

# **Investor Decisions and the Financial Crisis in Mexico's Privatized Social Security Market**

*by*

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## **I. Introduction**

There is an increasing movement to give workers greater control over pensions, allowing them to personally manage their retirement investments. The recent trend away from pay-as-you-go social security programs towards fully-funded systems based on individual accounts is the most prominent example of this policy shift. Principle-agent problems, inefficiencies and looming solvency issues have increased policy support for fully-funded private accounts in place of traditional government-managed pay-as-you-go systems.

However, there is growing empirical evidence that individuals may not make substantially wiser decisions when managing their own retirement funds, and this may have equilibrium impacts for competition, efficiency and wealth at retirement for pension systems covering a broad spectrum of the population. For example, there is a growing literature measuring financial literacy and showing how it correlates with measures of savings, retirement planning, and investment choice ((Lusardi and Mitchell [2006], [2008] and [2010]), Hastings and Tajeda-Ashton [2008], Hastings, Mitchell and Chyn [2010], Hastings [2010]). Financial literacy is measured as the ability to answer a series of questions measuring basic numeracy skills and financial knowledge necessary to make decisions for long-term savings and investment. In general, those with lower education levels and lower income levels are less likely to be able to do basic division, work with probabilities, understand compounding, inflation and diversification on investment returns. This suggests that consumers may not be sufficiently adept decision makers to incentivize efficient markets, particularly in markets that cover broad socio-economic

groups. Indeed two recent papers show how sub-optimal investor behavior contributed to high equilibrium fees in Mexico's privatized social security system from 1997 through 2006 (Duarte and Hastings [2010] and Hastings, Hortacsu and Syverson [2010]).

In addition, that even among the educated and financially literate, experienced and educated investors engage in return chasing, overconfidence, and myopic loss aversion, resulting in lower returns for their personally managed investments relative to diversified, passively managed ones (Benartzi and Thaler [1995], De Bondt and Thaler [1985, 1986], Gneezy and Potters [1997], Chevalier and Ellison [1996], Odean [1998, 1999], Barber and Odean [2001], Choi et al [2006], Grinblatt and Keloharju [2006]). Thus, it is unclear if fully-funded systems based on private accounts can yield more efficient outcomes and greater wealth at retirement than traditional pension models with government management.

This paper contributes to this literature by examining how investors responded to default investment risk reassignment and market volatility in Mexico's privatized pension market for the period surrounding the financial market crash. This event and context provides insights on several levels. First, the government liberalized investment regulations for the system near the height of the financial market bubble, allowing fund managers to invest more heavily in equity indexes and real estate derivatives. Account holders were moved by age as a default into newly-created higher-risk funds. Second we can use account-level data to examine how exposure to risk and negative investment returns changed investors' responsiveness to fees (charged with certainty) versus past returns.

We find that overall, more educated and higher-income workers are more likely to chase past returns, placing equal weight on management fees and past returns when making investment decisions. Low-educated and low-income workers place a greater importance on fees. These findings are interesting in light of other research in Mexico's privatized pension market and elsewhere showing that while high-income and highly educated investors are the most likely to state that past returns do not predict future performance, they are also the most likely to state that past returns were a primary factor influencing their actual investment decisions. Almost all demographic groups responded to the financial crisis by placing lower weights on past returns relative to management fees when choosing fund managers, indicating that the financial market crash reinforced the idea that returns are inherently uncertain relative to management fees.

## **II. Background on Mexican Privatized Pension System**

Mexico's privatized social security system has been in effect since July 1, 1997. The objective of the reform was to make the pension system financially viable, reduce the inequality of the previous pay-as-you-go system, and increase the coverage and amount of pensions through the establishment of individual ownership over retirement account contributions. The government approved private fund administrators called Afores (Administradoras de Fondos para el Retiro) to manage the individual accounts and established CONSAR to oversee this new Sistema de Ahorra para el Retiro (SAR). Six-and-half percent of wages are deposited bimonthly into the SAR account, and the worker can withdraw from this account at retirement (age 65 for men and age 60 for women),

disability in old age, and for a limited amount of insurance when unemployed.<sup>1</sup> In June 2007, SAR had over 25 million registered accounts, and total funds in the system exceeded 1.14 trillion pesos.

Over the course of the system, there have been between 11 and 21 Afores operating in the market place, with waves of consolidation and entry. During our sample period, March 2008 through December 2009, there were 14 to 18 AFORES in the market. CONSAR approves each Afore's entry into the market. Afores must submit fee schedules for approval and must seek CONSAR's approval for any subsequent fee changes they wish to implement. Table 1 lists the Afores with their entry date as well as a description of the firm. The Afores range from prominent Mexican banks like Banamex to international investment firms like HSBC to department store chains like Coppel (similar to Sears).

Afores, or fund managers, offer investment funds with government restrictions on investment vehicles and risk. At the inception of the system, each fund manager had to offer one fund, called Siefore Basica Siefores (Siefore is an acronym for "Specialized Investment Groups for Retirement Funds"). This fund was limited to bonds, with no restriction on the amount of Mexican government bonds. The Siefore could invest in corporate bonds (Mexican) with at least AA- rating up to 35%, with a 10% cap on financial sector corporate bonds. In 2004, CONSAR moved to liberalize investment regulations. This started with the mandated introduction of an age-based Siefore system –

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<sup>1</sup> Mandatory contributions to the retirement account come from three places: the worker contributes a mandatory 1.125% of her base salary, the employer contributes an additional 5.15%, and the government contributes 0.225% of the base salary as well as a "social contribution" of 5.5% of the inflation-indexed Mexico City minimum wage (Sinha (2003)). Workers can withdraw unemployment insurance from the account of 1-3 months of salary depending on the amount available in the account and their contribution history. Workers must have 3 years of contributions to the account to qualify for unemployment insurance withdrawals.

Afores had to offer two age-based investment funds a “higher-risk” fund for workers 55 and under called Siefre Básica 2 (SB2) and a “low-risk” fund for workers over 55 called Siefre Básica 1 (SB1).<sup>2</sup> Management fees were set at the Afore level, so the same management fee applied to both Siefres within each Afore. In addition, affiliates could not split their funds between Afores or Siefres and had to keep their funds in only one fund at one fund administrator at a time.<sup>3</sup>

From 2004 to 2007, CONSAR passed several regulations lifting investment restrictions on these two Siefres, so that by the end of 2007, SB2 could invest up to 15% of net assets in major stock indexes and 20% of net worth in foreign debt, and SB1 could invest up to 15% in foreign debt.<sup>4</sup> Hence, Siefres were effectively fund managers that could invest in government bonds, high-rated corporate bonds, and broad equity indices.<sup>5</sup> When we test for persistent outperformance using monthly returns, we do not find significant alphas for the Siefres nor do we find a relationship between point estimates for alpha and average fees charged.<sup>6</sup>

In March of 2008, CONSAR regulations moved the market from a 2-fund system to a 5-fund system (SB1-SB5). After April 1, 2008, each account was re-assigned to five different Siefres according to the account owner’s age: Siefre Básica 1 (SB1) for 56 year old or older employees, Siefre Básica 2 (SB2) for employees between 46 and 55 years old, Siefre Básica 3 (SB3) for employees between 36 and 45 years old, Siefre

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<sup>2</sup> In March of 2008, the system moved to a 5-fund age-based system introducing 3 ‘higher-risk’ funds with broader investment possibilities for younger workers.

<sup>3</sup> For these reasons we will focus our analysis on *Afore* choice since Siefre choice is completely determined by age of the worker and has no impact on relative costs.

<sup>4</sup> Principal Protected Notes and Exchange Traded Funds tied to major stock indices.

<sup>5</sup> Hastings and Tejeda-Ashton (2008) provide more detailed information on investment requirements and holdings for the Siefres during this time period.

<sup>6</sup> Specifically we calculated monthly returns for each Siefre, and measured performance relative to a Mexican Stock Market Index and an A rated or higher Mexican corporate bond index.

Básica 4 (SB4) for employees between 26 and 35 years old, and Siefore Básica 5 (SB5) for employees 25 years old or younger. Workers were reassigned by age to a Siefore within their current Afore as a default but could request to transfer to another Siefore (or Afore) as long as they satisfied the minimum age requirement for such Siefore.

Under the new investment regime SB1 was required to hold at least 51% of its assets in inflation protected Mexican government bonds but could hold up to 10% in major stock-market indexes. SB2, SB3, SB4, and SB5 allowed for increased ‘risk’, with caps on instruments linked to stock market indexes of 15%, 20%, 30% and 40% respectively. SB2 could invest 5% in investment-grade structured assets, while SB3-SB5 could invest up to 10%. A table describing the investment regulations appears in Appendix I. Importantly, to move from the 2-Siefore system to the 5-Siefore system, CONSAR moved accounts to the default-by-age Siefore within the account holder’s current Afore in March of 2008. *Nearly 100% of account holders complied with this move and did not switch their Siefore in the subsequent year.* This is not surprising as Hastings (2010) finds using a detailed household survey of system affiliates that even by 2010, only 24% of respondents were familiar with the term ‘Siefore,’ and of those 24%, only 8% knew that within an Afore, the Siefores are meant to offer different risks according to age. Those who knew what Siefores were had over twice the income and college education rates as the sample.

