their employers regularly contribute a significant part of their earnings through their retirement age. These contributions tend to be tax-differed, which means that pension benefits are also drawn gradually in retirement. Due to this liability structure, pensions' capital flows are associated with low volatility and high autocorrelation.[2]But, while the aggregate capital flows for private pensions are typically characterized by significant inertia, there is significant mobility within pension fund system. Using Chilean data, several papers including Da et al. (2018) document significant mobility across products (bond-stock baskets) in response to an investment adviser recommendations. In this paper we focus on the client mobility across individual pension managers.

We postulate that pressure emanating from the threat of capital flight faced by individual pension managers is an important factor in explaining their portfolio-allocation decisions.[3] The idea can be summarized by the following quote from 2017 interview, of then CEO of Denmark's PFA Pension:" The management of savings is a competitive market, the client can take the money and walk away. [...] Note that if we transfer a client, we basically transfer client's cash. The largest [corporate] client has around 2.5% of the assets. But the reason why the largest client would leave us is maybe the same reason why the second largest, the third largest, etc. leave us, and that's because there would be better investment performance elsewhere."[4]In DC plans, the return is not fixed ex-ante; instead, the plan accumulates a sum

[2]Relatedly, pensions reforms and growth has been shown to play a significant role in the development of public and private markets. Examples of studies looking at the connection between pension reforms around the world and development of the public markets include Raddatz and Schmukler (2008), Niggemann and Rocholl (2010), and Scharfstein (2018). Kortum and Lerner (2000) study implications of the 1979 addition to the U.S. Employee Retirement Income Security Act, a change that jumpstarted the growth of private equity industry.

[3]We use "plan" to refer to the individual product offered by a given pension provider. For example, 80%-20% or 60%-40% stock bonds combinations are potential plans. A given manager typically offers multiple plans that vary based on their riskiness.We use terms pension "provider" and "manager" as synonymous.

[4]The quote is taken from Ivashina, Gabrieli and Lenhardt (2017). PFA is ht largest commercial pension provider in Dennmark. Most of the PFA assets correspond to DC plans. About 20% of the DC accounts is held directly by individuals. The rest of the business is what is called "corporate", where the employer makes selects provider (and provider creates plans) every three to five years.

of assets, which can then be converted into pension income upon retirement. (In contrast, defined benefit (DB) pension plans specify a set pension income in advance, regardless of the performance of the underlying pooled portfolio.) Thus, individuals have incentive to reallocate capital toward better performance. In many DC plans, employees have the ability to choose from a menu of providers, and they can make this choice more than once, often at no additional cost. For employer-sponsored DC plans such as Denmark's or U.S.' private pension fund system, the employer serves as a gatekeeper by choosing one or more pension managers and developing a plan menu available to employees. In turn, employees allocate their individual DC account balances among choices provided to them through the employer. However, even in the U.S., individuals with private pensions–the focus of our study–often have more than one manager to choose from, and can shift their capital across providers.

There is a large body of research on mutual fund flow, which documents high sensitivity of capital flows to performance. So, one could think that these findings should generalize to DC pension funds. However, pensions accounts tend to be compulsory and apply to a much broader set of population.Given the evidence on lack financial sophistication and "set it and forget it" approach in retail behavior ranging from stickiness of banking deposits to lack of investments rebalancing in retail portfolios, it is not clear that capital flows pressures from individual employees (vs. their employer) should be economically large. Indeed, previous studies of retirees in DC pensions point to sticky investing behavior (e.g., Sialm, L. T. Starks, and Zhang (2015); Huberman and Jiang, 2006; Agnew, Balduzzi, and Sunden, 2003andBenartzi and Thaler 2001; Madrian and Shea, 2001).

In this paper, we examine participant's manager-switching behavior and its impact on pension portfolios using previously unexplored granular data from the private DC pension schemes in Chile and Peru (administradoras de fondos de pensiones or AFPs). The data from these countries, for the period we explore, is ideal for studying participant provider-switching behavior and its consequences, and using two data sources will help gain external validity of our findings. For example, in the U.S., there is substantial variation in the available options

across corporate sponsors, making it difficult to account for the perceived risk-return profile of products. In this context, any switching behavior is a combination of two things: chasing returns and portfolio rebalancing in response to individual risk preferences. In contrast, the advantage of the Chilean and Peruvian setting is that employers do not make manager or portfolio-composition choices. Instead, investment options are regulated and universally available to participants by different managers. This allows individuals to choose both (i) the provider/manager and (ii) the investment plan from a narrow, regulated menu. In both Chile and Peru, employees can switch pension providers while staying with the same product. Additionally, within our sample, there were no direct costs to switching providers in either country. The switching procedure is online and relatively simple, requiring participants to fill out a form to formalize the switch. For both countries, we have granular data on switching behavior. In particular, for Chile, the data allows us to track the same individuals over time, enabling us to analyze switching behavior within the same risk-return product across different managers for the same person. Finally, another attractive feature of the Chilean and Peruvian DC pension design for our study, is that managers are not directly incentive to chase returns. As we elaborate in the next section, their performance pressures come from capital flows.

Our Chilean data covers period between February 2009 and September 2019. Data for Peru starts in 1996 and ends in March 2020. The cut-off dates are intentional, as both countries have undergone withdrawal policies changes in the recent years. We observe 9.6 million individual accounts in Chile, with 1.8 million individuals (18.3% of all individuals with at least two months of data) switching providers at least once. For Peru, we observe monthly provider-level data, which is based on information from approximately 7 million individuals. Switching across all plans is about 0.40% per month or 5% per year for Chile , and 0.61% per month or 7% per year for Peru. Monthly customer churn rate regularly exceeds, for some providers, 3% of assets under management (AUM) in Chile, and 1.5% of AUM in Peru. These numbers correspond to sample averages, but rates have been climbing up throughout

the sample period. We also document a stable life-cycle pattern of switching behavior, with mid-20s, through mid-30s being the age group with significantly higher manager switching behavior.

In our main results, we look at the individual capital flows and their correlation with manager performance. Despite the heavily regulated portfolio composition of each provider, there is significant return heterogeneity across managers for any given risk category. This is similar to insurance companies behavior documented by Becker and Ivashina (2015). Specifically, we find an average difference of 1 to 2 percentage points between the highest and lowest performers for a given plan, which represents approximately one-fifth of the average return and three times the standard deviation. We show that capital flows a significant response to performance. For example, due to net inflows, the top-performing provider experiences an annual growth of approximately 6.4% of its AUM in Chile and about 7.2% in Peru. To further analyze this relationship, we employ a piecewise regression approach developed by Sirri and Tufano (1998). For Chile, the analysis includes period-plan fixed effects. In line with findings from the mutual fund literature, we find a significant convexity in capital flows within the pension industry in response to performance. Specifically, the sensitivity of inflows to the highest-performing providers is 3.06 times greater than the sensitivity of outflows for the lowest-performing ones, indicating a convex relationship.

In addition, our results reveal that individuals also react to consecutive declines in the performance of their current provider. In Chile, where individual account data is available, providers that experience three consecutive months of declining performance face a reduction of approximately 0.26% more outflows during such period compared to those who did not.. We find that that flows toward high-performing options peaks two months after the performance increase and remains significant, albeit diminished, one year later. In the Chelean data, we find that *manager*-switching is amplified when it coincides with financial advisors' *plan*-switching recommendations.

We further look whether the switching behavior leads to financial gains for retirees. This

analysis focuses on Chile, where we can attribute client mobility to the specific pension plan. On average, we find that individuals tend to switch to providers that had higher returns one month prior and lower costs (fees). Furthermore, we also find that, in the year following the switch, the new providers perform better than the original providers after the switch. This indicates that the switching behavior is reasonably informed. Nonetheless, consistent with the literature on returns predictability, we find that individuals do not tend to switch to the providers with the highest future twelve-month return. In line with the literature, we also uncover that these switchers are not making the most of their opportunities. We observe that individuals do not consistently choose the provider with the highest return one month prior to the switch. The difference in returns is often substantial, typically exceeding 0.5% annually, which, if invested for 20 years, could result in assets at retirement that are 10.5% higher. Our findings reveal that individuals tend to switch in pursuit of higher returns or in response to consecutive poor performance. This capital flows pressures create a significant pressure for pension managers that could lead to portfolio allocations, potentially favoring higher-yielding (and riskier) securities to attract switchers and reduce outflows. To test this hypothesis, we use a quasi-exogenous shock to the return patterns caused by the entry of a new competitor. Our data illustrates that the arrival of a new provider is followed by a notable outflow of capital. We document that in the aftermath of the new provider's entry, pension funds alter their fixed income positions by favoring higher-yielding (and riskier) securities. This response is indicative of the strategic adjustments made by pension managers to adapt to the competitive environment and changing investor preferences.

DC pension funds manage a significant amount of capital around the world. A subset of large global pensions with DC plans surveyed by the OECD represented $3.3 trillion in assets under management (AUM) in 2020. Our paper, contributes to the literature that studies factors that affect incentives and portfolio allocations of this pivotal group of institutional investors. In particular, our work is complementary to a set of papers that look at consequences of emergence of a private advisory service ("Felices and Forrados") in Chile that led

to multiple and significant rebalancings across different plans with significant consequences for the saving of the retirees (Da, Larrain, Sialm, and Tessade (2018); Cuevas and Bernhardt, 2023) and for the broader capital market (Aldunate, Da, Larrain, Sialm, 2024). Felices and Forrados comments were essentially marco bets, recommending shifts between stocks and bonds. Our focus in on the capital flows across managers.

Our evidence also points to manager's shift to higher yielding bonds within the same pension plans when facing higher competitive pressures. These findings are in line with the significant worldwide push by DC pension funds into alternative investments documented by Ivashina and Lerner (2018). These findings are also relevant for understanding investor demand elasticity, in line with the literature building on Koijen and Yogo (2019). Finally, our paper provides evidence on the role of individual employees decisions, complementing the evidence in Sialm, L. Starks, and Zhang (2018) who emphasize the role of employers in driving allocations across managers.

Our findings offer a perspective on participant behavior in DC pension plans: unlike the US employer-based plans, where participants are often seen as passive (see Pool, Sialm, and Stefanescu (2016) and Agnew, Balduzzi, and Sunden (2003)), our results suggest that in systems with universal options and no active role for sponsors, participants are neither naive nor inactive. This result, contributes to a large body of literature on the inertia in individual financial decisions.

The Chilean pension system was one of the first large-scale implementations of a fully privatized retirement savings model with portable individual DC accounts. In 2024, the Chilean system managed $198 billion in pension assets, ranking as the 19th largest globally. However, its influence extends far beyond its size, as at least 24 countries across different continents have adopted variations of this model.[5] Some of these implementations support

[5]Countries that have adopted pension systems inspired by Chile's model include Peru, Colombia, Mexico, Argentina (before reversal), El Salvador, Bolivia, Uruguay, Costa Rica, Dominican Republic, Ecuador, Paraguay, Honduras, Nicaragua, Slovakia, Romania, Latvia, Lithuania, Estonia, Kazakhstan, Russia (before reversal), Nigeria, Australia, Sweden, and Poland. Many later introduced modifications or reversals due to challenges such as low benefits, high fees, and sustainability concerns.

pension systems much larger than Chile's. For example, Mexico, which adopted a similar approach, managed over $342 billion in 2024, making it the 11th largest pension system worldwide.[6]

The US pension system is predominantly employer-based, meaning the employer selects pension manager . However, of the total $37.8 trillion in US retirement assets as of 2022 , approximately $11.5 trillion (30%) is held in Individual Retirement Accounts (IRAs). [7] Other major pension systems with substantial individual-based components include those of Australia, Japan, and Canada. This underscores that even in countries with significant employer-driven structures, individual retirement choices remain crucial—further reinforcing the relevance of the Chilean model that we study in this paper.

The rest of this paper is structured as follows: In Section 2, we describe our data sources. In Section 3, we look at the evidence and magnitudes of individual switching behavior across pension managers. In Section 4, we examine sensitivity of accounts and capital flows to past performance. In Section 5, we analyze the gains and optimality of the observed switching strategy. In Section 6, we look at the effects of entry of a new competitor. Section 7 concludes.

2 Pension Funds Structure and Data

Data for the Chilean market comes from *Superintendencia de Pensiones* (SP) and for Peru from *Superintendencia de Banca, Seguros y AFPs* (SBS); these are regulatory and supervisory bodies for private pensions. Peruvian pension reform, as well as similar reforms in other countries in the South American region, was closely modeled after the Chilean reform which led to creation of the private pension administrators (administradoras privadas de pensiones or AFPs). The defining legislation was passed in November 1980 in Chile and in December

[6]Data on the assets under management for each system is from 2025 Thinking Ahead Institute Global Pension Assets Study.

[7]For details on the US pension system see Sialm, L. Starks, and Zhang (2018). Number for 2022 come from the Congressional Research Service's report titled "U.S. Retirement Assets: Data in Brief," published on September 20, 2023.

1992 in Peru. Multiple academic studies have discussed these reforms and analyzed their consequences. Recent examples of studies using data for Chilean DC plans include Da et al. (2018),Illanes (2016), and Luco (2019).

The Chilean data has the most granular time-series data, it enables us to track individual switching activity across providers and plans for all employees covered by the DC system. The data is available on a monthly basis starting in February 2009 and we end our analysis in October 2019.[8] Overall, in the Chilean data, there are 9,631,207 individual accounts over our sample period. We have information on the individual age, account value and wage for the individuals that have switched across providers at least once during our sample.

Data for Peru contains information on the number of individuals that switched and the value of their pension fund at provider level (the data is aggregated across plans). The switching data frequency is monthly starting in March 1996 and we end our analysis in March 2020. The challenge with the Peruvian data is that when we observe individuals switching pension providers, we cannot rule out that they simultaneously switch risk-return profile of their saving. That said, we use both countries as being able to replicate the results in two different markets helps us gain confidence in the external validity of our findings.

The advantage of Chilean and Peruvian setting is that investment options are regulated and universally available to the participants. Employer does not play a role in the manager or product selection. Employees choose across two dimensions: (i) they select a plan; and (ii) they select a pension provider.

Pensions plans – Starting in 2002 in Chile, pension fund providers were mandated to offer five types of funds to their members. These funds ("A" through "E") cater to different risk preferences, with fund "A" having the largest share of equity investment, and fund "E" composed almost entirely by domestic fixed income securities. Table 1 Panel A shows the investment composition, share of participants and assets for each plan in 2019. Individuals

[8]With the beginning of the global pandemic, both Chile and Peru have allowed significant withdrawals from the private pension system. This rightfully might raise external validity concerns for using these data for a more recent period. However, these policy shifts were likely unexpected, and our sample stops ahead of these changes.

can choose any of the five plans, but funds "B", "C", and "D" are defaults options and participants are automatically shifted to less risky funds according to their age. Funds "A" and "E" are not part of the default option, and investors have to explicitly state when and how much of their assets they want to transfer into or out of these funds. By December 2007, fund "E" represented only 1.4% of Chilean pension assets. Since then, however, the fund has displayed significant growth, and, at the end of 2019, it represented more than 20% of total pension assets. In addition to the recent growing trend, fund "E" has also been characterized for its large and volatile flows.[9]

Before 2005, Peru only had one (regulated) pension plan for each manager. Starting in 2005, three plans were available: "1", "2" and "3". Plan "0" was added in 2012. Table 1 Panel B shows the share of variable and fixed income in each plan and their size as of 2020:Q1. Plan "3" is considered the riskiest (more variable income assets and less fixed income assets). Plan "0" (100% in fixed income) is the safest, but only people older than 65 can choose it. Plan "2" is the most popular with over 90% of individuals and 75% of the total asset under management.

In both Chilean and Peruvian pension systems the plans offered by different managers are intended to be substitutes. Furthermore, there are many regulations behind the asset composition of different plans. Besides the fixed and variable income split, pensions regulators specifies a series of additional limits based on ratings and maturity, allocations to derivatives, alternative assets,and domestic vs. international, and public vs. private assets. These regulations are similar for Chile and Peru.

