NBER WORKING PAPER SERIES

ADVERTISING AND COMPETITION IN PRIVATIZED SOCIAL SECURITY: THE CASE OF MEXICO

Justine S. Hastings
Ali Hortaçsu
Chad Syverson

Working Paper 18881
http://www.nber.org/papers/w18881

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 2013

We thank Steven Berry, Dennis Carlton, Judy Chevalier, J.P. Dube, Liran Einav, Matthew Gentzkow, Brigitte Madrian, Jesse Shapiro, Alan Sorenson and participants at the QME conference, the NBER Household Finance, Public Economics and Industrial Organization conferences for helpful comments. Noele Aabye, Denrick Bayot, Sarah Johnston, Carolina Orellana and Unika Shrestha provided outstanding research assistance. Hastings gratefully acknowledges financial support from the National Institute on Aging grant R01AG032411-01A2 and the U.S. Social Security Administration. Hortaçsu and Syverson thank the Chicago Initiative on Global Markets for financial support. We also thank the outstanding leadership and staff at CONSAR for making this project possible. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w18881.ack

Advertising and Competition in Privatized Social Security: The Case of Mexico
Justine S. Hastings, Ali Hortaçsu, and Chad Syverson
NBER Working Paper No. 18881
March 2013, Revised March 2013
JEL No. D14,D18,G11,L20,L21,L51

ABSTRACT

This paper examines how advertising impacts competition and equilibrium prices in the context of a privatized pension market. We use detailed administrative data on fund manager choices and worker characteristics at the inception of Mexico's privatized social security system, where fund managers had to set prices (management fees) at the national level, but could select sales force levels by local geographic areas. We develop a model of fund manager choice, price and advertising competition (in terms of sales force deployment), nesting models of informative and persuasive advertising. We find evidence in favor of the persuasive view; exposure to sales force lowered price sensitivity and increased brand loyalty, leading to inelastic demand and high equilibrium fees. We simulate oft-proposed policy solutions: a supply-side policy with a competitive government player, and a demand-side policy which increases price elasticity. We find that demand-side policies are necessary to foster competition in social-safety-net markets with large segments of inelastic consumers.

Justine S. Hastings
Brown University
Department of Economics
64 Waterman Street
Providence, RI 02912
and NBER
justine_hastings@brown.edu

Chad Syverson
University of Chicago
Booth School of Business
5807 S. Woodlawn Ave.
Chicago, IL 60637
and NBER
chad.syverson@chicagobooth.edu

Ali Hortaçsu
Department of Economics
University of Chicago
1126 East 59th Street
Chicago, IL 60637
and NBER
hortacsu@uchicago.edu

An online appendix is available at:
http://www.nber.org/data-appendix/w18881

1 Introduction

There is an increasing movement to give workers greater control over pensions, allowing them to personally manage their retirement investments. A prominent example is the recent trend away from pay-as-you-go social security programs towards fully-funded, individual-account systems. Individual-account systems, where management firms compete for employees' retirement funds, are promoted as a potential cure for the agency, efficiency and solvency problems of traditional pay-as-you-go pension schemes (Feldstein 2005).

Several countries have partially- or fully-privatized social security systems in search of these efficiencies, starting with Chile in 1981. Mexico launched its fully-privatized defined contribution plan in 1997. Workers were able to choose among 17 regulator-approved social security account management firms. These firms were well-known in Mexico through their pre-existing operations in the broader consumer financial and insurance sectors. Tight regulations on investment vehicles resulted in fund managers selling effectively homogeneous products.

Despite the similarity of the products and the large number of prominent firms competing for workers' accounts, fees in the newly launched system were strikingly high compared to those for similarly-styled financial accounts (both in Mexico, but outside the social security system, and in other countries). One year after the system's launch, the average asset-weighted load was 23 percent. That is, of every 100 pesos a Mexican worker contributed to the system, only 77 pesos were credited to his or her account. By way of comparison, most U.S. mutual funds do not charge loads, and among the minority that do, maximum loads are around four percent. In addition to these loads, many of the Mexican fund managers charged an annual fee based on the balance in the worker's account. The asset-weighted average annual fee across the 17 firms was 0.63 percent. All told, a 100-peso deposit by a Mexican worker into an account that earned a five percent annual real return and charged these average fee levels would be worth only 95.4 pesos after 5 years.

In this paper, we seek to understand the competitive forces behind this outcome. How could competition among many firms selling an essentially homogenous product result in fees at these levels? What lessons can we learn for privatization of social security or other social safety net programs?

Recent research has shown that consumers appear to respond weakly to prices in markets for seemingly similar financial products, including credit cards, index funds, mortgages, and in privatized social security systems (respectively, Ausubel 1991; Hortaçsu and Syverson 2004 and Choi et al. 2009; Hall and Woodward 2012; Duarte and Hastings 2012). While some of these studies rationalize price dispersion as arising from information frictions such as search costs (Hortaçsu and Syverson 2004, Hall and Woodward 2012), others find that even when price information is provided to consumers, consumers often select based on brand name rather than price (Choi et al. 2009). There is growing field evidence of investors' over-responsiveness to information framing and short-term incentives when selecting fund managers.[1]

Advertising is an important competitive component in consumer financial product markets. The U.S. mutual fund industry spends approximately $6 billion dollars on advertising annually.[2] Extant theoretical models do not provide a unified prediction as to how such advertising will affect market outcomes, and whether it is socially beneficial or harmful. Advertising that 'informs' consumers can reduce frictions and intensify price competition, increasing consumer surplus through market expansion (Butters 1977; Grossman and Shapiro 1984). However, advertising that 'persuades' consumers to focus on brand name or 'complements' consumption with prestige can lower price competition as consumers focus on non-price attributes – real or perceived – when selecting products (Schmalensee 1976; Becker and Murphy 1993; Chioveanu 2008). Understanding how investors react to advertising and how this affects management fees takes on new importance in the context of social security privatization where mandatory participation limits advertising's market expansion benefits and where the policy objective is to increase savings to decrease risk of poverty in retirement.

This paper presents evidence on how advertising impacts competition and equilibrium prices in the context of a privatized pension market. We use detailed administrative data on fund manager choices and worker characteristics at the inception of Mexico's privatized social security system. Fund managers had to set prices (management fees) at the national level, but could select sales force levels by local geographic areas. We develop a model of fund manager choice, price and advertising competition (in terms of sales force deployment) to examine how exposure to advertising shaped demand and how it contributed to observed management fees.

[1] See for example Choi et al. 2009, Hastings and Mitchell 2011, Duarte and Hastings 2012, and Hastings 2012.
[2] See Cronqvist (2006), who finds that U.S. mutual fund flows respond positively to advertising and that advertising is not related to measures of excess returns.

We allow advertising to influence both price sensitivity and brand loyalty in a flexible way, nesting the potentially informative and persuasive effects of advertising exposure in our demand model. We use variation in individual-level management costs (generated by system regulations) and instrumental variables for local sales-force levels to estimate the parameters of our demand model. Our rich individual-level data and empirical setting allow us to estimate a demand model with a remarkable degree of preference heterogeneity across geographies and demographic groups.

Our demand estimates explain important patterns observable even in raw summary statistics. First, large segments of Mexican workers are price insensitive, with management fees playing a very limited role in their fund manager choices. This is especially true among lower-income segments of the population. Second, workers' exposure to a firm's sales force decreases price sensitivity and increases brand value of the advertising firm. This can explain why high-price firms had large sales forces and large market shares in the aggregate data. Moreover, we find that advertising's influence is strongest among lower-income segments of the population.

We quantify the effects of advertising on demand by simulating fund manager choices under preference-neutral-advertising (i.e. setting to zero the effect of firms' sales forces on investors' preferences). All else equal, the price elasticity of demand more than doubles under neutral advertising. This results in a substantial drop in industry concentration measured by the Herfendahl-Hirshman Index (HHI); smaller firms gain market share from larger firms who deployed large sales forces. In addition, investors sort to lower-fee funds, leading to an overall reduction of 17% in total management fees paid. Contributions to pension accounts represent 6.5% of all formal sector wages and a primary source of retirement income particularly among less-educated workers.[3] Thus a decrease in management costs of this size represents a non-trivial portion of GDP and wealth at retirement, particularly for the core demographic groups social-safety-net policies intend to help.

Given the price insensitivity of demand and the sensitivity of fund manager choice to sales force advertising, we next explore two hypothetical policies: one focused on the supply side of the market and the other addressing the demand side. On the supply side, we simulate what would happen if the existing government-co-branded fund manager was required to charge a very low fee (akin to a discount mutual fund in the U.S.). Introducing a government or

[3] See Hastings (2012).

government-regulated competitor is an often-suggested policy solution for increasing competition in social-safety-net markets such as health care and pensions. On the demand side, we examine the impact of increasing price sensitivity at different points in the preference distribution—for example, through financial literacy programs for low-education workers.

To explore these counterfactual policies, we first model the market's supply side. This requires us to incorporate regulatory uncertainty and tackle non-convexities in the firms' profit functions caused by price-inelastic segments of the population. We then use supply and demand estimates together to simulate these counterfactual policies. Doing so leads to several interesting and unexpected results. First, we find that introducing a regulated government competitor has little impact on average fees in isolation, as many firms best-respond to the government competitor by increasing fees and selling only to the very inelastic segment of the market. As low-income workers are more likely to be inelastic, the best-response-fee-increases impact this segment the most. In the absence of limits on advertising and caps on fees, introducing a "competitive" government player in a social-safety-net market with large segments of price-inelastic consumers may be not only ineffective, but also regressive.

Second, we examine a demand-side policy that increases workers' price elasticity of demand. The effect size of a hypothetical policy depends of course on how much one assumes workers' price sensitivities would change in response to information, education, or financial literacy campaigns. We calibrate our change in demand elasticity to changes in stated preferences among financially illiterate investors from simplified found in field and natural experiments (Hastings and Tajeda-Ashton 2008, Duarte and Hastings 2012). We find that increasing price insensitivity of the most inelastic customers would result in 37 percent lower fees. In contrast to the competitive-government-player policy, firms best-respond by lowering fees since most consumers now substitute towards lower-fee-fund managers.

Finally, we add a government competitor, to combine demand and supply-side policies. These simulations show a 70 percent reduction in fees paid. Firms no longer best-respond to the government competitor by raising prices to sell to inelastic customer segments, as the demand-side policy has now reduced the demand-inelastic share of the population.

While our counterfactual analyses are stylized, and exclude unforeseen costs and consequences that actual interventions could introduce, we believe they are helpful in

understanding the potential benefits and pitfalls of social-safety net privatization, especially in markets with price-insensitive program participants.

This paper contributes to the literature in the following ways. We estimate a model of price and advertising competition and conduct counterfactual simulations demonstrating how important advertising's impact can be on product preferences and price sensitivity in a social-safety-net market. While there are several prominent theoretical models of the mechanisms through which advertising could affect demand and price competition, there is little direct empirical testing of these models (Bagwell 2007). Our approach allows us to do so by empirically distinguishing between the 'informative' versus 'persuasive' or 'complementary' effects of advertising. Further, many researchers studying the relationships between advertising and market prices (Benham 1972 and Milyo and Waldfogel 1999 are prominent examples) have had to infer advertising's impact on demand indirectly, from firms' pricing responses, and often using posted rather than transaction prices. This prevents formal tests of how exposure directly impacts individual decisions and precludes counterfactual simulations, both of which are important for drawing economic and policy conclusions particularly in markets where we care about redistribution.

We also contribute to the recent growth in empirical work that has added advertising as a strategic variable that can influence preferences for products or alter the perception of product attributes.[4] The closest research to our context is that on the pharmaceutical industry. Specifically, recent papers have used aggregate data on detailing (sales force directed at medical professionals) and prices to estimate models of competition to explain, for example, cross-country differences in detailing and prices (Chintagunta and Desiraju 2005). We add to this literature by using individuals' product choices and exposure to sales forces to estimate how advertising impacts preferences across socio-economic groups. Our setting shares with pharmaceuticals the potential policy importance of understanding how advertising regulation may or may not lead to efficiency and welfare gains in the provision of a key social safety net.

Finally, as privatization of once-publically-provided products grows, there is greater need to understand the interaction between policy, consumer behavior, and firm responses in shaping the outcomes under privatization. Treating prices as given, firms as passive actors, and

[4] Note that preferences and perceived attributes have equivalent representations in a random utility context when data on revealed choices, advertising and product characteristics are the only data available.

consumers of all backgrounds as forward-looking, frictionless decision makers may mischaracterize the efficiency and distribution effects of privatization (Abaluck and Gruber, 2011; Handel 2012; Duarte and Hastings 2012; Hastings, Madrian and Skimmyhorn 2012). We explicitly characterize the behaviors of both individuals and firms to determine the efficacy of various policy designs.

2 Background on Mexico's Privatized Social Security System

2.1 System Background

Mexico instituted its current privatized social security system on July 1, 1997. The system established individual ownership over retirement account contributions, and was designed to reform the previous pay-as-you-go system in a way that would increase financial viability, reduce inequity, and increase the coverage and amount of pensions.[5] The government approved private investment managers, called Afores (Administradoras de Fondos para el Retiro - pronounced uh-FOR-ay) to manage the individual accounts and established CONSAR (*Comisión Nacional del Sistema de Ahorro para el Retiro* [National Commission of the System of Savings for Retirement]) to oversee this new *Sistema de Ahorro para el Retiro* (SAR – System of Savings and Retirement).[6]

The privatization of the pension system was done effectively in two parts. First, in 1992, the government created private accounts for all pension holders in the system. From this point forward, social security contributions were placed into personal accounts rather than into the general fund. However, personal accounts were held by the Banco de México and earned a two percent real annual rate of return.[7] Accounts in this system were poorly managed, creating a

[5] PowerPoint presentation by CONSAR on "Modernization of the Mexican Pension System," New York, February, 2005.
[6] Initial reforms introduced in 1992 created private SAR accounts for workers at a bank of her choice, concurrent with participation in the partially funded scheme. However, the scope of privatization was largely limited to administrative tasks, such as record keeping and account statement generation, as all investment decisions were still made in a manner similar to the older system. The resources from SAR 92 can be transferred to individual accounts in the Afores if there are bank receipts that confirm that there were deposits regarding pension funds in those accounts. See la Ley de los Sistemas de Ahorro para el Retiro" Diario de la Federación, February 24, 1992 and IMSS (Article 183-H).
[7] "TASA de interés de los créditos a cargo del Gobierno Federal derivados del Sistema de Ahorro para el Retiro de los Trabajadores sujetos a la Ley del Seguro Social cuyos recursos se encuentran depositados en la Cuenta Concentradora a que se refiere el artículo 75 de la Ley de los Sistemas de Ahorro para el Retiro y el artículo cuarto transitorio del Reglamento de la Ley

multiplicity of accounts per worker and a poor success rate in linking actual deposits to individual accounts.[8] The government decided to move towards privately managed personal social security accounts. In 1997 president Ernesto Zedillo signed into law the current SAR, moving management of accounts from Banco de México to approved private fund managers called Afores.[9]

Firms that applied to be Afores needed to meet minimum capital requirements, minimum ownership share by Mexican firms, and have experience in the financial sector in Mexico.[10] Potential Afores submitted business plans including fee schedules to CONSAR for approval to operate as an Afore in the market. Twenty-four firms submitted applications and business plans, and of those seventeen were approved to operate. Two of the rejected applicants entered the market several years later.[11] The government took several steps on the supply-side to increase the likelihood of a competitive market. First, they aimed to have enough firms so that no one firm would have more than a 20 percent market share (though the implicit market share cap has never been enforced).[12] In addition, the regulations provided for a centralized database to process and record contributions, fees, and transactions.[13] This was done to take advantage of scale economies and ensure that the market did not gravitate towards a natural monopoly. The government puts out multi-year contracts for bid to private companies to run the central database. Afores pay regulated fees for centralized account processes.[14]

On July 1, 1997, the new system officially began. Account holders as well as new workers had to choose one of the seventeen approved Afores to manage their existing SAR 92 account balances and their pension contributions going forward. If a worker did not choose any Afore when the new system started, their pension account was to be turned over to a consolidated account ("Cuenta Concentradora") held by Banco de México for up to four years. If the worker still had not claimed their account at the end of the four year period, the account was

---

de los Sistemas de Ahorro para el Retiro." *Diario Oficial de la Federación*. Published July 31, 2002. Accessed December 3, 2012.