Aside from investment regulation changes, there were two additional important provisions in the new regulation. First, Afores were required to eliminate load fees and could only charge a single fee as a percent of assets under management.<sup>7</sup> Second, the regulation also impacted the way in which official information about the Afores was

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<sup>7</sup> For a discussion of prior fee structure please see Duarte and Hastings (2010).

presented to the public. Instead of presenting information on management fees alone (see Duarte and Hastings (2010)), CONSAR required that all Afores present a comparative table of *net returns* to potential clients at the time of switching and in all account statements sent home to clients. This table was updated monthly and presented the net return, the management fee, and the gross return in nominal annual percentage rates for every Afore operating in the system. Next to the management fee, between one to three peso signs appear to denote cheap versus expensive Afores. This change was done to increase competitive pressure on past returns while still highlighting management costs, hopefully increasing investment efficiency and account returns in the long run.<sup>8</sup>

Table 2 shows the implications of this change for investment category allocation for workers reassigned to new Siefores according to age category on the eve of the regulatory change. The largest change was an increase in the investments in foreign equity indexes. The Afores responded differently to the new investment limits; some Afores, like Inbursa (Telemex), retained their prior position in equities and varied investment decisions relatively little across the SB2-SB5. In contrast, Afores like Profuturo GNP, Invercap, and IXE raised equity limits for SB2 to near the cap and increased equity holdings by 100% between SB2 and SB5. These differences imply that people of different ages and different baseline Afores were exogenously exposed by default to different changes in investment risk exposure for their SAR account.

It is important to note that the SAR account serves two primary purposes: it is a savings account for retirement, but it also functions as Unemployment Insurance. Workers who have contributed a minimum number of months to the SAR account have the right to withdraw up to 3 months of unemployment insurance from the SAR account

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<sup>8</sup> Conversations with policy makers shaping the reforms.



if they become unemployed. Thus, although a retirement savings account can take on more risk at young ages since the funds are being held for a long term, in this case, young workers are likely to use the majority of their account's current funds for Unemployment Insurance. Hence, it is not clear that the life-cycle model for savings and retirement is a correct model for accounts that also must function for immediate Unemployment Insurance (UI) needs.<sup>9</sup> If workers are risk averse for immediate UI needs, but are unaware of the differences in risks across Siefors, this move to greater risk may significantly impact workers' utility and benefit from the SAR system. In addition, if equity returns are negatively correlated with unemployment rates, this problem is exacerbated.

Figure 1 plots 36 month returns by Afore for each of the Siefors as calculated by CONSAR and published in their monthly tables. Thirty-six month returns are calculated for the new Siefors assuming a person in the particular Afore bought a share of SB2 prior to the reforms that was then converted to a share of one of the SB3 to SB5 by age. Thus the three year past returns mask slightly the differences in performance across SB2-SB5 within each Afore. Figure 2 plots the 1 year return to more clearly illustrate the differences in return and volatility across Siefors and Afores. The 1 year returns were calculated by the author using Afore-Siefors share prices. Afores that moved conservatively with the new reforms, like Argos, Azteca, HSBC and Inbursa, experienced less volatility and a smaller downturn than those like Invercap and Profuturo GNP who moved more aggressively towards the new equity and structured assets caps. Interestingly, pre-reform Afores like Inbursa were cited as examples of underperformers,

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<sup>9</sup> In fact, Duarte and Hastings (2010) show that qualifying for UI and entering a spell of unemployment increases the probability that workers file to switch Afores by 100-400% across demographic groups.

when compared to Afores like Invercap, and part of the reason the government should move to increase competitive pressure on past returns, despite the fact that the current 2-Siefore investment system had only existed during a dramatic climb to the peak of a business cycle.

Thus the move to increase risk had a large impact on the risk positions of savings and retirement accounts and unemployment insurance benefits for workers moved by default into SB3-SB5, particularly if they were in an Afore that adopted a relatively aggressive response to the investment liberalization. We now examine how this change in returns impacted how investors chose Afores, conditional on which Siefore category they were in. Figures 1 through 2 show that, within Siefore categories, returns and exposure to the market downturn varied across Afores. We will use this exogenous change in past returns to test how preferences and sensitivity to past returns changed after the financial downturn and how this varied across workers of different demographic backgrounds.

### **III. Empirical Model and Results**

We use administrative data from the SAR that records all account information, basic affiliate demographics, and every switch between Afores in the system. Thus, we can observe movement of accounts between Afores as investors potentially respond to new information and re-optimize. These panel data include the date of the requested switch, the liquidation amount, the origin and target Afores and the Siefore. and they are

then matched using an anonymous id to administrative data on wages, contribution and employment history, gender, and age.<sup>10</sup>

Table 3 shows summary statistics for account holders in the system in January of 2010 and November 2009. All wages and balances are in Pesos – and there are currently about 13 pesos in one US Dollar. While average balances have grown over this period, this growth is consistent with a zero nominal return, once we account for contribution growth into accounts over time.

Figure 3 shows the total number of monthly switches over time. Switches were delayed in March with the introduction of the new regulations in March 2008, so overall switches take an artificial dip in March and an artificial spike in April of 2008. Overall, the number of switches is declining over time, and it appears to decline more in the months after the market decline than before. However this may not be solely due to the declining investment returns but could also be due to new regulations that made switching Afores slightly more difficult and time consuming.

To test the impact that negative returns had on Afore choice we begin by estimating a simple discrete choice model of Afore demand, where investors choose Afores based on brand name, management fees and 36 month past returns. We assume that investors choose an Afore to maximize

$$U_{icjt} = \beta_c X_{icjt} + \varepsilon_{icjt} \quad (1)$$

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<sup>10</sup> For a more detailed description of the data, please see Duarte and Hastings (2010).

where  $i$  denotes the account holder,  $j$  denotes the Afore, and  $t$  denotes the time period and  $c$  denotes the personal characteristics cell into which person  $i$  falls. The cells are determined by 24 combinations of employed wage quartiles, age terciles, and gender. We estimate the conditional logit separately for each of the demographic cells, effectively allowing the determinants of Afore choice to interact fully with these demographic characteristics.

To separately identify the preferences for brand (Afore dummies), management fees and past returns, we need exogenous variation in management fees and past returns. For past returns, mean investment positions and exogenous factors affecting the market create this independent variation, and we know from Duarte and Hastings (2010) that fees are not correlated with measures of market-outperformance for Siefore 1 and 2. In addition, halfway during our sample, after the market crash, CONSAR instituted a cap on fees, requiring the most expensive Afores to lower their fees to the historic average. Figure 4 shows the commissions over time, with the institution of the fee cap, and the gradual lowering of Afores with the highest fees to the historic average. This exogenous variation in fees will help us identify the price sensitivity of investors relative to their sensitivity to past returns and brand name.

Table 4 presents the pooled regression coefficients from equation (1) run on all demographic groups pooled together. The coefficients imply that pre-market crash, the average worker valued one percentage point decrease in fees the same as a 4.08 ( $109.617/26.879 = 4.08$ ) percentage point increase in the 36 month past returns as reported by CONSAR. This implies that workers did count certain fees greater than uncertain returns when considering which Afore to choose. In addition, the coefficient on

past returns interacted with a dummy for post-market-crash time periods is negative and significant, indicating that the negative downturn in the market caused the average investor to place a lower importance on 36 month past returns relative to fees and other Afore attributes. This suggests that rather than chasing past returns to a greater degree, the average investor learned from the downturn that returns are volatile and past returns do not predict future performance, causing him or her to focus more on fees than past returns, relatively speaking.

The pooled specification assumes that all investors have uniform preferences for Afores, fees and past returns. This specification masks potential heterogeneity that could reveal insights into investor behavior. It also could cause specification bias if indeed preferences are heterogeneous, varying with demographics, for example. Table 5 presents the results for separate conditional logits by the 24 demographic groups. Because preferences are only identified up to scale, we present the main results in Table 5 as the coefficient on fees for each cell divided by the coefficient on past returns. The interpretation is the percentage point decrease in fees that would yield the same increase in utility as a one percentage point increase in 36 month past returns.

The results in columns 1 and 3 of Table 5 (labeled Male, Pre-Market Crash and Female, Pre-Market Crash respectively) illustrate several interesting patterns. First, irrespective of gender and age, lower income investors place a much higher weight on fees relative to past returns. It is higher income workers who chase past returns, valuing a one percentage point increase in fees at or below a one percentage point increase in 36 month past returns. Workers in the lowest quartile trade-off fees and returns at a ratio of between -5 to -8, while the last four rows of results indicate that workers in the upper

quartile of the income distribution trade off fees at a rate between -0.232 and -1.45 pre-market crash. It is important to note that to the Afores, because upper quartile wage earners have substantially more valuable accounts, demand may be on average more responsive to past returns relative to fees than a straight average of investors would suggest. This is because investor responsiveness is weighted by dollar value in the account in the Afore's profit function. In this sense, the return-chasing behavior may of the wealthiest clients may have the largest impact on Afore decisions, dampening the impact of low-income-worker's price sensitivity on price competition between Afores.

The second interesting result is that, within an income group, older workers are less sensitive to fees relative to past returns than younger workers are. In other words, younger workers are less likely to chase past returns than older workers, a counter-intuitive result if we believe that older workers have more investing experience than younger workers. However, just as higher-income affiliates and experienced investors are more likely to chase past returns, perhaps the same holds true for older workers.

Interestingly, Hastings and Tajeda-Ashton (2008) and Hastings (2010) present survey evidence consistent with these findings. Both papers, the first using a convenience sample of system affiliates and the second using a random sample of system affiliates, find that approximately 25% of affiliates state "Past Returns" as a primary reason for choosing their Afore, and those who chose their Afore based on past returns have significantly higher income levels and significantly higher education levels as well. Hastings (2010) also finds that these investors have a slightly higher average age. However, both surveys also ask, as part of the financial literacy set of questions, whether past returns predict future performance in the Afore market. In responses to this question,

college educated workers and high-income workers are much more likely to state that past returns do not predict future performance. Indeed, those who responded that past returns do not predict future performance are just as likely to state that past returns were a primary reason for choosing their Afore. This is consistent with findings in Choi, Laibson and Madrian (2006) who find that even in index funds, MBA students chase past returns.

