Performance Capital Flows in DC Pensions

Bryan Gutierrez* University of Minnesota

Victoria Ivashina† Harvard Business School CEPR & NBER

Juliana Salomao‡ University of Minnesota CEPR & NBER

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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.

*gutie366@umn.edu

†vivashina@hbs.edu.

‡jsalomao@umn.edu

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1 Introduction

Defined contribution (DC) pension funds around the world manage a significant amount of capital. For example, a subset of large global pensions with DC plans surveyed by the OECD represented $3.3 trillion in assets under management (AUM) in 2020. In the U.S., according to Pensions&Investments, Federal Retirement Thrift Investment Board which administers the Thrift Savings Plan (TSP) alone managed $651.1 billion in the same year. So, biases or shifts in portfolio allocations of DC plans could be economically very consequential. With this in mind, we study whether DC pension plans display fund flow sensitivity to performance. Importantly, we tie this sensitivity to switching behavior at the individual account level.

Typically, pension funds liabilities are long-term with employees accounts regularly receiving contributions through the retirement age. Moreover, the retirement accounts tend to be tax-differed, which means that pension benefits are also drawn gradually in retirement. On aggregate, therefore, DC pension liability structure is expected to be associated with low capital flow volatility and steady accumulation of capital.[1] However, a typical DC plan setup allows for substantial variation of capital flows within manager. To ensure competition among DC providers, DC pension reforms have facilitated entry of multiple managers in any given market. An employees often can choose from a menu of providers, and do so more than once over time. While defined benefit (DB) pension promise a set pension income in retirement, DC plans accumulate a sum of assets based on the investments returns, which can then be turned into a pension income in retirement. As a result, individuals have an incentive to seek the fund that yields the highest returns. In sum, while the aggregate flows of private pensions are typically characterized by significant inertia, individual DC pension managers might be facing significant fund flow pressure. This idea is well illustrated by a

[1]For this reason, pensions reforms around the world that have facilitated growth of DC plans have been shown to play a significant role in the development of capital 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), andScharfstein (2018). Kortum and Lerner (2000) study implications of the 1979 addition to the U.S. Employee Retirement Income Security Act, a change that jump started the growth of private equity industry.

quote from an ex-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 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."[2]

The statement above is in line with the large body of research on *mutual fund* flow, which documents high sensitivity of capital flows to performance. However, Pensions accounts apply to a much broader set of population than mutual funds. Moreover, at least in part, pensions tend to be compulsory. Given the evidence on "set it and forget it" 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 for individual managers should be economically large. Indeed, studies of retirees in DC pensions point to sticky investing behavior (e.g., Benartzi and Thaler 2001; Madrian and Shea, 2001; Agnew, Balduzzi, and Sunden, 2003; andHuberman and Jiang, 2006). Sialm, L. T. Starks, and Zhang (2015) compare mutual fund flows of DC and non-DC mutual fund investors in the U.S.. For employer-sponsored defined contribution (DC) plans in the U.S. and several European countries, the employer serves as a gatekeeper by choosing one or more pension managers and developing a plan menu available to employees.[3] In turn, employees allocate their individual DC account balances among choices provided to them through the employer. Sialm, L. T. Starks, and Zhang (2015) conclude that DC asset flows tend to be less sticky than non-DC flows but attribute this to the actions of the plan sponsors (an institutional agent), and not to the plan participants.

[2]The quote is taken from Ivashina, Gabrieli, and Lenhardt (2017). PFA is the largest commercial pension provider in Denmark. 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.

[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 "provider" and "manager" as synonymous.

In this paper, we look at employee manager switching behavior and its impact on pensions portfolios using previously unexplored data from Chile and Peru (administradoras de fondos de pensiones or AFPs). The data from these countries – for the period that we explore – is ideal to study this question. In particular, for Chile, the data enables us to track individuals over time. Moreover, we can look at the switching behavior within the same risk profile of the specific pension product. In the U.S., there is substantial variation in available options across corporate sponsors which makes it difficult to isolate the impact of participants behavior. The advantage of Chilean and Peruvian setting is that the employer does not make any choices, instead investment options are regulated and universally available to the participants.

Our Chilean data covers period between February 2009 and September 2019. For this period we observe 9.6 million individual and the data structure enables us to separate switching across managers from switching across different saving products. We find that 1.8 million individuals (18.3% of all individuals with at least two month of data) switch the providers at least once in our data. 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, 1.5% of assets under management (AUM) in Peru, and 3% of AUM in Chile. These numbers correspond to eleven years 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. Firstly, we observe that 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.

When we categorize providers based on net inflow and previous performance, we identify a positive relationship that suggests investors are actively seeking higher returns and engaging in a switching behavior. The magnitudes of these shifts are substantial. For example, due to net inflows, the top-performing provider experiences an annual growth of approximately 6% of its AUM in Chile and about 7.5% 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 4.5 times greater than the sensitivity of outflows for the lowest-performing ones, indicating a convex relationship. Furthermore, our research reveals that individuals react more strongly to consecutive declines in performance. In the context of Chile, where we can track individual accounts, providers experiencing three consecutive months of declining performance face approximately 0.09% more outflows compared to those who did not.

We further look whether the switching behavior leads to financial gains for retirees. This analysis focuses on Chile, where we can account for 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). This indicates that the switching strategy is indeed welfare-improving as it results in higher pension benefits at the time of retirement. However, in line with the literature on we also uncover that these switchers are not making the most of their opportunities. Firstly, we observe that individuals do not consistently choose the provider with the highest return one month prior to the switch. The difference in (one-month lagged) 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. Secondly, suboptimal performance is persistent. Had individuals chosen to switch to the provider with the highest return one month prior to the switch, they would have achieved higher returns compared to their selected provider six months after the switch. This behavior cannot be solely attributed

to savings in fees. These findings suggest that while switching behavior can indeed lead to financial gains for individuals, the strategy adopted in the process is often suboptimal.

Our findings reveal that individuals tend to switch in pursuit of higher returns or in response to consecutive poor performance. If pension fund managers are aware of this behavior, it may create incentives for them to adjust their 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.

These findings are important as they speak to the pensions managers incentives, and ultimately to capital allocation by this pivotal group of institutional investors. Some of our evidence points to manager's shift to higher yielding bonds within the same pension plans. Similarly, these findings are in line with the significant 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) .

Moreover, our paper provides evidence on the role of individual employees decisions, and complementing the evidence in Sialm, L. Starks, and Zhang (2018) who emphasize the role of employers in driving allocations across managers. This contributes to a large body of literature on the inertia in individual financial decisions. As mentioned earlier, the pension regulatory setting in Chile and Peru, and especially account-level data for pensions in Chile enables us to isolate switching across products which are characterized by different risk-profiles based on their exposure to equity returns. (This decision is the focus in Da et al. (2018).) Instead we study individual switching among pension managers within saving

product type. This is the relevant dimension for understanding funds incentives, which are ultimately tied to assets under management.