[8] Sandoval (2004).

[9] "Ley del Sar", articles 18, 19 and 20. See also "Ley del Sar", Section II.

[10] "Ley del Sar", article 58.

[11] Online Appendix Section 4 describes the business plan submissions and the firms who submitted them in more detail.

[12] "Ley del Sar", articles 25 and 26.

[13] "Ley del Sar", Section IV, Articles 57-58.

[14] For example, internal information from CONSAR staff indicated that in 2008, fees for registering a new account were 25.99 Mexican pesos, 0.62 pesos for processing each contribution into the account, and 5.47 pesos for each switching of accounts (fee charged to the Afore accepting the account). One dollar is approximately 12 Mexican pesos.

to be assigned to an Afore by CONSAR.[15] In the first year, there were over 12 million workers who registered with an Afore, though only approximately 10 million of these had an account balance with the SAR 92 system.

2.2 Fees, Investment Structure, and Advertising

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.[16] The worker chooses the Afore that manages the funds in her account. At the inception of the system, each Afore was required to offer one specialized investment fund, called a *Siefore* (*Sociedades de Inversión Especializadas en Fondos para el Retiro*, pronounced See-FOR-ay). The Siefore was limited to Mexican government bonds and Mexican corporate bonds with at least AA- rating (up to 35% of assets), with a 10% cap on financial sector corporate bonds.[17] Thus Siefores were primarily composed of Mexican government bonds. Not surprisingly, tests for persistent outperformance using monthly returns show no significant difference between fund manager returns (full regression results available in the Online Appendix, section 2).[18]

Afores charged management fees on both automatic salary contributions (load fee) and on assets under management (balance fee). Because the load fee was only charged on inflowing contributions from automatic salary deductions (there was no load fee for transferring funds from

[15] The allocation process took place on 01/01/2001. Subsequent allocations took place every two months. The assignment rules change periodically, but the unclaimed accounts never sum to a large enough amount of money to be effective in generating price competition. In fact, in 2006, the sum total of the value in all unclaimed accounts was less than 5% of assets under management (Duarte and Hastings 2012). For details on the assignment policy, see "Ley del Sar", articles 75 and 76, and Article 7th transitional. See also Press release BP_02082000 (Aug 2nd, 2000) and Circular Consar 07-13.

[16] 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 ("Ley de Seguro Social," Section V, Article 168. *Diario de la Federación*, 21 December 1995). 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. This benefit can be used once in every five-year period. In addition, another 5% of the worker's base salary is contributed to a housing account. The employer pays this contribution. See "Ley del ISSSTE", article 167 for details.

[17] In the mid-to-late 2000s, a series of reforms were introduced to loosen investment restrictions. The system moved from a 1-fund system to a 2-fund system and later to the current 5-fund system, where workers are moved by default from less and less risky funds over their life cycle. For more discussion of investment reforms please see Duarte and Hastings (2012) and Hastings (2010). See also press release BP_003_01 (Oct 19th, 2001) for more details.

[18] A copy of the Online Appendix can be found here: http://www.justinehastings.com/images/downloads/HHS_NBERWP_OnlineAppendix_2013-03.pdf.

one Afore to another), it was referred to as "the flow fee." It was therefore quoted as a percent of the worker's *salary* instead of as a percent of the worker's contribution to the account. Hence a flow fee of 1% was actually a 15.4% load (1/6.5 = 0.154). In 1997, flow fees ranged from 0 to 1.70% (i.e., a 0% to 26.1% load). In addition to the flow fee, firms charged balance fees ranging from 0% to 4.75%.[19]

Importantly, the existence of these two separate fees implied that the relative cost ranking of Afores varied across individuals with their relative wage-to-balance ratio. In Mexico, where there is a strong informal sector and also a large public sector that has a separate pension system, workers of all income and education levels regularly move in and out of employment in the formal private sector. Thus, the relative wage to balance ratio depends on the 1) wage rate, 2) probability of working in the formal private sector versus in the informal sector, public sector or not working, 3) balance at the system inception.

These three factors vary considerably across workers within relatively fine demographic cells. This is due to Mexico's fluid informal labor market as well as mistakes in accounting and management in the SAR 1992 system (creating variation in the account balance at the inception of the system).[20] For example, a worker who contributed consistently under the 1992 system (and whose full account balance was retrievable in one account) and is currently employed in the informal sector, the cheapest Afore would be one with a zero balance fee, regardless of how high its flow fee is. Conversely, for a worker with high and steady contributions who did not have a 1992 account, the best Afore would be one with a low flow fee, even if it might have a high balance fee.

As noted earlier, workers who had a SAR 92 account were required to select an Afore by 2001 at the latest. If they did not, their account would be assigned to an Afore for them according to rules set forth by CONSAR. Overall, most account holders, representing 95% of assets under management, elected an Afore in the first year. To make a well informed, fee-conscious selection of an Afore, workers had to perform a fairly complex calculation: gathering and digesting

[19] Note, Inbursa started with only a fee as a percent of returns. We convert this to a fee on assets under management to facilitate comparison. Inbursa converted their return fee to a fee on assets under management and added a flow fee soon after the inception period and their acquisition of Captializa.

[20] In Mexico, there is an active informal labor sector with 30% of SAR account holders with a college education or more (overall 27% of investors) spending time in both the formal and informal employment sectors from 2005 through 2010, and 60% of workers with non-college backgrounds spending time in both sectors over the same time period. These statistics are based on author's calculations from the 2010-2011 Encuesta de Empleo Retiro y Ahorro, a household survey with field experiments of approximately 7,500 SAR account holders randomly sampled from the BDNSAR and residing in Distrito Federal.

information on fees, projecting their future contributions, and incorporating their current SAR 92 balance.

The government provided no information on fees, did not advertise Afore characteristics or regulate Afores' communication or advertising. Instead, the government made a directed decision to trust that competitive pressure would lead to competition for accounts with generous information provision and forward-looking choices by consumers. It was assumed that profit-maximizing firms would charge a low price to compete for consumers and use advertising to fully inform consumers about their low prices. Thus, advertising and account recruitment was left almost entirely to the Afores, and complaints or questions were handled by CONDUSEF, the regulatory arm for the Mexican financial sector. Investors relied on Agentes Promotores (literal translation is promoting agents, i.e., the Afores' sales forces; referred to as "agente(s)" going forward) and general advertisement campaigns through radio and television to gain information and make their Afore choice.[21]

Interestingly, in available examples of the campaigns, Afores did not appear to invest in informative advertising by disclosing or highlighting fees (Gabaix and Laibson 2006; Ellison 2005, 2006). Instead, they appealed to their experience in the financial industry, for example. If fees were mentioned at all, it appears that Afores combined the two fees in an undisclosed way that obfuscated the situation-dependency of relative Afore expense and minimized the size of the advertised fee through assumptions on tenure length and relative wage-to-balance ratios. Online Appendix Section 1 provides English translations of prominent television advertisements during the first year of the system.

To register for an Afore, workers had to contact an Afore, or they could instead have been contacted by a sales agent at their home or place of work. Once they registered, however, it was difficult to switch. Although workers were technically allowed to switch fund managers at their discretion, the right to switch the account and all of the paperwork resided with the Afore they *currently belonged to*, not the one they wanted to switch to. Thus switching Afores was a long and difficult process until reforms in the early 2000s.[22]

[21] See Duarte and Hastings (2012) for the impact of government mandated information on demand and prices in the Afore market during surrounding information reforms in 2004-2006. The government took important steps in later years to develop a mandate for information on fees and importantly required that this mandated information be placed in account statements and presented by Agentes to potential clients. See Hastings (2012) for the extent to which low-income and lower-educated workers rely on sales agents still for guidance in Afore choice.

[22] See Circular 28-5, July 2002. In the years following the switching reforms, several new Afores entered the market and the number of Agentes increased once more.

In this market setting, Afores hired sales agents to recruit accounts and advertise the Afore's name in a one-time competition at the start of the system. Figure I shows the level of agentes in the market over time. It is clear that Afores recruited account holders while expecting to hold them going forward; agente numbers dropped substantially after the first two years of the system. From 1997-2002, almost no account holders switched from the Afore they chose at the inception of the system. Switching did not occur in meaningful levels until key reforms were passed to make switching possible, as mentioned earlier. After these reforms, switching became more frequent and there was a new wave of Afore entry into the system. But from the vantage point of regulations in place in 1997, Afores were presumably setting fees they expected would hold for the foreseeable future and competed for customers using local sales force and advertising. Indeed, as Figures IIA and IIB show, fees were mostly constant from 1997 through 1999, and then if anything increased. They remained high until reforms in the mid-2000s.[23]

3 Data

We compile data from several sources to form a detailed picture of workers' characteristics, pension fund balances and contributions, fund administrator choices, and Afores' prices and deployments of sales agents across localities. We use administrative data, stripped of individual identifiers and provided under a confidentiality agreement with CONSAR, to construct measures of what workers ("investors") would have to pay each Afore in management costs if they chose to hold their pension fund with that Afore. Recall that these costs will differ across workers because of heterogeneity in their starting account balances, contribution rates, wages and ages. The data include each contribution made into each account on a bimonthly period from 1997 through 2007 for all workers in the system as well as their account balance (imported from the SAR 1992 system) at the start of the system. We construct local measures of sales force deployment and exposure by combining this data with information on workers' zip codes of residence (as of 2006) and the zip code of registry for each agente. The information on agentes comes from a registration panel that provides us with monthly information on all agentes and the Afore they worked for from 1997 through 2007.

[23] See Duarte and Hastings (2012) and Choi, Hastings and Shrestha (2012) for discussion of later reforms, regulations of fees, and impact on demand.

Before proceeding to a formal model of Afore demand, we can preview our findings with some basic summary statistics from the raw data. Table I shows Afores' flow and balance fees, market shares, and the size of their agente sales forces. Afores are sorted in ascending order by sales force size. Several patterns stand out. First, many Afores are dominated by other choices, meaning both their flow and balance fees are higher than both the flow and balance fees of at least one other Afore. For example, Santander charges a 1.70% flow fee (a 26% implied load on contributions) as well as a 1% balance fee, and is dominated at least by Banamex and Bancomer, which both charge the same high load fee, but only a zero balance fee. Those three firms' fees are dominated in turn by several firms who charge lower load fees and zero balance fees. It is clear from Table I that there was substantial price variation in this market even though the firms were all large, well-known institutions selling essentially homogenous investment products due to the tight regulations on portfolio composition.[24]

Despite this variation in fees, we can see that many of the highest-fee ('dominated') firms have the highest market shares. The three firms mentioned above, Santander, Banamex and Bancomer, had the three highest market shares at inception. This is consistent with the classic brand value effect—these firms were perceived to have a product of high enough quality on non-price/non-return attributes to garner large market shares despite high fees. Looking at the final column of the table, we see that these high-fee-high-share firms are also those with high numbers of sales agents, suggesting that advertising had the effect of building brand value rather than increasing price sensitivity. In particular, Santander had the largest market share of all Afores, and also had the highest level of sales agents. Overall, the correlation between the market share an Afore garnered during the market's inception phase and the number of agentes it deployed is 0.78.

We see a similar pattern emerge in summary statistics for the relative costs of the Afore each individual worker chose. To compute relative costs, we first calculate the 10-year projected cost of holding each Afore for a random 10% sample of workers in the system at inception. We compute this cost using the workers' actual contributions, wages, and initial balances recorded in the administrative data from 1997-2007, assuming that the Afore fees were held constant going forward. This is effectively a perfect-foresight measure of management costs. Next, we form an

[24] Duarte and Hastings (2012) test for persistent performance in Afore returns and find no evidence of persistent returns, consistent with the high degree of regulation on investment vehicles.

expected cost for every worker in the data by averaging our computed future costs over the 10% sample workers with very similar baseline characteristics. This expected cost measure lets us estimate worker sensitivity to fees free of measurement error bias and potential endogeneity associated with using actual realized costs.[25] We use the expected cost measure throughout the text and present specification checks using perfect-foresight cost measure in the Online Appendix.

We use our expected cost measure to calculate the ranking for each Afore for each individual (rank 1 to 17, with 1 being the least expensive Afore for a given individual), and the expected savings each person could have made if they switched from the Afore they actually chose to the cheapest Afore for them. Table II presents summary statistics of expected cost rank and potential savings by Afore using a random 10% sample of account holders. The first column gives the average rank of the Afore over people who chose that Afore. The second column gives the average rank of the Afore over all people in the system. If people were acting on their personal information to minimize costs, we would expect to see much lower values in column 1 than in column 2. This is not the case. Rather, the two columns closely resemble each other despite large variation in relative rank for most Afores across workers. Overall, the average rank is very high for Afores with substantial market share such as Santander, Profuturo GNP, Banorte, and XXI (XXI, Twenty-one or Veinte-uno, is the Afore co-branded with the Mexican social security administration, IMSS), suggesting that investors' Afore choices were driven by factors other than the fees they would pay.

In addition, the overall lowest cost Afore, Inbursa (the financial arm of Telemex owned by Carlos Slim), has a very low market share despite its prominent name in Mexico. However, it clearly attracts substantially higher-wage workers. This foreshadows our finding in Section 4 that investors' price sensitivities increase with their wage, while at the same time their responsiveness to advertising decreases with their wage. The combination of Inbursa's observed market position and this estimate of investor demand hint that advertising in this market might act primarily on lower-income and less-educated workers, making them less sensitive to high fees.

[25] The Online Appendix describes the expected cost construction in more detail. For our demand analysis we will use this cost, following the literature analyzing markets where prices for products may vary with expected usage (See for example, Miraveti 2003, Heiss McFadden and Winter 2010, Abaluck and Gruber 2011, Handel 2012, Einav et al. 2011, Grub and Osborne 2012 , and Jiang 2012, Duarte and Hastings 2012). *A priori,* fund manager choice is much less like likely to cause future labor force participation than health care plan choice is likely to cause subsequent use of different health services or cell phone plan is likely to cause calling behavior. However, we find that our estimated demand elasticities calculated using actual (perfect-foresight) costs are smaller in absolute value than those using predicted costs (see the Online Appendix).

Column 3 translates the relative rankings into a 'days of salary' measure. It shows the average number of days' wages that could be saved if each of the Afore's clients switched instead to the Afore that was cheapest for them. These average days of wages are non-negligible, suggesting that real money is at stake and that demand may not be very price elastic, particularly for Afores with high levels of sales agents. Interestingly, one of the highest cost Afores on average is XXI, the Afore that is co-branded with the Mexican social security system. This is reminiscent of findings for AARP co-branded Medicare Part D plans (Kling et al. 2009, Abaluck and Gruber, 2011). In addition, this Afore is particularly popular among women. Our demand estimation will allow both preferences for costs and for Afores to vary flexibly with demographic characteristics and municipality to separate out advertising's effect on brand value and price sensitivity from demographics.

Figure III combines statistics from Tables I and II to graphically illustrate a key point: higher cost Afores (using Table II, column 2) both had larger market shares and employed larger sales forces. The figure plots Afore market share from Table I column 4 against Afore total sales force from Table I column 5. There is clearly a positive relationship between market share and sales force (a correlation of 0.78). In addition, each Afore's point on the graph is proportional in size to its average cost to workers (using Table II, column 2), so larger circles represent higher costs. Higher-cost Afores are predominantly in the higher-market-share-higher-sales-force region of the graph. This graph suggests a persuasive and price-competition-detracting impact of sales force advertising.