Pensions managers – There are six pension fund providers in Chile and four in Peru. Table 2 shows the market share of each provider. From this table, it is clear that neither

[9]For Chile, 9 years before the legal age of retirement, people can only choose between plan C, D, and E. For other ages there are no restrictions in the choice. For Peru, once an individualturn 60 years old, , they can no longer select the riskiest option (Plan 3), but they can choose from the other available plans. Once an individual turns 65, they will be automatically assigned to the safest plan (Plan 0). For more details see "¿Puedo elegir cualquier tipo de fondo?" at https://www.spensiones.cl/portal/institucional/594/w3-propertyvalue-9897.html#recuadros_articulo_4130_18, and "¿Quiénes están obligados a estar en el fondo 0?" and "¿Si tengo más de 60 años estoy obligado a estar en el fondo Tipo 1?" at https://www.sbs.gob.pe/usuarios/informacion-de-pensiones/afiliacion-y-aportes/tipos-de-fondo.

market has an obvious leader. In Peru, private pensions space is roughly evenly split between the top three (the oldest) managers. In Chile, there is a bigger discrepancy on whether we measure market share based on the number of participants or AUM market share. For example, the bottom two managers on AUM represent less than 8% of the market value, but nearly 35% of number of participants.

There are some difference between mutual funds and DC pension plan manager compensation. In our setting, pension providers earn revenues through the fixed management fees, and are not directly compensated for performance. In Chile, management fees are calculated as a percentage of an employee's wage and remain constant regardless of the size of the individual account. For instance, if the fee is set at 1.27% of a worker's wage, that worker will pay the provider 1.27% of their wage in fees while employed, even though the their account will be continually growing. If a worker loses their job, the provider continues to manage their assets without imposing any charges.[10]

In Peru, up until 2013, fees were also determined solely as a percentage of a worker's wage. However, following a reform in June 2013, an alternative fee structure called the "mixed scheme" was introduced. This mixed scheme involves two components: one related to the worker's wage and the other linked to the value of each worker's individual account. Participation in this fee option was voluntary between 2013 and 2023, and it became mandatory after 2023. For our regression analysis, we will use the commission fees measured as a percentage of the monthly wage because this has been a consistent feature of the pension system since its inception. Also providers did not significant change the fund component of their fees over time. The fee structure is relatively consistent across different pension plans but may vary among different providers. See Figure 1 for the numbers for both countries.

[10]More information on this policy can be found at http://www.afphabitat.cl/servicios/preguntas-frecuentes/que-hacer-si/quedo-cesante-debo-seguir-pagando-mis-cotizaciones/quedo-cesante-debo-seguir-pagando-mis-cotizaciones.

3 Provider Switching Behavior

We start our analysis by documenting the switching behavior of pension fund contributors. The regulations on switching between providers in the different countries varies in the level of restrictiveness. Participants of the countries in our analysis are free to choose their pension manager. Since 2010 in Chile and 2013 in Peru, only new participants are locked into their initial or default provider for two years and then allowed to switch at the member's discretion.[11]

In the Chilean data, out of the 9,631,207 participants, 1,763,074 unique individual accounts register at least two pension manager in the eleven years of our data. This implied unconditional probability of switching of 18.3% over the course of our sample period. In what follows we look at the evolution of monthly switching behavior. We measure provider switching as gross numbers both in terms of individuals and volume. For example, suppose we have only two providers A and B. If we have 10 participants that switch from provider A to provider B, totaling a movement of 200 million, and 5 participants that switch form B to A, amounting in 50 million transfer, the total number of switches is 15 with 250 million in switching volume. (In this section, we are focused on the switching behavior and therefore look at the gross numbers. We will switch to net flows when analyzing capital flow sensitivity to performance.)

We denote as $Outflow_{p,t}$ the monetary value (or number of participants) that exits provider p to enter another provider at time t. $Inflow_{p,t}$ is the value that enters manager p after leaving another fund at time t. At the aggregate level, we measure the gross flow size as the sum across providers either from the outflows or the inflows (as this is a closed system both measures are equal at the aggregate level). Specifically we define our aggregate measure of gross flows size and our measure of net flow size at the provider level as:

[11] They represent on average 8% of the total participants

$$Gross\ Flow\ Size_t = \sum_p Outflow_{p,t} = \sum_p Inflow_{p,t} \tag{1}$$

Figure 2 looks at the switching behavior across providers for Peru and Chile by computing the aggregated gross flow size in equation 1, for total value and participation for the period of 2009 to 2019. Bars (left axis) show total private pension system size, the lines correspond to switching flow size(right axis). Panels A and B look at the magnitude of switching both in number of participants and total value, respectively. In terms of volume, the gross switching flow size with respect to the total value across all plans is 0.40% per month for Chile (close to 5% per year), and 0.61% for Peru (over 7% per year). To compare these numbers to mutual funds statistics in the U.S. we need to look at the net flows. Because the retiree capital is locked in the pension system, the aggregate net flows are zero. Instead we look at the net inflows at the pension manager level. The annual average for net capital flow at the manager level with respect to the total value is 0.51% in Chile and 0.31% Peru. In the U.S., net annual capital flow between mutual funds is 1.5% for 2021[12]. Thus, the individual flow numbers that we see in Chile and Peru are significant and about one third and one fifth of the magnitude of US mutual funds, respectively. Next, we calculate switching on the number of participants. While the switching in the number of accounts is still significant as a percentage of the number of participants in the provider, around 0.28% per month for Chile and 0.22% for Peru, it is lower than in volume. This fact implies that switching is more concentrated on investors with higher fund value. In line with this observation, the unconditional numbers reported in Luco (2019) are higher than what find in our sample[13].

In Panel C we show the data for Peru starting in 1996. There we can observe a significant increase in the switching behavior for Peru during 2005-2008. This is related with the entry of a new pension fund (Prima) on Oct-05. Before Sep-05, the average share of participants that switched was 0.12%, while the maximum of a given month was 0.57%, but between

[12]See https://www.icifactbook.org/pdf/2022_factbook_ch3.pdf.

[13]Luco (2019) analyzes a different sample period (1988 to 2001), during which there are significant changes in the Chilean pension system. He finds that 44% of individuals switch during that time period.

Oct-05 and Dec-08 the average share of participants switching was 1%, (with a monthly maximum of 1.8%). In terms of the fund value there was a similar response. Before Sep-05, the average total value of the funds among all the participants that switched was 45,642 thousand soles (around 13 million USD), while the maximum of a given month was 163,724 thousand soles (around 47 million USD), but between Oct-05 and Dec-08 the average total value of the funds among all the participants that switched was 905,418 thousand soles (around 263 million USD), while the maximum of a given month was 1,366,939 thousand soles (around 420 million USD). Besides the entry of the new competitor, another factor that contributed to this boom in switching behavior was the reduction on the switching time to one month on January 2005. Moreover, at the same time the administrative procedure for switching was also available online[14].

Since there is growth not only on the number and volume of the switchers but also of the total market participants, we calculate churn rates. These rates are calculate per provider, by dividing the number of individuals that did not renew their subscription by the total number of subscribers. In the example in the beginning of the section, for provider A had 10 individuals switching, we would scale that number by the total number of individuals investing with that provider in the previous month. Figure 3 Panel A plots the maximum of the "churn rate" across different pension fund providers for each month. Not surprisingly these numbers are substantially larger. For example, Panel B indicates that–for some providers– monthly customers churn can regularly exceed 1.5% of AUM. In Chile, this number is often over 3% AUM on a monthly basis.

3.1 Switcher Characteristics

Focusing on the Chilean data, where we can follow individuals over time, we look at employees characteristics and generational differences that are associated with the frequency of switching behavior. Table 3 looks at distribution of switching behavior, conditional on

[14]For more details see: https://www.sbs.gob.pe/Portals/0/jer/EDIPUB_VOLUMEN3/Berdejo.pdf)

at least one switch. The first column adds to 100%. The table looks at the average time between switching, wage, account balance and age. While most of the sample has switched only one time (62.75%), nearly 20% of switchers changes providers at least three times in the span of eleven years. The number of times switching is positively related to the wage, the age and account balance. In Chile, the average wage is around 550 thousands of pesos (near to USD 750), we observe that individuals that have switched earn at least 779 thousands of pesos (about USD 1,075).[15]Likely mechanical, since the sample length is fixed, we find that switching behavior is negatively related to the time before a new switch.

Figure 4 compares the switching behavior across age and time. [16]In Panel A.i, we compute the average switching probability by age group by dividing the total number of individuals that switched by the total number of participants of that age group in a given year. The results show the switching probability of each group across all the years. Individual are most prone to be switching providers in mid-twenties to mid-thirties, this probability declines as the person ages, but does not disappear through the retirement age. This result is novel and different from Agnew, Balduzzi, and Sunden (2003), who found a linear relationship between age and portfolio reshuffling. Panel A.ii looks at this pattern for three different snapshots: age group for 2009, 2014 and 2019. Although the general relationship across different ages is preserved, switching appears to trending up over time. The median switching probability was less than 0.5% per quarter at the beginning of the sample and it was 1% toward the end of the sample. This points to some important differences in what we find for post 2009 sample, and Luco (2019) who focuses on the period 1988–2001 period. This trend is not explained by economic growth: correlation between the annual real GDP growth and our annual average switching rates is -0.31.

While switching rates are highest among younger individuals, Panel B.i , illustrates that

[15]Although this relationship is consistent with Agnew, Balduzzi, and Sunden (2003), our results are driven by the population, while they rely on a survey of 7,000 retirement accounts of 401(k) plans.

[16]The frequency of these figures is quarterly because the pension fund regulator reports information about the number of participants by age at a quarterly frequency. The average quarterly switching share of accounts in our quarterly sample is 0.82%, as compared to 0.28% on the monthly basis.

older people account for the largest share of assets under management (AUM). The numbers in Panel B.i are estimates using mid-range values for a given age group, as the information for the full population (vs. switchers) is only available in ranges. (To reiterate, for individuals who have switched, where we have precise information on their accounts.) So, for instance, if the range is between 0-5, we take 2.5 as a reference point to calculate the share that each group represents of the total AUM. As one would expect, the largest share of the fund belongs to individuals approaching retirement. Consequently, even though the switching probability is relatively lower for older individuals, their larger AUM implies that they can still have a substantial impact.

In Panel B.ii, for each age group, we calculate the share that their switching volume contributes to the overall switching volume. The middle-aged group (between 40 and 50 years old) accounts for approximately 20% of the total switching volume, with the contribution from older age groups increasing over time. Thus, while younger people are more active switchers in terms of participants, middle-aged individuals are significant contributors on the extensive margin.

Lastly, we observe significant persistence in switching probability. In Figure 5, we computed the time-series correlation for several quarters ahead of the number of individuals who switched providers in each age group. Overall, we find that the correlation is high, exceeding 0.6, and it tends to increase with age. In the above 50 age group, this correlation is close to 1, even three quarters ahead. This high correlation suggests a high likelihood of herding behavior.

Taken together, the evidence we present regarding the volume and correlation of switching behavior implies that pension fund managers may be concerned about this pattern and could take it into consideration when making portfolio decisions. In the next section, we delve deeper into the potential drivers of switching across providers.

In our previous results, we highlighted how individuals frequently switch between different providers. While individuals have the option to choose their providers, they can also select

from various plans. As outlined in Table 4, we provide a breakdown of switching behavior across providers, categorized by plan. As noted in Table 1, in the case of Chile, Plan A is considered the riskier option, with a substantial 80% of its assets allocated to variable income, while Plan E is the safest, with a maximum of 5% invested in variable income.

Panel A of Table 4 utilizes the number of participants and reveals that switchers tend to be concentrated in the riskier plans, comprising around 68% of all switchers. Additionally, when individuals switch providers, they typically remain in the same plan, with 66% of Plan A switchers and 51% of Plan B switchers choosing to do so. Furthermore, a significant portion of those who switch providers opt for riskier plans, with 22.6% of those switching from Plan B going to Plan A and 22.4% shifting from Plan C to Plan A or B. This pattern indicates that when individuals switch providers, the majority are still seeking options with a substantial share of variable income, considered a riskier investment.

Panel B of Table 4 examines the fund value and presents a similar picture of switching volume being concentrated in the riskier plans. It also indicates that individuals tend to stick with the same risk level or choose higher-risk plans when switching providers.

4 Past Returns and Switching Behavior

In the previous section we documented active switching behavior by employees across managers within the same plan. In this section, we show that this behavior is associated with a search for higher returns. But, first, let's be clear about what performance information employees are exposed to. The investors receive monthly information on the performance of the funds they are invested in. In addition, regulators provide on line information about all pension funds (see https://www.spensiones.cl/apps/rentabilidad/getRentabilidad.php?tiprent=FP and for Peru https://www.sbs.gob.pe/estadisticas-y-publicaciones/estadisticas-/sistema-privado-de-pensiones). In both cases, the performance is assessed based on annual returns. Public disclosure of returns takes place on a monthly frequency for Chile and weekly frequency for

Peru. Finally, public disclosures rank pension funds based on returns by product type. That is, each pension provider is ranked in each individual plan category. This means that in the case of Chile where we have 5 plans possible (A to E), each provider will have 5 rankings.

As mentioned before, the pension plans are fixed by regulators, at a reasonably granular level. Naturally, this still leaves substantial discretion for managers in which assets to invest, allowing for differentiation in performance. Figure 6 shows the evolution of annual return disparities within a given plan across various provider characteristics. Panel A provides evidence that the spread between the provider with the highest and lowest returns is substantial, ranging between one to two percentage points annually. Panel B demonstrates that this discrepancy cannot be attributed to fees. This observation aligns with the fact that, during the period under examination, there is limited variation in fees among providers. The differential between providers with the highest and lowest fees remains close to zero after 2012. Furthermore, after 2012, return differentials are unexplained by the size of the funds. Panel C reveals that funds with the greatest assets under management exhibit returns similar to those of the smallest funds.

It's also important to note that there are penalties for very poor performance. In Chile, pension funds must guarantee a minimum return, determined by the average return of a plan over the preceding 36 months, with specific deductions depending on the plan type. For Funds A and B, the minimum return is based on the average return minus 4% or half of the average return, while Funds C, D, and E use a smaller deduction of 2%. Pension funds are required to maintain reserves to cover this guarantee, with state support available if reserves are exhausted. However, no pension fund was penalized for failing to meet the benchmark during the sample period. In Peru, pension funds must meet defined minimum return thresholds, calculated from the average return of the last 36 months. These thresholds are less stringent, particularly for Plan 2, the most common plan. In fact, every pension fund manager exceeded the minimum return requirement during the sample period, with the worst-performing funds exceeding the minimum by more than 4%.

In summary, our analysis reveals significant variability in returns among different providers, and this variation cannot be attributed to either fees or the size of the funds. These findings suggest that, despite regulatory restrictions on portfolio allocation for all providers, there is still diversity in their performance. Additionally, pension funds are required to guarantee a minimum return, which is determined by the average return of a given plan over the preceding 36 months, with specific deductions depending on the plan type. However, this regulation appears to be non-binding, as no penalties were ever imposed for failing to meet the benchmark during the sample period. This observation begins to highlight the potential for substantial gains for individuals through strategic provider switching. Next, we analyze investor's return-seeking behavior.

Figure 7 is a first non-parametric look at the data. Panel A presents results in terms of fund's assets under management, and Panel B in terms of number of accounts. The graphs display the *net* flow (the difference between inflow and outflow) as a share of the previous month balance (adjusted by returns as in equation 3) against the quartiles of manager's last month performance ranking based on the measure of annual returns. The net flow ratio is calculated for each manager every month, and then averaged across the sample by performance quartiles. The positive slope of the relationship in this figure gives the first glimpse at the return seeking switching behavior of investors. Our results suggest that the magnitudes of these shifts are substantial. For example, due to net inflows, the top-performing provider experiences an annual growth of approximately 6.4% of its AUM in Chile and about 7.2% in Peru. [17] Furthermore, we observe that the sensitivity of flows to performance is not linear in relation to the ranking. Specifically, higher-ranked providers demonstrate greater sensitivity. We will conduct formal tests to explore this relationship further.

[17] For Chile, the net monthly inflow of the top performer is 0.517%, which implies an annual inflow of 6.4% ((1+0.517%)^(12)-1). For Peru, the net monthly inflow of the top performer is 0.581%, which implies an annual inflow of 7.2% ((1+ 0.581%)^(12)-1).

4.1 Estimation Method

To capture flow performance sensitivity, we relate the monthly net flows to the relative fund performance rank over the previous month while controlling for other lagged fund characteristics, such as the funds age (Age), the fees charged by the fund *(Fees) as percentage of the salary,* fund's operating expenses over assets (monthly measured for Peru and quarterly for Chile) (Exp), the number of participants and total value of the fund (*N. Particip and* $Value$). Specifically we estimate the following equation:

$$Flow_{it} = \gamma\, R_{i,t-1} + \beta_1 Age_{i,t-1} + \beta_2 Fees_{i,t-1} + \beta_3 Exp_{i,t-1} + \beta_4 Ln(N.\ Particip._{i,t-1}) + \beta_5 Ln(Value_{i,t-1}) + \beta_t + \delta_j + \tag{2}$$

where $Flow_{it}$ is defined as

$$Flow_{\ it} \equiv \frac{Inflow_{i,t} - Outflow_{i,t}}{Fund\,Value_{i(t-1)} * (1 + r_{i,t})} \times 100. \tag{3}$$

Although the measures for Peru will be calculated at the provider level, in Chile we will calculate them at the provider-plan level due to the granularity of the data. Hence, i denotes the provider-investment plan for Chile and the provider for Peru and t is month. We include month fixed effects for Peru, plan-month fixed effects for Chile (both denoted in β_t) and provider fixed effects for both (δ_j). For Chile, the number of participants and value vary across plan-provider level but fees, age and expenses control are common across plans within a provider.