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

We study DC pension plans in Chile and Peru. Peruvian pension reform, as well as similar reforms in other countries in the 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 1992 in Peru.

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. 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), and Luco (2019).The novel aspect of our data is that we can looks at switching behavior across managers. 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.[4] Overall, in the Chilean

[4]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.

data, we observe 9,631,207 individual accounts with at least two month of data over our sample period. We have information on the individual age, account value and wage.

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 aggregate across plans). The switching data frequency is monthly starting in March 1996 and we end our analysis in March 2020. Although Peruvian data does not track switching behavior by individual plans, there is significant concentration of savings within one plan. The reason for using both countries is that 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. Importantly, employee can later switch its pension provider, even when deciding to stay with the same plan. Within our sample, in Chile and Peru there were no direct costs to switching providers. The procedure is online, and relatively simple with participants just needing to fill a form to formalize the switch.

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. While individuals can choose any of the five plans, funds "B", "C", and "D" are defaults options and participants are automatically shifted to less risky funds according to their age. (It is possible to split account accounts into two plans, but it is very rare for retiree to do so.) 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 percent of total pension assets. In addition to the recent growing trend, fund "E" has also been characterized for its large and volatile flows.[5]

Before 2005, Peru only had one (regulated) pension plan for each manager. Starting in 2005, there are four plans: "0", "1", "2" and "3". 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). The plan "0" (100% in fixed income) is the safest, but only people older than 65 can choose it. The 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 income and equity split, pensions regulators specifies a series of additional limits on the fixed income ratings and maturity, allocations to derivatives 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 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.

Managers' incentives – An important feature of the pension setting we are looking at is

[5]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 you achieve 60 years old you cannot choose the riskiest plan (plan 3), but you can choose the other plans. Once you are 65 years old, you are 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.

that 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. If a worker loses their job, the provider continues to manage their assets without imposing any charges.[6]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.

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. In Peru and Chile, new participants who do not choose a pension fund manager are locked into their initial or default provider for a certain period (1 month and 2 years respectively) and then allowed to switch at the member's discretion.

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

[6]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.

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 that switch from provider A to provider B, totaling a movement of 200 million, and 5 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.)

Figure 2 looks at the switching behavior across providers for Peru and Chile for the period of 2009 to 2019. Bars (left axis) show total private pension system size, the lines correspond to switching flows (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, gross switching 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 inflows at the pension manager level. The annual average for net capital flow at the manager level 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[7]. 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, 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[8].

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

[8]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.

In Panel C we show the data for Peru starting in 1996. There we can observe that there is 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-0Before Sep-05, the average share of participants that switched was 0.12%, while the maximum of a given month was 0.57%, but between 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, while the maximum of a given month was 163,724 thousand soles, 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, while the maximum of a given month was 1,366,939 thousand soles. 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[9].

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.

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

[9](https://www.sbs.gob.pe/Portals/0/jer/EDIPUB_VOLUMEN3/Berdejo.pdf)

switching switching behavior. Table 3 looks at distribution of switching behavior, conditional on 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). 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 compare the switching behavior across age and time. 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.) In Panel A figure (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. Panel A figure (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, Figure (i), illus-

trates that older people account for the largest share of assets under management (AUM). In Panel B (i) we calculate the approximate fund value per age[10] Notably, 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), we calculate, for each age group, 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

[10] As this information corresponds to the full population, it is only available in ranges. This is in contrast to our sample of individuals who have switched, where we have precise information on their values. Therefore, we estimate the fund value for each group using mid-range values. 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.

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). 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.

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 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.

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. This observation begins to highlight the potential for substantial gains for individuals through strategic provider switching. In the subsequent subsection, we delve into the examination of investors' 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* inflow (inflow - outflow) as a share of the previous month balance against the quartiles of manager's last month performance ranking. 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.

Next we test the relationship between performance and switching using a piecewise regression following Sirri and Tufano (1998) described in equation 1:

$$y_{it} = \beta_1 \times \underbrace{Min\left(Rank_{it}, \overline{Rank}\right)}_{Low\ Performance} + \beta_2 \times \underbrace{\left[Rank_{it} - Min\left(Rank_{it}, \overline{Rank}\right)\right]}_{High\ Performance} + X^{'}\delta + \epsilon_{it} \qquad (1)$$

i denotes the provider-investment plan for Chile or Peru, t is month. As in Figure 7, the dependent variable y_{it} represents net inflow of value and participants as a share of total of previous period total. $Rank$ is the fractional rank which is the raw rank divided by the number of observations. For example, suppose that there are 4 providers. The fund with the highest rank has the highest value (4). Then, we divide the ranking over the number of observations: 4 (ranking)/ 4 (number of observations) equals 1. We define $\overline{Rank} = 0.75$ for Peru and $\overline{Rank} = 0.5$ for Chile based on the graphical of 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 (fractional rank of 0.5) and around the third quartile of past performance ranking for Peru (fractional rank of 0.75).The main explanatory variables are $Min\left(Rank_{it}, \overline{Rank}\right)$ that captures low performance and $Rank_{it} - Min\left(Rank_{it}, \overline{Rank}\right)$ that captures high performance. Note that these regressions are different from the traditional dummy approach as the goal is to capture change in the slope. [11]

The control variables are the logarithm fund's age plus one, the percentage of fees charged by the fund, the logarithm of the number of participants in the fund, the operative expenses over assets (monthly for Peru and quarterly for Chile), the logarithm of the total value of the pension fund, the lagged (previous month) flow (in number of participants) of the plan. We include month fixed effects for Peru and time-month fixed effects for Chile.

Results are presented in Table 5 for Chile and in Table 6 for Peru. Columns (1) and (4) use the raw returns to evaluate performance. High performance relates to a higher switching

[11] For example, consider the following cases: (a) Rank=0.25 and (b) Rank=0.75. Case (a) gives the following results: Low Performance = Min(Rank,0.5) = 0.25 High Performance = Rank - Min(Rank,0.5) = 0 The prediction would be $(\beta_1 \times 0.25 + \beta_2 \times 0)$. Case (b) gives the following results: Low Performance = Min(Rank,0.5) = 0.5 High Performance = Rank - Min(Rank,0.5) = 0.25 The prediction would be $(\beta_1 \times 0.5 + \beta_2 \times 0.25)$. Using these explanatory variables in a regression is equivalent to: $y = \alpha_1 \times Rank + \alpha_2 \times (Rank - 0.5) \times I(Rank \geq 0.5)$. However, it is standard in the literature to specify it as $y = \beta_1 \times Min(Rank, 0.5) + \beta_2 \times [Rank - Min(Rank, 0.5)]$.

rate and we reject that low and high performance have the same impact ($\beta_1 \neq \beta_2$). Based on the estimates in column (1) for Chile, for the funds that are in the low performance group, one percentage point increase in their fractional performance ranking will increase the fund flows by 0.141%. On the other hand, for the funds that are in the high performance group, one percentage point increase in their fractional performance ranking will increase the fund flows by 0.627% (=0.141 + 0.486). Thus, the sensitivity of inflows for the high performance group is 4.5 (=0.627/0.141) times the sensitivity of outflows for the low performance group, which implies a convex relationship. In columns (2) and (4) we control for risk by using the standard deviation of the returns of the fund for the past 12 months. In columns (3) and (6) 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 with raw returns, showing that the fact that investors switching provider to chase returns is not driven by risk across providers or plans.