Finally, by comparing Columns 2 and 4, we can examine how valuation for fees relative to past returns changed after the market crash, when volatility and unpredictability of past returns may have been more salient to investors choosing Afores. Overall, investors became less sensitive to past returns, requiring a larger decrease in fees to equal the utility gained from a one percentage point increase in past returns. The parameter ratios in Columns 2 through 4 are larger in absolute value than their counterparts in Columns 1 and 3 for almost all types of investors. This implies that rather than chasing past returns more strongly, experiencing the market downturn emphasized to investors the principle that returns are volatile while fees are certain, causing them to place less emphasis on past returns, and a great emphasis on management fees.

#### **IV. Conclusions and Directions for Future Research**

Using administrative data on investor decisions in Mexico's privatized social security market surrounding policy reforms and the financial market crash, we examined how investors from different demographic backgrounds value management fees relative to past returns, and how their valuations changed as a result of experiencing sharp declines in investment returns as a result of the financial market crash. We find that

overall, more educated and higher-income workers are more likely to chase past returns, placing equal weight on management fees and past returns when making investment decisions. Low-educated and low-income workers place a greater importance on fees. These findings are interesting in light of other research in Mexico's privatized pension market and elsewhere showing that while high-income and highly educated investors are the most likely to state that past returns do not predict future performance, they are also the most likely to state that past returns were a primary factor influencing their actual investment decisions. Almost all demographic groups responded to the financial crisis by placing lower weights on past returns relative to management fees when choosing fund managers, indicating that the financial market crash reinforced the idea that returns are inherently uncertain relative to management fees.

Future research will link these preferences to Afore incentives, to examine whether investors provide sufficient incentives for price competition when both information on fees and past returns are presented. As Duarte and Hastings (2010) illustrate, an Afore's profit function depends both on captive demand and marginal demand from investors who are switching. Since high-income workers are more likely to actively manage their accounts and more likely to be inelastic to management fees when past returns are presented, the equilibrium effect of presenting both pieces of information may be to dampen incentives to lower management fees.

The case of Government's choice of investment reforms and investors' responses in Mexico's social security system highlights the difficulties in creating efficient privatized social security markets. First, even in a private accounts system, government regulation of investment risk is necessary when most investors do not understand



investment risk despite having clearly defined risk preferences, and where investors are overly sensitive to defaults, information and advertising in their investment decisions (Madrian and Shea (2001), Duarte and Hastings (2010), Hastings, Hortacsu and Syverson (2010)). However, this implies that even private accounts systems will be subject to inefficiencies and principal-agent problems inherent in publically managed systems (Bernstein, Lerner and Schoar (2009)).

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**Table 1: Description of AFORES in Our Sample Period, March 2008 to December 2009**

<b>Afore Name</b>	<b>Entry</b>	<b>Exit</b>	<b>Firm Description and Brand Perception</b>
Afirme Bajío	Dec-05		Mexican financial group
Ahorra Ahora	Aug-06	Aug-09	Owned by Mexican financial group Monex
Argos	Dec-06	Dec-10	Mexican insurance company affiliated with international insurance company Aegon
Azteca	Mar-03		Grupo Salinas (owns Elektra retailer for low- to middle-income WHAT and TV chain Azteca)
Banamex	Jul-97		Large Mexican bank (since 1884), bought by Citigroup (2001)
Bancomer	Jul-97		Large Mexican bank (since 1932), affiliated to Spanish Bank (in 2000)
Banorte Generali	Jul-97		Northern Mexican bank affiliated with International Insurance Company Generali
Coppel	Apr-06		Mexican leading departmental store for low- to middle-income WHAT
HSBC	Jul-97		International Bank
Inbursa	Jul-97		Banking and financial services group, owned by Carlos Slim
ING	Jul-97		International financial group
Invercap	Feb-05		Mexican mutual funds administrator founded in the north of Mexico
IXE	Jun-04	Jun-09	Mexican financial group
Metlife	Feb-05		International insurance company
Principal	Jul-97		International financial group
Profuturo GNP	Jul-97		Mexican mutual funds administrator
Scotia	Nov-06	Jan-10	International banking and financial services company
XXI	Jul-97		Owned by IMSS (former pension system administrator) and Prudential

**Table 2: Fraction of Investment Funds in Equity Indexes by Afore and Seifore, Pre and Post Reform**

<b>Afore</b>	<b>February 2008</b>		<b>April 2008</b>				
	<b>Siefore 1</b>	<b>Siefore2</b>	<b>Siefore 1</b>	<b>Siefore 2</b>	<b>Siefore 3</b>	<b>Siefore 4</b>	<b>Siefore 5</b>
Afirme Bajío	0.00	4.22	0.00	11.89	11.87	13.90	12.06
Ahorra Ahora	0.00	7.82	0.00	11.65	11.79	12.50	14.99
Argos	0.00	4.42	0.00	4.92	5.03	4.53	9.95
Azteca	0.00	11.16	0.00	0.00	0.90	0.93	1.55
Banamex	0.00	16.30	0.00	13.47	16.35	20.53	22.90
Bancomer	0.00	10.95	0.00	12.50	15.99	19.66	23.45
Banorte Generali	0.00	14.24	0.00	11.98	16.01	19.39	22.55
Coppel	0.00	8.70	0.00	10.37	15.32	17.38	21.40
HSBC	0.00	8.04	0.00	8.31	9.44	10.37	10.69
Inbursa	0.00	7.12	0.00	6.79	8.63	9.32	8.32
ING	0.00	13.45	0.00	11.70	15.25	18.76	21.85
Invercap	0.00	13.61	0.00	14.47	18.43	22.85	26.43
IXE	0.00	16.28	0.00	14.49	18.43	22.83	27.07
MetLife	0.00	13.42	0.00	13.16	15.07	18.63	22.51
Principal	0.00	11.89	0.00	10.86	14.27	17.88	20.10
Profuturo GNP	0.00	6.43	0.00	13.80	18.18	23.11	27.84
Scotia	0.00	14.19	0.00	11.24	14.09	15.90	19.87
XXI	0.00	8.58	0.00	8.80	9.83	10.78	12.66

Notes: Calculations by author based on investment category data from CONSAR.

**Table 3: Demographic Characteristics of Mexican Pension System Affiliates**

	Mean	10%	25%	50%	75%	90%	N
<b>January 2007 - 25,876,210 Accounts</b>							
Daily Wage <sup>1</sup>	196.1	58.4	77.7	119.4	207.3	404.9	23783000
Balance <sup>2</sup>	19,969	244	2,228	9,388	23,991	49,356	25876210
Percent Male	62.1%	-	-	-	-	-	25876207
Time in the System <sup>3</sup>	7.26	3.18	5.52	8.38	9.42	9.64	25876210
Time with Afore <sup>4</sup>	5.44	0.35	1.45	6.17	9.25	9.56	25876210
<b>November 2009 - 26,292,010 Accounts</b>							
Daily Wage <sup>1</sup>	194.8	58.7	77.3	117.4	205.1	407.5	25284702
Balance <sup>2</sup>	26,904	845	3,275	10,792	28,557	66,727	24965695
Percent Male	61.4%	-	-	-	-	-	26292010
Time in the System <sup>3</sup>	6.46	0.82	2.06	5.60	11.52	12.40	26292008
Time with Afore <sup>4</sup>	9.59	4.58	8.27	10.58	12.29	12.53	26292010

Notes: <sup>1</sup> Daily wage in Jan. 2009 Pesos. <sup>2</sup> RCV (Retirement & Disability) account in Jan. 2009 Pesos. <sup>3</sup> Years in the SAR system. <sup>4</sup> Years with current Afore.

**Table 4: Pooled Conditional Logit Results of Afore Choice at Time of Switching Between Afores**

	Parameter Estimates
Lagged Fee <sup>1</sup>	-109.617 (0.8689)**
Lagged 3 Yr Return <sup>2</sup>	26.879 (0.3169)**
Post Market Crash*Lagged 3 Yr Return <sup>3</sup>	-3.974 (0.4107)**
Observations	6067616
Mean Lagged Fee	0.0182
Mean Lagged Return	0.0762

Notes: Results from a conditional logit regression of afore chosen on fees and returns from the previous month, an interaction term, and afore dummies. Sample is all Afore switches between March 2008 and December 2009. <sup>1</sup>Balance fees charged at the afore level. <sup>2</sup>Three yr. nominal returns reported by CONSAR at the afore siefore level from the month prior to the date of the switch. <sup>3</sup> Lagged 3 yr. return interacted with a dummy variable for whether the switch occurred after November 2008 when the stock market crashed. Robust standard errors in parentheses. Std. errors clustered at the switching choice set level. \* significant at 5%; \*\* significant at 1%.