Following Pool, Sialm, and Stefanescu (2016) and Sialm, L. T. Starks, and Zhang (2015), we use two specifications for $R_{i,t-1}$.The first specification relates the flow to the performance rank of the provider and range between 0 and 1. We define $Rank_{it}$as:

$$Rank_{it} = \frac{Number\ of\ Providers\ with\ worst\ performance}{Total\ Number\ of\ Providers\ -1}$$

The highest performer provider will have $Rank_{it} = 1$ and the worst $Rank_{it} = 0$. For Chile, where we observe information on investment-plan level, the Rank is calculated within plan (across providers). Under this formulation flow respond linearly to performance, not capturing the convexity we observed in Figure 7.

The second specification follows Sirri and Tufano (1998) and estimates a piecewise linear specification function:

$$R_{i,t} = \gamma_L Low_{i,t} + \gamma_H High_{i,t}$$

where $Low_{i,t} = min\{Rank_{it}, \overline{Rank}\}$and $High_{i,t} = Rank_{it} - Low_{i,t}$. The performance coefficients $\gamma_L$and $\gamma_H$capture the marginal flow-performance sensitivity above and below the median. We define $\overline{Rank} = 0.75$ for Peru and $\overline{Rank} = 0.5$ for Chile based on the analysis in Figure 7. From the figure we can see that there is a "kink" around the second quartile of past performance ranking for Chile (percentile 0.5) and around the third quartile of past performance ranking for Peru (percentile 0.75). A firm with $Rank = 0.25$ (first performance quartile) would experience a flow of $\gamma_L \times 0.25$ if the other covariates were equal to zero. If a fund is in the third performance quartile (Rank=0.75) it would experience flows of $\gamma_L \times 0.5$ $+\gamma_H \times 0.25$ if the other covariates were equal to zero. Note that these regressions are different from the traditional dummy approach as the goal is to capture change in the slope[18]. Hence while the first (linear) specification only captures whether flows respond to performance, the second specification allows the response to performance to depend on whether you are above or below the threshold.

[18]Using these explanatory variables in a regression is equivalent to: $y = \alpha_1 \times Rank + \alpha_2 \times (Rank - \overline{Rank}) \times I(Rank \geq \overline{Rank})$. However, it is standard in the literature to specify it as $y = \beta_1 \times Min(Rank, \overline{Rank}) + \beta_2 \times [Rank - Min(Rank, \overline{Rank})]$. We choose $\overline{Rank}$ based on the kink observed in Figure 7. We can use different thresholds, but the interpretation will change regarding whether up to certain threshold there is a convexity or not. For example, suppose that we pick a 0.25 threshold, we might reject convexity at that point, but this does not mean that there is no convexity in the distribution, it just mean that there is not convexity when we compare the lowest quartile compared to the three highest quartiles.

4.2 Linear and Piecewise Results

We estimate the relation displayed in equation 2 using both specifications for performance. The results are shown in Table 5 for Chile. We analyze the impact on net inflows of improving one or two positions in the current ranking over the course of a year, which correspond to increases of 20 and 40 percentiles in the performance rank given that there are 6 providers. Columns (1) and (5) show the estimates for the first specification, where even after controlling for the other fund characteristics, flows positively and significantly respond to performance. Specifically, for each position that a provider advances, they observe a positive net inflow of value of 0.0528% and 0.015% in participants per month (equivalent to 0.63% and of 0.18% in participants annually). Hence, it looks like individuals with larger pensions respond more to performance.

The non parametric flow performance of Figure 7 justifies the piecewise linear specification suggested by Sirri and Tufano (1998), estimating different flow performance sensitivities for below and above the median. The results are presented in columns (2)-(4) and (6)-(8). Consistent with Figure 7, the results indicate an economically and statistically significant flow-performance relation for the providers with higher performance.

For Chile, based on the estimates in column (2), for funds in the low-performance group, improving by one position can increase their fund flows by 0.026% per month or (0.31% annually)On the other hand, for the funds that are in the high performance group, by moving up one position, fund flows can increase by 0.08% per month (or 0.96% annually). Thus, the sensitivity of inflows for the high performance group is 3.06 (=0.398/0.13) times the sensitivity of outflows for the low performance group, which implies a convex relationship.

In columns (3) and (7) we control for risk by using the standard deviation of the returns of the fund for the past 12 months. In columns (4) and (8) we only consider individuals that did not change their plan when they switched to another fund manager. (The unit of observation is fund-plan-month, so the sample size does not change.) Results are similar to the ones that does not control for risk/plan (columns 2 and 6), showing that the fact that

investors switching provider to chase returns is not driven by risk across providers or plans. Overall, our results for Chile show that high performance relates to a higher switching rate and we reject that low and high performance have the same impact .

Results for Peru are presented in Table 6. Given that there are only 4 providers, we interpret the impact on net inflows of improving one position in the current ranking within a year, which correspond to increases of 33.3 percentiles in the performance rank. Columns (1) and (4) confirm that assets and participants flow to high performing providers.For each position that a provider improves, there is an increase in flows of 0.041% in value and 0.01 in participants per month (0.56% and 0.14% annually).Similar to the findings in Chile, the piecewise specification reveals that the flow response to high performance is significantly different from that to low performance regarding value. A one position increase in rank performance among high performers leads to a 0.4% monthly (1.17% annual) increase in flows.

In Peru, we cannot account for plan changes at the individual level as we only observe flows at the provider level. However, since over 90% of participants are in Plan 2 (see Table 1), it is likely that most switchers remain within the same plan. Columns (3) and (6) include controls for risk using the standard deviation of fund returns over the past 12 months, and the results remain consistent with the other estimates. Additionally, in Columns (4) and (8) we analyze the period in which only one plan was available to control for risk and the results still hold.

In Appendix B, we test whether the minimum return requirement affects the performance-flow relationship by examining the heterogeneity of regulatory pressure across funds and over time. However, we find no evidence that the minimum requirement influences this relationship. Additionally, we find no indication that the regulation encourages pension managers to mimic their peers to avoid penalties. Before 2014, pension funds in Peru were not required to disclose their investment holdings, making it unlikely that managers could observe or imitate their competitors. Our analysis of the pre-2014 period, presented in the

appendix, confirms that the results remain consistent with our baseline estimates, providing no support for this behavior.

Comparing our results to the US DC plans, Sialm, L. T. Starks, and Zhang (2015) find that while participants show inertia, plan sponsors exhibit significant sensitivity to performance of their mutual fund allocations Their piecewise specifications indicate that a 10-percentile increase in fund performance for top quintile funds results in a 15.85% increase in annual flows to the better performer mutual fund, primarily driven by sponsors (13.89% increase), with minimal participant response.

Our study differs in its focus; we analyze the flow between pension funds in Chile, whereas they examine mutual fund flows within DC plans. Despite these differences, it is valuable to compare our findings. To align our analysis more closely with theirs, we conduct our regressions at the annual level using a granular sample from Chile. As shown in Table 10 , we find that for top performers, an increase of one position in relative rank leads to a statistically significant 3.43% rise in annual flows. While this response is smaller than the figures reported by Sialm, L. T. Starks, and Zhang (2015) for mutual fund flows, it still highlights a meaningful reaction from individual investors in our context.

These findings offer an interesting perspective on participant behavior in DC pension plans. Unlike the US employer-based plans, where participants are often seen as passive (see Pool, Sialm, and Stefanescu (2016) and Agnew, Balduzzi, and Sunden (2003)), our results suggest that in systems with universal options and no active role for sponsors, participants are neither naive nor inactive.

4.3 Response to Performance over Time

Sirri and Tufano (1998) study of mutual funds and Sialm, L. T. Starks, and Zhang (2015) study of U.S. DC plans document that the sensitivity to one year performance is stronger than longer term performances. Given that we observe flows at a monthly frequency, we can test the sensitivity of flows to performance over time and in response to repeated declines in

performance.

In Table 7, we show that in Chile, the sensitivity of flows to high performance peaks two months after the performance increase and remains significant, though reduced, one year later. Similarly, Table 8 indicates that in Peru, sensitivity to performance also diminishes over time.

It is likely that switching accounts has a personal cost even if there are not transaction costs associated with switching. For sure, it takes time to do it. So it is plausible that switching in response to performance may respond more strongly to consecutive declines in the performance of their current provider. Next, we explore whether a consecutive decline in returns drives outflows. Our sample contains 18% of episodes with consecutive declines and 80% of such episodes occur to at least four of the six pension funds in a given plan. We use the following specification:

$$o_{it} = \alpha \times Decline_{it} + X^{'}\vartheta + \epsilon_{it} \tag{4}$$

where o_{it} is the outflow measure of unit i at time t.For Chile i denotes the provider-investment plan while for Peru is provider. $Decline_{it}$ is a dummy variable that is one if unit i experienced a three-month consecutive return decline and X includes the set of controls and fixed effects (same as in the specification in equation 2). Results are presented in Table 9 and show that outflows are correlated to prolonged declines. This specification is comparing plans that experienced consecutive declines in their performance to those that did not. With this in mind, the coefficient estimate in column (1) for Chile implies that the ones that experienced three month of consecutive declines face on average monthly 0.0848% more outflows than those that did not, which implies a 0.26% outflow during such months.

4.4 Other Factors

We conclude this section by examining additional factors that could influence the sensitivity of flows to performance, specifically focusing on lock-in periods and the role of financial advisers.

In Chile, the financial advisory firm Felices y Forrados (FyF), which began operations in 2011, introduced a market-timing strategy for pension fund investors. By paying a subscription fee, investors receive recommendations on switching between plans, thereby altering the composition of their equity and bond holdings. Da et al. (2018) show that these recommendations lead to significant and coordinated fund flows, causing pension funds to adjust their allocations toward more liquid securities. Although FyF was not specialized in making recommendations of switching across providers, the switching behavior it prompts may indirectly affect our sensitivity analysis.

To investigate this, we create a dummy variable (FF) that equals one at time t if FyF has recommended switching in or out of the plan (with the unit of observation being plan-provider at each time). We then interact this dummy with the performance measure in equation 2, using both linear and piece wise specifications. Table 12 presents the results. According to the linear model, the sensitivity of inflows in value on the performance of high-performing providers increases by 2.11 times higher. Interesting, the sensitivity when measuring inflows in participants is 5.12 times higher when recommendations are made. Interesting, the sensitivity when measuring inflows in participants is 7.05 times higher. The convexity relationship between participant switching and performance significantly increases with F&F recommendations (high performance pension funds increases almost 5 times their net participant inflows). These findings suggest that FyF's recommendations not only impact plan switching but also indirectly influence the flow toward better-performing providers and that it specially had an impact on participants switching.

Additionally, as detailed in Section 6, regular auctions were held to foster competition and reduce fees within the sector. In these auctions the winning provider secured the right

to lock participants into the pension system for a specified number of years. In Table 11 of the Appendix, for Peru where we observe the number of new comers, we adjust the flow to exclude these locked-in individuals, and the results remain consistent with those presented in Table 6.[19]

5 Switching and Predictability

We have established that people are changing providers in search of better returns. However, the findings in the previous section do not necessarily mean that those who switch will experience improved performance afterward. In fact, Berk and Green (2004) theoretically demonstrate that, for mutual funds, while investor flows rationally react to past performance, they do not necessarily predict future performance. This outcome is attributed to decreasing returns to scale, where the inflow of performance-driven investments actually worsens the average investment ability of fund managers. Consistent with the mutual fund evidence documented by Frazzini and Lamont (2008), Sialm, L. T. Starks, and Zhang (2015) find that DC flows into mutual funds have no significant relation with mutual fund performance in the subsequent year.

In this section, we evaluate whether the return-seeking behavior of pension system participants leads to higher returns. To provide a fair comparison, we focus on switchers who remain with the same plan. Therefore, our analysis is restricted to Chile, where we can examine data at the plan-provider level. In Figure 8, we begin by presenting the average gains and losses from switching among various plans in Chile. Panel A compares the annual returns one month before switching between the new provider and the original provider. As expected, the difference is positive indicating that, on average, individuals appear to be making a sound decisions when switching. [20]

[19] The new comer information at the plan level is not available for Chile.

[20] The time series average for each plan is positive, with Plan A at 0.08%, Plan B at 0.06%, Plan C at 0.09%, Plan D at 0.10%, and Plan E at 0.12%. The only exception is in 2015 for Plan B, where this difference is negative.

Next we evaluate if flows are smart and choose providers that perform better after the switch. Panel B displays the realized annual return differentials twelve months after switching. The time series average for each plan is as follows: Plan A at 0.03%, Plan B at 0.02%, Plan C at 0.05%, Plan D at 0.003%, and Plan E at 0.04%. Thus, on average, this strategy yields return gains. It's important to highlight that this does not imply that individuals have a perfect foresight or predictability about the future returns of each provider or about who would be the provider with the highest return. Rather, it indicates that, on average, individuals tend to switch to providers that will perform better than their current ones. In Panel C, we report that the performance of the new provider is on average 0.7% lower than if they had been to the highest-return provider each month over the twelve-month period, which implies that the provider that they choose perform worse than the top performer provider.

It is worth noting that the difference in returns is unlikely to be offset by variations in fees, as suggested by the little dispersion in Figure 1. Panel D of Figure 8 calculates the fee differential achieved by those who switch providers based on their strategy. In this panel, we subtract the fee of the new provider from the fee of the original provider. On average, we observe a positive difference, indicating that individuals only save 0.01% on fees by changing providers, which is small compared to the observed fees. This is also consistent with 1, which shows that fees across providers are mainly constant and as a result it is not the main gain from switching. In summary, switching providers mainly leads to higher returns and this gains are not offset by fees..

The gains from switching, as discussed above, imply that the strategy of switching is beneficial for individuals (over one year horizon). We also look at whether–conditional on switching–individuals choose the best manager. In Figure 9, Panel A serves as a proxy for potential foregone gains by comparing the average annual return of the chosen provider with the highest annual return. While this difference fluctuates over time and across plans, it

generally exceeds 0.5%, which is higher than the figures in Figure 8. [21] This implies that there is potential for a more effective switching strategy than the one currently employed by individuals.

To establish a benchmark, we create an individual, whom we refer to as the "backward looking efficient switcher," who consistently invests with the provider that has the highest past returns. In Figure 9, Panel B compares, one month before the time of the switching, the one-month lag annual return of the provider with the highest return at the time of the switch to the annual return of the plan chosen by the switcher. If this number were zero or negative, it would imply that the switcher's decision is optimal, as any potential gains left on the table would not be predictable based on past returns. Since not all switchers select the same provider, we calculate the average difference across all switchers, taking into consideration the distribution of switchers.

The observed difference is positive and exceeds 0.5% annually. This suggests that while the switching behavior improves individual welfare, it is not optimal. Although a 0.5% annual difference may appear small, pension investments have long time horizons, and this differential compounds over time. For someone who is 20 years away from retirement, a 0.5% higher annual return would result in 10.5% higher savings at the time of retirement.

In Panel C of Figure 9, we observe that the sub-optimal outcome persists. This panel considers the same provider pairs as in Panel B, but we now compare the annual returns twelve months after the switch, specifically comparing the return of the provider with the highest pre-switch return to the chosen provider. While the value is positive, it is smaller and more volatile than the one in Panel B. Nevertheless, the fact that it remains consistently positive implies that even six months after the switch, individuals are still missing out on potential returns, rendering their switching strategy sub-optimal from a returns perspective.

Panel D of the Figure 9 presents the difference in fees between the provider with the highest return and the chosen provider (same pair as in Panel C). A positive value suggests

[21] The averages figure 9 Panel A are: 0.8% for Plan A, 0.68% for Plan B, 0.74% for Plan C, 0.69% for Plan D, and 0.72% for Plan E.

that switching to the chosen plan results in fee savings compared to the provider with the highest return. Apart from the anomaly in 2009, during which all providers in our sample experienced a drop, the average value is close to zero, with many periods showing values below zero. Therefore, overall savings in fees do not explain the sub-optimal switching pattern.

