

# Analysis of the Pension Reform in Mexico



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## **Abstract**

During recent decades, the phenomenon of the aging of the world's population and the unfunded financial situation of many public pension systems has been the main drivers of reform in those systems. In 1980, Chile was the pioneer when it replaced a pay-as-you-go system by a compulsory private pension system; during the following years, others countries from Eastern Europe and Latin America reformed their pension systems. In 1994, the World Bank suggested that most of the pension systems should be reformed based on a multi-pillar approach. In 1995, Mexico replaced the public pay-as-you-go system by a privately managed system based on individual accounts. This paper analyzes the causes that made necessary the reform of the old Mexican pay-as-you-go pension system. A description of the modifications and current situation of the pension system also are discussed. The paper concludes that although the pension system has been modified during the last few years, there are still some weaknesses that have to be corrected to provide an appropriate retirement benefit to workers.

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## 1 INTRODUCTION

The phenomenon of the aging of the world's population has become a major concern for most of the industrial and developing countries during the last four decades. The demographic transition caused by rising life expectancy and declining fertility rates has put significant stress on the budgets of governments, as a result of the rising costs of both public health care services and public retirement systems. Moreover, in the 1980s, extended families and other informal community arrangements to support the old were weakening and the public systems in most of the developing countries were nearing collapse.

In 1980 Chile was the pioneer in the reform of social security systems, when the government replaced the bankrupt pay-as-you-go social security system by a compulsory individual pension saving accounts managed by the private sector.

In 1994, the World Bank published the report "Averting the Old Age Crisis", which recommends a three pillar approach to support various types of pension reform in the world: a public managed system with mandatory participation; a privately managed, mandatory savings system; and voluntary savings.

The above events influenced pension reforms throughout Eastern Europe, as well as in Germany and Sweden, and in most of the Latin American Countries (LAC), which have been ahead of other regions in undertaking major reform from pay-as-you-go defined benefit pension plans to fully-funded defined contributions plans. By mid-2000, ten LAC have enacted reforms with different models: Chile (1980), Peru (1993), Argentina (1994), Colombia (1994), Uruguay (1996), Bolivia (1997), Mexico (1997), El Salvador (1998), Nicaragua (2000) and Costa Rica (2000).

The pension reform in Mexico replaced the old pay-as-you-go system by a privately administered system known as the AFORE system. The reform was based on the three pillars suggested by the World Bank in 1994. The first pillar consists of a minimum guaranteed pension equivalent to the indexed minimum wage for low-income workers. The second pillar is a fully-funded mandatory individual saving account with competitive mutual fund management and the third component is a voluntary savings regime.

This essay presents a complete analysis of the Mexican reform, from its origins up to its current situation. The main objective is to identify the causes that forced the replacement of the old public system, to describe the new system's situation and to propose solutions to the weaknesses of the reform.

This document is organized into three sections. The first section describes the evolution of social security in Mexico, including the reform of the 1992 Retirement Saving Systems and the conditions that forced the replacement of the old system by a fully-funded defined contribution plan. The second part shows the current situation of the AFORES by analyzing the three elements that affect the workers' balances: contributions, commissions and returns earned by the fund. In the following section, different scenarios are simulated to compare the replacement rate between the old and the new pension systems, and to determine the fiscal cost of these pensions to the government. Furthermore, this analysis is extended to disability and life insurance benefits. The main weaknesses of the new system are described in the last section.

## 2 THE MEXICAN PUBLIC PENSION SYSTEM

The main rationale of the public pension system is to protect all workers against the risks of temporary or permanent loss of income. Societies and governments have attempted to develop mechanisms to assure, to the maximum extent possible, an adequate standard of living for people in old age; however, this situation has not been possible due to inadequate saving instruments, insurance market failure, information gaps and long-term poverty.