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 n response to performance does not take place at a first sign of relative under performance. In the last result in this section, we explore whether a consecutive decline in returns drives outflows. We look at the Chilean data since this is the only setting where we can tie individual account to the pension plan. 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:

$$o_{it} = \alpha \times Decline_{it} + X^{'}\vartheta + \epsilon_{it} \tag{2}$$

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 1). Results are presented in Table 7

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 0.0869% more outflows than those that did not.

5 Gains from Switching

We have established that individuals are switching providers, driven by their pursuit of better returns. In this section, we assess whether this strategy results in positive returns. To ensure a fair comparison, we limit the analysis to switchers who maintain the same plan.

In Figure 8, we begin by presenting the average gains and losses from switching among various plans in Chile. Panel A compares the returns one month before switching between the new provider and the original provider. 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%. This indicates that, on average, individuals appear to be making "rational" decisions when switching. The only exception is in 2015 for Plan B, where this difference is negative.

Panel B displays the realized return differentials six months after switching. The time series average for each plan is as follows: Plan A at 0.05%, Plan B at 0.03%, Plan C at 0.06%, Plan D at 0.05%, and Plan E at 0.09%. Thus, on average, this strategy yields returns that closely align with expectations.

It's 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 C 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 save on fees by changing providers. In summary, switching providers not only leads to higher returns but also lower fees for

individuals.

The positive realized gains from switching, as discussed above, imply that the strategy of switching is beneficial for individual welfare. However, one may question if it is the optimal strategy or if individuals are still missing out on potential gains. We address this in the following analysis.

In Figure 9, Panel A serves as a proxy for potential gains by comparing the average return to the return of the provider with the highest return. While this difference fluctuates over time and across plans, it generally exceeds 0.5%, which is higher than the figures in Figure 8. [12] 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 "efficient switcher," who consistently invests with the provider that has the highest returns. In Figure 9, Panel B compares the one-month lag return of the provider with the highest return at the time of the switch to the lagged 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 returns six months after the switch, specifically comparing the return of the provider with the highest pre-switch

[12] 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.

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 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 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. For instance, in February 2010, the Chilean pension funds supervisor announced that the winner of the bid for new pensioners was a firm named Modelo, which was not currently operating in the market. Therefore, February 2010 represents a period characterized by increased competitive pressure due to the entry of a new fund provider and the resultant reduction in fees generated by the bidding process.

The introduction of competition exerts performance pressure on incumbent funds. Since pension managers' incentives are often linked to the fees they collect from contributors, the increase in fund outflows to new managers is likely a significant driver of portfolio choices. This effect might not be the sole mechanism through which competition influences providers, but it plays a substantial role.

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.

To illustrate the changes, we create a counterfactual benchmark portfolio by maintaining the fund holdings at the time before the new manager entered the market. We then compare the average bond yield of this synthetic portfolio to the actual realized bond yield. This comparison allows us to assess how the entry of the new manager has influenced the bond yield performance of the funds.[13]

Our analysis focuses on the six-month period following the announcement of the entry of a new manager. Given that we rely on bond 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 (equities) and fixed income (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

[13]We focus on bonds 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.

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. Therefore, the change in bond yield appears to be driven by the behavior of pension fund contributors, reflecting a search for higher returns.

7 Conclusions

How sensitive are DC pension fund flows to performance? We investigate this question empirically using 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 more often than we think. Furthermore, we find that the switching behavior is 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 present a puzzle to current low estimations of demand elasticity of these "stable" institutional investors.

References

Agnew, Julie, Pierluigi Balduzzi, and Annika Sunden (2003). "Portfolio choice and trading in a large 401 (k) plan". In: *American Economic Review* 93.1, pp. 193–215.

Becker, Bo and Victoria Ivashina (2015). "Reaching for yield in the bond market". In: *The Journal of Finance* 70.5, pp. 1863–1902.

Benartzi, Shlomo and Richard H Thaler (2001). "Naive diversification strategies in defined contribution saving plans". In: *American economic review* 91.1, pp. 79–98.

Coppola, Antonio (2021). "In safe hands: The financial and real impact of investor composition over the credit cycle". In:

Da, Zhi et al. (2018). "Destabilizing financial advice: Evidence from pension fund reallocations". In: *The Review of Financial Studies* 31.10, pp. 3720–3755.

Huberman, Gur and Wei Jiang (2006). "Offering versus choice in 401 (k) plans: Equity exposure and number of funds". In: *The Journal of Finance* 61.2, pp. 763–801.

Illanes, Gastón (2016). "Switching costs in pension plan choice". In: *Unpublished manuscript.*

Ivashina, Victoria, Federica Gabrieli, and Jérôme Lenhardt (2017). "PFA Pension: Expansion of Alternatives Portfolio". In: *Harvard Business School Case* 217-085.

Ivashina, Victoria and Josh Lerner (2018). "Looking for alternatives: Pension investments around the world, 2008 to 2017". In: *Unpublished working paper. Harvard University.*

Koijen, Ralph SJ and Motohiro Yogo (2019). "A demand system approach to asset pricing". In: *Journal of Political Economy* 127.4, pp. 1475–1515.

Kortum, Samuel and Josh Lerner (2000). "Assessing the contribution of venture capital to innovation". In: *RAND journal of Economics*, pp. 674–692.

Luco, Fernando (2019). "Switching costs and competition in retirement investment". In: *American Economic Journal: Microeconomics* 11.2, pp. 26–54.

Madrian, Brigitte C and Dennis F Shea (2001). "The power of suggestion: Inertia in 401 (k) participation and savings behavior". In: *The Quarterly journal of economics* 116.4, pp. 1149–1187.

Niggemann, Taro and Jörg Rocholl (2010). "Pension funding and capital market development". In: *SSRN Electronic Journal* 7.

OECD (2020). *Annual survey of large pension funds and public pension reserve funds.*

Raddatz, Claudio E and Sergio L Schmukler (2008). "Pension funds and capital market development". In: *World Bank Policy Research Working Paper* 4787.

Scharfstein, David S (2018). "Presidential address: Pension policy and the financial system". In: *The Journal of Finance* 73.4, pp. 1463–1512.

Sialm, Clemens, Laura T Starks, and Hanjiang Zhang (2015). "Defined contribution pension plans: Sticky or discerning money?" In: *The Journal of Finance* 70.2, pp. 805–838.