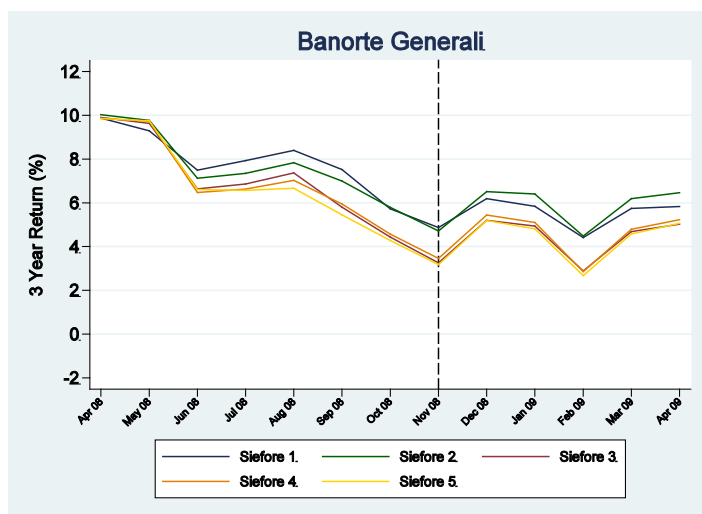
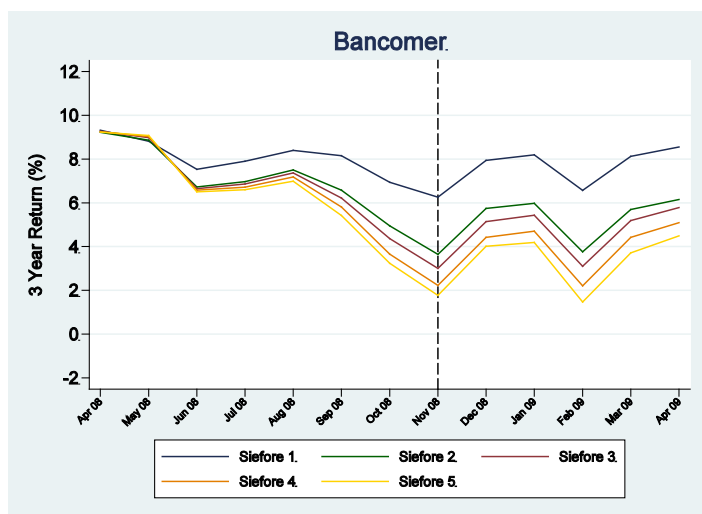
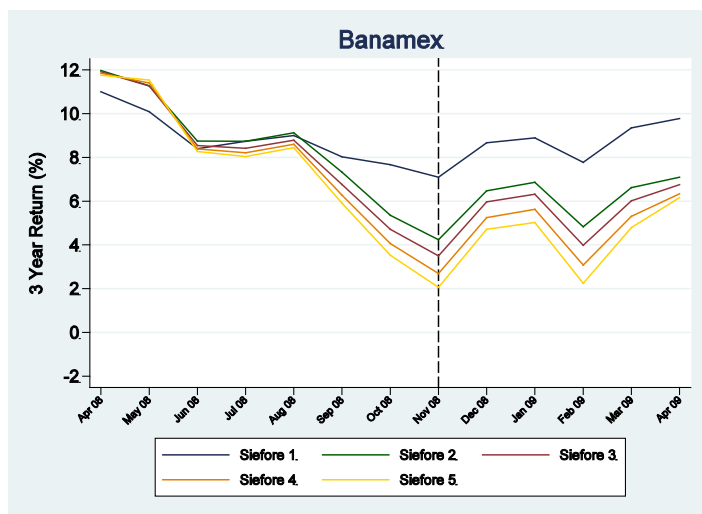
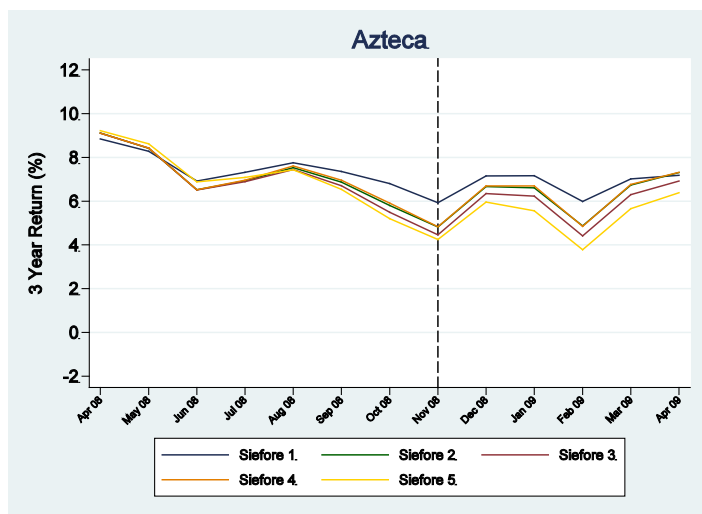
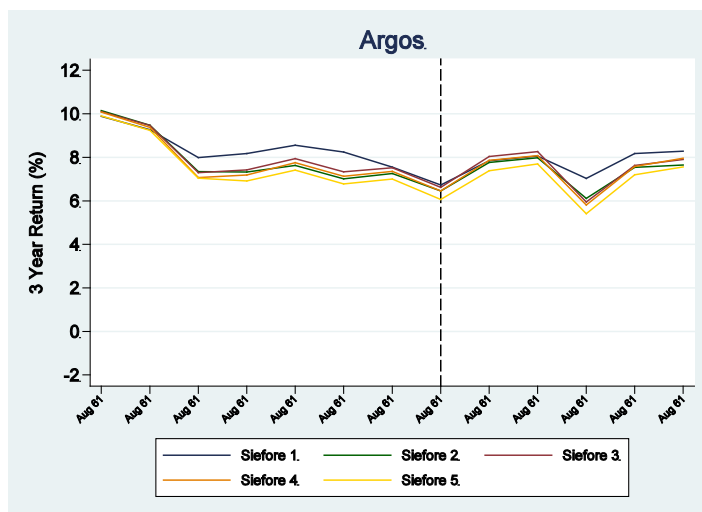
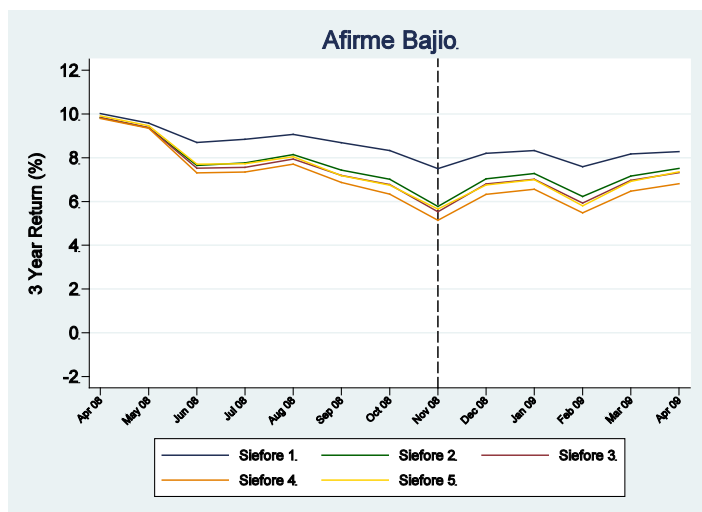


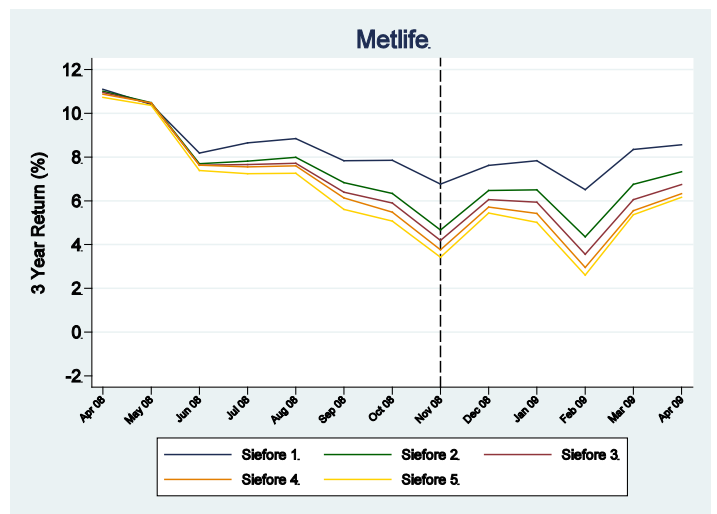
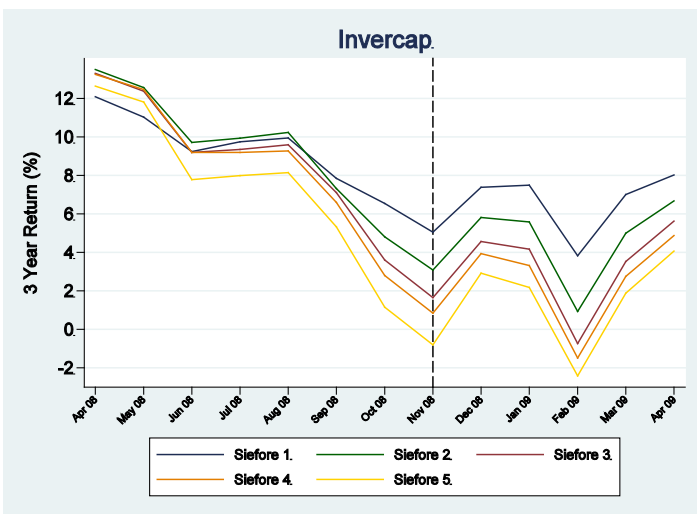
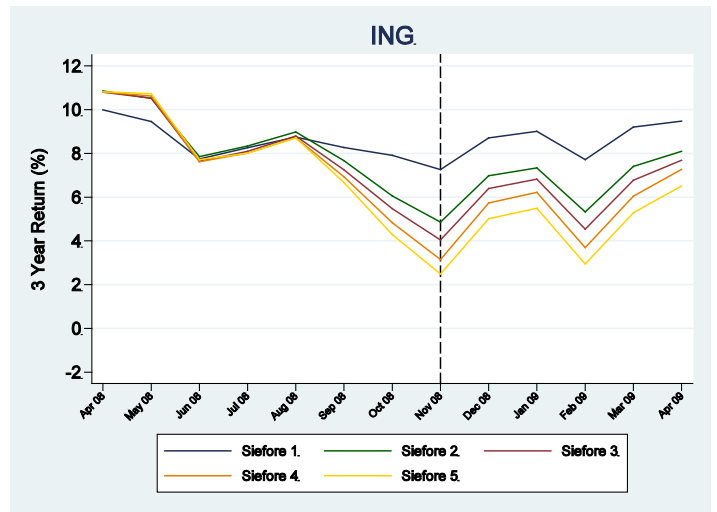
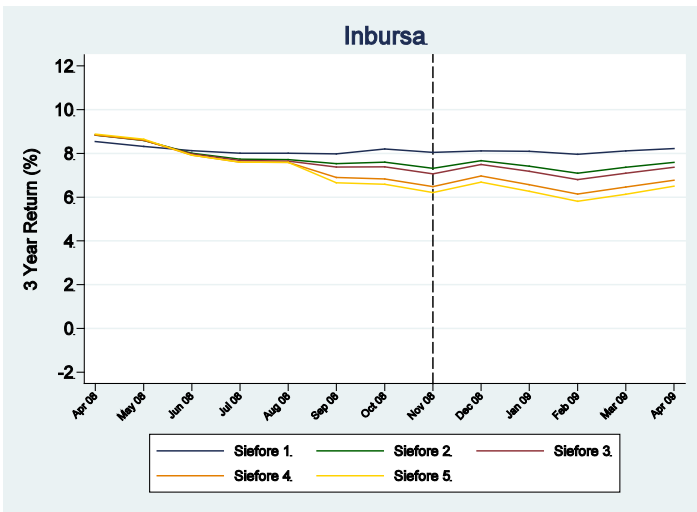
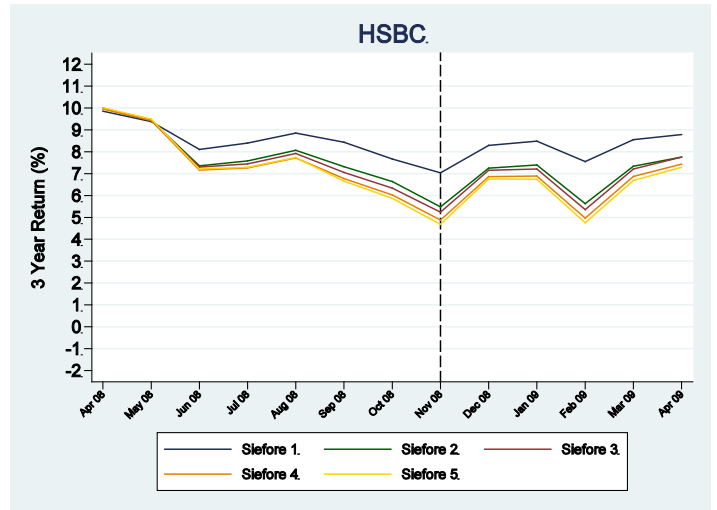
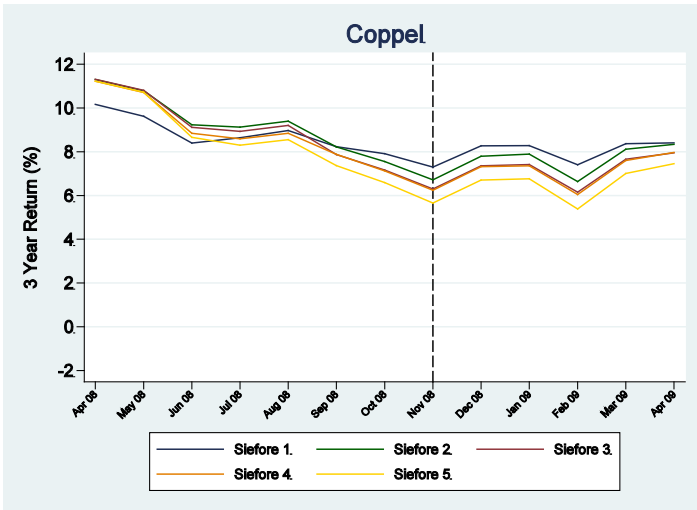
**Table 5: Ratio of Implied Preferences for Management Fees to Preferences  
for 36 Month Past Returns by Demographic Cell**