4 Demand Estimation

4.1 Demand Model

To formally measure how advertising affects Afore choice, we start by estimating a random utility model of Afore demand, allowing the weights individuals place on brand and price to vary with localized exposure to Agente Promotores. Specifically, we assume that system affiliates choose an Afore to maximize their indirect utility given by the following equation:

$$u_{ij} = \lambda_i\left(a_{m,j},\theta_i\right)C_{ij}\left(y_i,b_i,p_j\right)+\delta_{ij}\left(a_{m,j},\theta_i\right)+\varepsilon_{ij} \quad (1)$$

so that the indirect utility *i* receives from having Afore *j* manage her account is a function of: 1) her sensitivity to management costs, λ_i, which is in turn a function of Afore *j*'s level of Agente Promotores in *i*'s municipality of residence *m*, $a_{m,j}$, and individual *i*'s demographic characteristics, θ_i; 2) her expected management costs C_{ij} as a function of her expected formal labor sector income, y_i, her incoming SAR 92 balance, b_i, and the flow and balance fees set by Afore *j*, p_j; 3) her preference for Afore *j*, δ_{ij}, which is a function again of local advertising and demographic characteristics of *i*; and 4) a random component, ε_{ij}, which is assumed to be distributed *iid* extreme value.

4.2 Demand Estimation

We begin by estimating the parameters of the utility model given in (1). Note that we allow all parameters of the generic utility function to vary across individuals. To capture this preference heterogeneity among investors in a flexible yet still tractable manner, we estimate conditional logit models separately by demographic-by-geographic cells. We break the population into 32 demographic groups, categorized by age (of which there are four categories), gender, and wage quartile. These demographic groups are interacted with investors' municipality (county) of residence, since municipality of residence is most likely to determine the municipality of the agente who recruited the account. [26]

This gives us 3699 distinct cells and *sets* of estimated utility parameters (λ's and δ's), For each of the 3699 distinct cells, *c*, we estimate the following equation:

$$u_{ij} = \left(\alpha_c+\gamma_c w_i\right)C_{ij}\left(y_i,b_i,p_j\right)+\delta_{c,j}+\varepsilon_{ij} \quad (2)$$

[26] We define geographic markets by county based on information we have about the geographic reach of agentes. Specifically, for all workers who switched Afores, we know the identity of the agente who handled the switch. We also know both the worker's and the agente's residence, so we can measure the typical distance between worker-agente pairs. We found, for example, that the probability of having a worker using an agente in their same zip code is close to the probability of matching with a random agente in the local market, suggesting this is far too narrow an area to consider a market. The same result holds true at a 4-digit zip code level. Matches become more systematic, however, at higher levels of aggregation. The probability of a worker matching with an agente from the same county (there are over 500 such divisions in Mexico) is 0.34. Probabilities are even higher, of course, at the 2-digit zip code level (of which there are 100), but this strikes us as too aggregate a market area to allow for the rich variation in demand parameters across demographics and markets that we want in our estimations.

resulting in 3699 sets of parameter estimates for price sensitivity and brand loyalty. Note that within a cell, price sensitivity λ_i is allowed to vary linearly with individual *i's* current wage, so that price sensitivity varies smoothly with a measure of income within income quartile, age quartile, gender and county of residence.

Even though Afores set their prices at the national level, investors' estimated price (management cost) sensitivities λ_i are identified separately from Afore brand preferences using the variation in effective prices observed by the individuals within a demographic-geographic cell. That is, while the parameters of the investor-level price variable in our model (flow and balance fees) are set at the national level, the actual price faced by each worker varies smoothly according to her salary, age, account balance brought into the system, and the fraction of time she spends employed in the formal sector (versus the informal sector, the public sector, unemployed, or out of the labor force). Note that any unobservable demand component acting at the demographic-geographic cell level is absorbed by the estimated $\delta_{c,j}$, so our price sensitivity estimates are identified separately from any regional or demographic-group specific preferences for particular Afores.

Equation (2) essentially estimates for each demographic-by-county cell a portion of utility that varies with management cost (the first term), and a value for each Afore which includes all characteristics of the Afore, both observed and unobserved to the econometrician. We can then use our estimates of the utility parameters λ_i and δ_j^c to examine the impact of Afores' advertising/marketing efforts as measured in their use of agentes in each local market, *m*, on demand parameters of individuals in various demographic groups. We can use these estimates in OLS and IV frameworks to recover the causal relationship between sales force exposure, price sensitivity and brand preferences.

We estimate the following linear relationships between sales force exposure and price sensitivity (OLS equation 3) and brand loyalty (IV equations 4 and 5):

$$\alpha_c = \alpha_c^0 + \tilde{\alpha} A_{m,c} + \sigma_c \tag{3}$$

$$\delta_{c,j} = \delta_j^0 + \tilde{\delta} a_{c,m,j} + D_c + v_{c,j} \tag{4}$$

(5) $$a_{c,m,j} = a_c + \beta Z_{c,j} + \omega_{c,j}$$

In equation (3) an observation, *c*, is a demographic-by-county cell, $A_{m,c}$ is a measure of total Agente concentration in the county, *m*, corresponding to cell *c*, and σ_c is a mean zero error term which allows for clustering at the county level. In equations (4) and (5), an observation is an Afore's brand value estimate for individuals in cell *c*, δ_j^0 is an Afore-specific intercept, $a_{j,m,c}$ is the total concentration of Afore *j*'s agentes in the county *m* corresponding to cell *c*, D_c are dummies for estimation cells, and $Z_{c,j}$ are instruments for $a_{c,m,j}$. The error terms $\omega_{c,j}$ and $v_{c,j}$ allow for clustering at the county level.

Because agentes can be deployed strategically across metropolitan areas, we instrument for exposure to local sales force to recover the causal relationship between agentes and mean brand preferences within and across our geographic-demographic estimation cells. We will propose and test a handful of instruments when we estimate equations (4) and (5). Note that our structural equation in (1) and (2) implies that price preferences are not confounded by excluded factors correlated with agente concentration. We check and confirm this by showing that an IV approach does not meaningfully change the parameters of interest in (3) as it does in (4).

Once we have estimates of the utility parameters and how they vary with sales force exposure, we can conduct counterfactual simulations that examine how workers' price sensitivity of demand is impacted by restrictions on agentes or related demand- or supply-side policies.

4.3 Estimation Results

Because our demand estimates yield thousands of utility parameters without direct scale or interpretation, we start by succinctly quantifying the impact of sales force on the utility parameters. We then interpret the utility parameters and the impact of sales force on demand by summarizing the resulting demand elasticities.

Tables III and IV show the results of regressing our cell-level estimates of investors' price sensitivities α_c and Afore-specific brand effects $\delta_{c,j}$ on potential exposure to agentes that Afore *j* has in the market (county), *m*, corresponding to the utility estimation cell (demographic cell by county), *c*. We use the number of agentes for Afore *j* in a county *m* divided by the total

number of SAR affiliates (workers) in county *m* (in thousands) as our measure of sales force exposure. Hence our measure is the number of sales agents per 1,000 potential clients in a given county.

Columns 1 and 2 of Table III show results from regressing α_c via OLS on measures of local sales force exposure (linear and quadratic polynomials in the total number of agentes per worker in the market).[27] The positive and significant coefficient on sales force exposure in column 1 implies that as Afores step up marketing efforts, investors become less sensitive to fee differences across Afores (a positive coefficient denotes less price sensitivity, because a negative value of α_c indicates investors get disutility from higher management costs). A positive coefficient is not what one would expect if agentes merely served as information conduits that made it easier for investors to find the lowest-cost Afore by, for example, calculating expected fees, educating workers on the differences between balance and flow fees, and helping workers to cost minimize. In that case, investors would become more sensitive to costs as agentes made it easier to find lower-priced asset managers, and the number of agentes would instead be negatively correlated with α_c. The sign of the coefficient is positive and the size is economically meaningful as well. The mean value for our sales-force exposure measure is 4.757 with a standard deviation of 2.504. Thus a one standard deviation increase in sales force exposure from its mean would decrease the absolute value of price sensitivity by 29.4% in column 1.[28] The results from the quadratic specification indicate this effect might fade at higher exposure levels, though the higher-order term is not statistically significant.

Table IV relates investors' brand preferences for Afore *j*, as captured in $\delta_{c,j}$ to exposure to Afore *j*'s agentes.[29] The first two columns present OLS estimates from equation (4) allowing Afore *j*'s agentes to impact the brand value of Afore *j* (relative to the outside Afore) linearly and quadratically. The positive coefficients in the first row indicate that greater saturation of an Afore's agentes in a municipality is associated with a significantly greater average brand preference for that Afore. In other words, marketing efforts for an Afore positively impact

[27] Note we use OLS because the model implies that unobserved Afore quality characteristics are already captured in each market's Afore fixed effects. However, if we do instrument for sales force exposure as we do when estimating brand preference parameters below, the relationship between price sensitivity α_c and sales force exposure is not statistically different from the results we discuss here.

[28] α_c falls from (-6.06E-4 + 4.757*4.57E-5) to (-6.06E-4 + (4.757+2.504)*4.57E-5).

[29] The logit specification requires a reference Afore with a value of $\delta_{c,j}$ normalized to 0 in every cell. We use Garante as this reference; cell-level fixed effects absorb this Afore's sales force concentration. The estimated $\delta_{c,j}$ are interpreted as workers' brand preferences relative to Garante.

demand for that Afore. However, the negative quadratic term in column 4 implies the magnitude of this effect falls as agente density continues to rise. Note we also include cell fixed effects in these brand preference regressions, so the relationship is identified off of variation in Afores' agente deployment within markets.

Of course, marketing efforts are chosen by the Afores, and we might expect them to allocate agentes based on differences in demand across worker categories. This poses the standard endogenous attributes problem familiar in demand estimation, making causal inferences from the first two columns of results difficult. To address this problem we estimate the contribution of sales force exposure to the brand preference parameters $\delta_{c,j}$ using instrumental variables. We use two sets of instruments that should affect Afores' choices of agente concentration within a municipality, but are arguably excluded from the demand for that Afore by a consumer, conditional on the current controls and within a given demographic cell.

The first instrument we use is the average cost of Afore *j* for pension contributors in the same county but excluding those within the demographic cell we are studying. Because expenditure of agente effort should in theory concentrate in markets with high (potential) revenue, but agentes are deployed by geographic region and not by individual, the revenue potential of "neighboring" demographic cells may positively impact the level of agente exposure that an individual in demographic cell *c* receives, conditional on their own revenue potential for Afore *j*. This is effectively an advertising spillover: being located in a county where other workers are profitable to Afore *j*, controlling for one's own attractiveness to Afore *j*, will increase one's exposure to sales agents from Afore *j*, all else equal. (This idea is closely related to the argument in Waldfogel (2007), that the products a particular consumer is exposed to will depend in part on the preferences of nearby consumers, even if there is no correlation between the preferences of this consumer and her neighbors). The second instrument we use is the average wage of pension contributors in the county, but again excluding those within the particular demographic cell of the observation. The logic of this instrument is similar to the first: being in the same market as a set of workers who are profitable for a particular Afore will increase a worker's exposure to that Afore. This wage is interacted with Afore fixed effects to gain within demographic cell variation. Both own-revenue and own-wage are directly controlled for in the utility model from which the residual brand values are taken.

Table IV columns 3-7 show the results for the IV estimation using alternative instruments and first-stage specifications.[30] Columns 3-5 present alternate specifications using the neighbors' costs instrument. Column 6 uses the wage instrument allowing for Afore-specific effects. Across all four columns, the impact of a one-standard-deviation increase in sales force is positive, similar in magnitude, and larger than the corresponding OLS estimate. Just as in the OLS results in columns 1 and 2, increases in an Afore's agente coverage strengthen investors' preferences for that Afore. The fact that the IV estimates are larger in magnitude than their OLS counterparts suggests that all else equal, Afores direct agentes to markets where investors tend to have weaker brand preferences for that Afore. This is consistent with a world where the marginal return to advertising/marketing is larger in markets where investors lack current awareness or inherent taste for an Afore than in markets where the Afore has largely already "won over" investors for one reason or another.

The measured effect is sizable. Implied effect sizes of a one-standard-deviation increase in an Afore's agentes on its $\delta_{c,j}$ are presented in the lower rows of columns 3 through 6. The mean in $\delta_{c,j}$ is approximately 3.2. A one standard deviation increase in Afore *j*'s sales force concentration would be approximately 0.31, which would lead to a predicted increase in $\delta_{c,j}$ of 124% (= 0.31*12.79/3.2), using the point estimate of 12.79 in Column (5). Thus, advertising sales force contributed greatly to brand value at the expense of price sensitivity in this market. This is consistent with our motivating summary statistics in Table I, which showed an overall correlation of 0.78 between total market share and sales force size.

The final column of Table IV allows the impact of Afores' marketing efforts to vary with worker income (measured as the mean income in each cell). The worker wage coefficient is negative and significant, indicating that while agentes shift investors' preferences to their associated Afore, the strength of their ability to do so declines for higher-income investors. This is consistent with survey findings from Hastings (2013); higher-income system participants are more likely to depend on independent information sources such as CONSAR in choosing Afores.[31]

It is important to note that these results decompose brand value estimates from our utility model, $\delta_{c,j}$, into a portion that varies with exposure to sales force and a residual. This residual

[30] Online Appendix Table 1 shows first stage results for the instrumental variables regressions; all have strong first stages.
[31] Results from the 2010-2011 Encuesta de Empleo Retiro y Ahorro, a household survey with field experiments of approximately 7,500 SAR account holders randomly sampled from the BDNSAR and residing in Distrito Federal.

may capture many factors that impact an Afore's overall value or specific aspects that affect preferences for the Afore across municipalities or demographic groups. In Online Appendix Table II we explore some of these other possible brand value factors, including foreign ownership, insurance vs. financial firm ownership, and ex-post realized first year returns. We refer the interested reader to those results. However, we note that the variation key to our simulations and results – the impact of sales force on price sensitivity and brand value – is identified separately from any such factors that may be correlated with the residual mean values in equations 3 and 4.

The results in Tables III and IV are instructive about the fundamental nature of this product market. They reject the simplest product structure one might imagine for a market like this; namely, that Afores are essentially perfect substitutes (because they all offer very similar portfolios), but search frictions support some management fee dispersion in equilibrium. If this were the case, there should be no effect of agentes on inherent brand. Further, they would tend to make investors more price-sensitive, not less as we have found. An alternative structure that is consistent with our results is one in which an Afore's marketing effort is a complement to price. Greater marketing effort, reflected in agente concentration, raises investor's willingness to pay to hold their pension account with that Afore and reduces their sensitivity to fee differences. This structure is discussed in models of persuasive advertising such as Schmalensee (1976), Becker and Murphy (1993), and Chioveanu (2008), and could possibly explain why price competition seems muted in the market.

To further quantify and interpret the demand estimates, we calculate the demand elasticity for each individual for each Afore (using the observed prices, characteristics and sales force exposure levels). Then we take the average for each Afore across all individuals in the market. To quantify the impact of agentes on demand, we substitute zero for the estimated impact of Agentes on price sensitivity λ_i and brand value $\delta_{c,j}$ and recalculate elasticities. We refer to this counterfactual as "Neutral Agentes" as we force them to have no impact on preferences.[32]

Figure IV plots the mean elasticities for each Afore at the demand estimates and at the Neutral Agentes counterfactual. Online Appendix Table III presents the means in table form. Overall, elasticites calculated using our demand estimates are on average negative but less than

[32] To do this, we also zero out the impact of Garante's (the reference Afore) sales agents.

one in absolute value, with the exception of Bancrecer/Dresdner/HSBC (whose mean elasticity is -1.076). This implies that the average investor has inelastic demand for each Afore when evaluated at current prices, characteristics and sales force exposure.[33]

In contrast, under the Neutral Agentes counterfactual, average elasticities change considerably. Given the overall positive relationship between agente saturation, favorable brand preference and price sensitivity, it is not surprising that we find demand becomes more elastic when demand is neutral to agente exposure. More interesting, however, is the substantial quantitative extent of this weakening. The average price elasticity more than doubles relative to its level in the data; dropping from an average of -0.75 to an average of -1.93. There is also nontrivial variation in the size of the increase in the elasticity across Afores. This suggests that a substantial portion of the price insensitivity in the market can be attributed to the impact of sales force on brand loyalty and price sensitivity; without their effect demand would have been much more elastic across the board.

