

# Analyzing management fees of pension funds: A case study of Mexico

by

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## **Introduction**

Privatization of pension has become an important issue right around the world. From Chile to China, from Argentina to Zimbabwe, privatization of pension has either been implemented or being contemplated (Schwarz and Demircuc-Kunt, 1999).

Nowhere in the world has privatization of state-run pension schemes been undertaken with more zeal than in Latin America. Ten countries in the world have privatized their pension plans (Social Security Administration, 1999). Eight of them are from Latin America (Argentina, Bolivia, Chile, Colombia, El Salvador, Mexico, Peru, and Uruguay). The other two are from Eastern Europe (Hungary and Poland). The fundamental question that we need to answer is the following: *will it make people better off?* In what follows, we show that the risks that the privatized system carries are much higher than what appears at first sight.

Why are Latin American countries so enthused about privatizing social security? There are four related reasons: (1) the policy-makers have recognized that the current state-run systems will be bankrupt within the next decade. (2) The pioneering privatization plan in Chile has been advertised to be very successful. This has given the process of privatization a new sense of urgency in neighboring countries. (3) Such systems seem to increase national saving. (4) Such systems help develop long term capital markets.

## **Why is there a problem with the pay as you go system?**

The problem with any pay-as-you-go scheme is always the same: mismatch of benefits paid out to retired people compared with the revenue generated from the working population. However, this problem can arise in a number of different ways. (1) The government increases the benefits of the retired population by indexing benefits to inflation without indexing revenue in the same way. (2) The government relaxes eligibility (for example, by relaxing the age of retirement, by making the definition of disability or poor health broader etc.). (3) Directly or indirectly by reducing the revenue base. For example, let us consider a rise in tax rate. People go out of the formal sector (where they finance such a scheme through payroll taxes) into the informal sector. They avoid paying the tax. Revenue base is reduced. (4) The aging of the population. Aging is taking place mainly because of falling birth rates (and birth rates are predicted to continue to fall in the future). Table 1 illustrates how the proportion of older people will rise (in some cases, dramatically) in Latin American countries. For comparison, I have also included the United States in Table 1.

**Table 1: Percentage of population over 60 years 1990-2050**

Year	1990	2030	2050
Argentina	13.1	19.3	25.9
Bolivia	5.4	10.0	17.6
Brazil	6.7	16.9	24.2
Chile	8.7	20.8	26.4
Colombia	6.0	18.0	25.5
Ecuador	5.5	13.7	22.4
Mexico	5.7	15.7	24.6
Paraguay	5.2	10.4	16.1
Peru	5.8	13.7	21.5
Uruguay	16.4	22.5	27.8
Venezuela	5.6	15.5	23.6
US	16.6	28.2	29.8

Source: World Bank (1994).

There are two striking features of Table 1: (1) All the countries are converging to a similar population structure. (2) Not all countries have the same degree of the population aging problem. For example, Argentina and Uruguay have population structures that are very similar to the United States today. Thus, the urgency of reform for the state-run pension scheme is greater for those countries. On the other hand, even though Peru has a much younger population structure today, the population will age rapidly over the next 50 years. A similar thing is going to happen to all the other countries in Latin America.

Even though, strictly from the point of view of population structure, the potential problem seems to be far in the future. But, many Latin American countries will face the problem *much earlier*. The reason is that there are many inefficiencies in the system including a large informal sector which makes the problem more acute than ever before (Vittas (1994)).

Bolivia provides a classic example of how things can go wrong, even when the population structure is young. Bolivia had a defined benefit pay as you go scheme for many years. In 1997, the number of people contributing to the system was 300,000. The number of people drawing a pension from the system was 120,000. Thus, the dependency ratio of *the system* was 40%. However, if we look at the dependency ratio of *the population*, it was less than 6% (see, Table 1). The percentage of GDP covered by the system was less than 12% (von Gersdorff (1997)). Most affiliates were either government employees (65% of the total) and another large constituent was the group of schoolteachers (30%). In fact, the Bolivian economy is dominated by the informal sector.

**Why are they looking at Chile?**

The Chilean system has produced spectacular results in terms of rates of return on funds (see Table 2). The system has also created deeper financial markets: markets for long term bonds have developed as a direct consequence of the system. The saving rate in Chile has also seen a spectacular rise over the same period, from 8.2 percent of GDP in

1982 to 23.3 percent in 1996. Real GDP has also increased at the average annual rate of 7.7 percent over the period of 1980-1997 (for an illuminating discussion on the Chilean system, see Edwards (1996)). This has slowed down to 3.1% in 1998 and -1.4% in 1999. Many commentators have jumped to the conclusion that the rise in saving and GDP are (partly) *consequences* of privatization of pension (for example, Piñera, 2000). This leap of faith is not supported by statistical evidence (see below).

**Table 2: Rates of return for pension funds in Chile**

Year	Weighted Average	Range
1982	28.8	23.2 to 30.2
1983	21.2	18.5 to 24.7
1984	3.6	2.2 to 5.1
1985	13.4	13.0 to 14.3
1986	12.3	10.6 to 15.5
1987	5.4	4.8 to 8.5
1988	6.5	5.9 to 8.7
1989	6.9	4.0 to 9.5
1990	15.6	13.3 to 19.4
1991	29.7	25.8 to 34.3
1992	3.0	0.9 to 4.2
1993	16.2	14.6 to 16.9
1994	18.2	15.7 to 21.1
1995	-2.5	-4.6 to -1.8
1996	3.5	2.9 to 4.1
1997	4.7	-0.2 to 5.5
1998	-1.1	-2.7 to -0.4
1999	12.31	11.99 to 14.16

Source: Banco Central de Chile, Boletín Mensual (various issues). Rates of return are weighted by the asset value in each pension fund. The figure for 1999 is only up to the end of August 1999.

There are several notable features of Table 2. First, the average rates of return for funds in Chile have been very high. This has impressed many foreign observers. However, there is a large year to year variation. At the same time, in a given year, the rates of return across funds (especially early years) have not varied a great deal. The rate of return for funds is misleading, as it does not necessarily mean the same thing for the people who subscribe to these funds (affiliates). This difference is discussed further below.

### Saving and Capital Market Developments

In theory, under certain conditions, it is possible to envision a rise in saving as a result of privatization. However, such results are extremely sensitive to model specification. A change in model specification can lead to a collapse of the result (see, Sinha, 2000, Chapter 2). Therefore, it becomes an empirical issue. Chile has the longest experience of privatized pension. Therefore, it is natural that researchers have turned to

Chile investigating that question. Evidence from Chile, when carefully analyzed, shows that national saving does *not* increase when social security is privatized (Holzmann, 1996, Agosin et al., 1997).

Does capital market developments follow from pension privatization? It is clear that privatization needs to be preceded by *some* capital market development. For example, there has to be a well functioning government bond market (Vittas, 1996).

### Goals of this Research

In what follows we discuss the details of the privatized Mexican pension system. We clarify some issues about rates of return in the presence of transaction costs. We develop a model for calculating future value of the fund taking into account all the complexities of the Mexican system. This model is then used to compare funds over various horizons under a variety of scenarios.