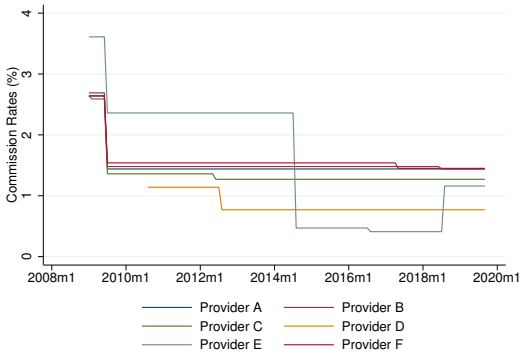
Sialm, Clemens, Laura Starks, and Hanjiang Zhang (2018). "DEFINED CONTRIBUTION PENSION PLANS AND MUTUAL FUND FLOWS". In: *Journal Of Investment Management* 16.3, pp. 31–45.

Sirri, Erik R and Peter Tufano (1998). "Costly search and mutual fund flows". In: *The journal of finance* 53.5, pp. 1589–1622.

Figure 1: **Fees over Time**

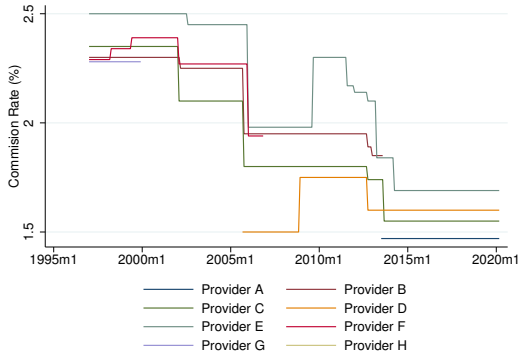
Figure 1 displays the fees charged by pension funds. Panel A shows the fees charged by Chilean providers, which are a share of their monthly wage. Panel B display the fees charged by Peruvian providers. First we depict the fees as a share of the salary, which was the predominant fee scheme in our sample. 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

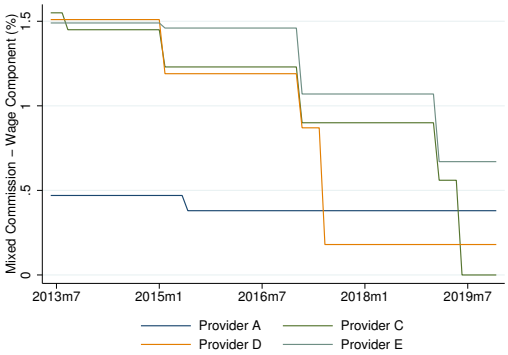


Panel B: Peru

Fees as a share of the salary



Mixed Scheme Fees (since 2013)



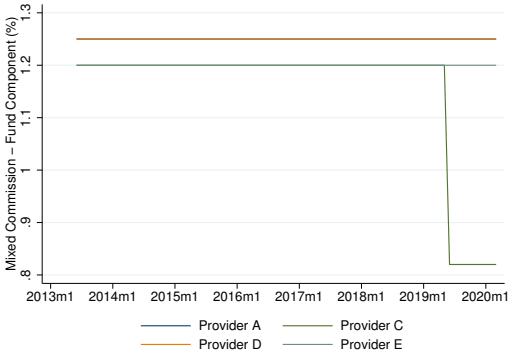
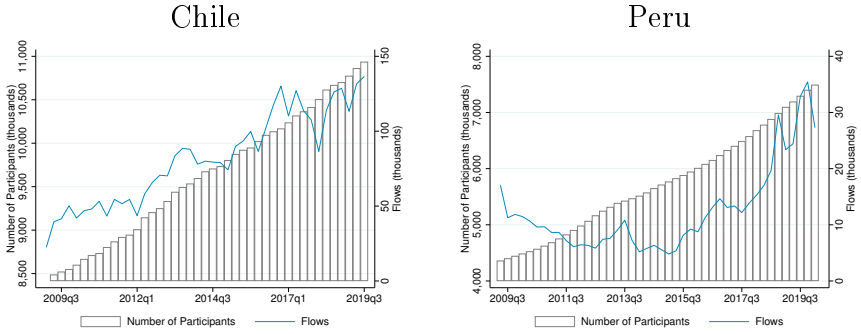


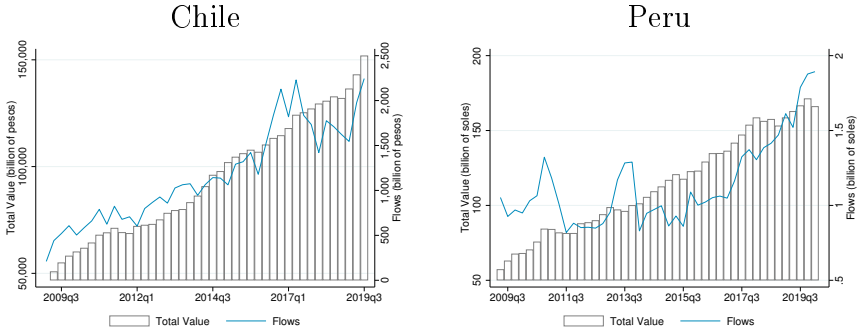
Figure 2: **Aggregate Pension Fund Value, Number of Participants, and Flows**

Figure 2 provides information about the number of participants, the total value of their pensions, and the switching flows. Panel A shows the total number of participants in the pension system (left axis) and the number of participants that switched from one pension fund to another (right axis). Panel B depicts the sum of the pension fund value across all the participants in the system (left axis) and the amount of the inter-fund flow (right axis). Panel C displays the complete sample for Peru, including a period in which there was a spike in the switching behavior after the entry of a new market participant. 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. For Chile, the data covers from February 2009 to September 2019.

Panel A: Number of participants



Panel B: Total value



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

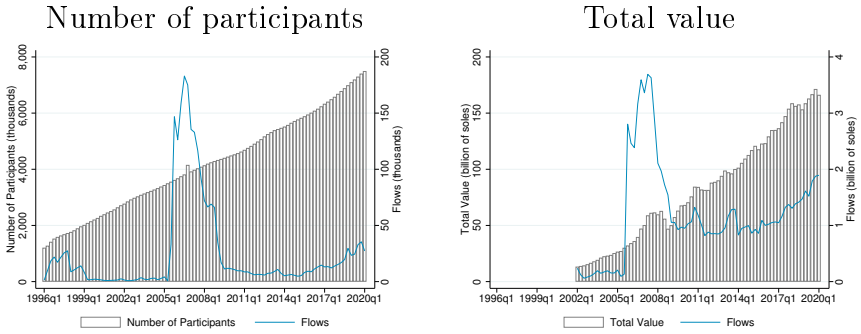
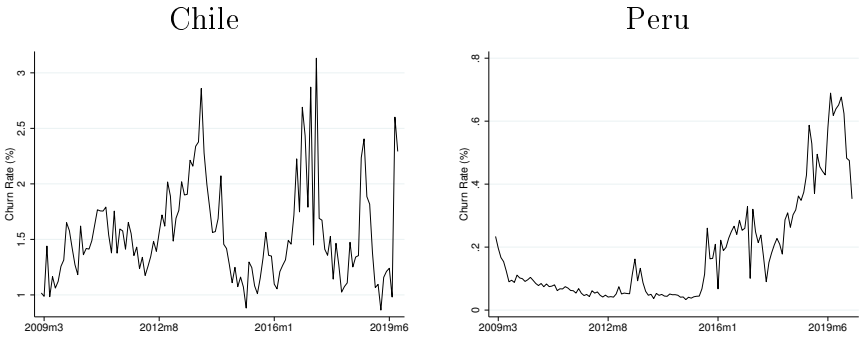