All else equal (i.e., holding prices constant), the market would have been less concentrated as well. Figure V plots the percent change in market share for each Afore resulting from Neutral Agentes versus the Afore's sales force.[34] Each Afore dot on the graph is labeled with its baseline market share level.[35] Online Appendix Table IV reports in table form actual market shares, the market shares predicted by our demand estimates at the data (which are almost identical to actual market shares), and predicted market shares under the Neutral Agentes counterfactual. The scatter plot is downward sloping, indicating the Afores that would suffer the greatest loss in market share are those that are currently the market leaders (and, again, have a large number of agentes in the field). For example, Santander, the Afore with the largest baseline market share and largest sales force, would lose over 85% of its market share (falling from a predicted share of 13.4% to a new share of 1.9%). Bancomer, Garante, and Profuturo would suffer similar losses. In contrast, considerable market share gains would be experienced by currently minor players with small sales forces (like Zurich, Principal and Capitaliza) and by the

[33] These elasticities are averaged across investors without weighting each investor by their potential revenue. They summarize individual behavior, but do not correspond to the objective function of the Afore. The Afore would weight each individual by expected revenues, as the elasticity of each peso, not each person, is what matters for revenue. Preferences of those with larger potential accounts matter more for Afore's optimal fees.

[34] To calculate these shares we compute for each person the probability they would choose each Afore given the Afore's observed attributes in the data and our demand estimates. We next sum the probabilities over all consumers to calculate each Afore's demand. We then do the same calculation while setting the impact of agentes on demand to zero.

[35] We plot share changes in levels instead of as percentage changes relative to baseline to avoid plotting very large percentage values for Afores with very small baseline market shares.

somewhat more major players, Inbursa and XXI, who had moderate sales force levels. Overall, the HHI drops from 1088 to 860 when the impact of sales force on preferences is zeroed out.

Figure V plots changes in expected revenues resulting from these changes in market shares. (These statistics are presented in table format in Online Appendix Table IV.) Recall that for now we evaluate shares at actual fees, though this will change in the counterfactuals below that incorporate supply-side responses. Dots on the graph are labeled with Afore names, and the vertical axis shows the ratio of revenues (fees paid out of social security accounts) under Neutral Advertising versus at the demand estimates. The y-axis is in log-scale. To calculate expected revenues, we compute choice probabilities for each worker for each Afore, and then take the probability-weighted total expected cost paid over 10 years across all individuals for each Afore (using the cost forecast as described in the discussion of Table II). This gives us each Afore's expected revenues. Computing choice probabilities at the estimates and data and in the Neutral Agentes counterfactual allows us to quantify how much Agentes contributed to higher Afore revenues, all else equal.

Overall, expected management fees paid in the system are 17.45% lower under the Neutral Agentes counterfactual. Figure VI shows a clear pattern: firms who had small market shares and small sales forces have increased revenues and market shares with a neutralized sales force, while firms with large market shares due to large sales force effects would have seen substantial declines in revenues due to relatively high fees. Agente exposure influenced consumer choice such that consumers chose substantially higher-cost fund managers than they would have in the absence of agente influence on preferences. This is important in light of a forced savings-for-retirement program, as larger management fees translate directly into reduced wealth at retirement.

5 Modeling Supply and Policy Simulations

We have shown evidence that the high fees in the Mexican social security market reflect the insensitivity of workers to price differences across asset management firms, that this insensitivity is related to exposure to the firms' sales forces, that this relationship is strongest for lower-wage

workers, and that the quantitative effect of sales forces on workers' demand generally is quite large.

In this section, we explore how management costs might have been affected by two counterfactual policy interventions. The first intervention is a "supply-side" policy mandating the existing government-co-branded fund manager (XXI) to charge a very low fee. This counterfactual is inspired by the occasionally suggested policy of introducing a "public option"—a government or government-regulated competitor to increase competition in partially or fully privatized social-safety-net markets such as this. The second, "demand-side" intervention is to increase (e.g. through financial educational programs) the price sensitivity of the most price insensitive workers in the system.

To conduct these counterfactuals, we first develop a model of the market's supply side taking into account some of the key features and difficulties in modeling a partially privatized market with mandatory participation and heavy regulation.

5.1. Modeling Firm Price Decisions: Nash-Bertrand Pricing

Most supply-side analyses of discrete choice demand systems assume that firms compete in a static Nash-Bertrand fashion.[36] In our setting, competition is based on several endogeneous variables: balance fees and flow fees set at the national level, and agente levels set at the regional level. In such a model, revenues for Afore *j* are:

$$(6) \qquad \pi_j\left(f_j, b_j, A_j\right) = \sum_{i \in I}\left[\rho_{ij}\left(f_j, b_j, A_j^i, f_{-j}, b_{-j}, A_{-j}^i; X_i, \theta_i\right) * rev_i\left(f_j, b_j; Z_i\right)\right]$$

where we sum over (expected) revenues obtained from each individual *i* in the system. Here f_j and b_j are flow and balance fees set by Afore *j*; A_j is the vector of region-specific agente levels

[36] We model the supply side as a static game even though competition may at first glance appear to have an important dynamic element: workers can switch Afores (though at a cost), creating switching-cost-driven dynamics. However, we are comfortable approximating the market as static because it turns out that, empirically, almost all switching of Afores by workers (which occurred at a very low rate to begin with) is driven by changes in employment status (Duarte and Hastings 2012). That is, workers who do switch appear to being doing it in response to what occurs in the labor market, not competition among Afores. We therefore think of the arrival and departure of clients as being driven by an exogenous process; firms maximize profits taking this process as given.

chosen by the Afore; A_j^i is the level of agente exposure for individual *i* from Afore *j*'s agentes; ρ_{ij} is the probability that individual *i* chooses Afore *j* given fees, Afore characteristics, agente exposure, personal characteristics, X_i , and preferences, θ_i ; and rev_i is the present value of the revenue stream generated by this individual assuming she does not switch to another Afore and is a function of a set of personal characteristics, Z_i.[37]

The individual level choice probabilities, ρ_{ij}, are given by the logit choice probabilities:

$$(7)\quad \rho_{ij}(f_j, b_j, A_j^i; f_{-j}, b_{-j}, A_{-j}^i, X_i, \theta_i) = \frac{\exp\left[\lambda_{ij}(A_j^i, A_{-j}^i)\text{cost}_{ij}(f_j, b_j) + \delta_{ij}(f_j, b_j, A_j^i, A_{-j}^i)\right]}{\sum_{j \in J} \exp\left[\lambda_{ij}(A_j^i, A_{-j}^i)\text{cost}_{ij}(f_j, b_j) + \delta_{ij}(f_j, b_j, A_j^i, A_{-j}^i)\right]}$$

Here, $cost_{ij}$ is the present discounted total fees that *i* pays *j* for management services (and $cost_{ij} = rev_{ij}$ if the account holder's and the Afore's time horizons and/or discount factors are the same).

A Nash equilibrium of this game is a vector of balance and flow fees and regional advertising/agente levels such that each firm's choices are best-responses holding other firms' decisions as given.

The game played in this setting differs from the standard logit-Bertrand pricing game in a number of ways that complicate the calculation of an equilibrium. First, the firms' maximization problems with respect to prices need not be convex. This arises because, as reflected in our demand estimates above, a substantial number of individuals are price-insensitive.[38] Thus, a best-response to increased price competition by rivals could be to stop competing on prices, by selling only to very inelastic individuals and charging them the highest permissible fee. If the segment of inelastic consumers is large enough and they will bear a substantial fee, this strategy could be more profitable than lowering price to compete with low-price-firms.

The presence of price insensitive individuals prevents us from characterizing the equilibrium as a system of equations defined by first order conditions, as is usually done in

[37] We set marginal costs of account management to zero. The Afore's profits also include the costs of hiring agentes. We could include this term in our analysis, but it would not change anything, as the counterfactuals we compute either leave marketing (i.e., agente) spending constant or shut it down completely. Hence we never need to know agente hiring costs, as we do not need to compute new optimal agente levels in any counterfactual.

[38] For example, survey responses of account holders in the 2010-2011 Encuesta de Empleo Retiro y Ahorro show that, as in many developed economies, a significant portion of workers lack basic financial skills and numeracy ('financial literacy') and display time-inconsistency as measured by a standard battery of survey questions. See Hastings, Madrian and Skimmyhorn (2012) for discussion.

similar problems. Though this issue has not been explored in the prior literature, we note that such non-convexities in best-responses may be present in many traditional and social-safety-net markets outside of ours.[39] We utilize a sequential best-response iteration algorithm to solve for the equilibrium fees conditional on advertising levels in our policy simulations. The Online Appendix describes the algorithm and sensitivity analysis we performed to demonstrate robustness of our solution to initial starting points.

5.2 Implications of the Nash-Bertrand Model: Rationalizing Observed Fee Levels

We begin by first checking if the observed balance and flow fees can be rationalized as the result of the above static equilibrium pricing game, taking our demand estimates and observed advertising levels as given. To do this, we calculate equilibrium balance and flow fees taking advertising levels as they are observed in our data.

We find that when applied to the demand estimates, the supply side model predicts a mix of flow and balance fees that are very different than those in the data. The model predicts that firms charge high balance and low flow fees in contrast to the high-flow, low-balance actual fee choices for the majority of cases.

Table V columns 1-3 present, for reference, the flow fees, balance fees and market share observed in the data. Columns 4-6 report equilibrium flow fees, balances fees and market shares assuming all Afores used a 10-year horizon when setting fees. In addition, in columns 4-6 we place an implicit cap on each fee at 2.00 for the flow fee (a 30% load) and 4.75 for the balance fee. Two patterns emerge: our equilibrium calculations have much lower flow fees and much higher balance fees than those actually seen in the data, and a handful of firms operate at the cap for both flow and balance fees.

Why does the baseline model have difficulty explaining the data? In supply and demand models there is typically one unknown factor, either marginal cost or conduct, which allows the model to fit the data. In this setting there are several reasons our predicted fees might not match actual fees even given unbiased estimates of demand. First, Afores made fee decisions under a

[39] For example, consider the potential response of mom-and-pop grocery retailers to entry by big-box discount stores such as Walmart.

regulatory approval process; they had to submit fees, forecasted demand and profitability to the regulator before being allowed to enter the market. They may have feared threat of regulation. This regulatory threat may have affected their fee strategy (e.g., Glazer and McMillan 1992, Stango 2003). They may also have been uncertain of the longevity of the system and thus favored flow fees because they yield revenues immediately, rather than high balance fees that could pay off more in future years. This longevity concern is plausible; new programs are started then quickly replaced under political pressure.[40] Moreover, we have the benefits of the full data for the system and hindsight of 10 years of such data. Afores did not have and still do not have access to this data, and had to make projections and approximations about consumer characteristics and growth, many of which were rational *ex ante* but incorrect *ex post*.

Given the fee submission and approval process, we focus on the threat of regulation and introduce a parameter to capture this threat. We allow each Afore to have a different time horizon over which they calculate present discounted value of profits, assuming a terminal value of zero. We then modify the first best-response exercise by solving for the "rationalizing" time horizon for each firm: the time horizon, flow fee and balance fee set that best fits the observed data. The flow fees, balance fees, market shares and fitted time horizons are presented in columns 7-10 of Table V. Allowing the time horizon to vary across Afores brings calculated "equilibrium" balance and flow fees much closer to their observed values than when we impose that all time horizons are 10 years. Because we are using only one variable (time horizon) to fit variation in both balance and flow fees, the "fit" of this model is not guaranteed to be perfect. Still, the correlation between observed and "equilibrium" flow and balance fees are 0.80 and 0.63 respectively, and the predicted market shares are correlated 0.99 with observe market shares.

Columns 10 and 11 of Table V compare the fitted time horizons and the *ex post* observed longevity for each Afore. Several firms exited the market within the first few years of the system, and we do in fact generally find these firms have shorter fitted time horizons. Likewise most firms who stay in the market over time have longer fitted time horizons. Overall, the fitted time horizons are correlated 0.45 with the *ex post* observed longevity of the firms. Note that *ex-post*, major reforms to the system took place in 2003 (6 years), 2005, and finally in 2008 (11 years

[40] Examples include Argentina and Venezuela's nationalization of pensions and private industry. See Duarte and Hastings (2012) for evolution of reforms in Mexico's system.

out) when fee caps were placed on Afores, forcing them to drop fees below the average in the market and restructure their fees completely.[41] Hence a shorter time horizon for current fee strategy may have correctly foreseen substantial regulatory changes on the horizon.

Allowing for differences in forecasts for longevity or modeling threat of regulation like this has not been incorporated in structural models of competition among firms. However, it strikes us as a potentially fruitful angle not just in this setting, but also in other situations where competition is occurring in unstable or new industries. This is particularly the case in industries subject to substantial government intervention, such as education, pensions, environment and energy, and health care.

5.3 Counterfactual Exercises

We now conduct our counterfactual exercises exploring the implications of the relationship between workers' choices of their retirement account managers and those managers' pricing and advertising decisions. We solve for Afores' profit-maximizing flow and balance fee rates under the Afores' fitted time horizons from above when 1) the government-branded firm, XXI, must charge a low regulated fee, and 2) when policies are implemented that shift price sensitivity of investors.

We start the simulations with XXI as a 'government player' that charges a price near marginal cost in the market in order to increase competition. We assume marginal cost pricing is a flow fee of zero and a balance fee of ten basis points (0.10), fees typical of the most popular index mutual funds (e.g. Vanguard) in the U.S.

We find that a government player can have unintended consequences, leading to *increased* rather than decreased prices. This happens for two reasons. First, as noted above, the best responses may be complicated due to groups of very price inelastic customers. If a competitor such as XXI lowers its price, Afores may find it optimal to match price decreases up to a point. However, for large enough price cuts by XXI, an Afore's best response may be instead to charge a very high price to a captive base of inelastic customers. We find this does in fact occur. Further, inelastic demand implies that their price increases swamp the competitive

[41] See Choi, Hastings and Shrestha (2012) for further discussion of these regulatory changes.

impact of XXI charging its marginal cost, because the inelasticity means XXI gains limited market share even when it drops its price to marginal cost.

Table VI summarizes these important dynamics through a couple of examples. Columns 2 and 3 show the competitive outcome in a world where XXI charges no flow fee and a 10 basis point management fee (0.00, 0.10). Column 2 imposes on all Afores a regulatory cap of (3.20, 5.00) – a 50% load and a 500 basis point management fee. Column 2 imposes a regulatory cap of (3.20, 10.00). We chose these caps to illustrate the non-convex best-responses.[42]

Looking at the first panel of simulation results, with the impact of advertising on demand held fixed its estimated values, when XXI plays (0.00, 0.10), it gains only 3.66 percentage points in market share (moving from a baseline fitted share of 2.87 to a new share of 6.54), while about 29% of customers remain with Afores who now respond by charging the cap. Overall fees actually increase by 4.10% as a result of XXI's competitive move. In column 3, we allow the cap to increase further. XXI's share only grows by 3.87 percentage points (relative to baseline), and overall fees increase by about 9%. It is clear from these examples that, in order for fees to fall in response to a low-cost public option, demand needs to be more elastic.