6 Increase in Competition and Switching Pressure

The previous sections have primarily assumed switching behavior as a given factor. In this section, we delve into an examination of increased switching behavior within the context of heightened competition and its potential impact on fund portfolio allocation. Specifically, we utilize the entry of new pension managers as a shock to switching behavior. In our dataset, we observe significant capital outflows coinciding with the entry of a new pension fund provider. The entry is a result of auction whose timing is exogenous and as we describe next, there is a lot of uncertainty whether it will lead to an entry of a new provider. Hence the event of entry generates a switching pressure that is arguably exogenous to fund performance.

The entry of these new providers was facilitated by regulators in both Chile and Peru, who created a competitive bidding process for the allocation of new pension accounts. The goal of these auctions is to keep these markets competitive. Chilean regulator explicitly stated that the objective of the licitations was to protect the clients by ensuring alternatives (see https://www.spensiones.cl/portal/institucional/594/w3-article-8048.html). In Peru, the Minister of Economy justified the measure arguing that it would generate more competition to the pension system (see https://www.mef.gob.pe/index.php?option=com_content&view=a
del-spp-generara-bienestar-de-trabajadores-&catid=100&Itemid=101958&lang=es).

The entry rules are the same for Chile and Peru. Incumbents and potential entrants can enter the auction by bidding on the fees they will charge to manage the workers pensions. The provider with the lowest bid wins the auction and gets all the new comers (the new

clients represent around 7% of total participants in Chile and 9% in Peru). This process can lead to the entry of a new provider if they submit the lowest bid. Winning incumbents are required to offer their existing clients the same fee schedule they bid, which may discourage them from setting low prices, even if their costs are low, as they risk losing substantial existing revenues. Zingales (2023) provides details of the auctions in Chile since 2010.

The emergence of a new, cheaper competitor puts performance pressure on incumbent funds, increasing the likelihood of clients switching providers. Our analysis of entry events reveals a notable rise in switching behavior. In Chile, gross flows increased by 33.15% six months after the entry of a new pension fund compared to the six months prior. Since Figure 2 shows a trend, we also compare the quarterly growth rates of the following two quarters after the entry with the historical average in our sample and they are 2 to 3 times much higher. . In Peru, the impact is even more pronounced, with gross flows rising by 39.04% after the new pension fund's entry, and the quarterly growth rate jumped from a historical average of 0.8% to a quarterly average of 22.6% on the following two quarters since the entry.

Given that pension managers' incentives are often linked to the fees they collect from contributors, the increase in outflows to new managers is a significant factor influencing their portfolio decisions. Our results demonstrate that individuals tend to switch providers in pursuit of higher returns or when they experience consecutive poor performances. Consequently, incumbent providers would arguably aim to achieve the best performance in order to retain their assets under management (AUM) as new competitors enter the market. This return-seeking behavior from providers can potentially increase the risk within their portfolios as they strive to deliver superior returns to attract and retain contributors. This effect might not be the sole mechanism through which competition influences providers, but, as we show, it plays a substantial role.

We analyze the initial auctions in both countries, announced in February 2010 in Chile and December 2012 in Peru. [22]The new pension fund providers—Modelo in Chile and Habitat

[22]We choose the focus on the first auction as this is the most exogenous to fund performance and was a "surprise" to fund participants. Other auctions might also have some anticipatory effects as the pension

in Peru—entered the market five and six months, respectively, after the announcements were made. This period is marked by heightened competitive pressure due to the entry of new providers, leading to a reduction in fees as a result of the bidding process. We will next examine how this competitive pressure influences the investment decisions of the fund managers.

To illustrate the changes, we create a counterfactual benchmark portfolio by maintaining the fixed income fund holdings at the time before the new manager entered the market. We then compare the average yield of this synthetic portfolio to the actual realized yield. [23]This comparison allows us to assess how the entry of the new manager has influenced the yield performance of the funds.[24]

Specifically, we construct a synthetic portfolio by keeping constant the holdings of portfolios at the month of the announcement of the winner of the bidding. We denote the synthetic portfolio share of instrument i of provider p with $\overline{\omega}_{p,i}$. Next, we use the observed portfolio holdings, denote as $\omega_{p,i,t}$ te portfolio share of instrument i of provider p at time t. Finally,we construct the synthetic and observed portfolio yields at the provider level (we analogous extend it at the provider-plan level for Chile) by weighting average the yields, $y_{p,i,t}$, of each instrument i that provider p holds at time t as follows:

$$Synthetic\,Yield_{p,t} \equiv \sum_i \overline{\omega}_{p,i} y_{p,i,t}$$

$$Observed\,Yield_{p,t} \equiv \sum_i \omega_{p,i,t} y_{p,i,t}$$

funds already learned how they will be affected by the licitation. Another advantage of using the first auction over others is that it generated the entry of a new pension fund manager in both countries.

[23]Although for Peru we have only bonds, for Chile we have all the fixed income instruments, which are mainly includes bonds, but also include other instruments (coupons, letters, certificates of deposits, etc). In Figure 3 12 of the Appendix we report the results including only bonds for Chile, which are consistent with our baseline results.

[24]We focus on fixed income instruments for two reasons. First, the idea of "searching for yield" is generally tied to bonds. Second, as yields are different than returns we do not have measures of other assets yield besides bonds. Regulation makes the funds disclose the yields of bonds so that information is easily available.

For Chile we are able to observe the full portfolio shares $\omega_{p,i,t}$. For Peru we only observe the portfolio of the whole pension system and we do not observe the portfolio shares using values, but we consider the simple average: $\omega_{p,i,t} \simeq \frac{1}{N_t}$, where N_t is the number of instruments of the pension system at time t.

Our baseline analysis focuses on the six-month period following the announcement of the entry of a new manager. For Peru is from January 2013 to June 2013, while for Chile spans from March 2010 to September 2010. Given that we rely on fixed income yields, in the case of Chile, we concentrate on Plans C, D, and E. These plans differ in terms of their allocations to variable income (e.g. equities) and fixed income (e.g. bonds). Specifically, Plan C allows for a maximum of 40% of the total fund to be invested in variable income, while Plan D has a limit of 20%, and Plan E only allows 5% in variable income. These distinctions in portfolio composition enable us to examine the impact of the new manager's entry on bond yields across these different plans.

In the case of Peru, we are only able to obtain an aggregate measure due to data restrictions, which limits our ability to explore the impact on bond yields for specific plans in the same manner as we do for Chile. Figure 10 provides a clear picture of our results. In Panel A, we present an aggregated measure for both Peru and Chile (focusing on plans C, D, and E). Panel B, on the other hand, breaks down the information for Chile by each relevant plan.

These findings indicate that pension funds tend to exhibit a behavior consistent with risk-taking. When compared to the counterfactual benchmark, the observed bond yield is, on average, 1.85% higher for Chile and 2.93% higher for Peru. Notably, this shift in behavior occurs during a period when a new entrant is entering the market and switching is expected to increase. For Chile, we found that the months where the new entrant started operations the effects were almost 2.5 times much higher than the average impact in our analysis period. Therefore, the change in bond yield appears to be driven by the competitive pressure and the behavior of pension fund contributors, reflecting a search for higher returns. In Figure 10, we run a placebo test and show that if we do the same analysis one year before the

bidding. During this period there was no expectation that a new provider would enter. We do not observe the same difference between the observed and synthetic yield. Hence, it appears that the difference is driven by the expectation of higher competition and switching. Finally, Table 13,in the Appendix confirms that after the entry, provider shift the composition towards lower rating securities, implying that it may be increasing the risk of the portfolio in its quest for yield.

7 Conclusions

How sensitive are DC pension fund flows to performance? We investigate this question empirically using detailed data from Peru and Chile. Using data on individual switchers between 2009 and 2019, we show that, in general, individuals do not stick to one pension provider and switch frequently especially in responsive to manager's performance. These findings stand in contrast to the bulk of the literature that points towards inertia on the behavior of individual pension fund contributor.

Importantly, the performance driven flows of individuals may change pensions managers incentive and their capital allocation. We provide evidence that this is indeed the case. Provider expectation of higher switching due to an new competitor, leads managers to shift their within plan portfolio into higher yielding bonds. These findings highlight fund flow pressures that emanate from individuals behavior and contrast with low aggregate estimates of demand elasticity for these "stable" institutional investors.

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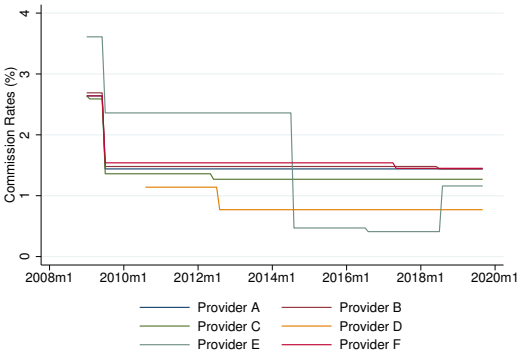
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Figure 1: **Fees over Time**

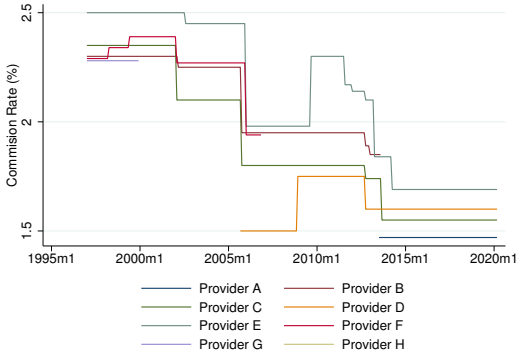
Figure 1 displays the fees charged by pension funds. Panel A shows the fees charged by Chilean providers, which are a share of their monthly wage. Panel B display the fees charged by Peruvian providers. First we depict the fees as a share of the salary, which was the predominant fee scheme in our sample. Second, we show the mixed scheme, which was introduced since 2013. For Chile, the data covers from February 2009 to September 2019. For Peru, the information covers January 1996 through March 2020.

Panel A: Chile

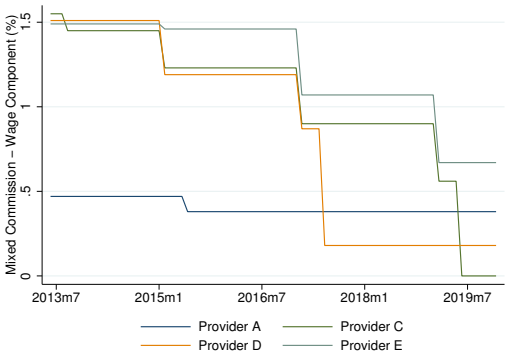


Panel B: Peru

Fees as a share of the salary



Mixed Scheme Fees (since 2013)



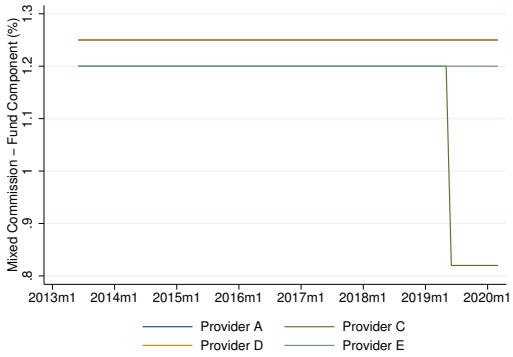
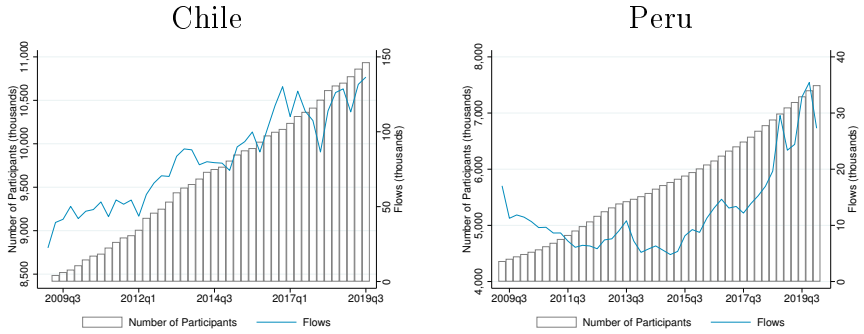
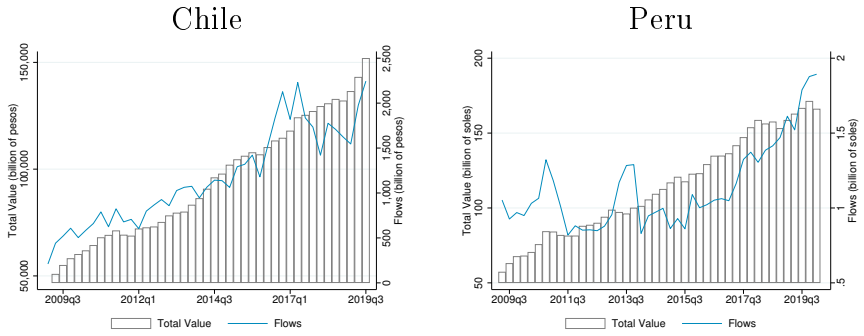


Figure 2: **Aggregate Pension Fund Value, Number of Participants, and Flows**
Figure 2 shows the number of participants, the total value of their pensions, and the switching flows. Panel A depicts the total number of participants in the system (left axis) and the number of participants that switched across providers(right axis). Panel B displays the sum of the pension fund value across all the participants (left axis) and flow amount (right axis). Panel C shows the full sample for Peru, including a period with a spike after the entry of a new competitor. For Chile, the data covers from February 2009 to September 2019. For Peru, information of number of participants covers January 1996 through March 2020 and for value since 2002.

Panel A: Number of participants



Panel B: Total value



Panel C: Full sample of Peru including a sizeable entry shock

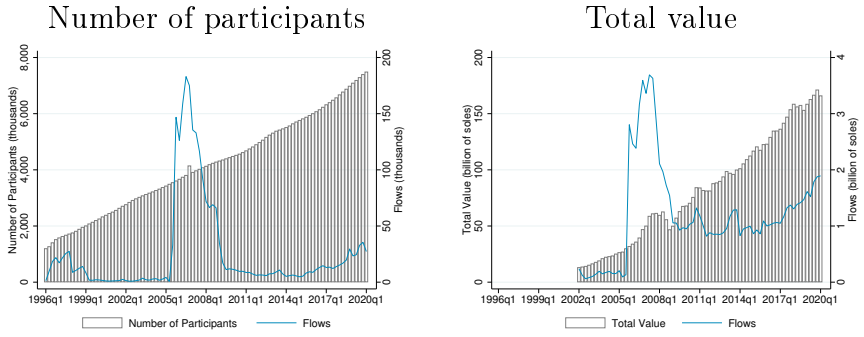
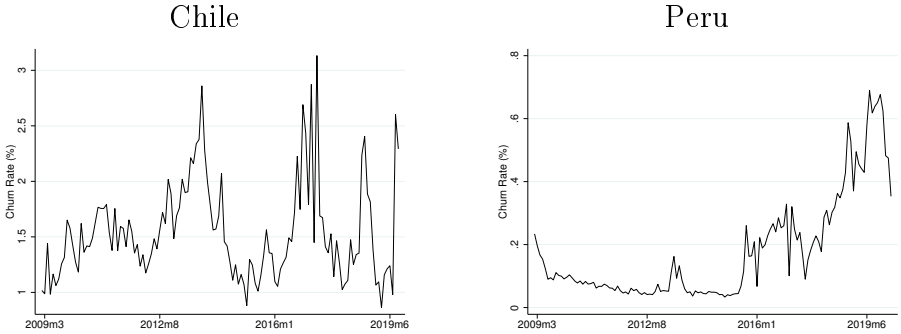


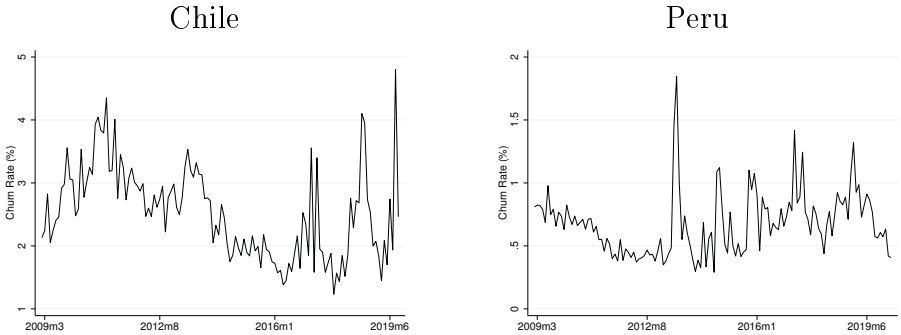
Figure 3: **Churn Rates over Time**

Figure 3 displays the maximum of the churn rates over time. We calculate a churn rate measure for each fund, and we display the maximum between funds. Panel A depicts the number of individuals that leave the fund over the number of individuals in the previous month. Panel B shows the amount that leaves the fund over the total amount in the previous month. Panel C displays the churn rates using the complete sample for Peru, which includes a period with a spike in the switching behavior after the entry of a new market participant. For Chile, the data spans from February 2009 to September 2019. For Peru, information of number of participants covers January 1996 through March 2020, but for the value we omit the information previous to 2002 because during 2000, and 2001 the data is available only every four months.