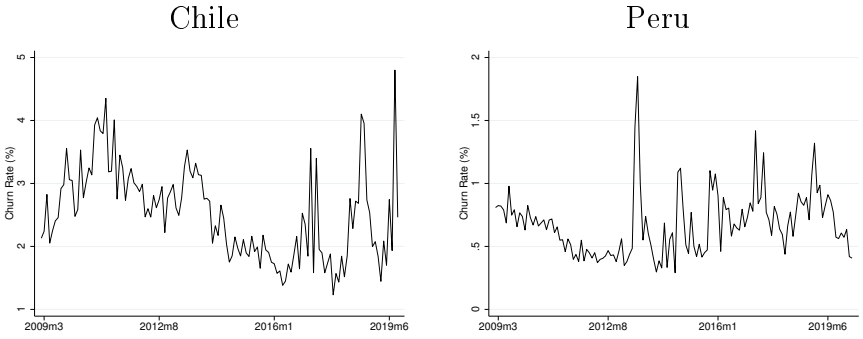
Figure 3: **Churn Rates over Time**

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 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. For Chile, the data spans from February 2009 to September 2019.

Panel A: Number of Participants



Panel B: Total Value



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

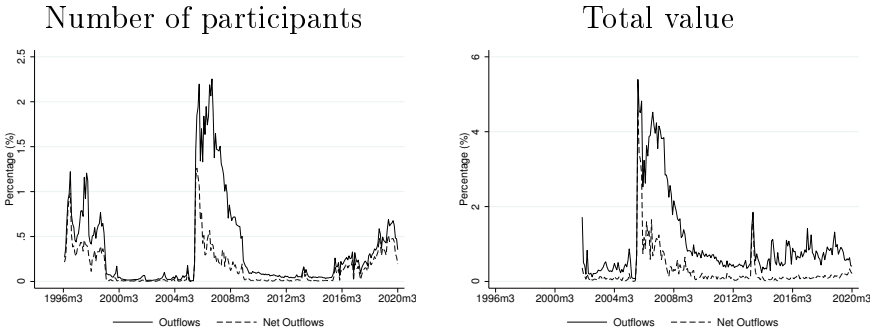
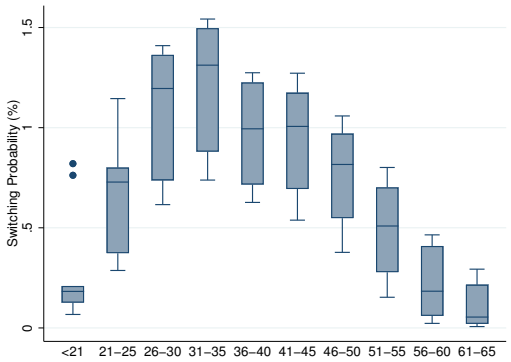


Figure 4: **Switching probability by age and time**

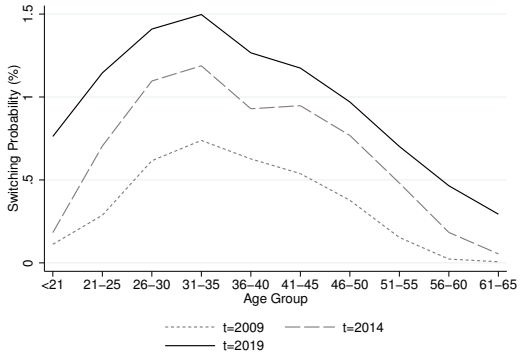
Figure 4 explores the switching behavior across age and time. Panel A - (i) displays a boxplot of the probability that an individual of a certain age group switches to another pension fund in a given year. Panel A - (ii) displays the switching probability by age group for three years: 2009, 2014, 2019. 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

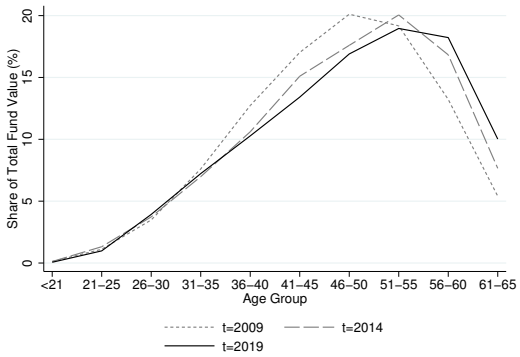


(ii) By age group across time



Panel B: Fund share and expected switching value by age

(i) Share of total fund value



(ii) Share of switching value by age group

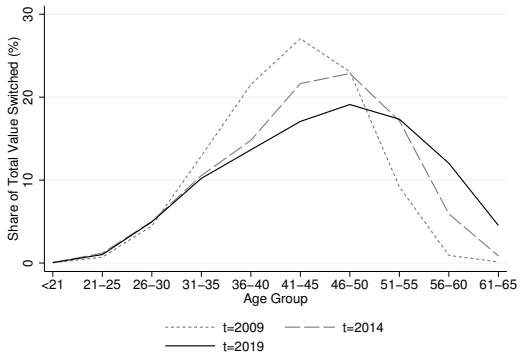


Figure 5: **Time-Series Correlation of Switching within Group**

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.

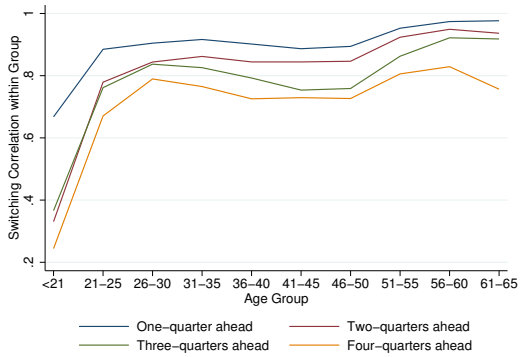
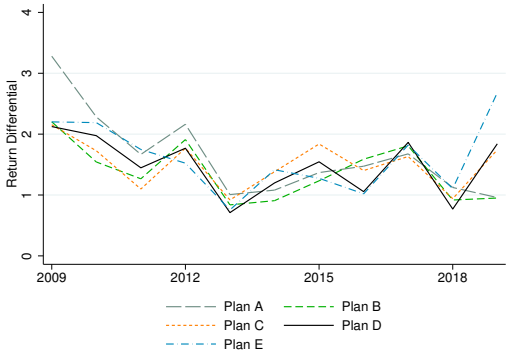