<i>Wage Quartile</i>	<i>Age</i>	<b>Male</b>		<b>Female</b>	
		<i>Pre-Market Crash</i>	<i>Post-Market Crash</i>	<i>Pre-Market Crash</i>	<i>Post-Market Crash</i>
1	<=35	-8.846	-7.132	-8.769	-7.669
1	(35, 50]	-5.571	-8.198	-6.498	-6.917
1	> 50	-5.366	-6.718	-5.681	-6.298
2	<=35	-6.243	-6.672	-6.374	-8.143
2	(35, 50]	-4.693	-8.650	-4.981	-8.659
2	> 50	-4.093	-10.584	-4.100	-3.637
3	<=35	-3.698	-4.662	-3.663	-3.521
3	(35, 50]	-3.011	-4.666	-3.036	-4.027
3	> 50	-3.110	-4.432	-1.673	-2.385
4	<=35	-0.901	-1.309	-0.561	-0.625
4	(35, 50]	-0.842	-1.348	-1.023	-1.253
4	> 50	-1.435	-2.286	-0.232	-0.287

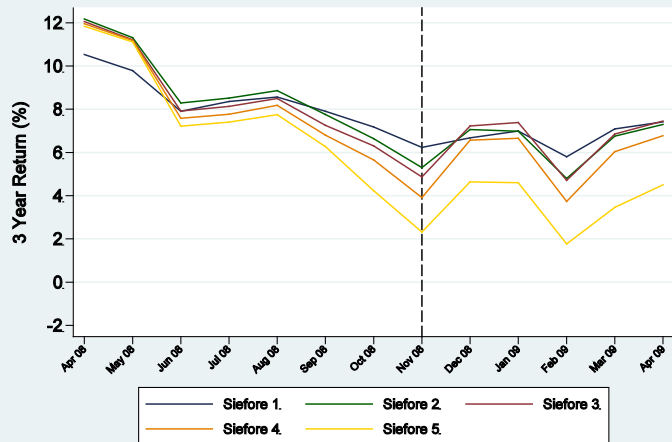
Notes: Each cell represents the coefficient on management fees divided by the coefficient on past returns from a conditional logit model of Afore choice. Each conditional logit model included Afore fixed effects, management fees, 36 month past returns as reported by CONSAR for the default Siefore for each individual as well as an interaction between past returns and an indicator for post-financial market crash time periods. The ratio can be interpreted as the decrease in management fees needed to offset the utility loss from a 1 percentage point increase in 36 month past returns

**Figure 1: 36 Month Nominal Past Returns as Reported by Mexican Social Security Administration**

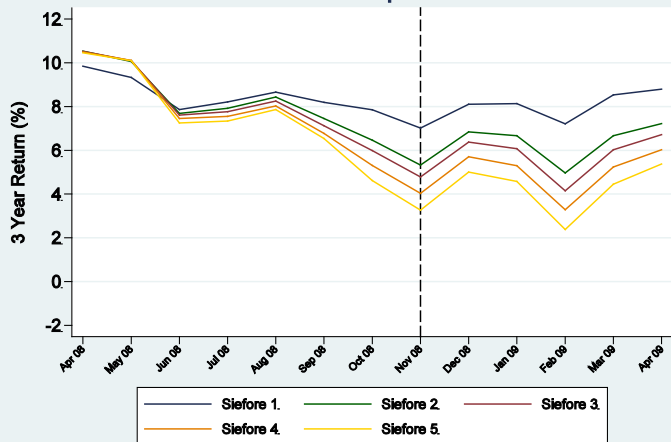




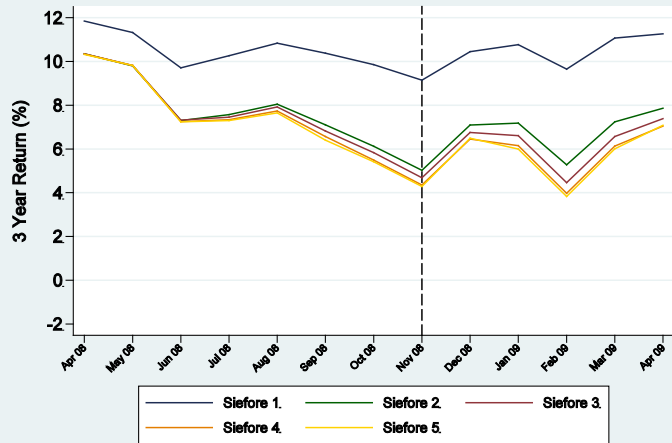
Profuturo GNP.