### ***Issues about Mexico***

#### Details of the old plan

The largest program for social security in Mexico was run by the IMSS (Instituto Mexicano del Seguro Social). The program is known as Seguro de Invalidez, Vejez, Cesancía en Edad Avanzada y Muerte (IVCM, disability, old age, and death security). This program has protected workers in the formal sector since 1943. However, even in 1999, less than 30% of workers in the labor force are covered under this program. The new law of social security repealed this process (see below). In addition, there are separate programs for government employees, for the Armed Forces and others. They have remained unchanged.

#### How did the IVCM program work?

Contributions: Total contribution was 8.5% of base salary in 1996. There is a *notional* tripartite split between the employers, employees and the government. Employers paid 5.95%, employees paid 2.125% and the government paid 0.425% of the base salary. In addition, there was an additional payment of 2% of base salary in the SAR (Sistema para el retiro, the "retirement account").

This concept is notional for two reasons. (1) Ultimately what matters to a worker is what he or she takes home. Therefore, in an economic sense, the employer/employee split makes no difference. (2) Government contribution has no real value. At the end of the day, the only way a government can pay any benefit is through direct or indirect (such as inflation with progressive taxes) taxes.

#### Pension Reform in Mexico

On July 1, 1997, a new privatized but government mandated system of retirement program came into existence in Mexico. This system has private companies operating pension funds. Each company operating a pension fund is called an Administradora de

Fondos de Retiro or an AFORE. The investment fund, run by the company is independent of the parent company, is called a Sociedad de Inversion en Fondos de Retiro (a SIEFORE). Each worker will have an account with an AFORE. Funds will be generated from accumulation of contributions of the individual and from the yield generated by investment in the AFORE. Thus, the contribution and the performance of the fund will solely determine each person's pension benefit. This individual pension scheme stands in sharp contrast with the existing pay-as-you-go scheme run directly by a specific division of the Mexican government: Instituto Mexicano del Seguro Social (IMSS).

There are two elements of contribution to an account: contribution of 6.5% of wages by the employee/employer and a government contribution of 5.5% of *minimum salary*. For a worker who earns exactly one minimum salary, the contribution to an AFORE will be 11.5% (6.5+5.5) of his or her salary. For a worker earning 10 minimum salary, the contribution will be 7.05% (6.5+5.5/10) of his or her salary. For the average worker, the government contribution amounts to 2.2% of salary. In summary, for high-income workers, government contribution does not amount to a large sum. For low-income workers (e.g., persons earning minimum wage), it does.

In a sense, the government contribution is an accounting procedure. After all, how is the government going to finance its own contribution? It has to come from taxes on workers or on firms. Thus, the government contribution ultimately does not amount to a contribution at a national level. At an individual level, it does.

### Why the New System?

Why did the Mexican government decide to institute these changes in the current retirement system? It was estimated that without any reform, under current regime, current revenue for the IMSS in 1999 would have fallen short of the current cost in 1999.

The new system has spawned many AFORES. Seventeen AFORES have been given licenses to operate (although four have since merged). Mexican companies (mainly by banks) own some of them (wholly). Others have large (although not majority) foreign shareholders (see the next section). They also have a bewildering variety of charges (see below). Therefore, except for sophisticated investors, it is difficult to disentangle the effects of various charges and determine which fund offers the best rate of return.

The Mexican government has also set up a separate division to oversee the activities of the AFORES: Comisión Nacional del Sistema de Ahorro para el Retiro (CONSAR). CONSAR has the critical role of overseeing all the activities of the AFORES. For example, to clarify the roles of the AFORES, CONSAR has set out general rules of operation of the AFORES.

The objectives of these institutions will include:

- 1) Open, administer and manage the individual retirement accounts in agreement with provisions in social security laws. Regarding housing-promotion sub-accounts, the AFORES will register each worker's contributions, and the interest paid thereon, based on information provided by social security institutions.

2) Receive, from social security institutions, the contributions made, in accordance with the law, by the government, employers and workers, as well as voluntary contributions by workers and employers.

3) Itemize the amounts received periodically from social security institutions and deposit them into each worker's individual retirement account, as with the returns obtained on the investment of these funds.

4) Provide administrative services to mutual investment funds. (Banco de Mexico, 1996).

#### Privatized Individual Retirement Plans: Basic Facts about AFORES

CONSAR, the regulatory body of the AFORES in Mexico, have issued 17 licenses by the end of 1997. These AFORES are listed in Table 1.

**Table 3: AFORES authorized by the CONSAR and their compositions**

<b>AFORE</b>	<b>Main Shareholders with percentage holding</b>
<b>ATLÁNTICO PROMEX</b>	Banca Promex 50, Banco del Atlántico 50
<b>BANAMEX</b>	Grupo Financiero Banamex-Accival 100
<b>BANCOMER</b>	Grupo Financiero Bancomer 51, Aetna Internacional, Inc. 49
<b>BANCRECER-DRESDNER</b>	Grupo Financiero Bancrecer 51, Dresdner Pension Fund Holdings 44, Allianz México, S. A. 5
<b>BITAL</b>	Grupo Financiero BITAL 51, ING America Insurance Holding, Inc. 49
<b>CAPITALIZA</b>	General Electric Capital Assurance Co. 100
<b>CONFIA-PRINCIPAL</b>	Abaco Grupo Financiero 51, Principal International 49
<b>GARANTE</b>	Grupo Financiero Serfín 51, Grupo Financiero Citibank40, Hábitat Desarrollo Internacional 9
<b>GÉNESIS</b>	Seguros Génesis, S. A. 100
<b>INBURSA</b>	Grupo Financiero INBURSA 100
<b>PREVINTER</b>	Boston AIG Company 90, The Bank of Nova Scotia 10
<b>PROFUTURO GNP</b>	Grupo Nacional Provincial 51, Banco Bilbao Vizcaya-México, S. A. 25, Provida Internacional, S. A. 24
<b>SANTANDER MEXICANO</b>	Grupo Financiero Invermexico 75, Santander Investment, S. A. 25
<b>SIGLO XXI</b>	Instituto Mexicano del Seguro Social 50, IXE Grupo Financiero 50
<b>SÓLIDA BANORTE TEPEYAC</b>	Grupo Financiero Banorte Seguros Tepeyac

<b>ZURICH</b>	Zurich Vida, Compañía de Seguros 77, Gabriel Monterrubio Guasque 10
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Note: No mention is made of shareholders with equity participations under 5 percent of the total capital of the respective AFORE

Some of these AFORES are fully owned by Mexican companies. Other AFORES are partly owned by foreign companies. For example, AFORE Bancomer is 51% owned by the second largest banking group in Mexico and the rest 49% is owned by Aetna, one of the largest insurance companies in the United States. Garante has the most interesting ownership structure. It has the majority shareholding by a Mexican group, it is partly owned by Citibank and partly by a pension fund from Chile, AFP Habitat. On one hand, the Mexican government was keen to have foreign companies participate in this sector, because foreign participation usually signals a faith in the system. On the other, the government was also keen on keeping the majority shareholding within the country for political reasons. Three of the AFORES are already on the verge of merging with others. Atlantico has been sold to Confia, Genesis has been sold to Santander and Previnter has been sold to Profuturo.