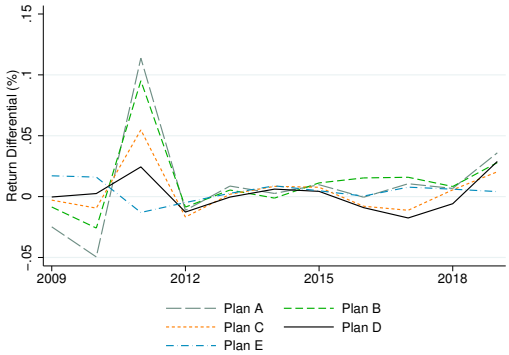
Figure 6: **Distribution of Returns Across Managers**

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

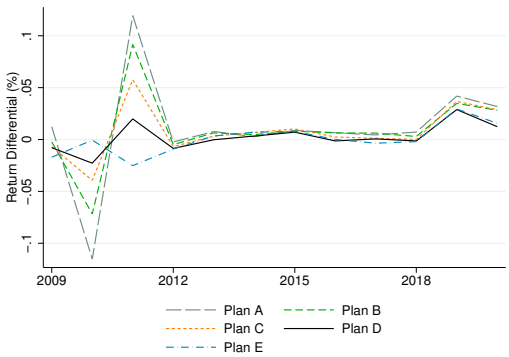
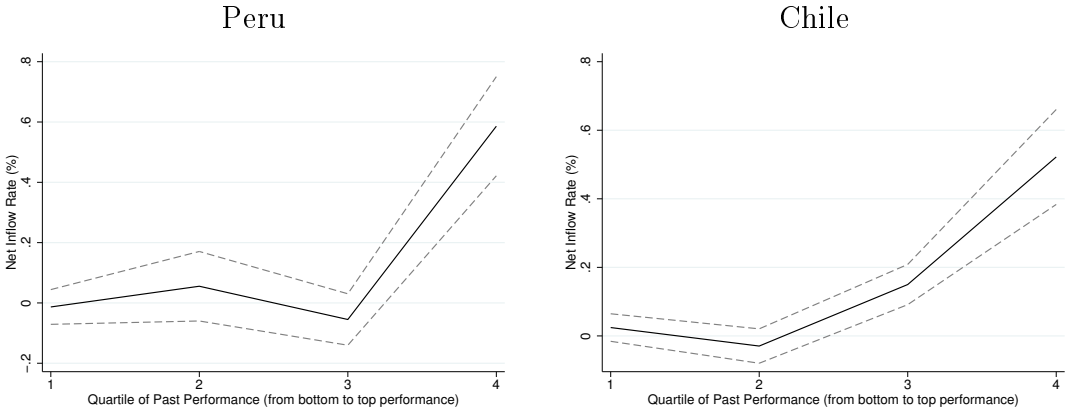


Figure 7: **Relative Performance and Growth**

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 Peru, the sample covers January 1996 through March 2020. For Chile, the information spans from February 2009 to September 2019. The dashed lines displays a 95% confidence interval.

Panel A: Total Value



Panel B: Number of Participants

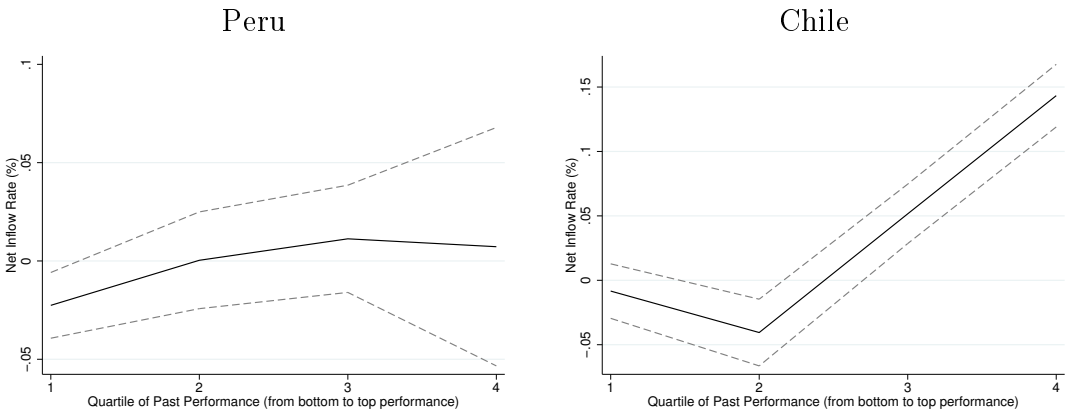
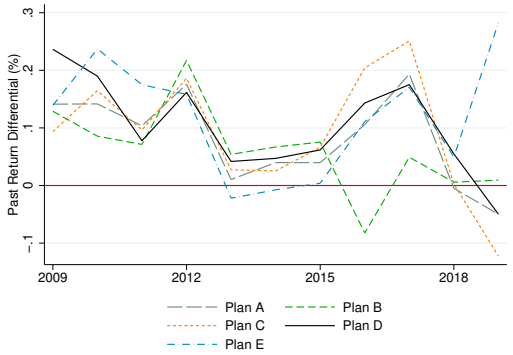


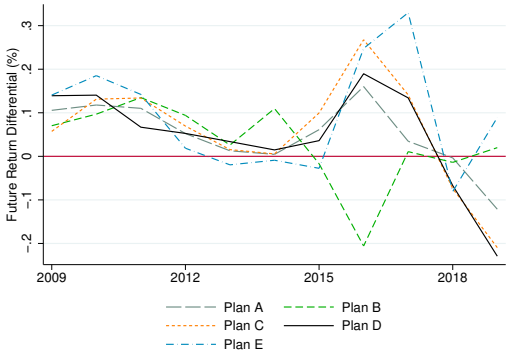
Figure 8: **Switching gains across time**

Figure 8 provides the average gain in terms of the additional or potential return obtained by switching across time. 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 six months after the switching, that is, we compare the returns of the new option with respect to the previous option six 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. 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 C 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



Panel C: Fees

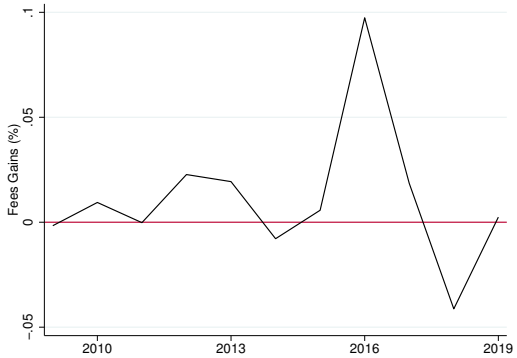
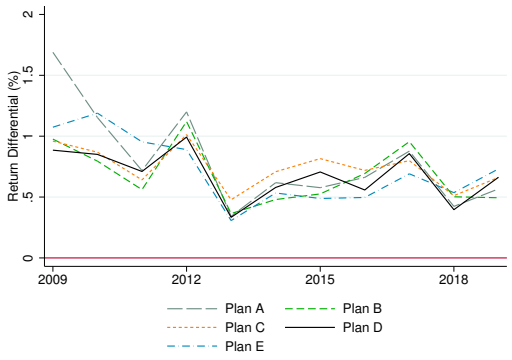


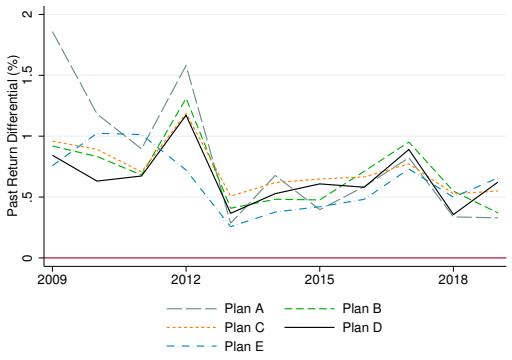
Figure 9: **Potential switching gains across time**

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 six 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.