The bottom panel of Table VI shows that with neutral advertising (i.e., agentes have no effect on workers' brand preferences or price sensitivities), the government player is much more effective. In column 2, XXI gains an almost 31% market share in response to low pricing, as demand is now more elastic in the absence of persuasive advertising. Even though about 40% of workers are still in Afores that price at the cap, the drastic decrease in XXI's price plus more elastic consumers leads to a 29% overall decline in costs. We see a similar story with the higher cap, except of course overall cost savings are somewhat lower (now only 25%) as the firms concentrating on the inelastic segments of the market charge higher fees.

The comparison between the upper and lower panels of Table VI suggests that adding a government player may only be an effective way of increasing competition if enough people are sufficiently price sensitive. This motivates our second counterfactual simulation: increasing price sensitivity in the marketplace. Financial illiteracy, for example, has been linked to consumer confusion and price insensitivity, prompting calls for increased financial education. These calls have made their way into sweeping financial reforms in the US with the Dodd-Frank Act and the Consumer Financial Protection Bureau's Office of Financial Education (Hastings, Madrian and

[42] For the full set of simulation results for each Afore in table format, please see the Online Appendix Tables 5A and 5B.

Skimmyhorn (2012)). Hastings and Tejeda-Ashton (2008) find that simplified information leads to a 25-50% increase in mean price elasticity measured from stated preferences in a convenience sample of account holders in Mexico. Duarte and Hastings (2012) show that a simplified fee index introduced in the system in 2005 (several years after the inception period we study here) increased sensitivity to that measure of price fourfold or more.

We take these two estimates and interpret them as reflecting a direct change in price sensitivity among the most inelastic quartile of investors. Our counterfactual examines the impact of these or equally potent policies that raise workers' responsiveness to Afores' management costs. To implement this counterfactual, we decrease the coefficient on total costs in the indirect utility function by one standard deviation for the least price sensitive quartile of the population. This increases the mean demand elasticity each Afore faces by between 50 and 75%, which is a substantial but not unreasonable given the results cited above.

Figure VII plots the level changes in equilibrium flow fees and balance fees for each Afore from this "demand side" intervention. The Afore dots are proportional to their baseline average cost (Table II, column 2). The left panel plots fee changes with agentes' impact on preferences held constant; the right panel sets their impact to zero (neutral advertising). Notice from the figure that all firms drop either their flow or balance fees in response to the change in demand; increasing the elasticity of the most inelastic tail of workers moves all firms away from the fee cap. The highest baseline cost firms drop fees the most, particularly in the model with neutralized advertising.[43]

Figure VIII plots, by Afore, the ratio of revenues under our demand side counterfactual to baseline revenues versus the ratio of counterfactual market share to baseline market share. Both axes are in log-scale. The left panel holds advertising at the baseline estimates, while the right panel assumes Neutral Advertising. In the left panel, all Afore revenues fall. Fee decreases outweigh market share gains among those Afores who gain share. In the left panel, revenues at some Afores increase as neutral sales force results in market share gains among firms with small initial shares and sales force. From Figure VII we see that these Afores take some of their increased demand in higher fees and some in increased market share.

Overall we find that increasing demand elasticity among the most inelastic successfully results in a more price-competitive market and substantial decreases in total management costs

[43] The full set of simulation results in table form by Afore are in the Online Appendix Table VI.

paid with and without persuasive advertising. This stands in contrast to supply-side-only interventions, which could lead to higher fees and higher overall costs due to sizeable segments of inelastic demand. Table VII combines the demand and supply side simulations to examine the impact on fees, costs and market shares. Columns 1-3 show the fees and market shares from the baseline model for comparison. Columns 4-7 show how fees, shares and revenues change when we combine our demand-side policy (increasing demand elasticity of the most inelastic quartile) with a competitive government player, XXI, pricing at (0, 0.10) and neutral advertising. These interventions complement each other: total costs to workers (revenues) decline by nearly 70%, and the government player supplies management services to 24% of the market. Firms no longer respond to the government competitor by pricing at the cap to inelastic workers, as there is no longer a sufficient density of them in the market.

While these counterfactual simulations depend on many assumptions about equilibrium conditions and firm strategy, we feel there are several interesting insights from this exercise. First, in safety-net markets with mandatory subscription, the mere presence of a low-priced "public option" may not in fact lower market prices and increase competition. If there is a density of inelastic consumers – either because of persuasive advertising, inherent brand preferences or inattention to prices – private firms may best respond to a government competitor by increasing prices and focusing on a core, captive set of consumers. Policies aimed at increasing demand elasticity in the most inelastic portions of the population (for example, low-income or low-financial literacy) may be necessary to ensure competition, even in the presence of a government competitor. Limiting persuasive effects of advertising could be a key element of that policy, as we find advertising's persuasive effects are strongest among low-income workers, consistent with experimental evidence that low-education workers are most sensitive to framing of management fees.[44]

There are some important caveats to note about these counterfactuals. Actual implementation of such interventions can involve its own costs that we do not model here. Further, agents on either side of the market could respond to such interventions in ways that are outside of the scope of the model, and these responses could have additional costly consequences. Additionally, we note that our calculations above do not say much about consumer welfare if Afores' advertising/marketing efforts were to be curbed. Exposure to a sales

[44] See for example Hastings and Tajeda-Ashton (2008), Hastings and Mitchell (2011).

force can actually raise an investor's utility from using a particular Afore. (We should note, however, that investors' participation in the program is mandatory, thus sales force does not affect participation rates per se.) This feature is built directly into our demand model; agentes' influence on investors' $\delta_{i,j}$ parameters reflects this effect. The fact that we find agente exposure raises investors' brand preference for Afores may be interpreted as agentes acting to raise consumer surplus, in concordance with Becker and Murphy's (1993) view of advertising as a complementary good. However, our counterfactual calculations, which focus on fees, are silent regarding any demand-side benefit provided by agentes.

Nevertheless, particularly in a market such as that for social insurance, the political process may arrive at a different evaluation criterion for an optimal social pension system. The system is itself forced-savings for retirement to insurance against poverty in old age. If policymakers focus on the net cost of delivering these portfolio management services (of which the major component is the total fees paid by investors), for example, a shift towards policies that increase price competition in the market would be viewed favorably under this criterion.

6 Discussion and Conclusion

We have used a new data set with rich detail on pension fund choices in Mexico's privatized social security system to examine how advertising can affect prices, competition, and efficiency in a private pension market. The system's inception gives us a unique opportunity to examine the role advertising can play in one of the most important markets for policy debates. Firms set market-wide prices, but choose sales force locally. Using measures of sales force exposure we estimate a very flexible model of demand for fund managers, and find that advertising was a key competitive channel used to gain customers by increasing brand value and decreasing price sensitivity.

Mexican regulators at the time made an explicit decision to follow a hands-off approach; they provided no information on fees nor did they regulate communication or advertising by the Afores. The expectation was, with such a large number of players (17 firms) selling what financially speaking were essentially homogeneous products, that competitive pressure would lead to price-driven competition for accounts in a market awash with information. We find that competition with advertising instead led to lower price sensitivities, especially among lower-

wage workers. Rather than serving to inform workers about the effective prices of the options available to them, advertising served to foster stronger brand preferences and weaken substitution motives. As a result, prices were at levels well above marginal cost.

We explored whether two hypothetical policies would foster greater price competition. One focused on the supply side of the market by having the existing government-co-branded fund manager act as a low-cost public option. The demand-side policy simulated the effect of an increase in workers' sensitivity to price differences across account managers. Perhaps surprisingly, the supply-side intervention had little impact on average fees in isolation. The reason is that there are enough inelastic workers in the market to cause firms to respond to the low-cost producer by raising fees and focusing on the price-insensitive segment of the market. On the other hand, a demand-side policy that increases workers' price elasticity of demand would lead to a considerable decrease in fees, as more elastic consumers raise firms' incentives to compete on a price basis. We find the greatest impact on fees when we combine these policies. They are complements because when consumers are more price-sensitive, there is no longer an incentive for firms to respond to a government competitor by raising prices to sell to inelastic customer segments.

Our analysis demonstrates that, even in a market with a large number of firms and financially homogeneous products, price competition need not be intense in the face of advertising-driven differentiation. Given that this market – the Mexican social security retirement system – is an example of the privatization of pension systems that have been proposed in many countries, there are important policy implications of our findings. The results here indicate that, to the extent policymakers care about the total costs paid to operate a privatized system, it may be necessary to do more than simply set up a market with several players and free information flows. If firms can find other ways to compete than on price, they will, and it is apparent that the structures of preferences and advertising technologies in the Mexican market allowed them to channel competitive efforts into brand-oriented advertising that served to make workers even less price sensitive. At the same time, our findings suggest that merely creating a low-cost public option will not necessarily foster price competition. Instead, demand-side efforts that raise workers' sensitivity to the costs they pay for management of their accounts are the most fruitful interventions.

References

Abaluck, Jason and Jonathan Gruber. "Choice Inconsistencies among the Elderly: Evidence from Plan Choice in the Medicare Part D Program," *American Economic Review*, 101(4), 2011, 1180-1210.

Ausubel, Lawrence M., "The Failure of Competition in the Credit Card Market," *American Economic Review*, 81(1), 1991, 50-81.

Bagwell, Kyle, "The Economic Analysis of Advertising," *Handbook of Industrial Organization*, 3(28), 2007, 1701-1845.

Becker, Gary and Kevin Murphy, "A Simple Theory of Advertising as a Good or Bad," *Quarterly Journal of Economics*, 108(4), 1993, 941-964.

Benham, Lee. "The Effect of Advertising on the Price of Eyeglasses." *Journal of Law and Economics*, 15(2), 1972, 337-32.

Butters, Gerard R., "Equilibrium Distributions of Sales and Advertising Prices," *Review of Economic Studies*, 44(3), 1977, 465-91.

Chintagunta Pradeep K. and Ramarao Desiraju, "Strategic Pricing and Detailing Behavior in International Markets," *Marketing Science*, 24(1), 2005, 67-80.

Chioveanu, Ioana, "Advertising, Brand Loyalty and Pricing," *Games and Economic Behavior*, 64(1), 2008, 68-80.

Choi, James J., Justine S. Hastings and Unika Shrestha, "The Impact of Risk and the Financial Crisis on Perceptions of Privatized Social Security and Retirement Planning." NBER SSRRC working paper, September 2012.

Choi, James J., David Laibson, Brigitte C. Madrian, and Andrew Metrick, "Reinforcement Learning and Savings Behavior." *Journal of Finance*, 64(6), 2009, 2515-2533.

Choi, James J., David Laibson, and Brigitte C. Madrian, "Why Does the Law of One Price Fail? An Experiment on Index Mutual Funds," *Review of Financial Studies*, 23(4), 2010, 1405-1432.

Cronqvist, Henrik. "Advertising and Portfolio Choice." *Working Paper*, 2006.

Duarte, Fabian and Justine Hastings, "Fettered Consumers and Sophisticated Firms: Evidence from Mexico's Privatized Social Security Market," NBER Working Paper 18582, 2012.

Einav, Liran, Amy Finkelstein, Stephen P. Ryan, Paul Schrimpf, and Mark R. Cullen, "Selection on Moral Hazard in Health Insurance," National Bureau of Economic Research, 2011.

Ellison, Glenn, "A Model of Add-on Pricing," *Quarterly Journal of Economics*, 120(2), 2005, 585-637.

Ellison, Glenn, "Bounded Rationality in Industrial Organization," MIT and NBER, 2006.

Feldstein, Martin S., "Structural Reform of Social Security," *Journal of Economic Perspectives*, 19(2), 2005, 33-55.

Gabaix, Xavier, and David Laibson, "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets," *Quarterly Journal of Economics*, 121(2), 2006, 505-40.

Glazer, Amihai and Henry McMillan, "Pricing by the Firm Under Regulatory Threat," *Quarterly Journal of Economics*, 107(3), 1992, 1089-1099.

Grossman, Gene M. and Carl Shapiro, "Informative Advertising with Differentiated Products," *Review of Economic Studies*, 51(1), 1984, 63-81.

Grubb, Michael D. and Matthew Osborne, "Cellular Service Demand: Biased Beliefs, Learning, and Bill Shock". manuscript, MIT, 2012.

Hall, Robert E. and Susan Woodward, "Diagnosing Consumer Confusion and Sub-Optimal Shopping Effort: Theory and Mortgage-Market Evidence," *American Economic Review*, 102(7), 2012, 3249-3276.

Handel, Benjamin, "Adverse Selection and Inertia in Health Insurance Markets: When Nudge Hurts," NBER Working Paper 17459, 2012.

Hastings, Justine S. and Lydia Tejeda-Ashton, "Financial Literacy, Information, and Demand Elasticity: Survey and Experimental Evidence from Mexico." NBER Working Paper 14538, 2008.

Hastings, Justine S. "Investor Decisions and the Financial Crisis in Mexico's Privatized Social Security Market." NBER RRC Working Paper, 2010.

Hastings, Justine S. and Olivia S. Mitchell. "How Financial Literacy and Impatience Shape Retirement Wealth and Investment Behaviors." NBER Working Paper 16740, 2011.

Hastings, Justine S., "La Encuesta de Empleo, Retiro y Ahorro: Whitebook and Survey Results from Mexico's First Social Security Household Survey." Unpublished Manuscript, Brown University, 2013.

Hastings, Justine S., Brigitte C. Madrian, and Bill Skimmyhorn, "Financial Literacy, Financial Education and Economic Outcomes," NBER Working Paper 18412, 2012.

Heiss, Florian, Daniel McFadden, and Joachim Winter, "Mind the Gap! Consumer Perceptions and Choices of Medicare Part D Prescription Drug Plans," in *Research Findings in the Economics of Aging*, David A. Wise, ed., Chicago, IL: University of Chicago Press, National Bureau of Economic Research, 2010.

Hortaçsu, Ali and Chad Syverson, "Product Differentiation, Search Costs, and Competition in the Mutual Fund Industry: A Case Study of S&P 500 Index Funds," *Quarterly Journal of Economics*, 119(2), 2004, 403-456.

Jiang, Lia, "The Welfare Effects of "Bill Shock" Regulation in Mobile Telecommunication Markets," Unpublished manuscript, 2012.

Kling, Jeffrey, Sendhil Mullainathan, Eldar Shafir, Lee Vermeulen, and Marian V. Wrobel, "Misperception in Choosing Medicare Drug Plans," Working Paper, 2009.

Milyo, Jeffrey and Joel Waldfogel, "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart," *American Economic Review*, 89(5), 1999, 1081-1096.

Miravete, Eugenio J., "Choosing the Wrong Calling Plan? Ignorance and Learning," *American Economic Review*, 93(2003), 297-310.