In Mexico, social security was one of the main concerns of the government from the beginning of the twentieth century; however, it was not until 1943 that the Law of Social Security was enacted to provide a public pension system and a national health care system to private sector workers. In 1944, the Mexican Social Security Institute (Instituto Mexicano del Seguro Social - **IMSS**) started offering medical services to formal sector workers and their beneficiaries. Though social insurance coverage was initially limited to workers in Mexico City, benefits were soon extended to cover formal sector waged workers in the entire country.

The hospital infrastructure of the IMSS grew rapidly during the early years. Between 1950 and 1960 sixty hospitals, as well as three hundred clinics, were built. In 1973, the Law

of Social Security was modified to create insurance for Child Care to support working mothers, to provide medical services to groups without payment capacity (self-employed agricultural workers and the excluded urban sectors) and to offer the voluntary incorporation to the institute.

Today, the IMSS is financed from contributions from workers, employers and the state and provides insurances for Health and Maternity, Worker's Compensation, Retirement, Severance and Old Age, Disability and Life, and Child Care. Enrollment into IMSS is mandatory for private sector workers and members of cooperative societies of production; and is optional for workers of the informal sector in the economy (the cash economy). In the case of public sector workers, they can be enrolled into IMSS only if they work for the Central Bank; in other cases, they are protected by the Institute for Security and Social Services for Government Workers (Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado - **ISSSTE**), the States, the Armed Forces or the State-owned petroleum company (**PEMEX**).

At the end of the first semester of 2004, 52.7 million of people had access to the health care system of the IMSS and 16.1 million of people contributed to the pension system; that means that the IMSS is the most important social security institution in Mexico since is responsible for the health care of 50.1% of the population of the country and provides a pension plan to almost 40% of the labor force. (1)

## 2.1 The early years of the pension system

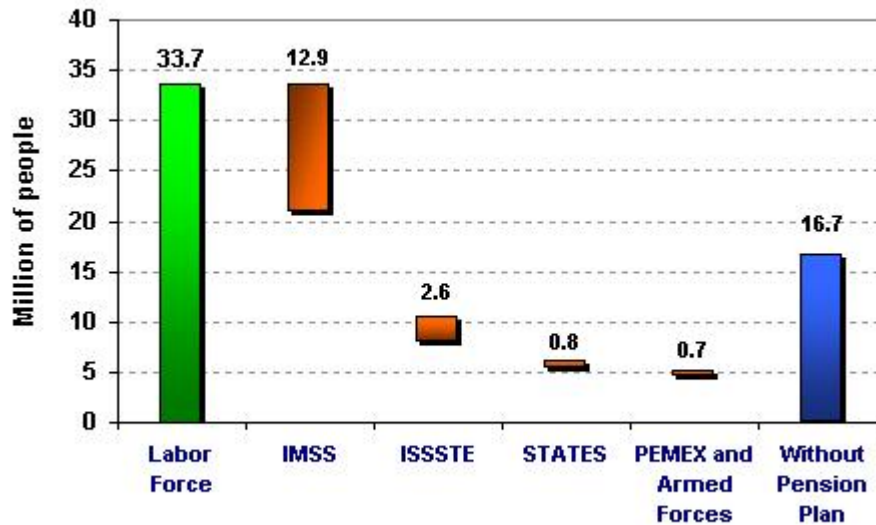
From its inception, the IMSS's pension program operated as a pay-as-you-go basis, which is a funding method where "the pension costs are charged to the retirement years as benefits are paid out."<sup>1</sup> In the case of Mexico, actuarial reserves during the first 16 years were used to finance other social insurance activities, particularly health and maternity insurance; this situation was possible because of two circumstances:

- a) There was a stable macroeconomic environment;
- b) There were enough contributions to finance current liabilities and also the health require-

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<sup>1</sup> Aitken, William H. A Problem-Solving Approach to Pension Funding and Valuation

Fig. 1: Distribution of Mexican Labor Force by Social Security Scheme (2000)



Source: Report of CONSAR, 2000

ments.