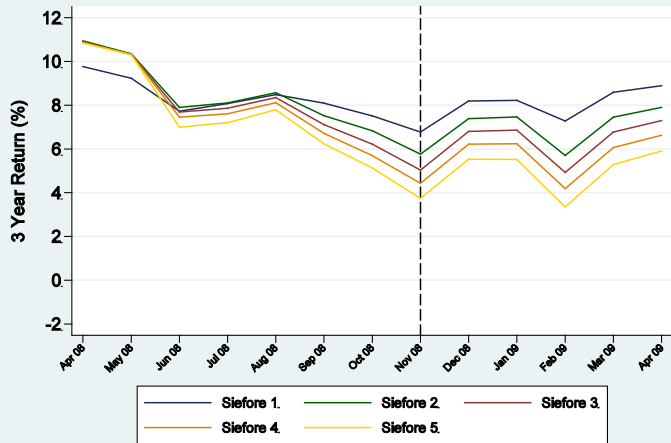
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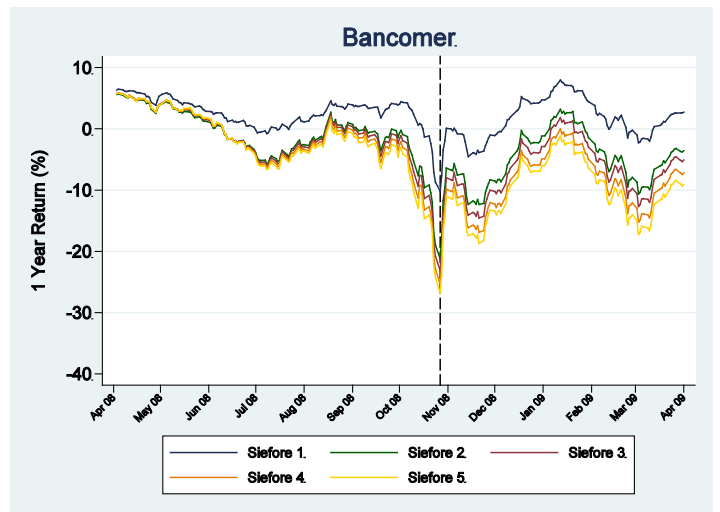
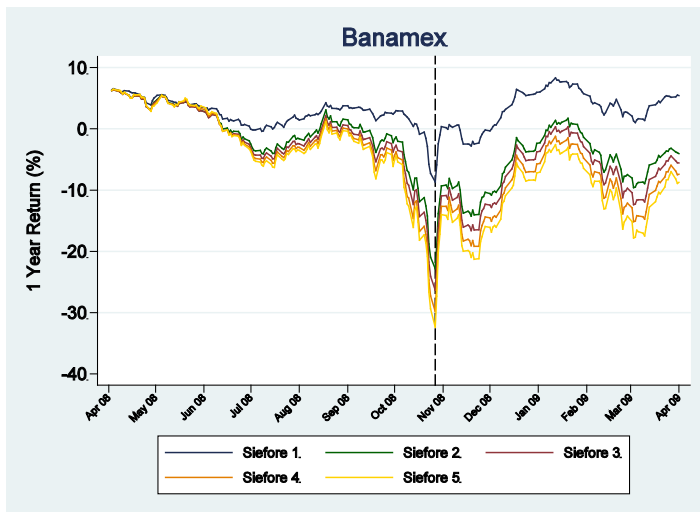
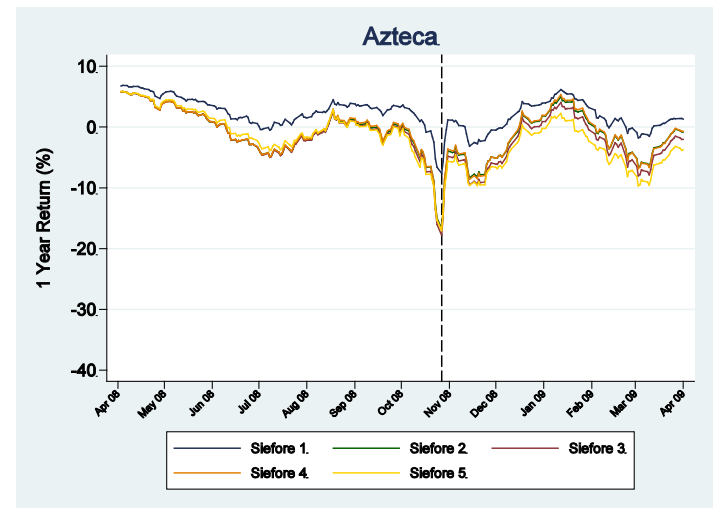
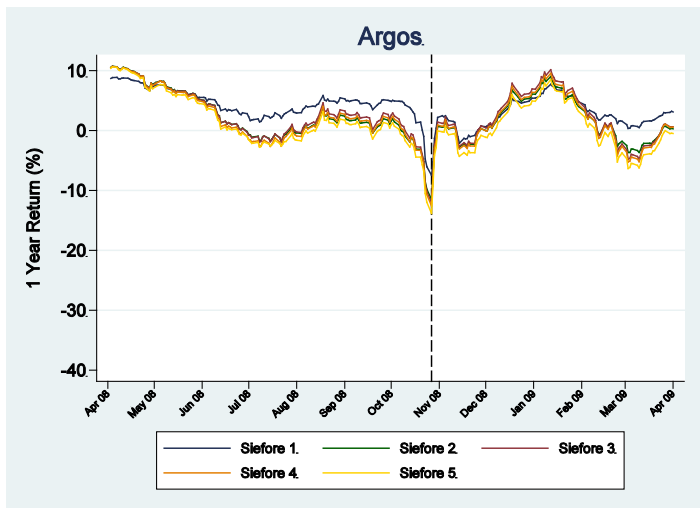
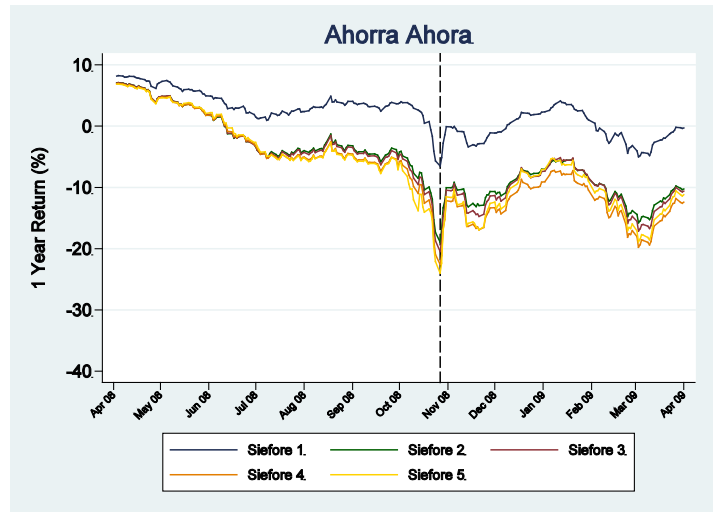
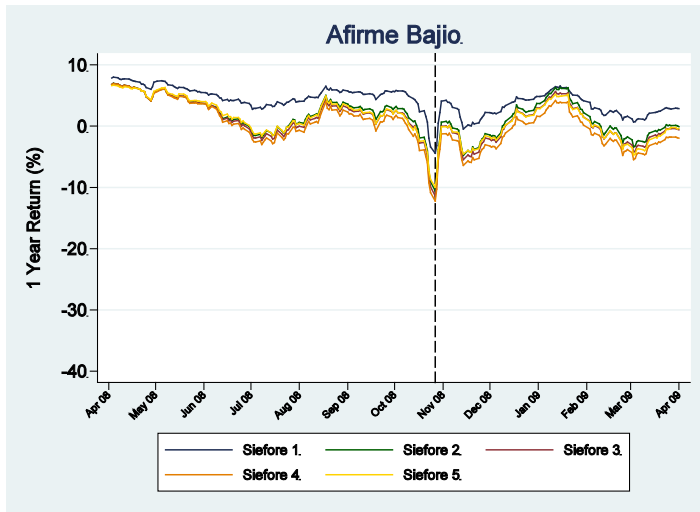
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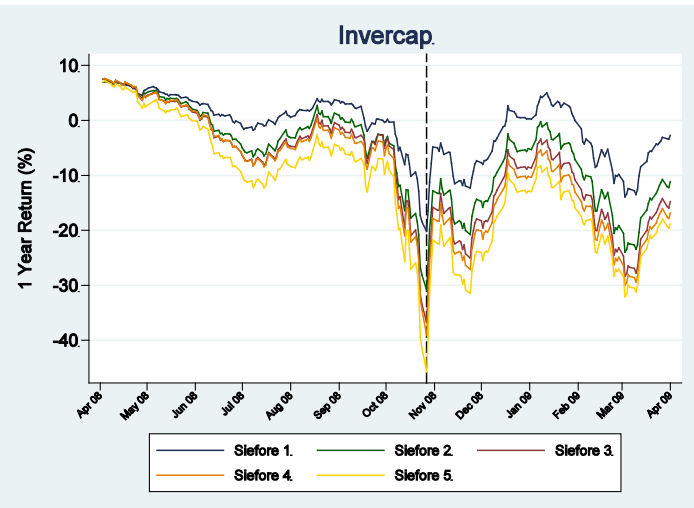
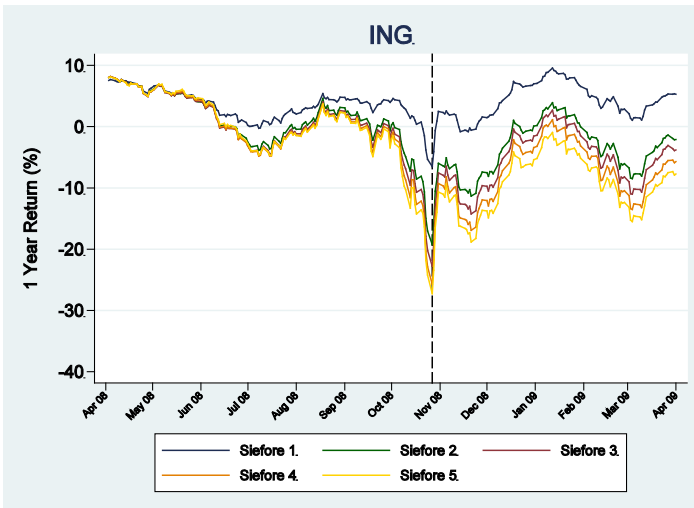
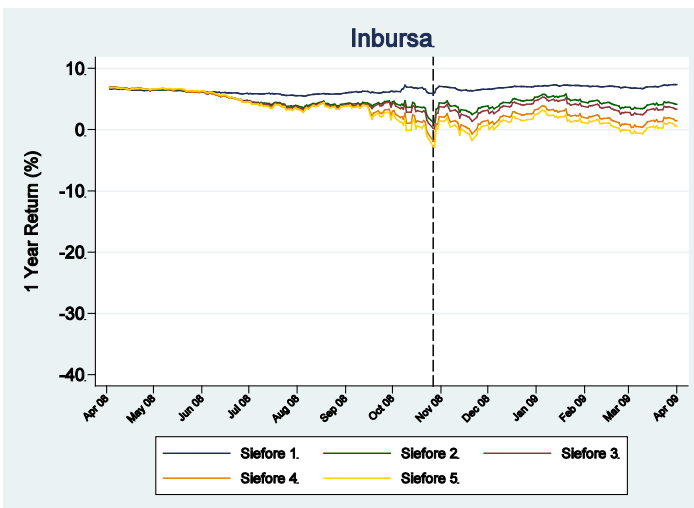
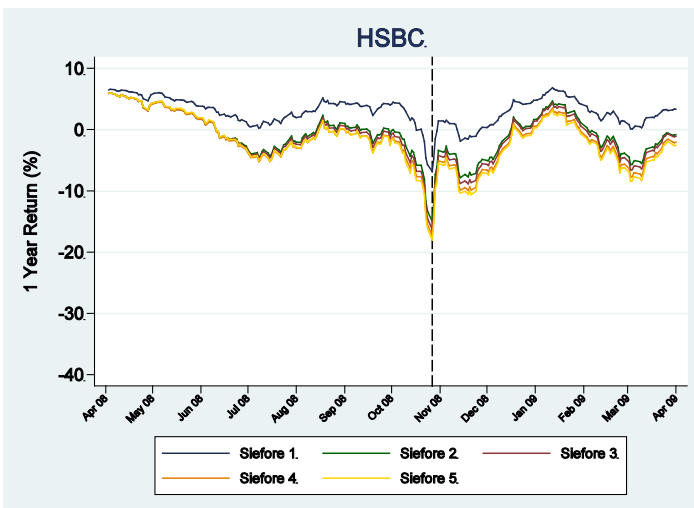
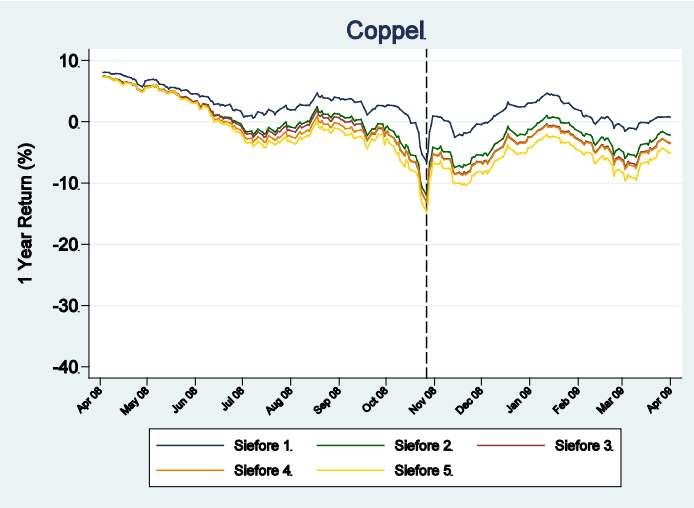
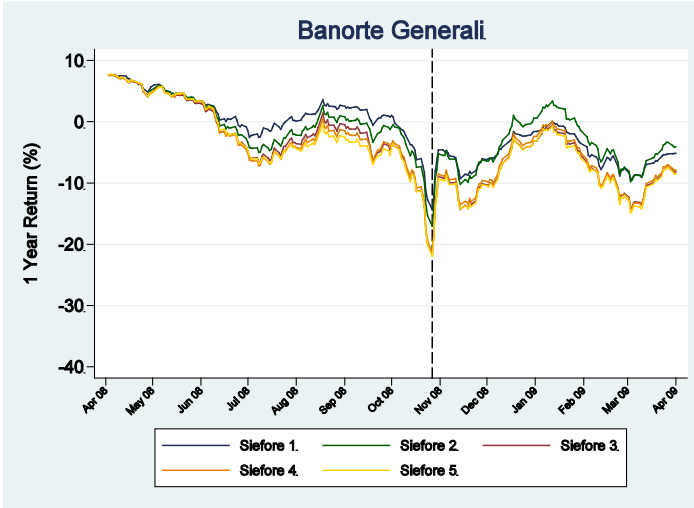