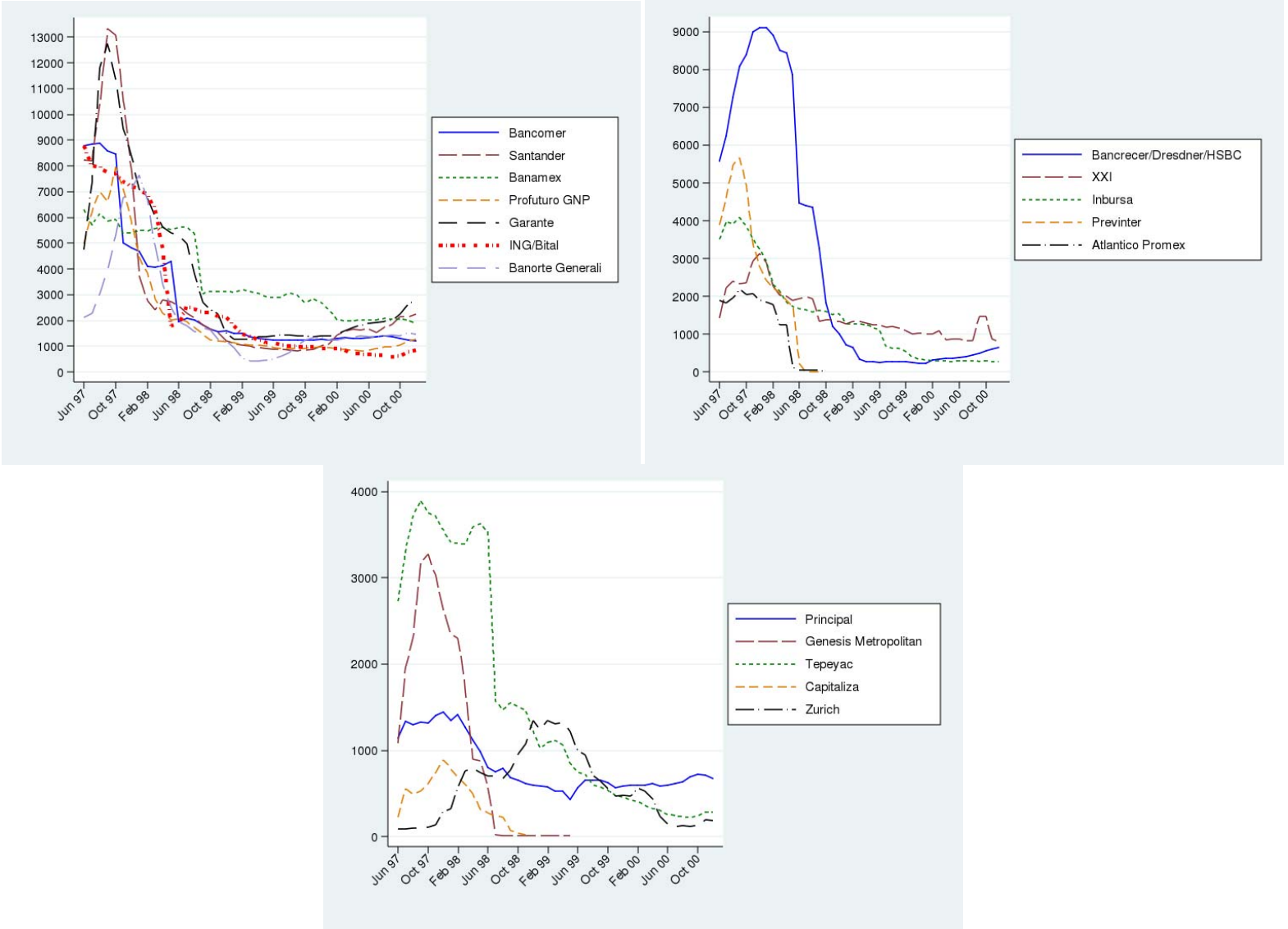
Sandoval, Héctor, "Analysis of the Pension Reform in Mexico," Waterloo, Canada: University of Waterloo, 2004.

Schmalensee, Richard, "A Model of Promotional Competition in Oligopoly," *Review of Economic Studies*, 43(3), 1976, 493-507.

Stango, Victor, "Strategic Responses to Regulatory Threat in the Credit Card Market," *Journal of Law and Economics*, 46(2), 2003, 427-452.

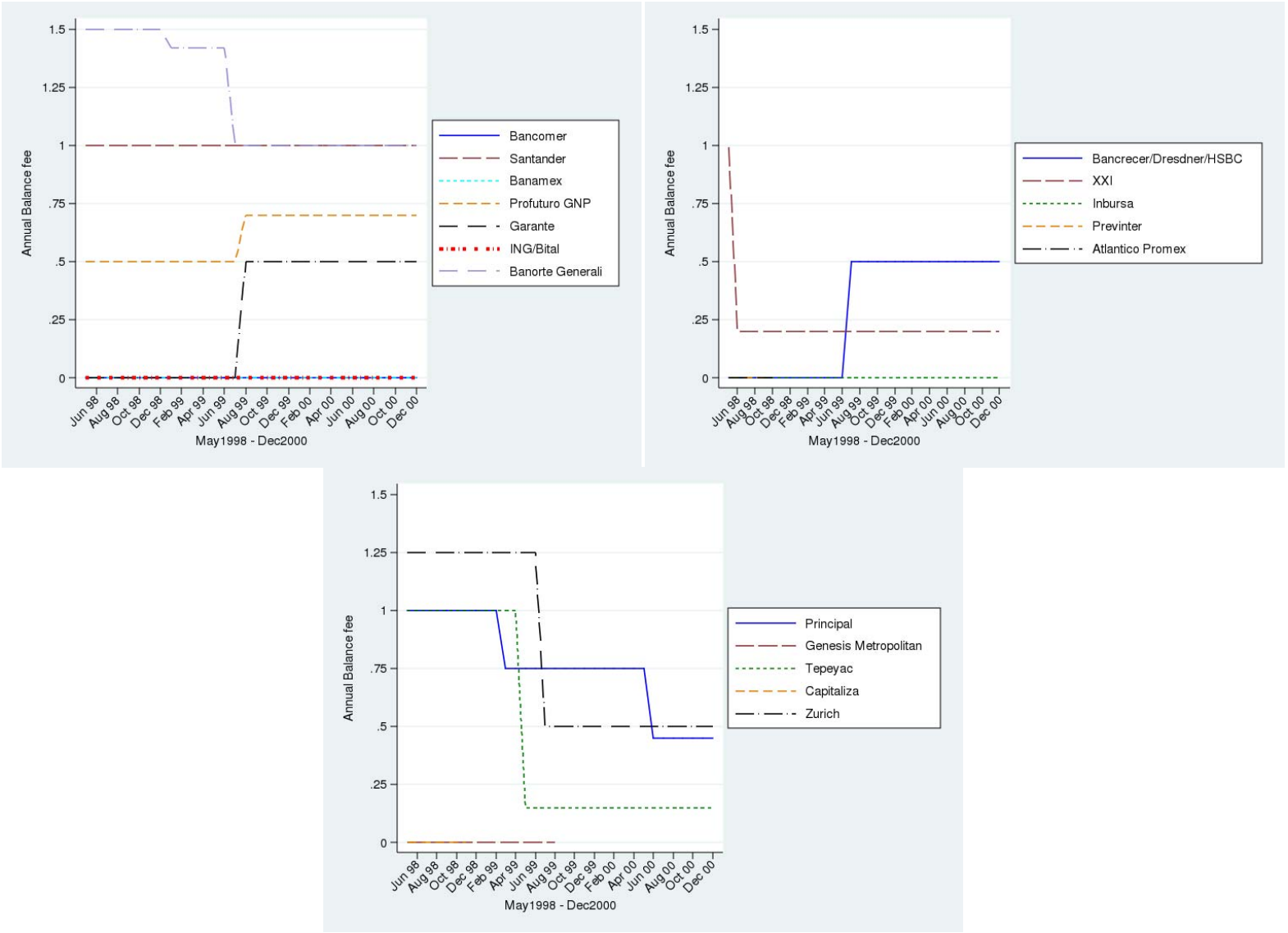
Waldfogel, Joel, "The Tyranny of the Market," Cambridge, MA: Harvard University Press, 2007.

FIGURE I: NUMBER OF AGENTE PROMOTORES ACTIVE IN THE MARKET



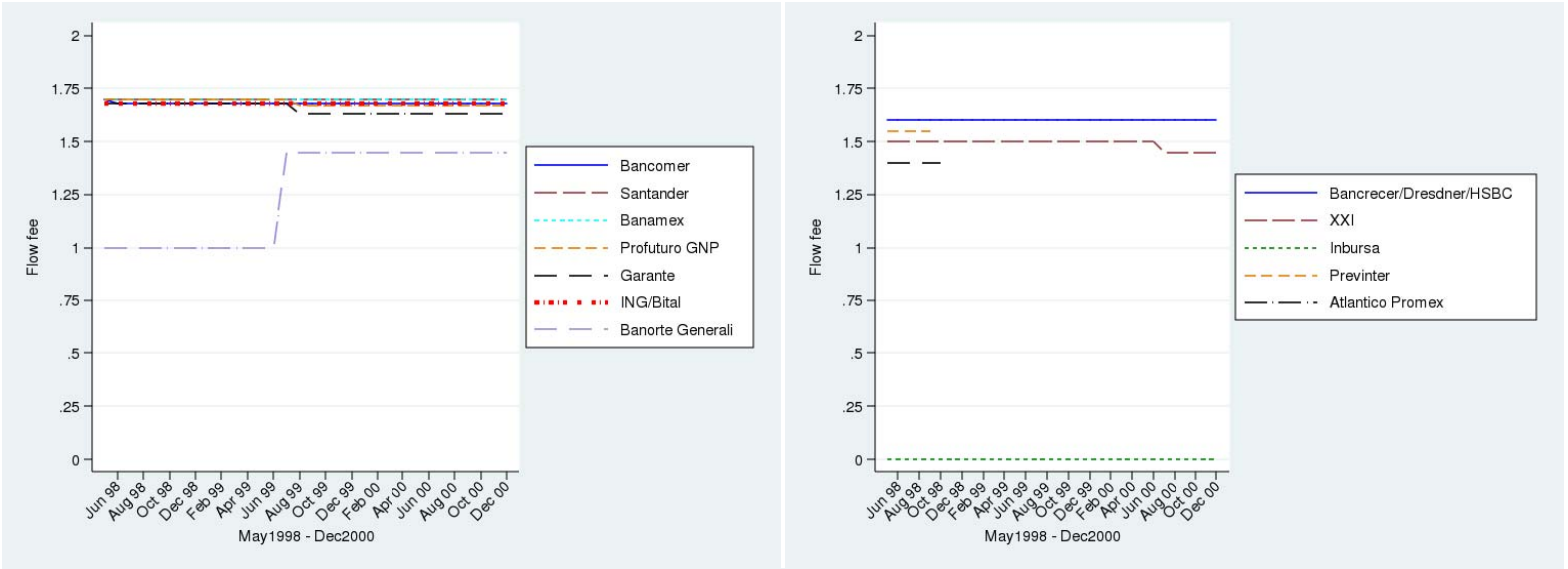
Note: Data from official Agente Registration panel from CONSAR. Data record each Agente Promotor, their current status and the Afore for whom they are working.

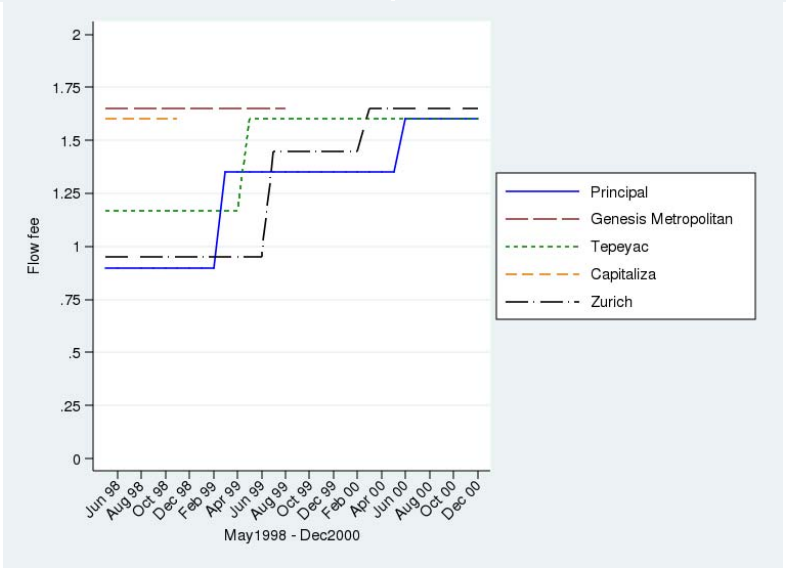
FIGURE IIA: AFORE BALANCE FEES OVER TIME



Note: Annual balance fees for Afores shown from May 1998 to December 2000.

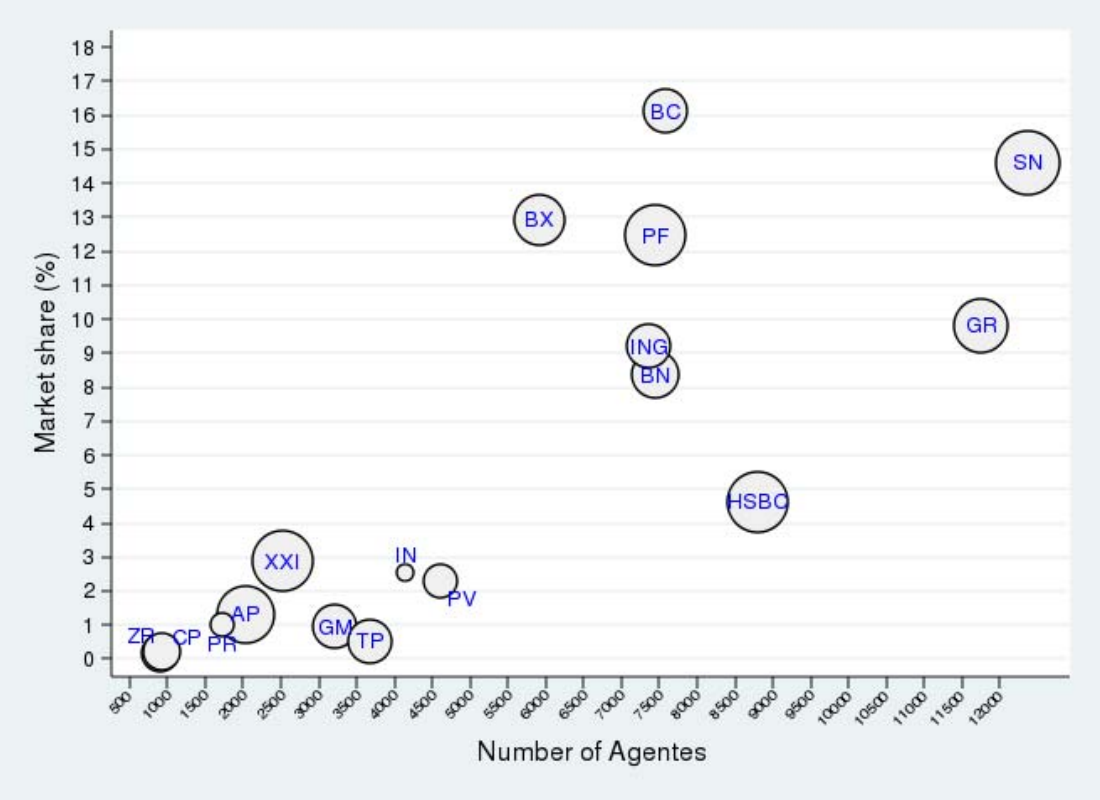
FIGURE IIB: AFORE FLOW FEES OVER TIME





Note: Flow fees for Afores reported as a percentage of salary from May 1998 to December 2000.