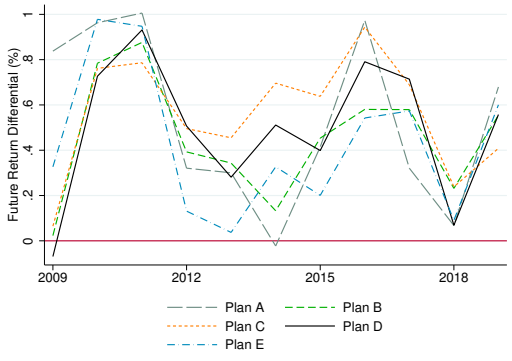
Panel A: Potential Switching Gains



Panel B: Potential efficient switching gains



Panel C: Future efficient switching gains



Panel D: Fee Differential

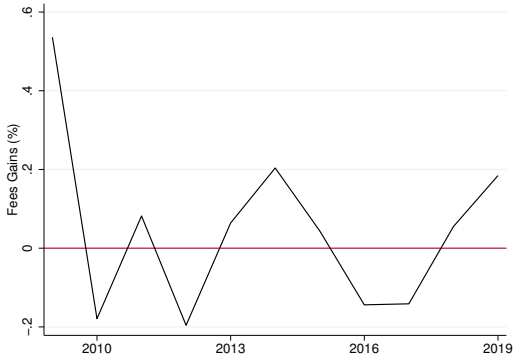
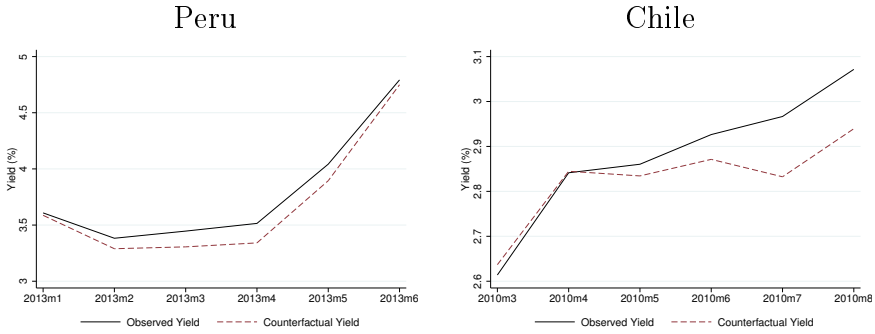


Figure 10: **Search for Yield and Competitive Pressure**

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 Peru the sample covers from January 2013 to June 2013, while for Chile spans from March 2010 to September 2010.

Panel A: Aggregated measure



Panel B: Plan level measures - Chile

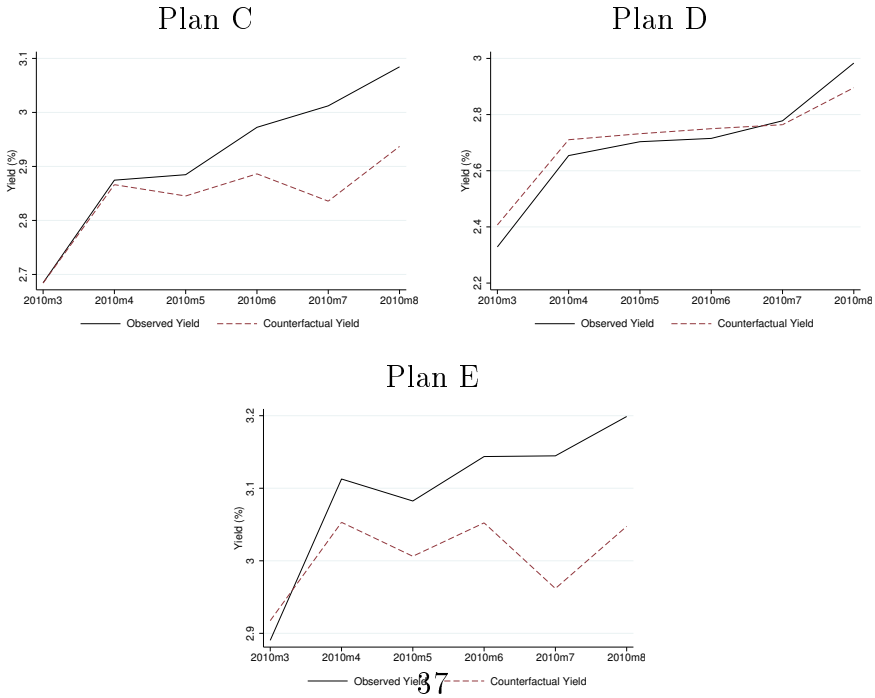


Table 1: **Investment share according to instrument type**

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 2019m8, 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%	14.86%
Cuprum	19.18%	5.38%
Habitat	27.87%	17.89%
Modelo	5.43%	18.98%
Planvital	3.38%	15.88%
Provida	24.97%	27.02%