It is curious to note that although the CONSAR is clear on ownership rules, it has been ambiguous on the issue of prevention of monopoly rule. It states:

The CONSAR will establish procedures to prevent absolute or relative monopolistic practices resulting from the behavior of individual market participants or due to market concentration. In doing so, the CONSAR will abide by the Economic Competition Federal Act. Accordingly, *no single AFORE may have more than 20 percent of the retirement saving system's market*. Subject to prior authorization from its Consultative and Surveillance Committee, the CONSAR may authorize greater market concentration ratios, as long as this does not harm workers' interests.

At first, the rule did not specifically state what it meant by "no more than 20% of the market". Later, CONSAR ruled that it meant 20% of the total number of individual accounts (rather than 20% of the market share in terms of value). CONSAR also left the question of some AFORE operating with more than 20% of all individual accounts open by adding the phrase "as long as this does not harm workers' interests."

## Investment Regimes

At present, AFORES do not have much freedom in choosing their investment portfolios. Basically, all of their investments have to be in the form of government bonds called CETES and price indexed linked bonds (like UDIBONOS).

CETES (Certificados de la Tesorería de la Federación) are peso-denominated money market instruments issued by the Mexican Treasury in 28-day, 91-day, 182-day, 364-day, and occasionally 728-day, maturity. CETES are considered to be the short-term interest rate benchmark in Mexico and, with rare exceptions, are auctioned on a weekly basis. CETES are similar to U.S. Treasury bills, and the two instruments have several important characteristics in common. The market for CETES is the most important capital market instrument available in Mexico. It is also one of the few Mexican capital market instruments with an active futures market: CETES futures are traded in the Chicago Mercantile Exchange.

As a consequence, CONSAR has chosen CETES to be the first instrument for the AFOREs. Because there are CETES of differing maturity, it is possible to get different rates of return on CETES, as the term structure of interest rates does not stay constant over time.

About 35% of total investment by AFOREs has been in CETES. Another 48% in five year inflation indexed government bonds called Bonde91 with 10% in convertible bonds called Udibonos.

Restrictions on the use of financial instruments by the AFOREs have reduced the variability in the before-charges rates of return of the funds (see, table 4). With the restrictions imposed, one important question arises: why should different AFOREs charge such high fees? After all, their roles have been reduced to (almost) nothing but bookkeeping (see Espinosa and Sinha, 2000).

Table 4 Annualized Rates of return (July 1997-June 1999)

<i>Name</i>	<i>nominal</i>	<i>real</i>
Banamex	28.83%	8.38%
Bancomer	29.12%	8.59%
Bancrecer	25.12%	5.64%
Bitel	29.90%	9.17%
Garante	29.21%	8.66%
Génesis	28.29%	7.98%
Inbursa	25.26%	5.75%
Principal	27.54%	7.43%
Profuturo	29.92%	9.19%
Santander	26.48%	6.64%
Banorte	28.19%	7.91%
Tepeyac	26.48%	6.64%
XXI	27.27%	7.23%
Zurich	26.79%	6.87%
Average	28.33%	8.01%

Source: CONSAR

### Costs of Pay as You Go Pensions

To understand the new system, it is necessary to review the existing system of pensions because the contribution rates and the many other aspects of the new system rely on the old. Moreover, the new system only partially replaces the old system.

Before July 1, 1997, Mexico had the old system run by the IMSS (the Mexican Social Security Institute). There were four pillars of this system: (1) Disability, Old Age, Severance and Life Insurance, (2) Maternity and Health Insurance, (3) Workplace Insurance, (4) Child Care Centers. Among these four pillars, only a part of the first pillar is being privatized through the AFOREs. The other three pillars are still going to be operated by the IMSS. In our discussion here, we will not consider the other three pillars of the IMSS at all (see Banco de Mexico (1996), for further discussions on reform carried out in the other three pillars).



Cost of administration was high by OECD standards. However, when compared with other Latin American countries, it does not look that bad (see table 5). The question that arises is the following: will the new system be better?

Table 5 Administrative Costs as a Percentage of Expenditure

<i>Latin America</i>	<i>OECD</i>	
Argentina	2.3	Australia 1.22
Bolivia	21.39	Canada 2.8
Chile	8	France 4.18
Colombia	81.8	Germany 2.86
El Salvador	33.4	Italy 2.2
Mexico	23.55	Japan 1.79
Peru	130.98	Spain 2.81
Uruguay	6.51	Switzerland 3.04
		United Kingdom 3.1
		United States 3.28

Source: Mitchell (1996)

The new system is obligatory to people who enter the workforce on or after July 1, 1997. For people who have already contributed to the old system have a choice: they can still opt for the benefits under the old scheme or they can get benefits from the new scheme whichever is larger. It turns out that for the majority who have contributed to the old system for at least twenty years, will be better off under the old scheme. For others, it depends critically on the rates of return that the new scheme will earn. Thus, there will be additional cost incurred for the people during transition. The cost will rise to up to 4% of GDP during the early part of the next century (see Sales-Sarrapy et al (1996)).

#### Rate of Return: Pension Fund versus Individual Account

Do high rates of return of the funds mean high rates of return for workers who have money in those funds (affiliates)? The answer is: not necessarily. The basic problem is the high "management fees" charged by private pension funds. Shah (1997) has calculated these rates of return after charges for Chile (table 6). The table shows that even though the real rates of return of funds have been very large and positive for the funds, they have not been so for the affiliates.

The basic features of individual accounts are very similar in Mexico. Therefore, it should not be surprising that the Mexican system too will not produce positive real rates of return in the next decade.

Table 6 Rate of Return of Funds versus Rate of Return of Affiliates

<i>Year</i>	<i>Real return for funds</i>	<i>Cumulative real return for affiliates</i>
1982	28.8%	-3.2%
1983	21.3%	-1.3%
1984	3.5%	-5.9%

1985	13.4%	-2.3%
1986	12.3%	0.3%
1987	5.4%	0.5%
1988	6.4%	1.4%
1989	6.9%	2.1%
1990	15.5%	4.2%
1991	29.7%	7.9%
1992	3.1%	6.9%
1993	16.2%	8.0%
1994	18.4%	9.1%
1995	-2.5%	7.4%

Source: Shah (1997).

Note: The first column gives the rate of return of the fund in a given year. The second column gives the *cumulative* rate of return. Thus, for example, the figure for 1995 for the affiliates is the real rate of return the affiliate would have between 1982 and 1995. As a result, it is possible to have the second column to have a bigger number than the first.

### **Calculating Future Value of AFORE in Presence of Transactions Costs**

#### Developing the model

Essentially, individual retirement benefits are calculated by using a future value formula. However, the simple future value formulas we find in Kellison (1991) or other similar treatment does not deal with some of the complexities we find in the Mexican system: (1) Government contribution to the individual account does not apply every month, and the indexing is also not applicable monthly. (2) Commissions come in three basic flavors (a) commission over the flow of funds, (b) commission over the account balance and (c) commission over the *real* rate of return. In addition, some companies charge commission by combining (a), (b) and (c). (3) In addition, the commissions mentioned in (2) do not stay constant over time. They vary with the number of years one stays in the fund. (4) Income of each individual does not stay constant during his/her working life. Such changes have to be taken into account. For these reasons, the following discussion will be based on a recursive development of the formula for calculating retirement benefits.