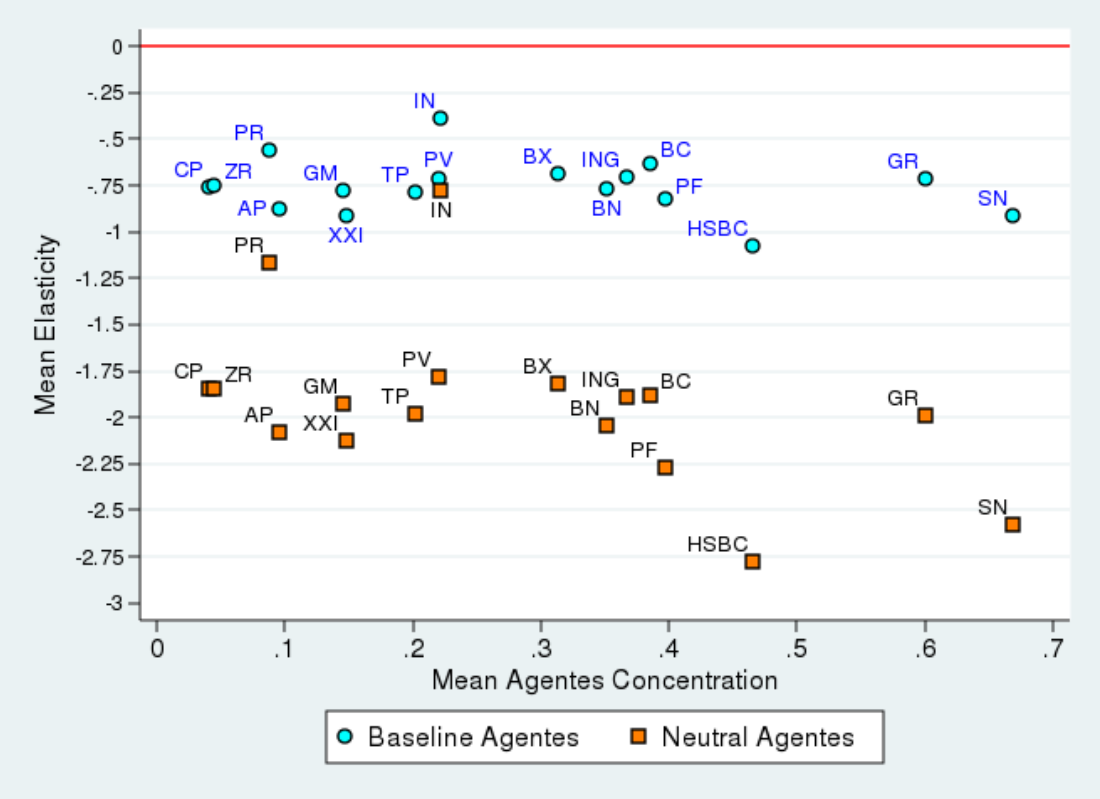
FIGURE III:
MARKET SHARE vs. AGENTES



Afore Legend:		
AP-Atlantico Promex	GR-Garante	PV-Previnter
BC-Bancomer	HSBC-Bancrecer/Dresdner/HSBC	SN-Santander
BN-Banorte Generali	IN-Inbursa	TP-Tepeyac
BX-Banamex	ING-ING / Bital	XXI-XXI
CP-Capitaliza	PF-Profuturo GNP	ZR-Zurich
GM-Genesis Metropolitan	PR-Principal	

Note: Each marker represents an Afore's market share at inception. Markers are weighted by mean Afore rank based on average expected cost per account in the system from Table II column 2. Projected costs over 10 years were calculated for each worker using their actual contributions, initial balance and wages recorded in the administrative data from 1997-2007, assuming that Afore fees were held constant going forward. Expected costs for each worker were then calculated by averaging projected costs in each year over workers with similar baseline characteristics. All costs are calculated using a 10% random sample.

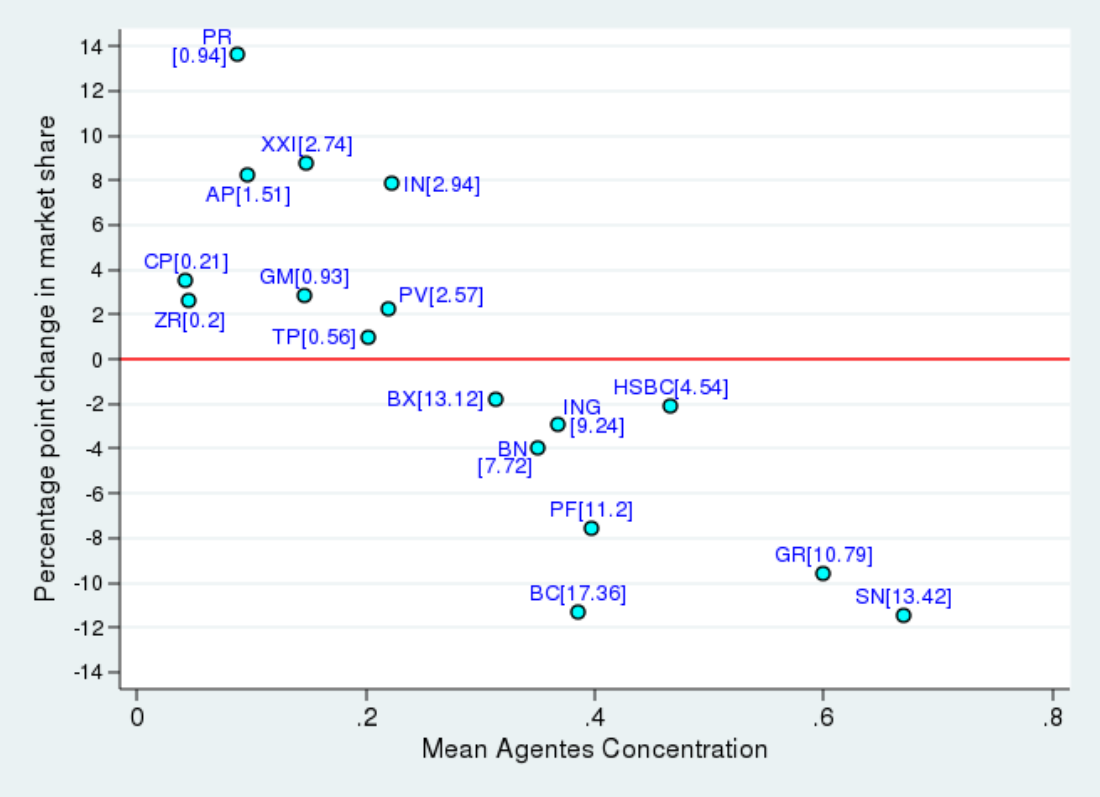
FIGURE IV:
MEAN ELASTICITY: BASELINE vs. NEUTRAL AGENTES



Afore Legend:		
AP-Atlantico Promex	GR-Garante	PV-Previnter
BC-Bancomer	HSBC-Bancrecer/Dresdner/HSBC	SN-Santander
BN-Banorte Generali	IN-Inbursa	TP-Tepeyac
BX-Banamex	ING-ING / Bital	XXI-XXI
CP-Capitaliza	PF-Profuturo GNP	ZR-Zurich
GM-Genesis Metropolitan	PR-Principal	

Note: Elasticities are calculated at the observed fee levels and individual characteristics. Elasticities in the Baseline Agentes model are calculated using estimates from equation 2 to generate the logit choice probability for each individual for each Afore. Elasticities for the Neutral Agentes model use estimates for demand parameters with neutral agentes from equations 2, 3, and 4. Calculations are based on a 10% random sample of system affiliates.

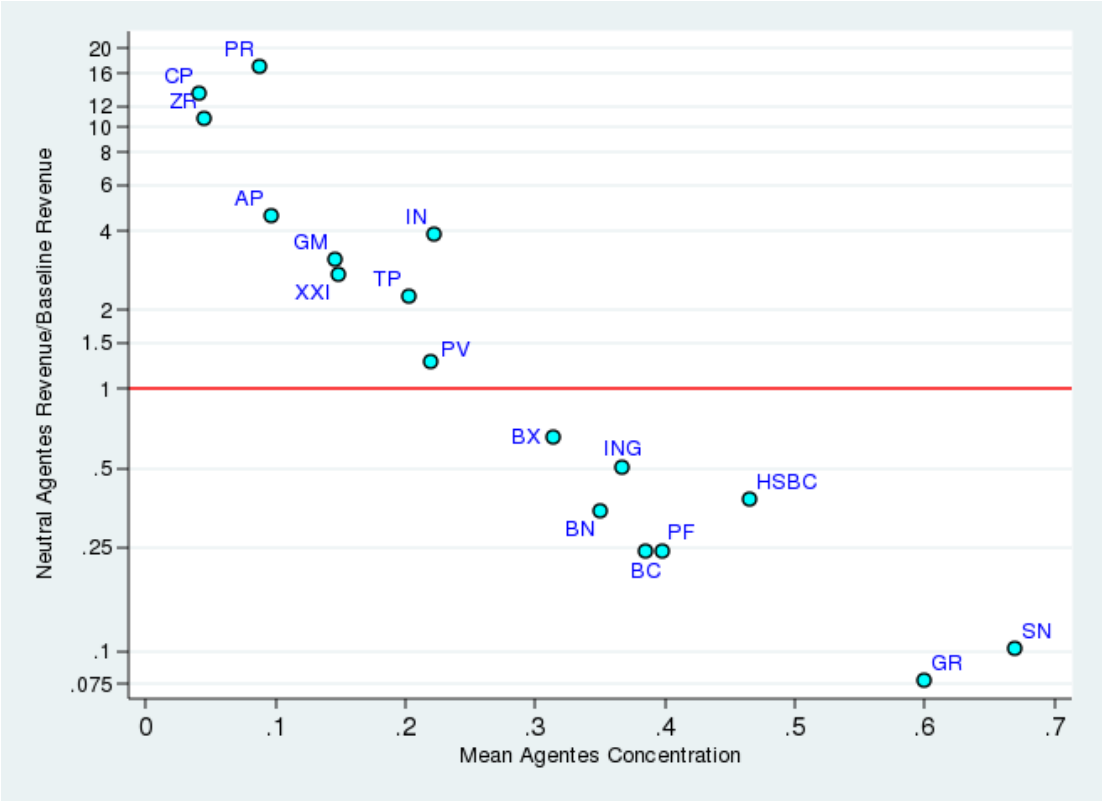
FIGURE V:
CHANGE IN SHARES vs. AGENTE CONCENTRATION



Afore Legend:		
AP-Atlantico Promex	GR-Garante	PV-Previnter
BC-Bancomer	HSBC-Bancrecer/Dresdner/HSBC	SN-Santander
BN-Banorte Generali	IN-Inbursa	TP-Tepeyac
BX-Banamex	ING-ING / Bital	XXI-XXI
CP-Capitaliza	PF-Profuturo GNP	ZR-Zurich
GM-Genesis Metropolitan	PR-Principal	

Note: (%) Market share in the Baseline Agentes model shown in brackets. Market shares in the Baseline Agentes model are calculated using the estimates from equation 2 to generate the logit choice probability for each individual for each Afore. Market shares for the Neutral Agentes model use estimates for demand parameters with neutral agentes from equations 2, 3, and 4. Calculations are based on a 10% random sample of system affiliates.

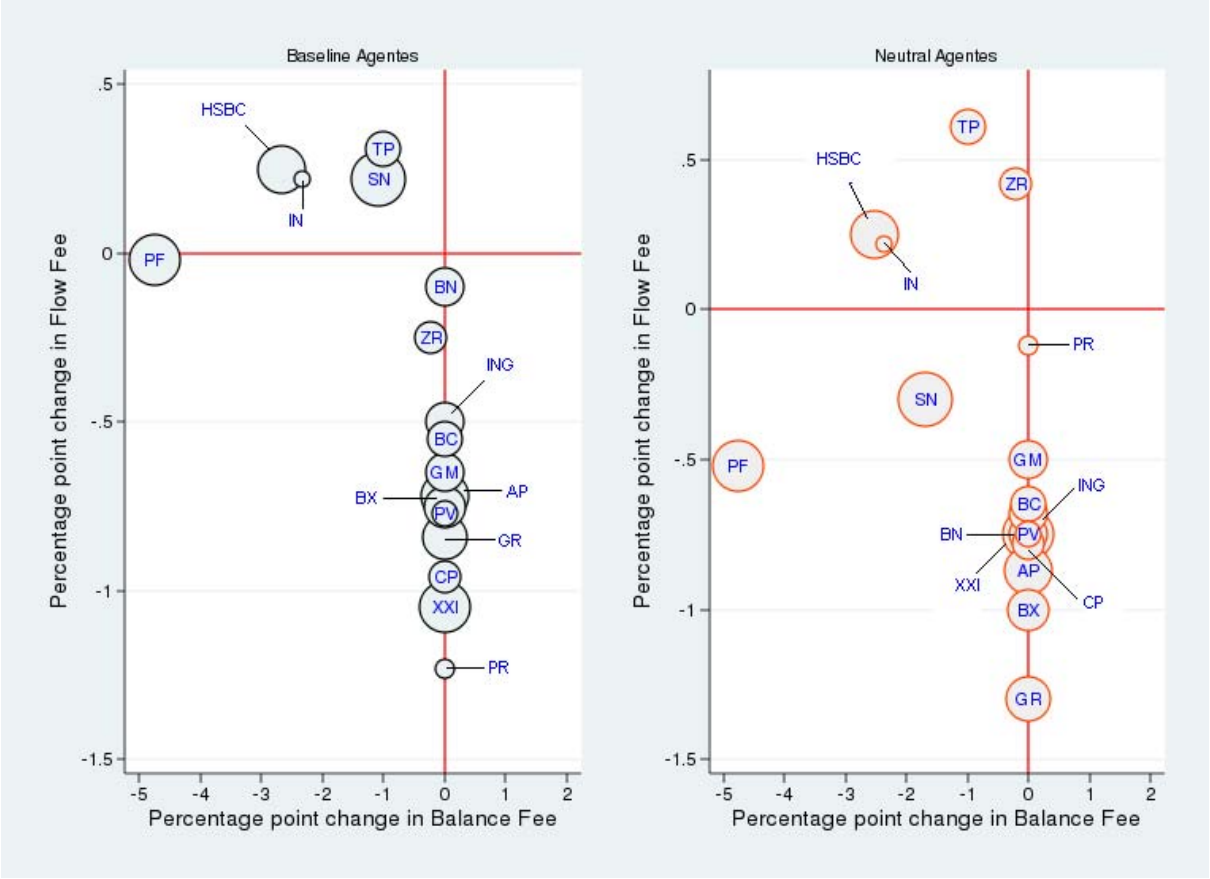
FIGURE VI:
CHANGE IN REVENUE vs. AGENTE CONCENTRATION



Afore Legend:		
AP-Atlantico Promex	GR-Garante	PV-Previnter
BC-Bancomer	HSBC-Bancrecer/Dresdner/HSBC	SN-Santander
BN-Banorte Generali	IN-Inbursa	TP-Tepeyac
BX-Banamex	ING-ING / Bital	XXI-XXI
CP-Capitaliza	PF-Profuturo GNP	ZR-Zurich
GM-Genesis Metropolitan	PR-Principal	

Note: Expected revenues are calculated at the observed fee levels. Expected revenues in the Baseline Agentes model are calculated using expected cost and the estimates from equation 2 to generate the logit choice probability for each individual for each Afore. Expected revenues for the Neutral Agentes model use expected cost and estimates for demand parameters with neutral agentes from equations 2, 3, and 4. For each worker, expected costs are calculated by averaging projected costs, calculated using actual contributions, initial balance and wages over a 10 year period, in each year over workers with similar baseline characteristics. Calculations are based on a 10% random sample of system affiliates.

FIGURE VII:
EQUILIBRIUM CHANGE IN FEES WITH INCREASED PRICE SENSITIVITY



Afore Legend:		
AP-Atlantico Promex	GR-Garante	PV-Previnter
BC-Bancomer	HSBC-Bancrecer/Dresdner/HSBC	SN-Santander
BN-Banorte Generali	IN-Inbursa	TP-Tepeyac
BX-Banamex	ING-ING / Bital	XXI-XXI
CP-Capitaliza	PF-Profuturo GNP	ZR-Zurich
GM-Genesis Metropolitan	PR-Principal	

Note: Equilibrium fees are calculated from an iterated best response method using a random sample of 80,229 workers plus a proportional random sample of new workers who entered the market over time, to capture growth forecasts in market size. These calculations use a new price-sensitivity parameter, $\alpha_c^{new} = \alpha_c - \sigma_\alpha I_{\{\alpha_c \geq \alpha_{75}\}}$; where, σ_α is the standard deviation of the estimated price sensitivity parameter, α_{75} its 75th percentile and I denotes the indicator function. Markers are weighted by mean Afore rank based on average cost per account in the system from Table II column 2. Cost calculations are discounted at a 5% rate in the equilibrium fee calculation. See Online Appendix for details on the iterated best response method.