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 and period. The dependent variables are the growth measures. Columns (1) though (3) shows the estimates considering as a dependent variable the growth rate measured as $(Value\ Inflow_{ft} - Value\ Outflow_{ft})/Total\ Value_{f(t-1)}$. Columns (4) to (6) computes the growth rate as $(Participant\ Inflow_{ft} - Participant\ Outflow_{ft})/Total\ Participants_{f(t-1)}$. *Low Performance* is defined as $Min(Rank, \overline{Kink})$, and *High Performance* is $Rank - Min(Rank, \overline{Kink})$. We define $\overline{Kink} = 0.5$ for Chile based on the graphical of analysis in Figure 4. $Ln(Age)$ 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. *Lagged Flow Participants* is the lagged flow of the number of participants on a given plan, while *Lagged Flow Value* is the lagged flow of the fund value of a given plan. , *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 (1) and (4) uses raw returns, (2) and (5) use risk-adjusted measures, (3) and (6) 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		
	Raw Returns	Risk Adjusted	Switching within Plan	Raw Returns	Risk Adjusted	Switching within Plan
	(1)	(2)	(3)	(4)	(5)	(6)
Low Performance	0.141	0.147	0.162	-0.130**	-0.127*	-0.0465
	(1.02)	(1.06)	(1.49)	(-2.00)	(-1.94)	(-0.92)
High Performance	0.486***	0.487***	0.283***	0.236***	0.236***	0.123***
	(6.24)	(6.26)	(4.82)	(6.33)	(6.35)	(4.43)
Ln(Age)	0.138*	0.146*	0.0230	0.0617	0.0659*	-0.0270
	(1.68)	(1.76)	(0.38)	(1.62)	(1.72)	(-0.98)
Fees	-0.431***	-0.440***	-0.325***	-0.218***	-0.223***	-0.172***
	(-9.04)	(-9.02)	(-8.66)	(-7.97)	(-8.01)	(-7.74)
Ln(Number of Participants)	-0.513***	-0.517***	-0.346***	-0.446***	-0.448***	-0.264***
	(-6.97)	(-6.91)	(-5.51)	(-13.91)	(-13.76)	(-9.96)
Expenses	0.691***	0.697***	0.456***	0.152***	0.156***	0.0671**
	(5.90)	(5.95)	(5.33)	(4.26)	(4.35)	(2.52)
Ln(Value)	0.521***	0.529***	0.378***	0.555***	0.560***	0.348***
	(4.16)	(4.13)	(3.34)	(10.29)	(10.17)	(7.32)
Standard Deviation		-11.03			-5.876*	
		(-1.45)			(-1.81)	
Number of observations	3,545	3,545	3,545	3,545	3,545	3,545
R-squared	0.35	0.35	0.27	0.24	0.24	0.16
Fixed Effects:						
Time-Investment Plan	Yes	Yes	Yes	Yes	Yes	Yes
Provider	Yes	Yes	Yes	Yes	Yes	Yes
Test:						
Low=High	Rejected*	Rejected*	Fail to Reject	Rejected***	Rejected***	Rejected**
P-value test	0.065	0.071	0.410	0.000	0.000	0.016

Table 6: Flow Performance and Switching for Peru

Each observation used for the analysis reported in this table correspond to a different pension fund and period. The dependent variables are the growth measures. Columns (1) though (3) shows the estimates considering as a dependent variable the growth rate measured as $(Value\ Inflow_{ft} - Value\ Outflow_{ft})/Total\ Value_{f(t-1)}$. Columns (4) to (6) computes the growth rate as $(Participant\ Inflow_{ft} - Participant\ Outflow_{ft})/Total\ Participants_{f(t-1)}$. *Low Performance* is defined as $Min(Rank, \overline{Kink})$, and *High Performance* is $Rank - Min(Rank, \overline{Kink})$. We define $\overline{Kink} = 0.75$ for Peru based on the graphical of analysis in Figure 4. $Ln(Age)$ 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. *Lagged Flow Participants* is the lagged flow of the number of participants on a given plan, while *Lagged Flow Value* is the lagged flow of the fund value of a given plan. , *Standard Deviation* is the pas 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 (1) and (4) uses raw returns, (2) and (5) use risk-adjusted measures, (3) and (6) use a risk based perspective by considering only the individuals that did not change their plan when they switched. Since in Peru we do not observe the plan, we considering the period before December 2015, where only one more plan was available.

	Net flow rate of the fund value			Net flow rate of the number of participants		
	Raw Returns	Adjusted by Risk	Switching within Plan	Raw Returns	Adjusted by Risk	Switching within Plan
	(1)	(2)	(3)	(4)	(5)	(6)
Low Performance	-0.138	-0.132	-0.583***	0.0290	0.0257	-0.0504
	(-1.54)	(-1.48)	(-2.75)	(1.31)	(1.17)	(-1.12)
High Performance	0.993***	0.998***	1.021***	0.108**	0.104**	0.106
	(4.91)	(4.93)	(2.76)	(2.21)	(2.14)	(1.21)
Ln(Age)	-0.453**	-0.457**		0.211***	0.217***	
	(-1.99)	(-2.02)		(3.43)	(3.61)	
Fees	-0.506	-0.506	-1.715**	-0.131	-0.137	-0.727***
	(-1.31)	(-1.31)	(-2.00)	(-1.00)	(-1.05)	(-3.16)
Ln(Number of Participants)	-0.295	-0.258	-0.00423	0.223***	0.194***	0.194***
	(-1.25)	(-1.12)	(-0.01)	(5.08)	(4.48)	(3.09)
Expenses	0.0539	0.0294	0.789*	-0.0223	-0.0129	0.0335
	(0.24)	(0.13)	(1.70)	(-0.82)	(-0.48)	(0.70)
Ln(Value)	-0.514***	-0.584***	0.0296	-0.285***	-0.238***	-0.158*
	(-3.03)	(-3.37)	(0.06)	(-9.61)	(-7.43)	(-1.81)
Standard Deviation		0.0522			-0.0366***	
		(0.98)			(-4.33)	
Number of observations	1,037	1,037	366	1,112	1,112	442
R-squared	0.67	0.67	0.25	0.38	0.39	0.30
Fixed Effects:						
Time	Yes	Yes	Yes	Yes	Yes	Yes
Provider	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	0.002	0.220	0.222	0.186

Table 7: **Return decline and pension fund flows**

In this table, we investigate if a consecutive decline of returns generates a switching provider. Column (1) dependent variable is $Value\ Outflow_{ft}/Total\ Value_{f(t-1)}$. Column (2) dependent variable is $Participant\ Outflow_{ft}/Total\ Participants_{f(t-1)}$. 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.

Panel A. Chile

	(1) Number of Participants	(2) Total Value
Consecutive Decline	0.0335*	0.0793***
	(1.79)	(2.99)
Ln(Age)	-0.00930	0.0233***
	(-1.55)	(2.62)
Fees	0.297***	0.378***
	(20.84)	(15.56)
Ln(Number of Participants)	-0.0737***	0.0791***
	(-10.82)	(7.63)
Expenses	0.0495**	0.0632*
	(2.08)	(1.72)
Ln(Value)	-0.0275***	-0.266***
	(-2.74)	(-16.81)
Lagged Flow Participants	1.115***	
	(13.48)	
Lagged Flow Volume		1.568***
		(14.40)
Number of observations	3,545	3,545
R-squared	0.70	0.65
Fixed Effects:		
Monthly	Yes	Yes
Type of 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	0.0551	-0.0949
	(1.14)	(-0.75)
Ln(Age)	-0.0521***	-0.0140
	(-3.45)	(-0.34)
Fees	0.122**	0.886***
	(2.50)	(6.31)
Ln(Number of Participants)	-0.212***	-0.351***
	(-8.49)	(-3.59)
Expenses	0.0299	-0.0267
	(0.96)	(-0.25)
Ln(Value)	0.0166	-0.117***
	(1.18)	(-3.20)
Number of observations	1,112	1,037
R-squared	0.92	0.83
Fixed Effects:		
Monthly	Yes	Yes

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$