#### What is the right measure of cost?

Because charges apply to different parts of the AFORE, it is not easy to compare charges across AFOREs. If we look at the system as a whole, there is a problem of charges when the system starts up. Charges appear too high! In Chile, for example, in 1984, charges amounted to 9% of wages or 90% of contributions to the retirement system (Edwards (1996), p. 17). However, the costs have come down to about 15% of contributions in 1990, (see, World Bank, (1994), p. 224).

#### Simple formula

For individual AFOREs, it makes it difficult to compare across funds. For example, suppose we want to compare the charges for Inbursa and Banamex. Since Banamex charges 26.15% of total contribution up-front but Inbursa charges nothing up front, it may seem like charges for the AFORE run by Banamex is very high. However, charges for Inbursa are complicated because their charges apply to the *real rate of return*, over the long run, it adds up. Thus, it makes little sense to calculate charges as a percentage of total assets in a system that just starts up.

There are several ways to look at the charges: (1) operating costs as a percentage of total annual contribution, (2) operating costs as a percentage of average total assets, (3) operating costs as a percentage of covered annual wages, (4) operating costs as a percentage of affiliates times per capita income.

There are two components of the new system: (1) contribution by the worker, (2) contribution by the government. The contribution by the worker is 6.5% of his or her base wage. The contribution by the government is 5.5% of the minimum salary *indexed to the rate of inflation*. There are two additional complications: (1) interest rate is calculated for every account every *two* months and (2) indexation of the government contribution takes place every *three* months. Let  $S_k$  denote the accumulated sum in the  $k$ th month.

Therefore, we can write the accumulated value in the AFORE as follows in a recursive formula in the simplest case:

$$S_k = \begin{cases} (6.5\% * BW * 2 + G_k) * (1 + i_1^{(12)}) & k = 1 \\ S_{k-1} * (1 + i_k^{(12)}) & k = 2i \quad i = 1, 2, \dots, \frac{CP}{2} \\ (S_{k-1} + (6.5\% * BW * 2 + G_k)) * (1 + i_k^{(12)}) & k = 2i + 1 \quad i = 1, 2, \dots, \frac{CP - 2}{2} \end{cases}$$

where, the government contribution ( $G$ , also called Social Contribution)

We write  $G_k = CS_k + CS_{k+1}$

Where  $CS_k$  is defined as follows:

$$CS_k = \begin{cases} 5.5\% * MW - \text{where} \dots k = 1 \\ CS_{k-1} (1 + p^{(4)}) - \text{where} \dots k = 3i, i = 1, 2, \dots \\ CS_{k-1} - \text{in} \_ \text{all} \_ \text{other} \_ \text{cases} \end{cases}$$

There are several peculiar natures of the formula above: calculation of benefit account uses a *simple interest* rate for the adjustment for one month's rate of return to a bimonthly rate. Therefore, we get the factor  $BW.2$  in the above equation. Every even month, the accumulated value is simply the value of the fund with compounded interest.

Every odd month, *two* monthly contributions of BW are added. Along with it, the government contribution (G) is thrown in at every odd month. The G was set at the 5.5% of the minimum salary in Mexico City for the year 1997 (about US\$1 per day under the exchange rate at the end of 1997). Every three months the government contribution is adjusted according to the consumer price index. Thus, we have a factor  $\pi^{(4)}$  that indicates this adjustment.

**Table 7 Fee structure of AFOREs**

AFOREs	Charges on flow each year (% of wages)	Charge on account balance	Charge on real rate of return
Atlantico Promex	1.40%		20.00%
Banamex	0.002 in 1997 0.85% in January 1998 1.70% in March 1998 onward		
Bancomer	1.70%		
Bancrecer Dresdner	1.60%	0.50%	
Banorte	1.00%	1.50%	
Bitel	1.68%		
Capitaliza	1.60%		
Confia Principal	0.90%	1.00%	
Garante	1.68%		
Genesis	1.65%		
Inbursa			33.00%
Previnter	1.55%		
Profuturo GNP	1.70%	0.50%	
Santander	1.70%	1.00%	
XXI	1.50%	0.99%	
Tepeyac	1.17%	1.00%	
Zurich	0.95%	1.25%	

### Making the Formula more realistic: Charges

In the formula above, we did not take into account charges that funds impose on the account holders (affiliates). Some AFOREs have charges on contribution as a percentage of wages (for example, for Banamex). Others have charges on the balance in the AFORE account (such as Bancrecer). Still others have charges on the real interest rate (such as Inbursa). Let CW be the charge on wage (rate). Let CB be the charge on balance. We need to modify the above formula as follows:

$$S_k = \begin{cases} \left( 6.5\% * BW * 2 * \left( 1 - \frac{CW}{6.5\%} \right) + G_k \right) * (1 + i_1^{(12)}) * \left( 1 - \frac{CB}{12} \right) & k=1 \\ S_{k-1} * (1 + i^{(12)}) & k=2i \quad i=1,2,\dots, \frac{CP}{2} \\ \left( S_{k-1} + \left( 6.5\% * BW * 2 * \left( 1 - \frac{CW}{6.5\%} \right) + G_k \right) \right) * (1 + i_k^{(12)}) * \left( 1 - \frac{CB}{12} \right) & k=2i+1 \quad i=1,2,\dots, \frac{CP-2}{2} \end{cases}$$

There is a third element of charges. For two funds (Inbursa and Atlantico) charges apply to the real rate of return. Thus, we need to modify the formula to incorporate that element.

Therefore, if we include charges on the *real* interest rate, the formula becomes

$$S_k = \begin{cases} \left( 6.5\% * BW * 2 * \left( 1 - \frac{CW}{6.5\%} \right) + G_k \right) * \left( (1 + i_1^{(12)}) * \left( 1 - \frac{CB}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1 + \pi^{(12)}} \right) * CY \right) & k=1 \\ S_{k-1} * \left( (1 + i_1^{(12)}) * \left( 1 - \frac{CB}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1 + \pi^{(12)}} \right) * CY \right) & k=2i \quad i=1,2,\dots, \frac{CP}{2} \\ \left( S_{k-1} + \left( 6.5\% * BW * 2 * \left( 1 - \frac{CW}{6.5\%} \right) + G_k \right) \right) * \left( (1 + i_1^{(12)}) * \left( 1 - \frac{CB}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1 + \pi^{(12)}} \right) * CY \right) & k=2i+1 \quad i=1,2,\dots, \frac{CP-2}{2} \end{cases}$$

where  $\pi^{(12)}$  is the monthly inflation rate, and  $CY$  is the charge on the real interest rate and  $i_R^{(12)}$  is the real interest rate

$$i_R^{(12)} = \frac{(i^{(12)} - \pi^{(12)})}{1 + \pi^{(12)}}$$

One assumption made here is that the charges remain fixed for the total life of the system. Charges for each company depends on the number of years a person has been in the AFORE. For example, AFORE Banamex charges 1.70% of wages up to year 4. However, for a person who stays with it for the fifth year gets a reduction in charges. Thus, year 5 charge becomes 1.68% of wages, year 6 charge becomes 1.66% of wages and so on. This process continues until year 39 with the AFORE with a reduction of