FIGURE VIII:
CHANGE IN REVENUES – CURRENT vs. NEUTRAL ADVERTISING

Afore Legend:		
AP-Atlantico Promex	GR-Garante	PV-Previnter
BC-Bancomer	HSBC-Bancrecer/Dresdner/HSBC	SN-Santander
BN-Banorte Generali	IN-Inbursa	TP-Tepeyac
BX-Banamex	ING-ING / Bital	XXI-XXI
CP-Capitaliza	PF-Profuturo GNP	ZR-Zurich
GM-Genesis Metropolitan	PR-Principal	

Note: Equilibrium fees are calculated from an iterated best response method using a random sample of 80,229 workers plus a proportional random sample of new workers who entered the market over time, to capture growth forecasts in market size. These calculations use a new price-sensitivity parameter, $\alpha_c^{new} = \alpha_c - \sigma_\alpha I_{\{\alpha_c \geq \alpha_{75}\}}$; where, σ_α is the standard deviation of the estimated price sensitivity parameter, α_{75} its 75th percentile and *I* denotes the indicator function. Cost calculations are discounted at a 5% rate in the equilibrium fee calculation. Revenues are calculated over the full account horizon. See Online Appendix for details on the iterated best response method.

TABLE I: DESCRIPTIVE STATISTICS OF AFORES AT THE INCEPTION OF MARKET

Afore	Flow fee	Implied Load on Contributions	Balance fee	Share of Accounts	Number of Agentes
Santander	1.70%	26.15%	1.00%	14.60%	12,361
Garante	1.68%	25.85%	0.00%	9.83%	11,756
Bancrecer/ Dresdner/HSBC	0.00%	0.00%	4.75%	4.62%	8,804
Bancomer	1.70%	26.15%	0.00%	16.12%	7,583
Profuturo GNP	1.70%	26.15%	0.50%	12.45%	7,443
Banorte Generali	1.00%	15.38%	1.50%	8.35%	7,440
ING / Bital	1.68%	25.85%	0.00%	9.21%	7,369
Banamex	1.70%	26.15%	0.00%	12.94%	5,914
Previnter	1.55%	23.85%	0.00%	2.28%	4,614
Inbursa	0.00%	0.00%	1.57%	2.52%	4,150
Tepeyac	1.17%	18.00%	1.00%	0.52%	3,685
Genesis Metropolitan	1.65%	25.38%	0.00%	0.94%	3,213
XXI	1.50%	23.08%	0.99%	2.88%	2,521
Atlantico Promex	1.40%	21.54%	0.95%	1.32%	2,045
Principal	0.90%	13.85%	1.00%	1.01%	1,732
Capitaliza	1.60%	24.62%	0.00%	0.23%	925
Zurich	0.95%	14.62%	1.25%	0.18%	910
Total				100%	92,465

Note: Share of accounts is calculated using all account holders as of June 2006 who entered the SAR 1997 system before June 1998. Santander is a Spanish financial group. Garante is a Mexican insurance and financial group. Bancrecer/Dresdner/HSBC is an international financial group. Bancomer is the second largest Mexican bank. Profuturo GNP is a Mexican insurance group. Banorte Generali is a joint venture between a large northern Mexican bank, Banorte and the largest Italian insurance company, Assicurazioni Generali S.p.A. ING/Bital is an international financial group. Banamex is the largest Mexican bank. Previnter is a France-based international insurance company, acquired by Profuturo GNP in late 1998. Inbursa is the financial arm of Telcel magnate's Slim Corporation. Tepeyac is a Mexican insurance company. Genesis Metropolitan is owned by the US-based insurance company, Metropolitan Life. It was acquired by Santander in late 1998. XXI is the Afore branded by IMSS, the former pension system administrator. Atlantico Promex is a Mexican financial group which was acquired by Principal in late 1998. Principal is an international financial group. Capitaliza is a Mexican financial group and was acquired by Inbursa in late 1998. Zurich is an international commercial insurance company.

TABLE II: DESCRIPTIVE STATISTICS OF AFFILIATES BY AFORE

Afore	Mean rank for own clients	Mean rank over system	Mean savings, days of wages	SD savings, days of wages	Mean daily wage of clients (1997 pesos)	Fraction of clients who are male
Santander	16.51	16.46	42.39	299.00	60.66	0.71
Garante	11.15	11.02	31.01	143.57	76.92	0.69
Bancrecer/ Dresdner/HSBC	14.23	14.15	59.97	1100.39	69.48	0.69
Bancomer	7.43	7.60	29.32	45.00	109.81	0.67
Profuturo GNP	14.41	14.35	34.35	115.56	59.69	0.71
Banorte Generali	8.04	9.23	34.70	153.15	64.30	0.68
ING / Bital	8.07	8.01	29.61	103.51	74.09	0.65
Banamex	9.71	10.02	28.22	38.34	97.34	0.67
Previnter	4.09	4.16	25.24	77.44	99.51	0.65
Inbursa	1.21	1.34	0.48	6.03	217.89	0.65
Tepeyac	7.19	7.62	26.88	26.51	70.32	0.71
Genesis Metropolitan	8.10	7.91	26.42	86.04	63.20	0.65
XXI	14.84	14.83	39.58	48.49	121.28	0.57
Atlantico Promex	13.02	12.92	39.57	145.09	72.79	0.66
Principal	2.36	2.33	11.59	39.33	78.63	0.67
Capitaliza	6.05	5.51	22.35	14.42	103.44	0.66
Zurich	5.91	5.55	26.22	11.93	95.67	0.83
Total			32.77	273.56	85.44	0.68

Note: Afore rank is based on expected costs. For each worker, expected costs are calculated by averaging projected costs, calculated using actual contributions, initial balance and wages over a 10 year period, in each year over workers with similar baseline characteristics. The Online Appendix provides details on the expected cost estimation. Savings in days of wages is the number of days' wages that a worker could save if she/he switched from their current Afore to the Afore with the lowest expected cost. Calculations are based on a 10% random sample of system affiliates.

TABLE III: REGRESSIONS OF PRICE SENSITIVITIES ON MEASURES OF LOCAL SALES FORCE

	(1) OLS	(2) OLS
Dependent variable	α_c	α_c
Municipality total agentes per 1000 social security accounts	4.57e-05***	9.36e-05**
	(1.19e-05)	(4.16e-05)
(Municipality total agentes per 1000 social security accounts)^2		-3.97e-06
		(2.72e-06)
Constant	-0.000606***	-0.000719***
	(8.13e-05)	(0.000141)
Observations	3,699	3,699
R-squared	0.01	0.012
% Impact of 1 SD increase in sales force	0.294	0.317
SE of Impact	0.0638	0.0803
Peak		11.80

Note: Standard errors are clustered at the municipality level. Significance levels denoted by: ***p<0.01, **p<0.05, *p<0.1. Impact of 1 SD increase in sales force is measured as the percentage change in the price-sensitivity parameter (α_c) with an increase in mean agentes by 1 SD. Peak is the value that maximizes α_c given the quadratic fit.

TABLE IV: EFFECT OF SALES AGENTES ON BRAND VALUE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	IV	IV	IV	IV	IV
Dependent variables	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$
Municipality agentes for Afore j per 1000 social security accounts	7.601***	17.99***	10.37***	33.18***	12.79***	12.66***	12.87***
	(0.538)	(0.873)	(0.221)	(1.253)	(0.109)	(0.109)	(0.110)
(Municipality agentes for Afore j per 1000 social security accounts)^2		-8.196***		-19.93***			
		(0.685)		(1.053)			
Municipality agentes for Afore j per 1000 social security accounts X cell level mean wage							-0.000692***
							(4.92e-05)
Constant	-4.892***	-6.316***	-5.612***	-8.441***	-6.240***	-6.207***	-6.239***
	(0.140)	(0.134)	(0.0606)	(0.168)	(0.0346)	(0.0344)	(0.0346)
Observations	59,184	59,184	59,184	59,184	59,184	59,184	59,184
Number of cells	3,699	3,699	3,699	3,699	3,699	3,699	3,699
R-squared	0.243	0.329	0.145	0.0671	0.0893	0.0931	0.0889
Peak		1.097		0.832			
Cell FEs	Y	Y	Y	Y	Y	Y	Y
Instruments			Neighbor cell revenue by afore	Neighbor cell revenue by afore and its square	Neighbor cell revenue by afore interacted with afore FEs, Afore FEs	Neighbor cell wages interacted with afore FEs, Afore FEs	Neighbor cell revenue interacted with afore FEs, Afore FEs, All interacted with cell mean wage

Note: Significance levels denoted by: ***p<0.01, **p<0.05, *p<0.1. Standard errors in columns (1) & (2) are clustered at the municipality level.

TABLE V: RATIONALIZING OBSERVED BALANCE AND FLOW FEES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							Base Model				
		Observed		Equilibrium (10 yr horizon)			Equilibrium (fitted horizon)				
	Flow	Balance	Market	Flow	Balance	Market	Flow	Balance	Market	Fitted	Observed
Afore:	(%)	(%)	Share (%)	(%)	(%)	Share (%)	(%)	(%)	Share (%)	Years	Years
Genesis Metropolitan	1.65	0.00	0.93	2.00	4.75	0.73	2.00	0.00	0.93	7	2.17
Zurich	0.95	1.25	0.20	0.12	2.07	0.27	0.93	0.22	0.26	9	4.59
Tepeyac	1.17	1.00	0.55	0.03	2.55	0.70	0.62	1.00	0.72	9	5.67
XXI	1.50	0.99	2.75	0.00	3.75	3.15	1.90	0.00	2.87	7	10.00
Banorte Generali	1.00	1.50	7.69	2.00	4.75	6.03	2.00	0.00	7.82	7	10.00
Bancrecer/Dresdner/HSBC	0.00	4.75	4.62	0.20	3.65	5.86	0.03	4.75	5.49	10	10.00
Profuturo GNP	1.70	0.50	11.10	0.40	4.05	12.09	2.00	4.75	9.01	8	10.00
Atlantico Promex	1.40	0.95	1.52	0.12	3.22	1.81	1.72	0.00	1.70	7	1.25
Principal	0.90	1.00	1.00	2.00	4.75	0.62	2.00	0.00	0.80	6	10.00
Santander	1.70	1.00	13.30	0.52	3.77	16.22	1.50	1.78	15.54	9	10.00
Previnter	1.55	0.00	2.52	0.20	2.67	2.90	1.52	0.00	2.70	4	1.25
ING/Bital	1.68	0.00	9.16	0.50	3.67	9.33	2.00	0.00	9.27	8	10.00
Capitaliza	1.60	0.00	0.22	0.25	2.50	0.25	1.48	0.00	0.24	4	1.42
Garante	1.68	0.00	10.68	0.50	3.40	11.08	1.92	0.00	10.94	8	4.59
Inbursa	0.00	1.57	3.52	0.25	2.60	2.04	0.25	2.83	1.90	10	10.00
Banamex	1.70	0.00	13.10	0.55	4.05	12.35	2.00	0.00	12.86	7	10.00
Bancomer	1.70	0.00	17.12	0.93	4.75	14.57	2.00	0.00	16.96	6	10.00
Correlation w. observed				0.05	-0.06	0.98	0.80	0.63	0.99	0.45	

Note: Equilibrium and market share calculations are based on a 80,229 random sample plus a proportional random sample of new workers who entered the market over time, to capture growth forecasts in market size. Equilibrium fees are calculated from an iterated best response method where best response methods are calculated over a 0.00025 grid-level increment. See Online Appendix for details on iterated best response method. Market shares are calculated using estimates from equation 2 with costs calculated over the whole account horizon and discounted at a 5% rate to generate the logit choice probability for each individual for each Afore. Observed years in column (11) are truncated at 10 years.

TABLE VI: SUMMARY OF DISCONTINUOUS RESPONSES TO GOVERNMENT COMPETITOR

	Base Model	Cap at (3.20, 5.00)	Cap at (3.20, 10.00)
Advertising held fixed			
XXI price	(1.90, 0.00)	(0.00, 0.10)	(0.00, 0.10)
XXI share	2.87	6.54	6.74
Market share of firms at Cap	--	22.46	22.60
% of firms at Cap	--	29.41	23.53
Change in total cost	--	4.10	8.98
Neutral Advertising			
XXI price	(1.90, 0.00)	(0.00, 0.10)	(0.00, 0.10)
XXI share	2.87	30.76	31.73
Market share of firms at Cap	--	36.31	34.17
% of firms at Cap	--	41.18	41.18
Change in total cost	--	-29.02	-24.18

Note: Equilibrium calculations are based on a 80,229 random sample plus a proportional random sample of new workers who entered the market over time, to capture growth forecasts in market size. Equilibrium fees are calculated from an iterated best response method using a 0.00025 grid for the base model while for the models with raised caps, equilibrium fees are calculated from an iterated best response method using a 0.0005 grid. See Online Appendix for details on iterated best response method. Cost is calculated over the whole account horizon and discounted at a 5% rate. A firm is at the cap if either equilibrium flow or balance fee is set at the maximum level. Share of firms at Cap denotes the total predicted market share of the Afores at the cap. Full results by Afore are available in the Online Appendix Tables VA & VB.

TABLE VII: SIMULATIONS WITH COMBINED SUPPLY-SIDE AND DEMAND-SIDE POLICIES

	Base Model			Increased Price Sensitivity + Government Firm Competes + Neutral Advertising			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Afore	Flow	Balance	Share (%)	% Change in Flow fee	% Change in Balance fee	% Change in Market share	% Change in cost from Base Model
Genesis Metropolitan	2.00	0.00	0.93	-0.47	0.00	282.29	91.89
Zurich	0.93	0.22	0.26	0.20	-0.05	938.77	442.42
Tepeyac	0.62	1.00	0.72	0.42	-0.57	117.42	19.26
XXI	1.90	0.00	2.87	-1.90	0.01	850.28	-96.88
Banorte Generali	2.00	0.00	7.82	-0.57	0.00	-50.53	-78.01
Bancrecer/Dresdner/HSBC	0.03	4.75	5.49	0.52	-2.67	-42.10	-71.41
Profuturo GNP	2.00	4.75	9.01	-0.38	-4.75	-57.58	-84.40
Atlantico Promex	1.72	0.00	1.70	-0.22	0.00	514.58	195.40
Principal	2.00	0.00	0.80	-0.17	0.00	934.54	404.73
Santander	1.50	1.78	15.54	-0.17	-1.38	-85.28	-93.30
Previnter	1.52	0.00	2.70	-0.12	0.00	52.83	-35.66
ING/Bital	2.00	0.00	9.27	-0.42	0.00	-38.17	-70.87
Capitaliza	1.48	0.00	0.24	-0.05	0.00	1,324.29	552.04
Garante	1.92	0.00	10.94	-0.75	0.00	-88.58	-95.32
Inbursa	0.25	2.83	1.90	0.33	-1.90	56.29	-48.59
Banamex	2.00	0.00	12.86	-0.42	0.00	-22.89	-65.65
Bancomer	2.00	0.00	16.96	-0.50	0.00	-66.87	-86.80
Total							-69.11

Note: Equilibrium and market share calculations are based on a 80,229 random sample plus a proportional random sample of new workers who entered the market over time, to capture growth forecasts in market size. Equilibrium fees are calculated from an iterated best response method where best response methods are calculated over a 0.00025 grid-level increment. See Online Appendix for details on iterated best response method. Market shares in the Base model are calculated using estimates from equation 2 to generate the logit choice probability for each individual for each Afore. Market shares in the Neutral Agentes model use estimates for demand parameters with neutral agentes from equations 2, 3, and 4. Costs are calculated over the whole account horizon and discounted at a 5% rate in both market share calculations.