Panel A: Number of Participants



Panel B: Total Value



Panel C: Full sample of Peru including a sizeable entry shock

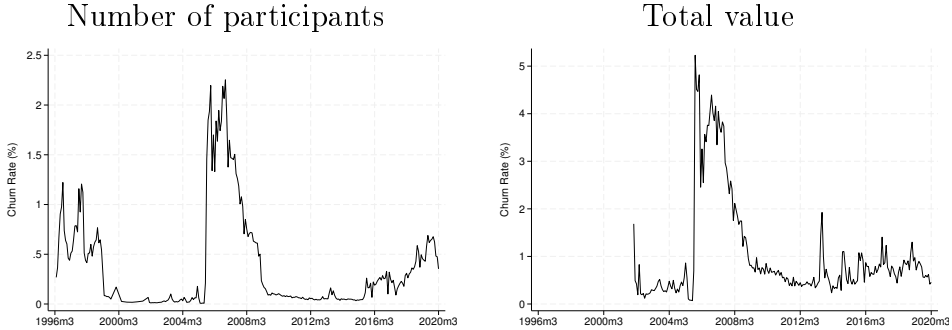
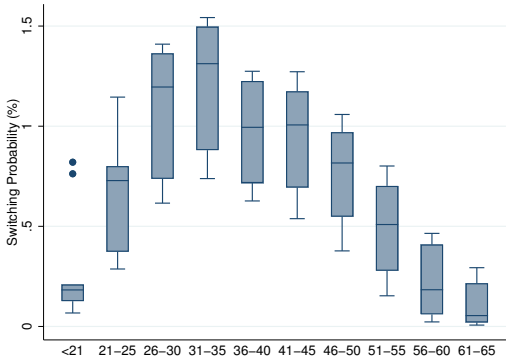


Figure 4: **Switching probability by age and time**

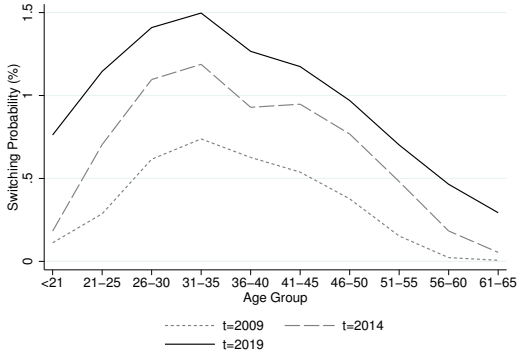
Figure 4 explores the switching behavior across age and time. Panel A - (i) displays a boxplot of the probability that an individual of a certain age group switches to another pension fund in a given year. Panel A - (ii) displays the switching probability by age group for three years: 2009, 2014, 2019. Panel B - (i) displays an estimated fund value of each age group for the three years of reference. The data of fund value for the population of a given age group is available in ranges and this graph we use the mid-range value of each range. Panel B - (ii) displays the contribution of each age group to the total switching volume. The information is for Chile and spans from 2009 to 2019.

Panel A: Switching probability

(i) By age group

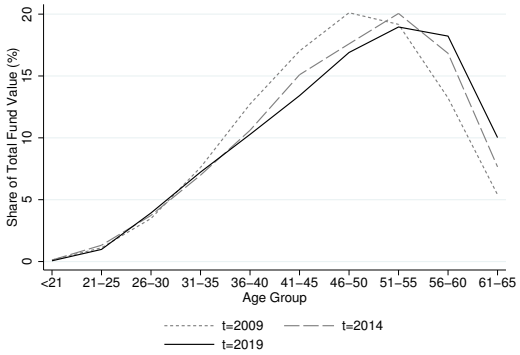


(ii) By age group across time



Panel B: Fund share and expected switching value by age

(i) Share of total fund value



(ii) Share of switching value by age group

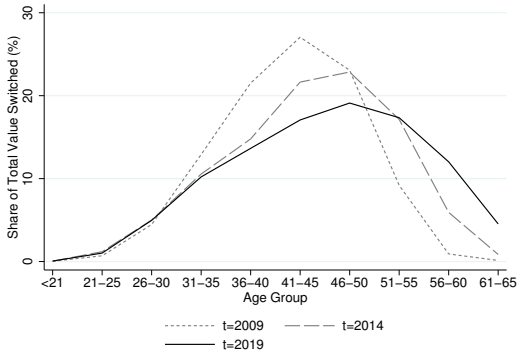


Figure 5: **Time-Series Correlation of Switching within Group**

Figure 5 displays the time-series correlation of the switching behavior within age group. We calculate the correlation between the number of individuals that switched across providers for a given age group with the lead value of the variable h periods ahead: $corr\left(s_t^{age\ group}, s_{t+h}^{age\ group}\right)$. We display the results for different quarters ahead: $1, 2, 3$,and 4. The information is for Chile and spans from February 2009 to September 2019.

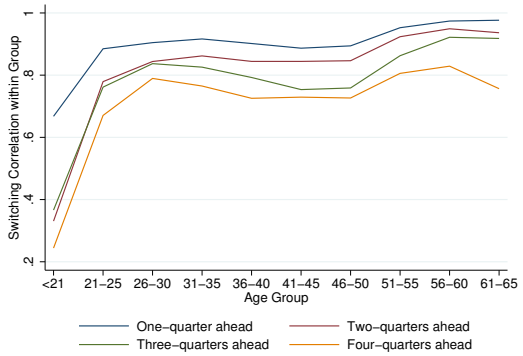


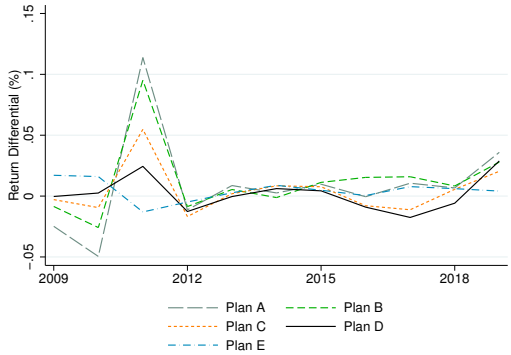
Figure 6: **Distribution of Returns Across Managers**

Figure 6 shows the return differential across different provider characteristics. Panel A displays the average return differential between the provider with the highest returns and the provider with lowest returns. Panel B displays the average return differential between the provider with the highest returns and the provider with lowest returns. Panel C displays the average return differential between the largest and smallest provider. We split the statistics by type of plans. Plan A is considered the riskier (variable income could represent 80% at maximum), while Plan E the less risky (variable income could represent 5% at maximum). The data is for Chile and data spans from February 2009 to September 2019.

Panel A: Return differential between the highest and lowest return provider



Panel B: Return differential between the highest and lowest fee provider



Panel C: Return differential between the largest and smallest provider

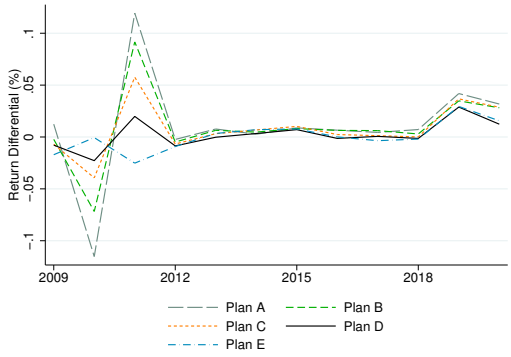
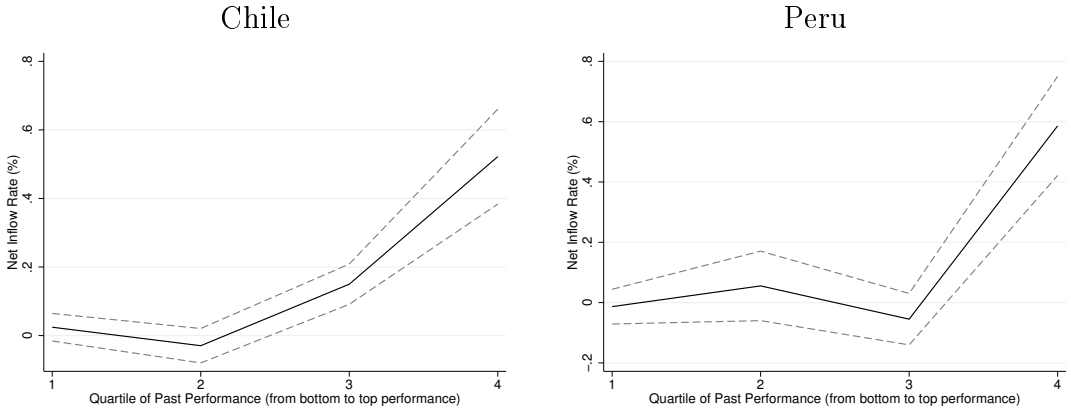


Figure 7: **Relative Performance and Growth**

Figure 7 divides the sample into quartiles based on the past return. Panel A displays, for each group, the mean growth rate calculated as $(Value\,Inflow_{ft} - Value\,Outflow_{ft})/Total\,Value_{f(t-1)}$, where $Value\,Inflow_{ft}$ is the value of the inflows to pension fund f in month t, $Value\,Outflow_{ft}$ is the value of the outflows from pension fund f to another fund in month t, and $Total\,Value_{f(t-1)}$ is the sum of the pension fund value across all the participants of the fund f in month $t-1$. Panel B shows, for each group, the mean growth rate calculated as $(Participant\ Inflow_{ft} - Participant\,Outflow_{ft})/Total\ Participants_{f(t-1)}$, where $Participant\,Inflow_{ft}$ is the number of participants that switched to fund f at time t, $Participant\,Outflow_{ft}$ is the number of participants that switched from fund f to another fund at time t, and $Total\ Participants_{f(t-1)}$ is the number of participants in the pension fund f at time $t-1$. For Chile, the sample covers from February 2009 to September 2019. For Peru, it spans January 1996 through March 2020. The dashed lines displays a 95% confidence interval.

Panel A: Total Value



Panel B: Number of Participants

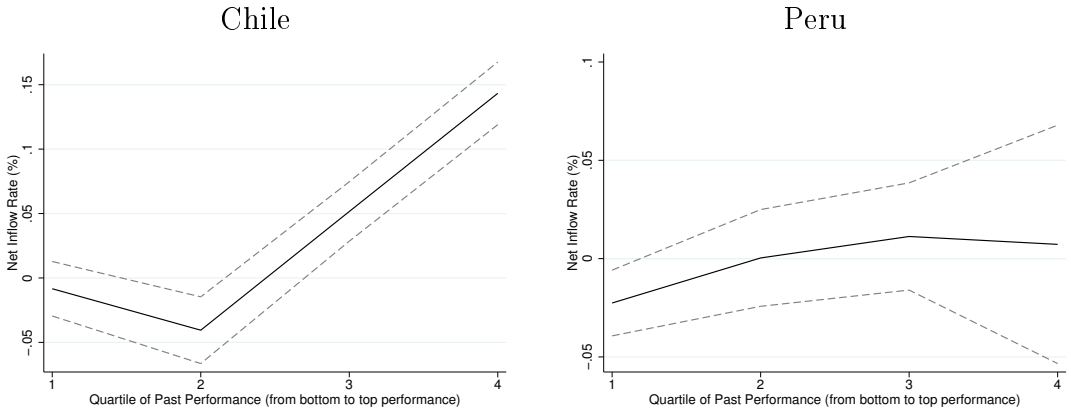
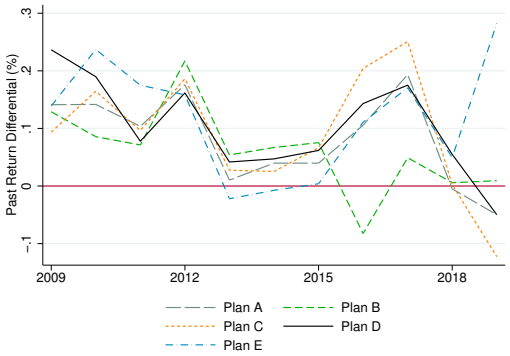


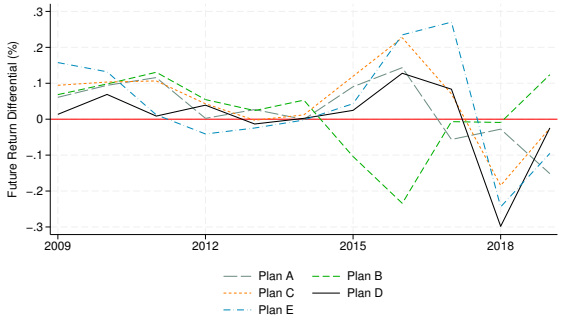
Figure 8: **Switching gains across time**

Figure 8 provides the average gain in terms of the additional or potential return obtained by switching across time. We split the statistics by type of plans. Plan A is considered the riskier (variable income could represent 80% at maximum), while Plan E the less risky (variable income could represent 5% at maximum). Panel A compares the returns (in percentages) one month before switching between the new provider and the original provider. Panel B computes the realized gains twelve months after the switching, that is, we compare the returns of the new option with respect to the previous option twelve months after the switching decision. The red line denotes the case in which both returns are equal and a value above the red line implies a positive return gains due to switching. Panel C compares the returns of the new option with respect to the providers with the highest return during the twelve months after the switching decision. Panel D provides the average gain in terms of the reduction of fees obtained by switching across time, that is, we compare the fee of the provider before switching with respect to the fee of the new provider. The red line denotes the case in which both fees are equal and a value above the red line implies a saving in fees. The data is from Chile and spans from 2009 to 2019.

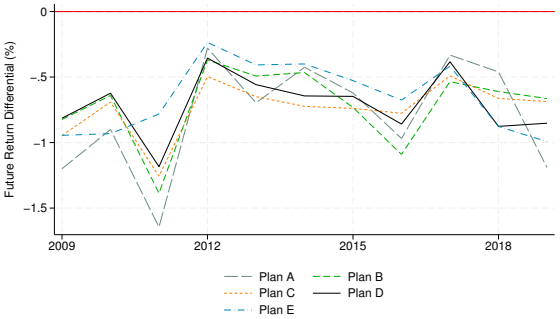
Panel A: Past Returns Gains



Panel B: Future Returns Gains
New Against Past Provider



Panel C: Future Returns Gains
New Against Efficient Providers



Panel D: Fees

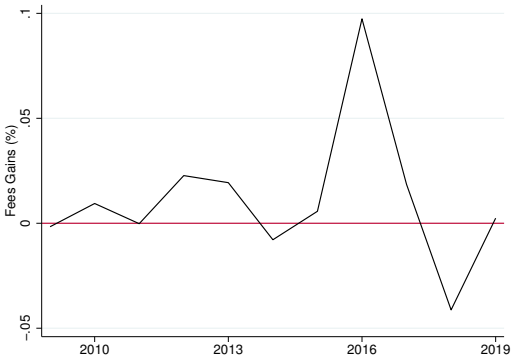
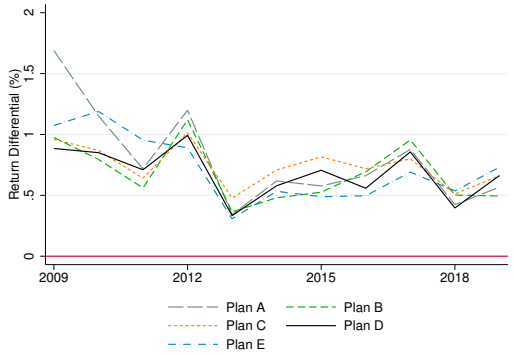


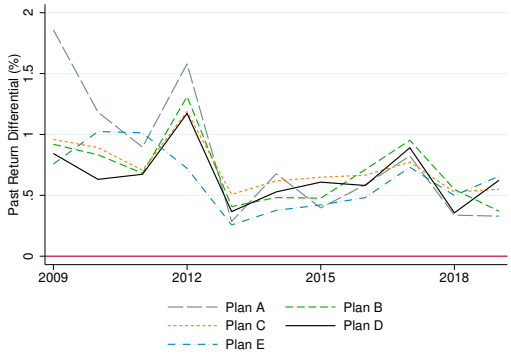
Figure 9: **Potential switching gains across time**

Figure 9 provides the average gain in terms of the additional or potential return obtained by switching across time. Panel A displays the potential efficient switching gain (in percentages), that is, we compare the returns of the provider with the highest return with the average provider. Panel B displays the potential efficient switching gain (in percentages) using a measure of past returns, that is, we compare the returns of the provider with the highest return with the provider chosen by the individual one month before the switching. Panel C displays the future efficient switching gain (in percentages) using a measure of future returns. For that we first the define the highest return provider prior switching as the one with the highest return one month before the switching. Then we compare twelve months after the switching the returns of the highest return provider prior switching with the returns of the provider chosen by the individual. Panel D compares the fees between provider selected by the individual and the highest return provider prior switching. The data is from Chile and spans from 2009 to 2019.