0.02% of wages for every additional year. Hence, our formula needs to take such a reduction into account.

$$S_k = \begin{cases} \left( \left( 6.5\% * BW^k * 2 * \left( 1 - \frac{CW^k(1-f_k)}{6.5\%} \right) + G_k \right) * \right. \\ \left. \left( (1+i_1^{(12)}) * \left( 1 - \frac{CB^k(1-f_k)}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1+\pi^{(12)}} \right) * CY^k(1-f_k) \right) \right) & k=1 \\ S_{k-1} * \left( (1+i_1^{(12)}) * \left( 1 - \frac{CB^k(1-f_k)}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1+\pi^{(12)}} \right) * CY^k(1-f_k) \right) \\ k=2i \quad i=1,2,\dots,\frac{CP}{2} \\ \left( S_{k-1} + \left( 6.5\% * BW^k * 2 * \left( 1 - \frac{CW^k(1-f_k)}{6.5\%} \right) + G_k \right) \right) * \\ \left( (1+i_1^{(12)}) * \left( 1 - \frac{CB^k(1-f_k)}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1+\pi^{(12)}} \right) * CY^k(1-f_k) \right) \\ k=2i+1 \quad i=1,2,\dots,\frac{CP-2}{2} \end{cases}$$

Note that  $f_k$  is not the same for all funds. For example, AFORE Bancomer offers a rising discount rate starting with 0.01% of wages up to 0.05% of wages.

### More Refinements

There is still one realistic element missing in our formula: growth in wages. In Chile, the average wage rate has grown at a rate of 6% per year over the last twenty years. But, the rise in average wage rate is not important here as it represents the average across many individuals at a given point of time. For individuals, the more meaningful number is the growth of wage rate longitudinally. Therefore, we need to modify our formula thus:

$$S_k = \begin{cases} \left( 6.5\% * BW^* 2 * \left( 1 - \frac{CW^*(1-f_k)}{6.5\%} \right) + G_k \right) * \\ \left( (1+i_1^{(12)}) * \left( 1 - \frac{CB^*(1-f_k)}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1+\pi^{(12)}} \right) * CY^*(1-f_k) \right) & k=1 \\ S_{k-1} * \left( (1+i_1^{(12)}) * \left( 1 - \frac{CB^*(1-f_k)}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1+\pi^{(12)}} \right) * CY^*(1-f_k) \right) \\ k=2i \quad i=1,2,\dots, \frac{CP}{2} \\ \left( S_{k-1} + \left( 6.5\% * BW^*(1+\Delta s^{(6)}) * 2 * \left( 1 - \frac{CW^*(1-f_k)}{6.5\%} \right) + G_k \right) \right) * \\ \left( (1+i_1^{(12)}) * \left( 1 - \frac{CB^*(1-f_k)}{12} \right) - \left( \frac{i^{(12)} - \pi^{(12)}}{1+\pi^{(12)}} \right) * CY^*(1-f_k) \right) \\ k=2i+1 \quad i=1,2,\dots, \frac{CP-2}{2} \end{cases}$$

where  $\Delta s^{(6)}$  is the bimonthly growth rate of wage rate of an individual worker over his or her lifetime. Here, we are assuming that the growth rate is constant. However, because of the recursive nature of the formula, it is easy to incorporate non-linear growth rate in wages. In some countries (Chile, South Korea), the average wage rates have risen by more than 6% in real terms per year. In others (Mexico), the average real wage rate has fallen over the past two decades. However, here we should be looking at wage rate for each individual *longitudinally* and not the average wage for the population.

Finally, the formula may seem somewhat strange for charges applying to real rates of return. For example, what happens when the real rate of return turns out to be negative? We took that into account by simply adding a restriction that took a zero value (for CY) when the real rate of return was negative.

### Some Observations on Commissions

Most often in Mexico, commissions are expressed as a percentage of wages and not as a percentage of contribution. Thus, if a person earns 1,000 pesos a month, the actual contribution will be 6.5% of 1,000 pesos or 65 pesos. Hence the charges in some cases will be a straight percentage of that 65 pesos. Out of the 17 AFOREs, 15 charges on the flow of wages. In fact, 8 of them charge only on the wages and nothing else. These companies, therefore, do not have schemes based on performance of the funds. Regardless of the performance of the fund, charges apply. Clearly, it is easy to make a comparison across those funds: all we have to do is to choose the fund with the lowest charges. In this case, the winner is Previnter with 23.85% of contribution. Note that by international standard even this is very high.

**Table 8 Commissions as percentages of contribution**

AFORE	Commissions as a % of wage	Charges as a % of contributions
Banamex	1.70%	26.15%

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Bancomer	1.70%	26.15%
Profuturo	1.70% plus others	26.15% plus others
Santander	1.70% plus others	26.15% plus others
Bital	1.68%	25.85%
Garante	1.68%	25.85%
Genesis	1.65%	25.38%
Previnter	1.55%	23.85%
XXI	1.50% plus others	23.08% plus others
Capitaliza	1.50%	23.08%
Atlantico	1.40%	21.54%
Tepeyac	1.17% plus others	18.00% plus others
Banorte	1.00% plus others	15.38% plus others
Zurich	0.95%	14.62%
Confia	0.90% plus others	13.85% plus others
Bancrecer	Charges on balance	Charges on balance
Inbursa	Charges on real return	Charges on real return

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### ***Issues for Simulation***

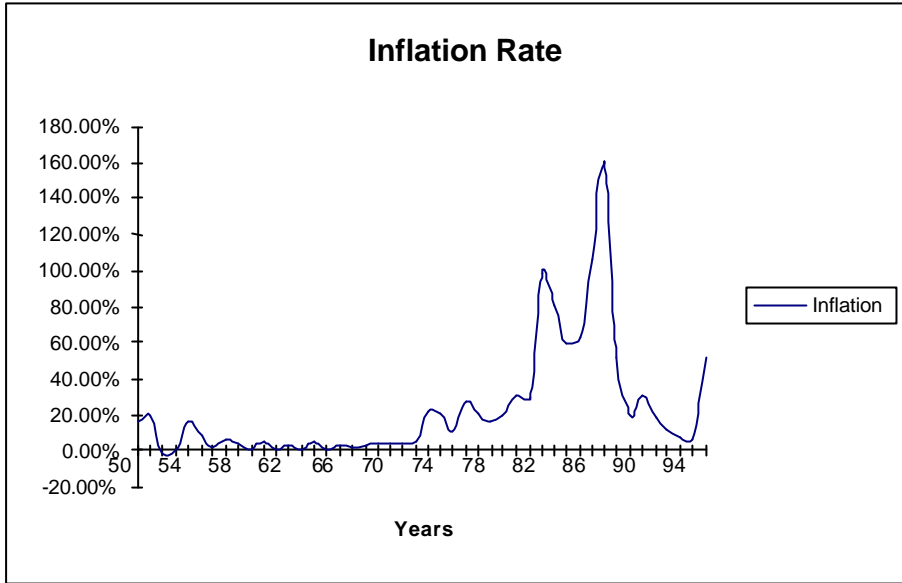
Several issues need to be addressed before we could go ahead with the simulation exercise. (1) What should be the appropriate rates of return for an AFORE? In this context, we have to make guesses about the rate of inflation and the real rate of return separately because two of the seventeen AFOREs have charges on *the real* rate of return (Inbursa and Atlantico). (2) We have to specify the time path for growth of wage rate for an individual. (3) We have to guess some evolutionary time paths of charges.