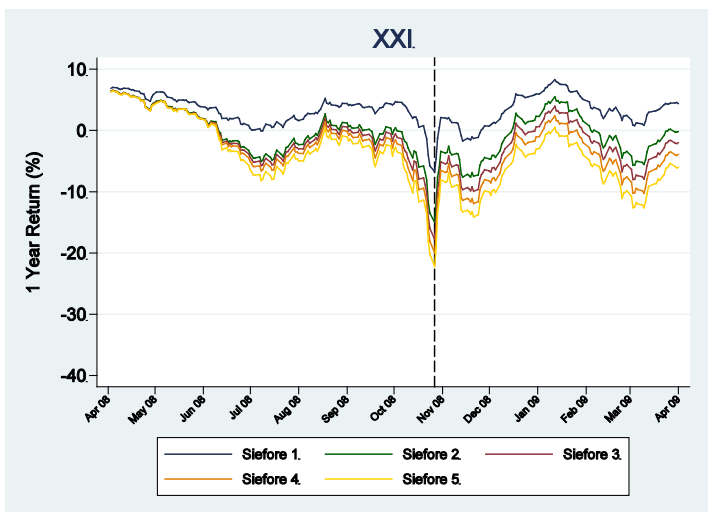
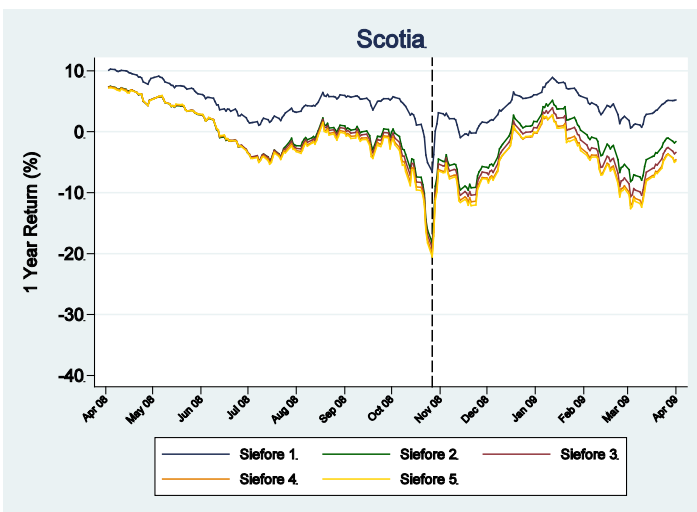
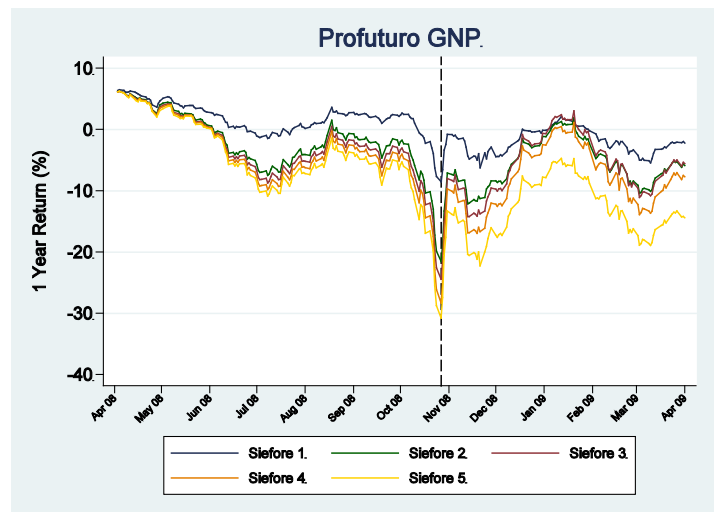
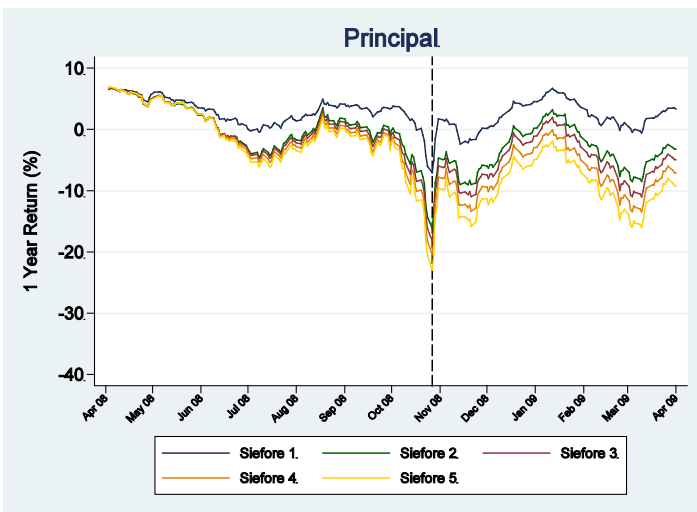
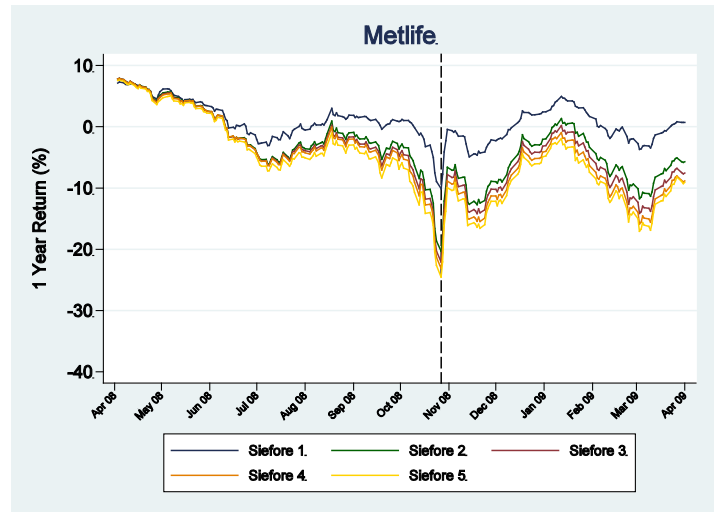
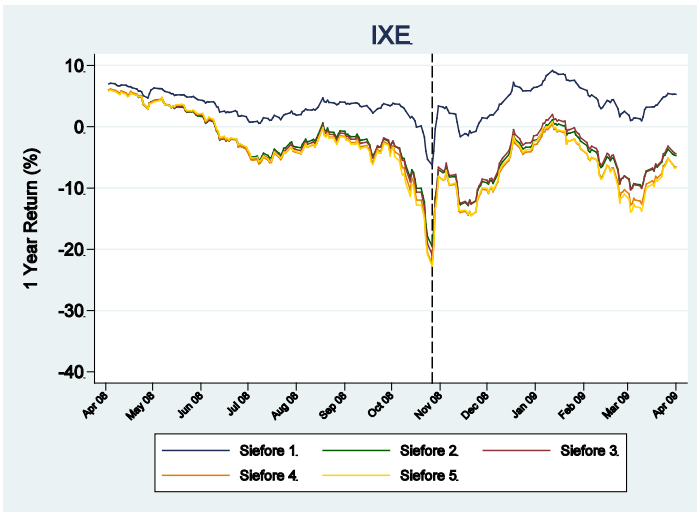
XXI.