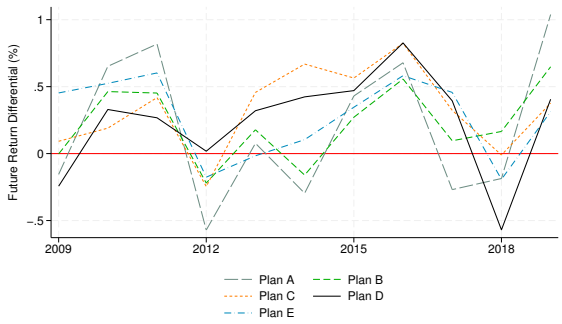
Panel A: Potential Switching Gains



Panel B: Potential efficient switching gains



Panel C: Future efficient switching gains



Panel D: Fee Differential

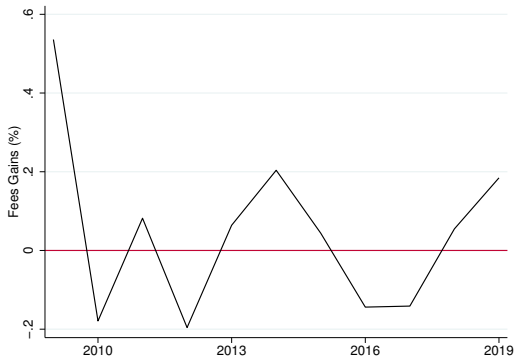
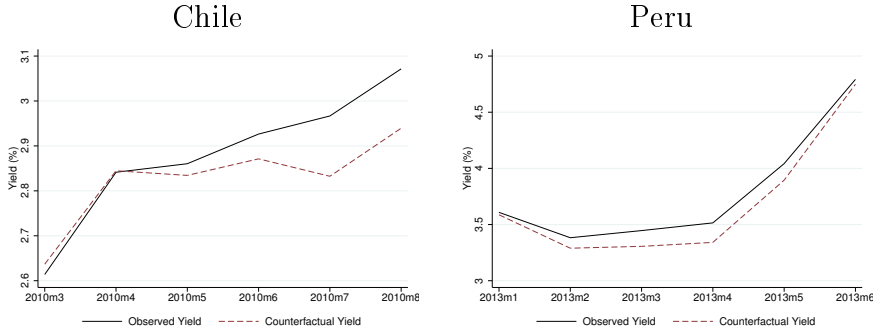


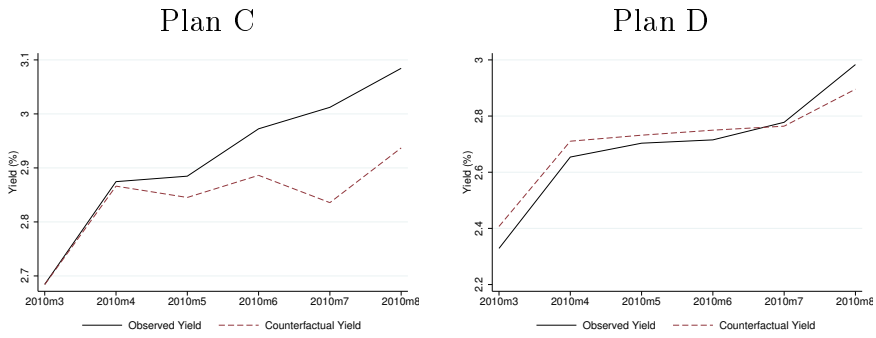
Figure 10: **Search for Yield and Competitive Pressure**

Figure 10 displays measures of average yields after the implementation of the first competitive bidding in which a new pension fund entered. We calculate an average realized (observed) yield across pension funds and a counterfactual yield. The counterfactual measure assumes a holding strategy where the pension fund does not buy or sell any bond after the bidding. As we are relying on bond yields, for Chile we focus on Plans C, D, and E, which are the ones that hold less (more) variable income (fixed income). For Plan C, the maximum investment in variable income is 40% of the total fund, while Plan D has a limit of 20%, and Plan E a 5%. For Peru, we obtain only an aggregate measure due to data restrictions. Panel A depicts an aggregated measure for Peru and Chile (considering only plans C, D, and E). Panel B presents the information for Chile for each relevant plan separately. The figures displays information from six months after the first competitive bidding in which a new pension fund won the bid. For Chile the samples spans from March 2010 to September 2010, while for Peru covers from January 2013 to June 2013.

Panel A: Aggregated measure



Panel B: Plan level measures - Chile



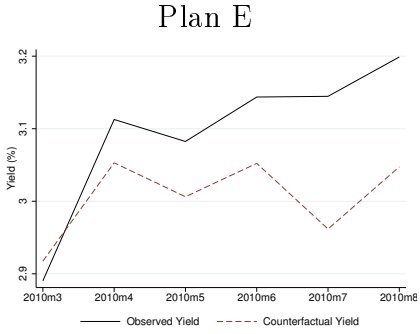


Figure 11: **Placebo - Search for Yield and Competitive Pressure**

This figure displays measures of average yields one year before the first competitive bidding in which a new pension fund entered. We calculate an average realized (observed) yield across pension funds and a counterfactual yield. The counterfactual measure assumes a holding strategy where the pension fund does not buy or sell any bond after the bidding. As we are relying on bond yields, for Chile we focus on Plans C, D, and E, which are the ones that hold less (more) variable income (fixed income). Panel A depicts an aggregated measure for Chile (considering only plans C, D, and E) and Peru. The figures displays information of one year before the first competitive bidding in which a new pension fund won the bid. For Chile the samples spans from March 2009 to September 2009, while for Peru covers from January 2012 to June 2012, while for

Panel A: Aggregated measure

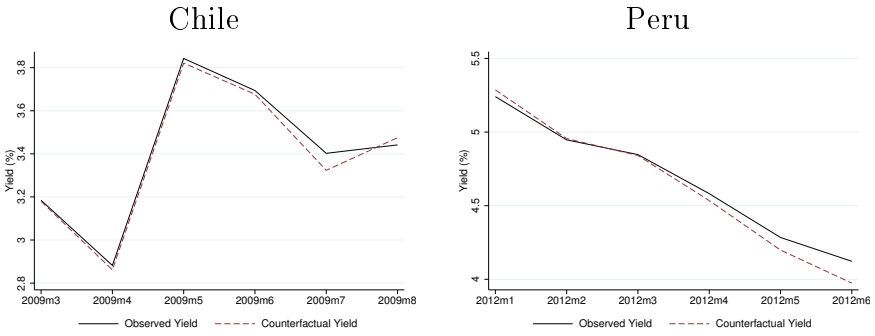


Table 1: **Investment share according to instrument type**

Table 1 describes the total invest of pension funds between fixed and variable income for different plans. The data for Chile is for 2019m8, while the for Peru corresponds to 2020m3

Panel A: Chile

Investment Plan	Fixed Income (%)	Variable Income (%)	AUM (%)	Share of Participants (%)
A	20.77%	79.23%	11.93%	10.64%
B	41.91%	58.09%	14.72%	35.48%
C	62.54%	37.46%	34.38%	33.07%
D	82.77%	17.23%	18.52%	12.49%
E	96.02%	3.98%	20.43%	8.32%

Panel B: Peru

Investment Plan	Fixed Income (%)	Variable Income (%)	AUM (%)	Share of Participants (%)
0	100%	-	1.91%	1.02%
1	73.10%	26.90%	11.98%	4.01%
2	46.37%	53.63%	75.37%	91.62%
3	5.47%	94.53%	10.73%	3.35%

Table 2: **Market share among pension providers**

Table 2 displays the market share of each provider. The data for Chile is for 2019m9, while the for Peru corresponds to 2020m3

Panel A: Chile

Provider	Market share measured by total value (%)	Market share measured by number of participants (%)
Capital	19.18%	14.84%
Cuprum	19.18%	5.37%
Habitat	27.87%	17.85%
Modelo	5.43%	19.16%
Planvital	3.38%	15.80%
Provida	24.97%	26.97%

Panel B: Peru

Provider	Market share measured by total value (%)	Market share measured by number of participants (%)
Habitat	7.04%	13.52%
Integra	37.22%	31.56%
Prima	30.42%	31.42%
Profuturo	25.32%	23.49%

Table 3: **Recurrence of switching behavior**

Table 3 provides the descriptive statistics about the individuals that have switched between pension funds. The information displays the average characteristics. The wage is measured in thousand of pesos, the fund value in million of pesos, and the age in years. The data is only for Chile and spans from 2009 to 2019.

Number of times switching	Share of the sample	Months before a new switching	Wage	Fund Value	Age
1	62.75	.	779	9.47	34.7
2	19.49	30.3	1,009	15.11	37.2
3	7.81	23.6	1,172	19.69	39.0
4	3.72	19.7	1,279	23.50	40.3
5	2.02	17.5	1,367	26.67	41.2
More than five	4.21	13.3	1,537	35.68	43.5

Table 4: **Switching Behavior Across Plans**

Table 4 provides descriptive statistics about the the switching behavior across providers disaggregated by plan. Plan A is considered the riskier (variable income could represent 80% at maximum), while Plan E the less risky (variable income could represent 5% at maximum). Panel A presents the share of the sample that has switched considering the initial and the new plan using the information of the number of participants, while. Panel B employs the information of the fund value. The data is from Chile and for 2014.

Panel A: Distribution across plans using the number of participants (%)

		New Plan				
Initial Plan	% of Switchers	Plan A	Plan B	Plan C	Plan D	Plan E
Plan A	32.3	66.3	10.4	9.4	1.4	12.4
Plan B	35.8	22.6	51.3	12.0	1.6	12.4
Plan C	17.1	11.1	11.3	57.9	3.2	16.6
Plan D	2.0	13.6	11.2	19.7	34.8	20.6
Plan E	12.7	17.3	8.5	14.3	3.1	56.9

Panel B: Distribution across plans using the total value (%)

		New Plan				
Initial Plan	% of Switchers Value	Plan A	Plan B	Plan C	Plan D	Plan E
Plan A	37.8	72.7	6.1	8.6	1.3	11.3
Plan B	18.6	14.6	55.1	15.0	2.2	13.2
Plan C	20.6	8.4	8.6	64.1	3.3	15.6
Plan D	2.9	8.7	7.1	20.2	42.8	21.1
Plan E	20.1	13.2	5.9	14.1	3.3	63.5

Table 5: Flow Performance and Switching for Chile

Each observation used for the analysis reported in this table correspond to a different pension fund, f, investment plan, p, and year-month, t. The dependent variables are growth measures. Columns (1) through (4) show the estimates considering as a dependent variable the growth rate measured as $(Value\,Inflow_{fpt} - Value\,Outflow_{fpt})/(Total\,Value_{fp(t-1)} * (1 + R^m_{fpt})) \times 100$. Columns (5) to (8) compute the growth rate as $(Participant\,Inflow_{fpt} - Participant\,Outflow_{fpt})/Total\,Participants_{fp(t-1)} \times 100$. Performance is *equal to the Rank* denotes the percentile performance of a given provider within investment plan at $t-1$. *Low Performance* is defined as $Min(Rank, 0.5)$, and *High Performance* is $Rank - Min(Rank, 0.5)$. $Ln(Age)$ is the logarithm of the number of years of the fund plus one. $Fees$ denotes the percentage of fees charged by the fund. $Ln(Number\ of\ Participants)$ is the logarithm of the number of participants in the fund. $Expenses$ is a measure of the operative expenses over assets. $Ln(Value)$ is the logarithm of the total value of the pension fund investments. *Standard Deviation* is the past standard deviation of the returns of the fund. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively. Columns (4) and (8) use a risk based perspective by considering only the individuals that did not change their plan when they switched.

	Net inflow rate of the fund value				Net inflow rate of the number of participants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Performance	0.264***				0.0751***			
	(6.37)				(4.04)			
Low Performance		0.130	0.132	0.129		-0.0594	-0.0585	-0.0183
		(1.38)	(1.39)	(1.61)		(-1.33)	(-1.31)	(-0.51)
High Performance		0.398***	0.400***	0.220***		0.209***	0.210***	0.107***
		(4.84)	(4.88)	(3.34)		(5.45)	(5.49)	(3.60)
Ln(Age)	0.184**	0.219***	0.228***	0.0865	0.0634*	0.0984***	0.103***	0.000984
	(2.33)	(2.70)	(2.79)	(1.40)	(1.78)	(2.71)	(2.82)	(0.04)
Fees	-0.366***	-0.363***	-0.372***	-0.277***	-0.193***	-0.189***	-0.194***	-0.154***
	(-7.78)	(-7.68)	(-7.72)	(-7.52)	(-6.88)	(-6.76)	(-6.83)	(-6.86)
Ln(Number of Participants)	-0.468***	-0.466***	-0.471***	-0.307***	-0.430***	-0.429***	-0.431***	-0.251***
	(-7.36)	(-7.34)	(-7.27)	(-6.02)	(-14.92)	(-14.99)	(-14.84)	(-11.39)
Expenses	0.679***	0.693***	0.700***	0.455***	0.152***	0.165***	0.169***	0.0750***
	(5.65)	(5.75)	(5.82)	(5.13)	(4.50)	(4.95)	(5.07)	(3.03)
Ln(Value)	0.440***	0.446***	0.454***	0.310***	0.517***	0.524***	0.528***	0.320***
	(4.30)	(4.38)	(4.34)	(3.59)	(11.25)	(11.50)	(11.35)	(8.62)
Standard Deviation			-10.53				-5.590*	
			(-1.43)				(-1.75)	
Number of observations	3,545	3,545	3,545	3,545	3,545	3,545	3,545	3,545
R-squared	0.23	0.35	0.35	0.27	0.22	0.23	0.23	0.15
Fixed Effects:								
Time-Investment Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test:								
Low=High		Rejected*	Rejected*	Fail to Reject		Rejected***	Rejected***	Rejected**
P-value test		0.087	0.087	0.493		0.000	0.000	0.038

Table 6: Flow Performance and Switching for Peru

Each observation used for the analysis reported in this table correspond to a different pension fund, f, and month, t. The dependent variables are the growth measures. Columns (1) through (4) show the estimates considering as a dependent variable the growth rate measured as $(Value\,Inflow_{ft} - Value\,Outflow_{ft})/(Total\,Value_{f(t-1)} * (1 + R^m_{ft})) \times 100$. Columns (5) to (8) compute the growth rate as $(Participant\,Inflow_{ft} - Participant\,Outflow_{ft})/Total\,Participants_{f(t-1)} \times 100$. Performance is *equal to the Rank* denotes the percentile performance of a given provider within investment plan at $t-1$. *Low Performance* is defined as $Min(Rank, 0.5)$, and *High Performance* is $Rank - Min(Rank, 0.5)$. $Ln(Age)$ is the logarithm of the number of years of the fund plus one. *Fees* denotes the percentage of fees charged by the fund. $Ln(Number\ of\ Participants)$ is the logarithm of the number of participants in the fund. *Expenses* is a measure of the operative expenses over assets. $Ln(Value)$ is the logarithm of the total value of the pension fund investments. *Standard Deviation* is the past standard deviation of the returns of the fund. Since in Peru we do not observe the plan, we considering the period before December 2005, where only one plan was available. We report such results in Column (4) nad (8). The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively. .