### **Guessing the Evolution of Rates of Return in Mexico**

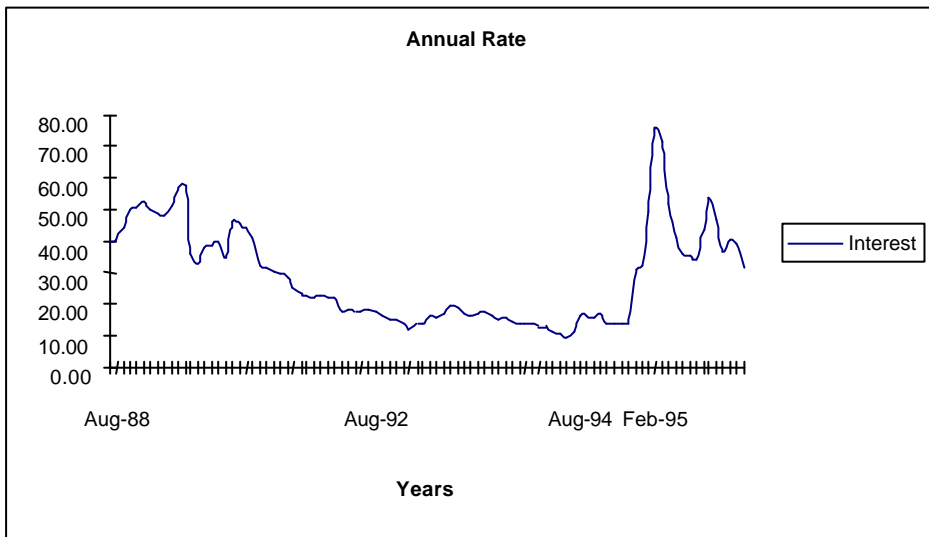
It is a daunting task to predict inflation and interest rates for a country that has seen triple digit inflation rates and negative real interest rates over number of years in the last twenty years (see Figure 1 and Figure 2). Very few forecasters are brave enough to predict these rates past three years (even the Central Bank of Mexico is reluctant to venture into such an exercise!). However, pension schemes are meant for long run benefits. Most workers who are contributing into the system now will not see the benefits until several decades later. Thus, it is essential to work out some possible future paths of rates of return on investment. CONSAR has stipulated that all investment must be made in CETES (short-term government bonds) for now. Even though it is never stated explicitly, most people expect that the rules for investment will be relaxed in the future.

### **Figure 1: Annualized Monthly Inflation Rates in Mexico 1950-1997**





**Figure 2: Annualized Rates of Return for CETEs 1988-1997**



Source: Banco de Mexico

## Scenarios

We decided to run the simulations under three sets of scenarios: fixed interest rate, stochastic but time independent interest rates, and stochastic and time dependent interest rate. Fixed interest rate scenario gives us a benchmark. However, it is unrealistic to expect that the (nominal) interest rate and the inflation rate are not going to change over the next decades in Mexico. A more realistic approach is to assume a stochastic interest rate. To do this, we need to make some assumption about the distribution of the rate of inflation and/or the rate of nominal interest rate. In our simulations, we posit two sets of assumptions: truncated normal distribution and a uniform distribution. We felt

that it was unrealistic to assume normal distribution without any modification because the nominal interest rates would not take very large positive or negative values. A study of month to month changes in the (nominal) interest rate shows that they are not independent. There is clear evidence of first order autocorrelation. Therefore, we build a model with first order autocorrelation (we use a model of the following form:  $x_t = 0.7x_{t-1} + 0.015 + \varepsilon$ , where  $\varepsilon$  is subject to a choice of variance:  $\varepsilon$  is normally distributed with mean zero and some chosen variance. Under this assumption, the long-term interest rate converges to 5%). It is also possible to restrict the maximum and minimum of the distribution in a similar vein discussed earlier.

### ***Lessons from Simulations***

Simulations were carried out under various scenarios with fixed interest rates, stochastic but independent interest rates and stochastic dependent independent interest rates. What follows is a general discussion of the results. In the tables that follow, we only restrict our results for the *deterministic case*. With stochastic rates, the results depend on the exact paths of realization of interest rates. However, the modal frequencies of these realizations were very similar to the ones discussed with deterministic rates.

#### **Discussion of the results**

Broadly, the results show that for most income levels, Inbursa performs the best at the *beginning*. Intuitively, since Inbursa charges only on balance, performs well with small balance. As the balance grows, the charges get higher and higher. Others that charge on contribution only have exactly the opposite. Their charges appear high when the balance is low (compared with the contributed amount). This gets relatively smaller as the balance grows. However, this kind of result is sensitive to several factors that determine how the balance grows. They are the following: (1) the real interest rate, (2) the level of income, (3) the inflation rate.

**Impact of real interest rate:** If the real interest rate is high and stays high (for example, more than 6%), the charges of Inbursa begins to bite within five to ten years. If the real interest rate is low (say, 3%), the performance of Inbursa stays at the top for twenty years.

**Impact of income level:** If the income level rises, the benefit from staying with Inbursa rises. For example, for people earning the minimum wage, the benefits from Inbursa erodes after ten years. But, for people earning ten times the minimum wage, the benefits from staying with Inbursa stays for twenty years.

**Impact of inflation rate:** Except for Inbursa, all other funds charge regardless of how well the funds are performing (Atlantico charges on the real rate and the contribution). Therefore, if the inflation rate is equal to the nominal rate of return on the funds, Inbursa will not charge anything. This is not the case for any other fund. Therefore, variable inflation rate puts a floor value on the charges of Inbursa, but not for the others.

The simulation results show another interesting aspect of the situation: After ten to twenty years (depending on the level of income), it is optimal to switch to a different fund. Which fund to shift to? The answer again depends mainly on the level of income and the level of real interest rate.

In our results, we do not show the accumulated values under each scenario for each fund. Instead, we report ranking of the funds. One fair question is that it does not tell us how far apart the funds are in their final balance. Another fair question is that it does not tell us how does it compare with a fund with zero fees. The precise results depend on the scenarios considered. In most cases, fund balance is reduced by 15 to 30 percent due to the presence of management fees. The gap between funds in two consecutive positions also depends on the exact nature of the scenario. For 25 years or more, in most cases, the differences are in the order of magnitude of one to three percent.