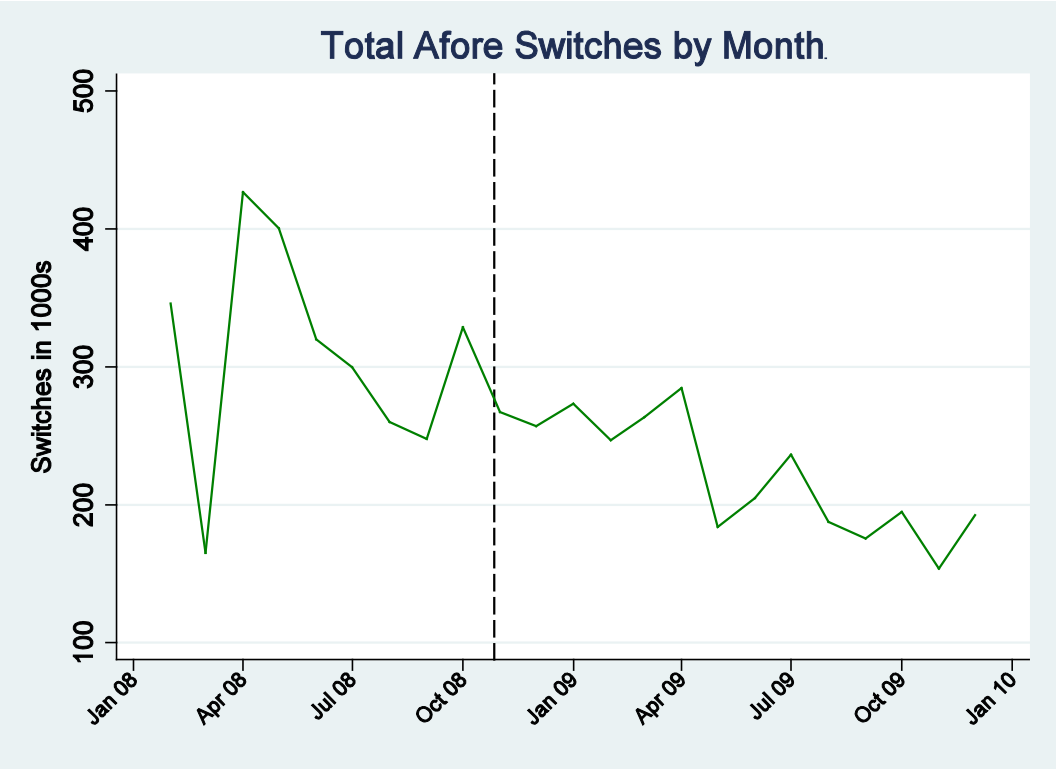
**Figure 2: 1 Year Nominal Past Returns, Author's Calculations Using Share Prices**





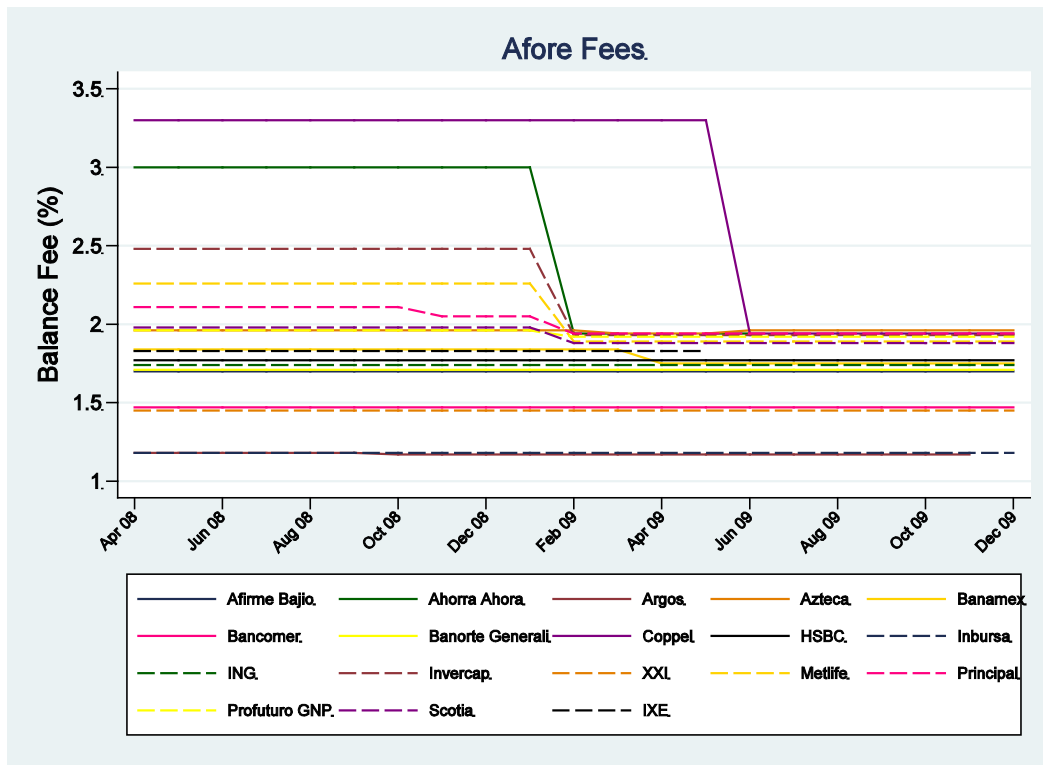


**Figure 3: Total Monthly Number of Switches Between Afores Surrounding Financial Crisis**





**Figure 4: Afore Management Fees for Sample Period**



## APPENDIX I

**Figure 3: Summary of Investments Limits by each type of SIEFORE**

This document is a summary of the applicable regulation and it should be used only as a guide of the investment regime. The applicable regulation might have change since it was last updated. This document does not substitute, add nor modify the applicable regulation; making it public does not bind CONSAR nor any other participant in the Retirement Savings System (SAR).  
Last update: Circular 15-23; August 3rd, 2009

		Limits by kind of SIEFORE (fund) <sup>1</sup>				
		1	2	3	4	5
Market Risk	Value at Risk [VaR <sub>historical</sub> (1-α=95%,1day)]	0.6%	1.0%	1.3%	1.6%	2.0%
	Equity (only through indices)	0%	15%	20%	25%	30%
	Foreign Currency (Dollars, Euros, Yens or currencies to acquire equity)	30%	30%	30%	30%	30%
	Derivatives	Yes	Yes	Yes	Yes	Yes
Credit Risk	mxAAA <sup>2</sup> and Government securities	100%	100%	100%	100%	100%
	mxAA - rated securities	50%	50%	50%	50%	50%
	mxA - rated securities	20%	20%	20%	20%	20%
Concentration/ Counterparty Risk	Local Securities					
	mxAAArated securities from one issuer <sup>3</sup> or counterpart	5%	5%	5%	5%	5%
	mxAAArated securities from one issuer or counterpart	3%	3%	3%	3%	3%
	mxArated securities from one issuer or counterpart	1%	1%	1%	1%	1%
	BBB+ rated sec. denominated in foreign currency from one issuer	5%	5%	5%	5%	5%
	BBB- rated sec. denominated in foreign currency from one issuer	3%	3%	3%	3%	3%
	For. A- rated foreign securities from one issuer or counterpart	5%	5%	5%	5%	5%
Other Limits	Maximum ownership of one issue <sup>4</sup>	20% for all the Siefors operated by a pension Funds Administrator (AFORE)				
	Foreign securities (if fixed income, minimum rate is A- )	20%	20%	20%	20%	20%
	Securitizations <sup>5</sup>	10%	15%	20%	30%	40%
	Structured securities (issued by Mexican nationals) <sup>5</sup>	0%	5%	10%	10%	10%
	REITs(Real estate must be in Mexican territory)	0%	5%	5%	10%	10%
	Inflation protected securities minimum <sup>6</sup>	Yes (51% Min.)	No	No	No	No
Conflict of Interests	Securities endorsed by related parties	15%	15%	15%	15%	15%
	Securities endorsed by parties related to the Afore <sup>7</sup>	5%	5%	5%	5%	5%

1- All limits expressed as percentages of assets under management (Activos Netos) ) but the maximum ownership of one issue. All limits are maximums, but the inflation protected securities minimum.

2- These are local rates for securities issued by Mexican nationals in Mexico. Global rates apply to foreign securities. All securities must have at least two rates.

3- Issuer or endorser in the percentage it guarantees. Counterparty exposure in repos and derivatives must be added to exposure acquired through securities.

4- Percentage of the total amount stated in the prospectus, adjusted by later amortizations and repurchases

5- Securitizations must comply with Circular 15-19's appendix K to be considered the SPV as an independent issuer.

6- Minimum limit on securities that guarantee a return equal or in excess of Mexico's inflation rate.

7- This limit is contained in the Law (Art. 48, fracc. X), although Circular 15-19 sets a limit of 0% for related parties that are financial institutions.

Differentiation factors