	Net flow rate of the fund value				Net flow rate of the number of participants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Performance	0.125***				0.0358***			
	(2.68)				(3.42)			
Low Performance		-0.155**	-0.149**	-0.353**		0.0137	0.0117	-0.00659
		(-2.22)	(-2.14)	(-2.27)		(0.80)	(0.69)	(-0.19)
High Performance		1.217***	1.226***	1.408***		0.121**	0.117**	0.0722
		(5.60)	(5.63)	(3.65)		(2.30)	(2.22)	(0.84)
Ln(Age)	-0.233	-0.283	-0.295		0.203***	0.198***	0.206***	
	(-1.14)	(-1.42)	(-1.50)		(3.52)	(3.41)	(3.64)	
Fees	-0.733**	-0.527	-0.516	0.644	-0.129	-0.111	-0.121	-0.320
	(-2.08)	(-1.50)	(-1.48)	(0.65)	(-1.11)	(-0.95)	(-1.04)	(-1.12)
Ln(Number of Participants)	-0.206	-0.323	-0.265	6.690***	0.213***	0.205***	0.179***	1.989***
	(-0.95)	(-1.50)	(-1.27)	(4.95)	(5.08)	(4.72)	(4.21)	(7.57)
Expenses	-0.0872	-0.0904	-0.119	0.0257	-0.0404	-0.0411	-0.0316	-0.0605
	(-0.47)	(-0.49)	(-0.65)	(0.09)	(-1.43)	(-1.46)	(-1.13)	(-1.51)
Ln(Value)	-0.604***	-0.577***	-0.684***	-9.294***	-0.288***	-0.286***	-0.241***	-2.482***
	(-3.39)	(-3.37)	(-3.92)	(-5.00)	(-10.08)	(-9.95)	(-7.71)	(-7.34)
Standard Deviation			0.0828				-0.0355***	
			(1.58)				(-3.99)	
Number of observations	1,037	1,037	1,037	370	1,113	1,113	1,113	447
R-squared	0.67	0.68	0.69	0.43	0.38	0.39	0.39	0.45
Fixed Effects:								
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test:								
Low=High		Rejected***	Rejected***	Rejected***		Fail to Reject	Fail to Reject	Fail to Reject
P-value test		0.000	0.000	0.001		0.101	0.107	0.486

Table 7: Flow Performance and Switching for Chile - Alternative Lags

This table extends Table 5 by using alternative lags as explanatory variables. Instead of using *Low Performance* and *High Performance* and the independent variables measured at time $t-1$, we measured them at time $t-2$, $t-3$, $t-4$, $t-6$ and $t-12$. The dependent variables are the growth measures. Columns (1) through (5) show the estimates considering as a dependent variable the growth rate measured as $(Value\ Inflow_{fpt} - Value\ Outflow_{fpt})/(Total\ Value_{fp(t-1)} * (1 + R^m_{fpt})) \times 100$. Columns (6) to (10) compute the growth rate as $(Participant\ Inflow_{ft} - Participant\ Outflow_{ft})/Total\ Participants_{f(t-1)} \times 100$. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively.

	Net inflow rate of the fund value					Net inflow rate of the number of participants				
	t-2	t-3	t-4	t-6	t-12	t-2	t-3	t-4	t-6	t-12
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low Performance	0.0404	-0.000671	-0.000833	0.0527	-0.123*	-0.105**	-0.115***	-0.103**	-0.0721	-0.0796**
	(0.50)	(-0.01)	(-0.01)	(0.60)	(-1.96)	(-2.53)	(-2.73)	(-2.38)	(-1.56)	(-2.06)
High Performance	0.483***	0.476***	0.378***	0.141	0.267**	0.230***	0.236***	0.206***	0.144***	0.156***
	(4.67)	(4.67)	(3.62)	(1.40)	(2.30)	(5.01)	(5.11)	(4.22)	(2.96)	(2.83)
Ln(Age)	0.282**	0.266**	0.136	0.183**	0.316***	0.0929**	0.0757*	0.0425	0.120***	0.188***
	(2.41)	(2.48)	(1.45)	(2.56)	(4.01)	(2.28)	(1.92)	(1.03)	(2.98)	(4.33)
Fees	-0.297***	-0.232***	-0.162***	-0.100**	-0.0324	-0.151***	-0.126***	-0.0994***	-0.0858***	-0.0476
	(-5.76)	(-4.65)	(-3.42)	(-2.44)	(-0.78)	(-5.26)	(-4.34)	(-3.38)	(-3.01)	(-1.59)
Ln(Number of Participants)	-0.440***	-0.367***	-0.293***	-0.244***	-0.161***	-0.413***	-0.387***	-0.362***	-0.361***	-0.333***
	(-6.46)	(-5.96)	(-5.27)	(-4.96)	(-3.19)	(-14.57)	(-14.37)	(-13.30)	(-13.52)	(-11.34)
Expenses	0.739***	0.589***	0.366***	0.249***	0.187***	0.156***	0.115***	0.0656*	0.0992***	0.0846***
	(4.48)	(4.08)	(3.16)	(3.62)	(3.03)	(3.93)	(3.12)	(1.72)	(3.09)	(2.75)
Ln(Value)	0.434***	0.328***	0.207**	0.130*	0.0166	0.500***	0.454***	0.407***	0.404***	0.346***
	(3.89)	(3.29)	(2.28)	(1.72)	(0.20)	(10.89)	(10.59)	(9.42)	(10.20)	(7.82)
Number of observations	3,515	3,485	3,455	3,395	3,215	3,515	3,485	3,455	3,395	3,215
R-squared	0.34	0.32	0.30	0.28	0.27	0.22	0.21	0.21	0.20	0.20
Fixed Effects:										
Time-Investment Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test:										
Low=High	Rejected***	Rejected***	Rejected**	Fail to Reject	Rejected***	Rejected***	Rejected***	Rejected***	Rejected**	Rejected***
P-value test	0.004	0.002	0.020	0.613	0.010	0.000	0.000	0.000	0.014	0.003

Table 8: Flow Performance and Switching for Peru - Alternative Lags

This table extends Table 6 by using alternative explanatory lags as explanatory variables. Instead of using *Low Performance* and *High Performance* and the independent variables measured at time $t-1$, we measured them at time $t-2$, $t-3$, $t-4$, $t-6$, and $t-12$. The dependent variables are the growth measures. Columns (1) through (5) show the estimates considering as a dependent variable the growth rate measured as $(Value\,Inflow_{ft} - Value\,Outflow_{ft})/(Total\,Value_{f(t-1)} * (1 + R^m_{ft})) \times 100$. Columns (6) to (10) compute the growth rate as $(Participant\,Inflow_{ft} - Participant\,Outflow_{ft})/Total\,Participants_{f(t-1)} \times 100$. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively.

	Net flow rate of the fund value					Net flow rate of the number of participants				
	t-2	t-3	t-4	t-6	t-12	t-2	t-3	t-4	t-6	t-12
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low Performance	-0.117*	-0.0608	-0.0586	-0.0734	-0.127**	0.0320*	0.0296*	0.0326**	0.0325*	0.00548
	(-1.70)	(-0.94)	(-0.95)	(-1.17)	(-2.45)	(1.89)	(1.81)	(1.99)	(1.89)	(0.30)
High Performance	0.988***	0.705***	0.464**	0.0453	-0.293*	0.0350	0.00839	-0.0256	-0.113**	-0.127**
	(4.55)	(3.42)	(2.26)	(0.21)	(-1.72)	(0.63)	(0.15)	(-0.44)	(-1.97)	(-2.53)
Ln(Age)	-0.0814	-0.0777	-0.241	-0.416**	-0.165	0.220***	0.198***	0.179***	0.116***	0.152***
	(-0.43)	(-0.43)	(-1.30)	(-2.20)	(-1.25)	(3.85)	(4.11)	(3.76)	(2.79)	(3.96)
Fees	-0.589*	-0.550**	-0.248	-0.0309	0.0695	-0.143	-0.0846	-0.0736	0.0226	-0.0669
	(-1.91)	(-1.97)	(-1.01)	(-0.13)	(0.39)	(-1.22)	(-0.90)	(-0.80)	(0.32)	(-1.00)
Ln(Number of Participants)	-0.138	-0.0144	0.0734	0.251	0.417***	0.230***	0.256***	0.263***	0.257***	0.209***
	(-0.64)	(-0.07)	(0.35)	(1.37)	(2.94)	(5.62)	(6.82)	(7.48)	(7.52)	(5.58)
Expenses	-0.258	-0.381*	-0.361*	-0.417**	-0.204	-0.0642***	-0.0470**	-0.0391*	-0.0372*	-0.0913***
	(-1.34)	(-1.95)	(-1.76)	(-2.53)	(-1.63)	(-2.59)	(-2.15)	(-1.95)	(-1.84)	(-3.35)
Ln(Value)	-0.624***	-0.713***	-0.723***	-0.774***	-0.481***	-0.298***	-0.292***	-0.286***	-0.262***	-0.242***
	(-3.53)	(-4.06)	(-4.14)	(-4.62)	(-3.42)	(-10.37)	(-10.98)	(-10.89)	(-10.37)	(-9.02)
Number of observations	1,030	1,023	1,016	1,002	960	1,107	1,100	1,093	1,079	1,037
R-squared	0.68	0.70	0.70	0.72	0.75	0.40	0.40	0.41	0.42	0.44
Fixed Effects:										
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test:										
Low=High	Rejected***	Rejected***	Rejected**	Fail to Reject	Fail to Reject	Fail to Reject	Fail to Reject	Fail to Reject	Rejected**	Rejected**
P-value test	0.000	0.002	0.033	0.637	0.401	0.965	0.747	0.400	0.032	0.025

Table 9: **Return decline and pension fund flows**

This table investigates if a consecutive decline of returns generates a switching provider. Column (1) dependent variable is $ValueOutflow_{fpt}/(TotalValue_{fp(t-1)} * (1 + R^m_{fpt})) \times 100$. Column (2) dependent variable is $ParticipantOutflow_{ft}/TotalParticipants_{f(t-1)} \times 100$. We use a three-month consecutive decline in returns as a trigger of switching. If the trigger is activated, *Consecutive Decline* is one. Each observation used for the analysis reported in this table correspond to a different pension fund and period for Peru, while for Chile represents a pension fund, plan and period.

Panel A. Chile

	(1) Number of Participants	(2) Total Value
Consecutive Decline	0.0383**	0.0848***
	(2.34)	(3.69)
Ln(Age)	0.0421	0.0126
	(1.58)	(0.33)
Fees	0.202***	0.146***
	(14.50)	(6.21)
Ln(Number of Participants)	0.0199	-0.0697***
	(1.26)	(-2.99)
Expenses	-0.0881***	-0.0801**
	(-3.54)	(-2.07)
Ln(Value)	-0.178***	-0.166***
	(-8.26)	(-5.23)
Lagged Flow Participants	1.209***	
	(15.89)	
Lagged Flow Volume		1.645***
		(17.60)
Number of observations	3,545	3,545
R-squared	0.77	0.73
Fixed Effects:		
Time	Yes	Yes
Fund	Yes	Yes
Plan	Yes	Yes

t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Panel B. Peru

	(1) Number of Participants	(2) Total Value
Consecutive Decline	-0.0170	-0.0762
	(-0.49)	(-0.65)
Ln(Age)	-0.00810	0.619***
	(-0.13)	(3.74)
Fees	-0.0577	-0.341
	(-0.62)	(-1.27)
Ln(Number of Participants)	-0.242***	0.169
	(-8.09)	(1.57)
Expenses	0.0927***	0.0571
	(3.37)	(0.56)
Ln(Value)	0.193***	-0.333***
	(7.15)	(-4.29)
Number of observations	1,112	1,037
R-squared	0.94	0.86
Fixed Effects:		
Time	Yes	Yes
Provider	Yes	Yes

t statistics in parentheses

Online Appendix

Table 10: Flow Performance and Switching for Chile - Annual

Each observation used for the analysis reported in this table correspond to a different pension fund, f, investment plan, p, and year, t. The dependent variables are growth measures. Columns (1) through (4) show the estimates considering as a dependent variable the growth rate measured as $(Value\,Inflow_{fpt} - Value\,Outflow_{fpt})/(Total\,Value_{fp(t-1)} * (1 + R^m_{fpt})) \times 100$. Columns (5) to (8) compute the growth rate as $(Participant\,Inflow_{fpt} - Participant\,Outflow_{fpt})/Total\,Participants_{fp(t-1)} \times 100$. Performance is *equal to the Rank* denotes the percentile performance of a given provider within investment plan at $t-1$. *Low Performance* is defined as $Min(Rank, 0.5)$, and *High Performance* is $Rank - Min(Rank, 0.5)$. $Ln(Age)$ is the logarithm of the number of years of the fund plus one. $Fees$ denotes the percentage of fees charged by the fund. $Ln(Number\ of\ Participants)$ is the logarithm of the number of participants in the fund. $Expenses$ is a measure of the operative expenses over assets. $Ln(Value)$ is the logarithm of the total value of the pension fund investments. *Standard Deviation* is the cummulative past standard deviation of the returns of the fund. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively. Columns (4) and (8) use a risk based perspective by considering only the individuals that did not change their plan when they switched.

	Net inflow rate of the fund value				Net inflow rate of the number of participants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Performance	5.519*				1.765**			
	(1.95)				(2.05)			
Low Performance		-6.320	-6.699	-4.167		-1.479	-1.507	-0.984
		(-1.14)	(-1.21)	(-1.04)		(-0.95)	(-0.96)	(-0.84)
High Performance		17.14**	17.35**	13.77**		4.949***	4.965***	4.076***
		(2.22)	(2.32)	(2.36)		(3.19)	(3.24)	(3.23)
Ln(Age)	9.189	11.13	32.62*	7.708	0.579	1.112	2.713**	0.416
	(1.51)	(1.64)	(1.73)	(1.55)	(0.69)	(1.27)	(2.14)	(0.65)
Fees	-2.389	-2.206	-2.874	-2.171	-1.789	-1.739	-1.789	-1.770*
	(-0.97)	(-0.89)	(-1.20)	(-1.16)	(-1.45)	(-1.42)	(-1.46)	(-1.73)
Ln(Number of Participants)	0.258	-0.123	-1.316	0.0995	-4.134***	-4.238***	-4.327***	-2.477***
	(0.04)	(-0.02)	(-0.23)	(0.02)	(-4.67)	(-4.68)	(-4.84)	(-3.90)
Expenses	15.65*	16.31*	17.81**	11.74*	1.468*	1.650**	1.761**	0.934
	(1.87)	(1.90)	(2.03)	(1.86)	(1.85)	(2.08)	(2.24)	(1.64)
Ln(Value)	-5.820	-5.112	-3.826	-3.560	4.346***	4.540***	4.636***	2.647**
	(-0.61)	(-0.55)	(-0.46)	(-0.52)	(3.10)	(3.19)	(3.29)	(2.58)
Standard Deviation			-40.21				-2.996*	
			(-1.53)				(-1.87)	
Number of observations	290	290	290	290	290	290	290	290
R-squared	0.53	0.53	0.57	0.52	0.27	0.29	0.29	0.23
Fixed Effects:								
Time-Investment Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test:								
Low=High		Rejected*	Rejected**	Rejected**		Rejected**	Rejected**	Rejected**
P-value test		0.057	0.046	0.049		0.014	0.013	0.014

Table 11: Flow Performance and Switching for Peru - Adjusting for New Comers

This table extends Table 6 by adjusting the total value $Total\ Value_{f(t-1)}$ and $Total\ Participants_{f(t-1)}$ by the corresponding share that new comers that were locked represented due to the competing bidding to switch across plans. The dependent variables are the growth measures. Columns (1) through (3) show the estimates considering as a dependent variable the growth rate measured as $(Value\ Inflow_{ft} - Value\ Outflow_{ft})/(Total\ Value_{f(t-1)} * Adjusted\ Share * (1 + R^m_{ft})) \times 100$. Columns (4) to (6) compute the growth rate as $(Participant\ Inflow_{ft} - Participant\ Outflow_{ft})/(Total\ Participants_{f(t-1)} * Adjusted\ Share) \times 100$. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively. Columns (1) and (4) use raw returns, (2) and (5) use risk-adjusted measures, (3) and (6) focus on the period before the introduction on the competitive bidding where no individuals were locked to switch across providers.