**Table 9 Different Scenarios with the Real Interest Rate: 3%**

Real Rate 3%  
Initial Wage 10 Min Salaries  
Min Salary 768.5

Rates Nominal	Inflation	Time (In years)						
		5	10	15	20	25	30	35
3%	0%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich
		Bancrecer	Bancrecer	Bancrecer	Bancrecer	Bancrecer	Zurich	Inbursa
		Confía	Confía	Confía	Zurich	Bancrecer	Bancrecer	Banamex
9%	6%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich
		Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Zurich	Banamex
		Confía	Confía	Confía	Bancrecer	Bancrecer	Banamex	Inbursa
15%	12%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich	Zurich
		Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Inbursa	Banamex
		Confía	Confía	Zurich	Bancrecer	Banamex	Banamex	Previnter
21%	18%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich	Zurich
		Bancrecer	Confía	Zurich	Zurich	Zurich	Inbursa	Banamex
		Confía	Bancrecer	Confía	Banamex	Banamex	Banamex	Previnter

Real Rate 3%  
Initial Wage 1 Min Salaries  
Min Salary 768.5

Rates Nominal	Inflation	Time (In years)						
		5	10	15	20	25	30	35
3%	0%	Inbursa	Inbursa	Inbursa	Inbursa	Zurich	Zurich	Zurich
		Confía	Confía	Zurich	Zurich	Banamex	Banamex	Banamex
		Bancrecer	Zurich	Confía	Banamex	Inbursa	Previnter	Previnter
9%	6%	Inbursa	Inbursa	Inbursa	Banamex	Banamex	Banamex	Banamex
		Confía	Confía	Banamex	Previnter	Previnter	Previnter	Previnter
		Bancrecer	Banamex	Previnter	Inbursa	Zurich	Capitaliza	Capitaliza
15%	12%	Inbursa	Inbursa	Inbursa	Banamex	Banamex	Banamex	Banamex
		Confía	Banamex	Banamex	Previnter	Previnter	Previnter	Previnter
		Zurich	Confía	Previnter	Capitaliza	Capitaliza	Capitaliza	Capitaliza
21%	18%	Inbursa	Inbursa	Inbursa	Banamex	Banamex	Banamex	Banamex
		Confía	Banamex	Banamex	Previnter	Previnter	Previnter	Previnter

Zurich Previnter Previnter Capitaliza Capitaliza Capitaliza Capitaliza

Bases:

Real Rate	3%
Initial Wage	100 Min Salaries
Min Salary	768.5

Rates Nominal	Inflation	Time (In years)						
		5	10	15	20	25	30	35
3%	0%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa
		Bancrecer	Bancrecer	Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich
		Confía	Confía	Confía	Zurich	Zurich	Bancrecer	Bancrecer
9%	6%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich
		Bancrecer	Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Inbursa
		Confía	Confía	Confía	Zurich	Bancrecer	Banamex	Banamex
15%	12%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich
		Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Zurich	Inbursa
		Confía	Confía	Confía	Bancrecer	Banamex	Banamex	Banamex
21%	18%	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Inbursa	Zurich
		Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Zurich	Inbursa
		Confía	Confía	Zurich	Bancrecer	Banamex	Banamex	Banamex

A quick look at the table above tells us the story about the best performing AFOREs when the real interest rate is 3%. For example, the first box in the top left hand corner says that Inbursa is the best performing fund (when the nominal interest rate is 3% and inflation is 0% and a person with income equivalent to one minimum salary leaves his or her money in the AFORE for 5 years). In fact for investment for 5, 10 and 15 years, Inbursa turns out to be the best. However, the scenario changes dramatically after 25 years. Then, the best AFORE with 0% inflation turns out to be Zurich but Banamex leads in other scenarios. This scenario was chosen because the National Development Plan, the Mexican government is projecting a long-term real rate of 3% in Mexico.

**Table 10 Different Scenarios with the Real Interest Rate: 6%**

Real Rate	6%
Initial Wage	10 Min Salaries
Min Salary	768.5

Rates Nominal	Inflation	Time (In years)						
		5	10	15	20	25	30	35
6%	0%	Inbursa	Inbursa	Bancrecer	Bancrecer	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Inbursa	Zurich	Bancrecer	Bancrecer	Banamex
		Confía	Confía	Confía	Confía	Confía	Banamex	Previnter
12%	6%	Inbursa	Inbursa	Inbursa	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Bancrecer	Bancrecer	Banamex	Banamex	Banamex
		Confía	Confía	Confía	Confía	Previnter	Previnter	Previnter
18%	12%	Inbursa	Inbursa	Inbursa	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Zurich	Banamex	Banamex	Banamex	Banamex
		Confía	Confía	Bancrecer	Previnter	Previnter	Previnter	Previnter
24%	18%	Inbursa	Inbursa	Inbursa	Zurich	Zurich	Zurich	Banamex
		Bancrecer	Confía	Zurich	Banamex	Banamex	Banamex	Zurich
		Confía	Bancrecer	Confía	Previnter	Previnter	Previnter	Previnter

Real Rate	6%
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Bases:

Real Rate	6%
Initial Wage	100 Min Salaries
Min Salary	768.5

Rates		Time (In years)						
Nominal	Inflation	5	10	15	20	25	30	35
6%	0%	Inbursa	Inbursa	Bancrecer	Bancrecer	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Inbursa	Zurich	Bancrecer	Bancrecer	Banamex
		Confía	Confía	Confía	Confía	Confía	Banamex	Previnter
12%	6%	Inbursa	Inbursa	Inbursa	Bancrecer	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Bancrecer	Zurich	Bancrecer	Banamex	Banamex
		Confía	Confía	Confía	Confía	Banamex	Previnter	Previnter
18%	12%	Inbursa	Inbursa	Inbursa	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Bancrecer	Bancrecer	Banamex	Banamex	Banamex
		Confía	Confía	Confía	Inbursa	Previnter	Previnter	Previnter
24%	18%	Inbursa	Inbursa	Inbursa	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Bancrecer	Inbursa	Banamex	Banamex	Banamex
		Confía	Confía	Zurich	Banamex	Previnter	Previnter	Previnter

What happens if we choose a different scenario? Does the ranking change? The answer is yes. Once again, Inbursa does well for short time periods such as five or ten years. However, Banamex rules for all the long horizon scenarios. We have also included other funds in the top three positions. For example for 6% nominal interest rate and 0% inflation rate, if you keep your money in your AFOREs for ten years, Confía comes out at the top, followed by Zurich and Banamex.

If the real interest rate stays high (say 9%) for a number of years, the advantage of Inbursa erodes quickly as the next set of results show.

**Table 11 Different Scenarios with the Real Interest Rate: 9%**

Bases:

Real Rate	9%
Initial Wage	10 Min Salaries
Min Salary	768.5

Rates		Time (In years)						
Nominal	Inflation	5	10	15	20	25	30	35
9%	0%	Inbursa	Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Zurich
		Bancrecer	Inbursa	Confía	Zurich	Bancrecer	Banamex	Banamex
		Confía	Confía	Zurich	Confía	Banamex	Previnter	Previnter
18%	9%	Inbursa	Inbursa	Bancrecer	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Zurich	Banamex	Banamex	Banamex	Banamex
		Confía	Confía	Confía	Previnter	Previnter	Previnter	Previnter
27%	18%	Inbursa	Inbursa	Zurich	Zurich	Zurich	Banamex	Banamex
		Bancrecer	Confía	Confía	Banamex	Banamex	Zurich	Zurich
		Confía	Bancrecer	Banamex	Previnter	Previnter	Previnter	Previnter

Bases:

Real Rate	9%
Initial Wage	1 Min Salaries

Min Salary 768.5

Rates		Time (In years)						
Nominal	Inflation	5	10	15	20	25	30	35
9%	0%	Inbursa	Confía	Zurich	Zurich	Zurich	Banamex	Banamex
		Confía	Zurich	Banamex	Banamex	Banamex	Zurich	Previnter
		Bancrecer	Banamex	Previnter	Previnter	Previnter	Previnter	Zurich
18%	9%	Inbursa	Banamex	Banamex	Banamex	Banamex	Banamex	Banamex
		Confía	Confía	Previnter	Previnter	Previnter	Previnter	Previnter
		Zurich	Previnter	Capitaliza	Capitaliza	Capitaliza	Capitaliza	Capitaliza
27%	18%	Inbursa	Banamex	Banamex	Banamex	Banamex	Banamex	Banamex
		Confía	Previnter	Previnter	Previnter	Previnter	Previnter	Previnter
		Zurich	Capitaliza	Capitaliza	Capitaliza	Capitaliza	Capitaliza	Capitaliza

Bases:

Real Rate 9%  
 Initial Wage 100 Min Salaries  
 Min Salary 768.5

Rates		Time (In years)						
Nominal	Inflation	5	10	15	20	25	30	35
9%	0%	Inbursa	Bancrecer	Bancrecer	Bancrecer	Zurich	Zurich	Zurich
		Bancrecer	Inbursa	Confía	Zurich	Bancrecer	Banamex	Banamex
		Confía	Confía	Zurich	Confía	Bancrecer	Bancrecer	Previnter
18%	9%	Inbursa	Inbursa	Bancrecer	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Confía	Bancrecer	Banamex	Banamex	Banamex
		Confía	Confía	Zurich	Confía	Previnter	Previnter	Previnter
27%	18%	Inbursa	Inbursa	Zurich	Zurich	Zurich	Zurich	Zurich
		Bancrecer	Bancrecer	Bancrecer	Banamex	Banamex	Banamex	Banamex
		Confía	Confía	Confía	Previnter	Previnter	Previnter	Previnter

What do we learn from the simulations?

From the simulations, one fact emerges very clearly: There is no single "winning" AFORE under all possible alternatives. However, we can see that under most cases, there are two or three AFOREs that top the list. Does that mean that an optimal strategy would be to stay with one fund for a number of years and then switch? In fact, this intuition is borne out by the results. In some cases it requires two or three switches depending on the scenario and the number of years one stays in the system of AFOREs.

**Which Model?**

In this paper, we have compared the performance of funds under various scenarios and showed that the optimal strategy for individuals is to switch funds. The point of switching depends on the assumptions about the scenarios. Moreover, in some scenarios, the optimal strategy is to switch more than once. It is interesting to note that the same model can be used for assessing the impact of taxes if the tax rate varies over the years.



Why did Mexico adopt this model?

Alternatives to the system: The Mexican model is not the only model of privatized pension scheme in the world. In some sense, Mexican model can be viewed as an adaptation of the Chilean model. The Chilean model is the most decentralized model of pension plans in the world. In some sense, it has succeeded in delivering many benefits that privatized pension plans are supposed to. Most policy makers in Mexico are also familiar with the system in Chile and are influenced by it the most. Economists because of its high transaction cost (see, for examples, Diamond (1994)), have criticized the Chilean system. In some ways, the high growth rate in real wages and high real rates of return have obscured high transactions cost for Chile.

When do transactions costs not matter for fund members?

There are two circumstances in which transactions cost or low rate of return becomes obscure: (1) when the wage is growing rapidly, (2) when the contribution rate is increasing rapidly.

In case of Chile, high transactions cost was obscured by the fact that wage rate there grew very rapidly. In addition, the real rates of return on the funds were also very high. Therefore, in a sense, account holders ignored costs because the growths in AFPs balances have been very high.

In case of Singapore, similar growth in funds were observed but for different reasons. There, the rate of contribution grew rapidly (from 11% of salary to 45% of salary) over a period of 25 years. The rates of return on the funds have been low. But, account holders did not protest as their balances grew. In the late 1980s, real wage rate in Singapore grew rapidly. Once again, the low rates of return were masked.

Alternatives to Decentralized Model of Pension

The model adopted by Mexico is not the only model available. Other models have been tried successfully in different countries. Two most cited alternatives are the Singaporean Central Provident Fund (CPF) model and the employer based Australian-Swiss model.

Model 1: One Size Fits All

As the name suggests, CPF model has only one fund. This fund is centralized and totally controlled by the government. The investment by the CPF has been mainly in foreign government bonds and some foreign stocks. The real rate of return for the fund has been less than 3% per year over a period of 25 years. At the same time, the transactions cost has been very low as well. To implement the Singaporean model, people have to have faith in government. Unfortunately, in Mexico (and in other parts of Latin America), the population had very little faith in government. In the past, governments in these countries have not been efficient or open. Therefore, implementing a model with a central and crucial role for the government was not really a viable option.

There have been criticisms of the Singapore model on the grounds that it does not give the best possible result. Two comparisons can be made: one with other private pension funds operating in Singapore and the other with holding a "mostly bonds" fund. On both counts, the CPF account holders are punished to the tune of 1-3% per annum (Valdés-Prieto, 1998).

## Model 2: Employer Based Fund

The second model is to adopt the Australian-Swiss model. In this case, each employer (rather than each employee) chooses a fund. Every employee for the employer is then assigned the same fund. In this case, the transactions cost is low. Funds do not have to seek out each account holder. They can concentrate on a few thousand employers rather than millions of employees. Therefore, the costs of getting additional accounts are significantly lower. Actually, in these systems of pension, there is some choice by the superannuation account holders. Each pension fund is floated as a separate entity. In each entity, the employees (mostly through the unions) choose half of the members of the board of directors, and the employer chooses the rest. Hence, it is possible for workers to have (at least) indirect influence on the fund. However, from the complaints received by the Commissioner of Superannuation in Australia, it seems that many people are deeply dissatisfied with the lack of choice. As a result, new legislation are being considered which would force each superannuation fund to have a menu of at least five separate funds for the employees.

Early evidence on management fees in Australia seemed to indicate that costs were low. A recent study conducted by the Association of Superfunds of Australia indicates that earlier estimates might have severely underestimated management fees. This study, reported by Quinlivan (1998) argued that the pension fund industry in Australia has approximately 350 billion dollars under management (all are in Australian dollars). Cost of administration and management is estimated at 4 billion dollars. The annual inflow was around 33 billion dollars. Therefore, charges were 12% of annual inflow and 1.15% of account balance. Therefore, charges in Australia were not spectacularly lower than what we observe in Latin America. The results from Murthi et al. (1999) for the United Kingdom seem to be very similar. The cost of fund management (without including fees for changing funds) is of the same order of magnitude in the United Kingdom.

## **Conclusions**

Privatization has become a new mantra around the world. Privatization of pension system is no exception. But pension system is a very complicated beast. First, privatization brings in the risk of adverse selection well known in insurance literature. Second, privatization does not solve the problem of "transition generation" - the obligations of the government to the old pay as you go system. If issuing government bonds finances the transition, we have not really privatized anything (see Espinosa and Sinha, 2000). Third, if privatization entails huge transaction costs, we may not have solved the problem we set out to solve.

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