	Net flow rate of the fund value			Net flow rate of the number of participants		
	Raw Returns	Adjusted by Risk	No Locking Period	Raw Returns	Adjusted by Risk	No Locking Period
	(1)	(2)	(3)	(4)	(5)	(6)
Low Performance	-0.111	-0.109	-0.136	0.0124	0.0111	0.0371
	(-1.60)	(-1.57)	(-1.47)	(0.71)	(0.64)	(1.57)
High Performance	1.114***	1.126***	1.290***	0.132**	0.123**	0.140**
	(5.29)	(5.29)	(5.21)	(2.46)	(2.25)	(2.26)
Ln(Age)	-0.511***	-0.502***	-0.306	0.238***	0.234***	0.296***
	(-2.69)	(-2.66)	(-1.14)	(3.95)	(3.97)	(3.54)
Fees	-0.664*	-0.658*	-0.0271	-0.101	-0.110	0.0566
	(-1.89)	(-1.88)	(-0.06)	(-0.85)	(-0.93)	(0.43)
Ln(Number of Participants)	0.117	0.134	2.299***	0.168***	0.155***	0.870***
	(0.56)	(0.65)	(2.84)	(3.88)	(3.60)	(4.59)
Expenses	-0.107	-0.109	-0.135	-0.0201	-0.0201	-0.0647
	(-0.56)	(-0.57)	(-0.53)	(-0.62)	(-0.62)	(-1.55)
Ln(Value)	-1.140***	-1.163***	-3.961***	-0.221***	-0.205***	-1.143***
	(-6.18)	(-6.30)	(-3.25)	(-6.19)	(-5.62)	(-4.43)
Standard Deviation		0.0417			-0.0303***	
		(0.97)			(-2.78)	
Number of observations	1,027	1,027	730	1,103	1,103	806
R-squared	0.71	0.71	0.31	0.41	0.41	0.34
Fixed Effects:						
Time	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes
Test:						
Low=High	Rejected***	Rejected***	Rejected***	Rejected*	Rejected*	Fail to Reject
P-value test	0.000	0.000	0.000	0.072	0.097	0.194

Table 12: Flow Performance and Switching for Chile - FF Effect

This table extends Table 5 by including an interaction effect with the recommendation of *Felices and Forrados* advice to switch across plans. FF is a dummy that takes the value of one if at time t *Felices and Forrados* provided recommendations to switch in or switch out to plan p. The dependent variables are growth measures. Columns (1) through (3) show the estimates considering as a dependent variable the growth rate measured as $(Value\,Inflow_{fpt} - Value\,Outflow_{fpt})/(Total\,Value_{fp(t-1)} * (1 + R^m_{fpt})) \times 100$. Columns (4) to (6) compute the growth rate as $(Participant\,Inflow_{fpt} - Participant\,Outflow_{fpt})/Total\,Participants_{fp(t-1)} \times 100$. Control variables are identical to the ones in Table 5. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively.

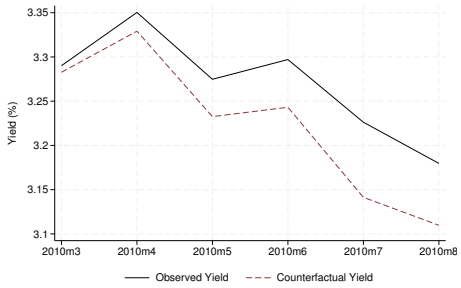
	Net inflow rate of the fund value		Net inflow rate of the number of participants	
	Linear	Piecewise	Linear	Piecewise
	(1)	(2)	(4)	(5)
Quartile	0.152***		0.0217	
	(4.77)		(1.34)	
Quartile×FF	0.321***		0.153***	
	(3.55)		(3.48)	
Low Performance		0.0202		-0.0317
		(0.36)		(-1.05)
High Performance		0.287***		0.0769***
		(4.66)		(2.70)
Low Performance×FF		0.350		-0.0710
		(1.47)		(-0.60)
High Performance×FF		0.283		0.370***
		(1.40)		(3.85)
Number of observations	3,545	3,545	3,545	3,545
R-squared	0.35	0.35	0.23	0.23
Fixed Effects:				
Time-Investment Plan	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes
Controls:	Yes	Yes	Yes	Yes
Test:				
Low=High		Rejected**		Rejected*
P-value test		0.044		0.061

Figure 12: **Bonds Only - Search for Yield and Competitive Pressure**

This figure displays measures of average yields after the implementation of the first competitive bidding in which a new pension fund entered considering only bonds for Chile. We calculate an average realized (observed) yield across pension funds and a counterfactual yield. The counterfactual measure assumes a holding strategy where the pension fund does not buy or sell any bond after the bidding. As we are relying on bond yields, for Chile we focus on Plans C, D, and E, which are the ones that hold less (more) variable income (fixed income). For Plan C, the maximum investment in variable income is 40% of the total fund, while Plan D has a limit of 20%, and Plan E a 5%. Panel A depicts an aggregated measure (considering only plans C, D, and E). Panel B presents the information for each relevant plan separately. The figures displays information from six months after the first competitive bidding in which a new pension fund won the bid. The data spans from March 2010 to September 2010.

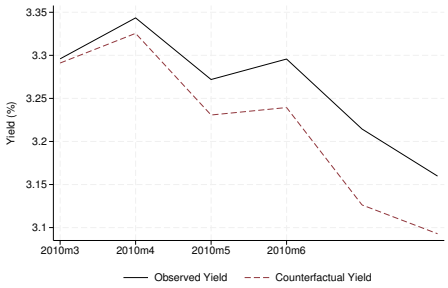
Panel A: Aggregated measure

Chile

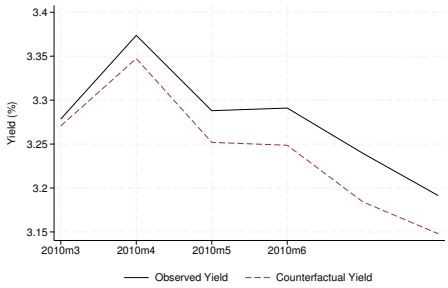


Panel B: Plan level measures - Chile

Plan C



Plan D



Plan E

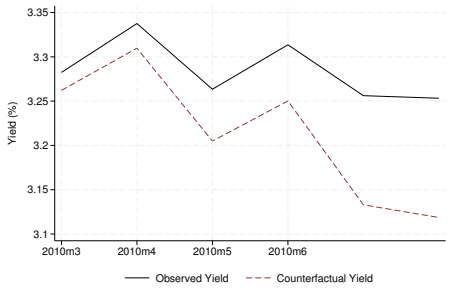


Table 13: **Portfolio composition by rating after competitive event - Peru**
This table explores how the rating composition of the portfolio changed after the competitive event (the announcement of the winner of the bidding in December 2012 that result in the entry to a new pension fund provider). The ratings correspond to the S&P classification. The data is from Peru and covers from June 2012 to June 2013.

Rating	Portfolio share before event (%)	Portfolio share after event (%)	Difference
AAA/AAA+/AAA-	57.85%	55.23%	-2.62%
AA/AA+/AA-	35.43%	36.49%	+1.06%
A/A+/A-	5.46%	5.69%	+0.23%
BBB/BBB+/BBB-	1.23%	2.18%	+0.95%
BB/BB+/BB-	0%	0.39%	+0.39%

Appendix B Minimum Return Guarantee Requirement

Regulatory Background

Chile

According to Article 37 of Decree Law No. 3,500, as amended by Law No. 19,725 (2002), pension funds are mandated to provide a minimum return to individuals. This minimum return is determined by the specific type of fund and the average return of a given plan over the preceding 36 months.

For Funds A and B, the minimum return is calculated as the lower of:

- The average return of the providers in the same plan minus 4 percentage points.
- Half of the average return of the providers in the same plan.

For Funds C, D, and E, the minimum return is the lower of:

- The average return of the providers in the same plan minus 2 percentage points.
- Half of the average return of the providers in the same plan.

This requirement is formally expressed as:

$$R_{min,plan} \equiv \begin{cases} Min\left\{0.5 * \overline{R}_{plan}, \overline{R}_{plan} - 4\right\} & if \;\; plan = A, B, \\ Min\left\{0.5 * \overline{R}_{plan}, \overline{R}_{plan} - 2\right\} & if \;\; plan = C, D, E \end{cases}$$

where $\overline{R}_{plan}$ is the average return of the preceding 36-months for a given plan.

The minimum return is guaranteed by a reserve requirement. Pension funds are required to maintain a reserve amounting to 1% of the assets invested by their clients that they can use to cover the minimum return guarantee. If these resources are exhausted, the state provides a final guarantee. A manager cannot use the resources of one plan's reserves to cover the return deficit of other plans it manages.

We calculate the minimum guarantee requirement for each plan and we found that during our sample period no pension fund was penalized for being lower than the benchmark. In fact, the worst performing fund of every plan in each month was at most 2% below the average fund, implying that even the bottom performer funds were not penalized.

Peru

According to Supreme Decree No. 104-2010-EF, approved in 2010, pension funds must ensure that the real annual return of each fund type over the past 36 months meets a defined minimum threshold, which is calculated monthly. The minimum return for each fund type is determined based on the lower of two possible values:

For Fund Type 1, the minimum return is the lower of:

- The average annual return of the last 36 months minus two percentage points.
- 50% of the average annual return for the same period.

For Fund Type 2, the minimum return is the lower of:

- The average annual return minus three percentage points.
- 35% of the average annual return.

For Fund Type 3, the minimum return is the lower of:

- The average annual return minus four percentage points.
- 25% of the average annual return.

The formula for the minimum return for each fund type is:

$$R_{min,plan} = \begin{cases} Min\left\{0.5 * \overline{R}_{plan}, \overline{R}_{plan} - 2\right\} & if \;\; Plan = 1 \\ Min\left\{0.35 * \overline{R}_{plan}, \overline{R}_{plan} - 3\right\} & if \;\; Plan = 2 \\ Min\left\{0.25 * \overline{R}_{plan}, \overline{R}_{plan} - 4\right\} & if \;\; Plan = 3 \end{cases}$$

We focus on Plan 2, which is the most common, with 91% of individuals enrolled in it. Since the implementation of this regulation, all pension fund managers have met or exceeded the minimum return requirement. In fact, even the worst-performing fund achieved a return more than 4% above the minimum threshold. This is mainly because the Peruvian requirement is relatively lenient, especially for Plan 2, where the minimum return is only 35% of the average return, making it easier for funds to surpass the threshold.

Flow-Performance Relationship under Penalty Pressure

Although we did not observe the penalty being applied, it is possible that the threat of a penalty still exerts some off-equilibrium pressure. To explore this, we examine whether the potential pressure from the regulatory penalty affects the flow-performance relationship using the Chilean setup shown in Table 14.

First, since Plans A and B face less regulatory pressure than Plans C, D, and E, we analyze whether the flow-performance relationship differs across plans with varying levels of regulatory burden. The results in columns (1) and (3) indicate that the relationship remains consistent across all plans, irrespective of their regulatory pressure.

Next, we examine whether the flow-performance relationship changes in years when managers might have faced increased pressure from being closer to the penalty threshold. To

assess this, we calculate the average return volatility for each plan in each year and then compute the overall average volatility across all plans. Using these yearly averages, we determine the historical mean volatility across the entire sample period. We define a "low-pressure" year as one where the volatility is below the historical mean.

The findings in column (2) show that when flows are measured using the fund value, there is no significant difference in the flow-performance relationship between high-pressure and low-pressure years. Overall, these results suggest that the potential penalty pressure does not appear to have a substantial impact on the flow-performance relationship.

Table 14: Flow Performance and Switching for Chile - Penalty Pressure

This table estimates the linear relationship between inflows and performance and includes an interaction effect to capture the differential penalty pressure that might arise due to the minimum guarantee requirements. Low-Pressure Plans reflects the fact that the penalty pressures for plans A and B are less restrictive compared to the other plans It is a dummy variable that takes the value of one if the plan is either A or B, and zero otherwise. Low-pressure years captures the years in which the average volatility within a given year was lower compared to other years. We calculate the average return volatility across plans for each year and define a low-pressure year as those in which the average volatility is below the historical annual mean. The dependent variables are growth measures. Columns (1) through (2) show the estimates considering as a dependent variable the growth rate measured as $(Value\ Inflow_{fpt} - Value Outflow_{fpt})/(Total Value_{fp(t-1)} * (1 + R^m_{fpt})) \times 100$. Columns (3) to (4) compute the growth rate as $(Participant Inflow_{fpt} - Participant Outflow_{fpt})/Total Participants_{fp(t-1)} \times 100$. Control variables are identical to the ones in Table 5. The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively.

	Net inflow rate of the fund value		Net inflow rate of the number of participants	
	Plan Pressure	Time Pressure	Plan Pressure	Time Pressure
	(1)	(2)	(3)	(4)
Performance	0.229***	0.316***	0.0545**	0.150***
	(4.83)	(4.59)	(2.31)	(5.51)
Performance×Low-Pressure Plans	0.0957		0.0555	
	(1.35)		(1.61)	
Performance×Low-Pressure Years		-0.0792		-0.114***
		(-1.07)		(-3.40)
Number of observations	3,545	3,545	3,545	3,545
R-squared	0.35	0.35	0.23	0.23
Fixed Effects:				
Time-Investment Plan	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes
Controls:	Yes	Yes	Yes	Yes

Another concern regarding the regulation is that it may prompt pension managers to mimic their peers in order to avoid penalties. For this explanation to hold, pension fund

managers would need to have access to information about their peers' holdings. We leverage the Peruvian context to investigate this issue, where, prior to 2014, pension funds were not required to disclose detailed investment holdings. It was only after the release of Circular N° AFP - 137 - 2014 that reporting such information became mandatory, and the details were published on the regulator's public website. Therefore, before 2014, pension funds had no access to data on their competitors' asset allocations, making it unlikely that they were directly mimicking one another. In Table15, we analyze the period before 2014, and our results continue to align with our baseline estimates.

Table 15: Flow Performance and Switching for Peru - Excluding the Reporting Period of Portfolios

This table extends Table 6 . The dependent variables are the growth measures. Columns (1) through (3) show the estimates considering as a dependent variable the growth rate measured as $(ValueInflow_{ft} - ValueOutflow_{ft})/(TotalValue_{f(t-1)} * (1 + R^m_{ft})) \times 100$. Columns (4) to (6) compute the growth rate as $(Participant\ Inflow_{ft} - Participant\ Outflow_{ft})/Total\ Participants_{f(t-1)} \times 100$. Performance is equal to the *Rank* and denotes the percentile performance of a given provider within investment plan at $t-1$. *Low Performance* is defined as $Min(Rank, 0.75)$, and *High Performance* is $Rank - Min(Rank, 0.75)$. $Ln(Age)$ is the logarithm of the number of years of the fund plus one. $Fees$ denotes the percentage of fees charged by the fund. $Ln(Number\ of\ Participants)$ is the logarithm of the number of participants in the fund. *Expenses* is a measure of the operative expenses over assets. $Ln(Value)$ is the logarithm of the total value of the pension fund investments. *Standard Deviation* is the past standard deviation of the returns of the fund.The standard errors are clustered using the white method. t-statistics are in parentheses. Significance at the 1%, 5%, and 10 % levels is denoted by ***, **, and *, respectively. .

	Net flow rate of the fund value			Net flow rate of the number of participants		
	Linear	Piecewise - Raw Returns	Piecewise - Adjusted by Risk	Linear	Piecewise - Raw Returns	Piecewise - Adjusted by Risk
	(1)	(2)	(3)	(4)	(5)	(6)
Performance	0.151**			0.0526***		
	(2.48)			(3.75)		
Low Performance		-0.148	-0.147		0.0352	0.0352
		(-1.61)	(-1.60)		(1.49)	(1.49)
High Performance		1.194***	1.203***		0.113*	0.105*
		(4.89)	(4.89)		(1.82)	(1.66)
Ln(Age)	-0.338	-0.375	-0.356	0.259***	0.257***	0.243***
	(-1.32)	(-1.49)	(-1.44)	(3.31)	(3.24)	(3.18)
Fees	-0.316	-0.133	-0.110	0.00617	0.0178	-0.00563
	(-0.78)	(-0.33)	(-0.27)	(0.05)	(0.14)	(-0.04)
Ln(Number of Participants)	1.737***	1.484**	1.458**	0.622***	0.606***	0.626***
	(2.71)	(2.33)	(2.28)	(3.80)	(3.65)	(3.79)
Expenses	-0.0352	-0.0620	-0.0586	-0.0440	-0.0454	-0.0498
	(-0.14)	(-0.25)	(-0.24)	(-1.09)	(-1.12)	(-1.24)
Ln(Value)	-3.033***	-2.840***	-2.809***	-0.803***	-0.789***	-0.813***
	(-3.14)	(-2.94)	(-2.91)	(-3.59)	(-3.51)	(-3.63)
Standard Deviation			0.0367			-0.0312**
			(0.71)			(-2.29)
Number of observations	745	745	745	821	821	821
R-squared	0.27	0.30	0.30	0.32	0.32	0.32
Fixed Effects:						
Time	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes
Test:						
Low=High		Rejected***	Rejected***		Fail to Reject	Fail to Reject
P-value test		0.000	0.000		0.329	0.387