In the early years, the pension system included disability, old age, severance and life insurance (Invalidez, Vejez, Cesantía en Edad Avanzada y Muerte - IVCN). The defined retirement benefit was calculated on the average salary of the last five years of a worker's employment, and a table that classified groups according to their level of wages; however, this table was useless because almost all of the pensions were calculated based on the top level - equal to 35% of wages plus 1.25% for each contribution after the first 10 years. The pension had a maximum limit of 100% of the above-mentioned average, and a minimum limit of 90% of one minimum wage.<sup>2</sup>

### Example I.

Age:	65 years
Credited Service:	39 years
Final Monthly Salary:	USD 350

<sup>2</sup> The minimum wage is fixed by the government, usually after consultation with the social partners, and it is the smallest daily amount that a worker should receive in cash for the services of a work day. On January 2004, the minimum wage is USD 3.94 per day.

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Average Earnings of last five years:	USD 275
Minimum Monthly Wage:	USD 123

$$PIMSS_{OS} = \text{Max}[\text{Min}(AE_5 * (0.35 + (CS - 9.5) * 0.0.125), AE_5), 0.90 * MMW]$$

where:

$PIMSS_{OS}$ =	Amount of the pension according to the rules in the old system
$AE_5$ =	Average Earnings of the last five years
$CS$ =	Credited Service
$MMW$ =	Minimum Monthly Wage
9.5 =	Years equivalent to 500 weeks of contributions

$$\therefore PIMSS_{OS} = \text{USD } 127.6$$



## 2.2 Context for Pension Reform

In a pay-as-you-go system, the benefits of retired workers are paid by the contributions of active workers; that means that the main weaknesses in this system are the lack of security and sustainability. On one hand, no security implies that there is no guarantee that there will be money available to cover the benefits at the moment of retirement. On the other hand, there is no sustainability since costs are tremendously affected by changes in the plan demographics.

Beginning in the early 1990's, the above problems in the pension system in Mexico became the subject of long debates, which always concluded that the sustainability of the IMSS was in jeopardy. The system was plagued by problems, such as corruption, bureaucratic mismanagement and inefficiency. Moreover, as a consequence of using the old-age retirement funds to support the national health care system, the level of unfunded liabilities reached figures impossible to cover with the assets.

The three critical factors that are identified as the catalyst to reform of the pension system in Mexico are: changes in the demographic trends, inadequate pensions and insufficient contributions.

### ◇ *Demographic trends*

The main demographic transitions in Mexico during the last 40 years are:

#### 1. *Decrease in the fertility rate and an increase in the life expectancy*

In 1962, the fertility rate reached an historical maximum of 7.26 children; in 2003 this rate was 2.20 and it is expected to continue to decrease for the next few years. In regard to life expectancy, the figures show an important increase from 33.9 years in 1930 (33.0 years for men and 34.7 for women) to 74.9 years in 2003 (72.4 and 77.4, respectively).

#### 2. *Decrease in the natural growth of the population*

In addition to the trends of fertility and mortality rates, migration to the U.S. of nearly 80,000 people every year has further reduced the natural growth. The base of Mexico's

population pyramid has been reducing in size and Mexico is expected to see a rapidly aging population over the coming decades. In 1950, of 26 million inhabitants, 5.5% were older than 60 years, while 60.8% were below 25 years. In 1990, those figures changed to 6.1% and 59.9% and according to projections of the National Council of Population (Consejo Nacional de Población - CONAPO), it is expected that in 2030 the population older than 60 years will reach a level of 17.5%.

### 3. *Decrease in the dependency ratio*

In 1950, the system had approximately 67 workers per retiree, but by 1994 that ratio declined to 8 workers per retiree. According to the IMSS's projections, from 1990 to 2010, the number of retirees could increase by an annual rate of 5.6%, while the growth in numbers of new entrants to the labor force will be around 2.6%. The overall effect of those two trends is to increase the elderly dependency ratio from 6.4% in 1990 to 14.8% in 2030.

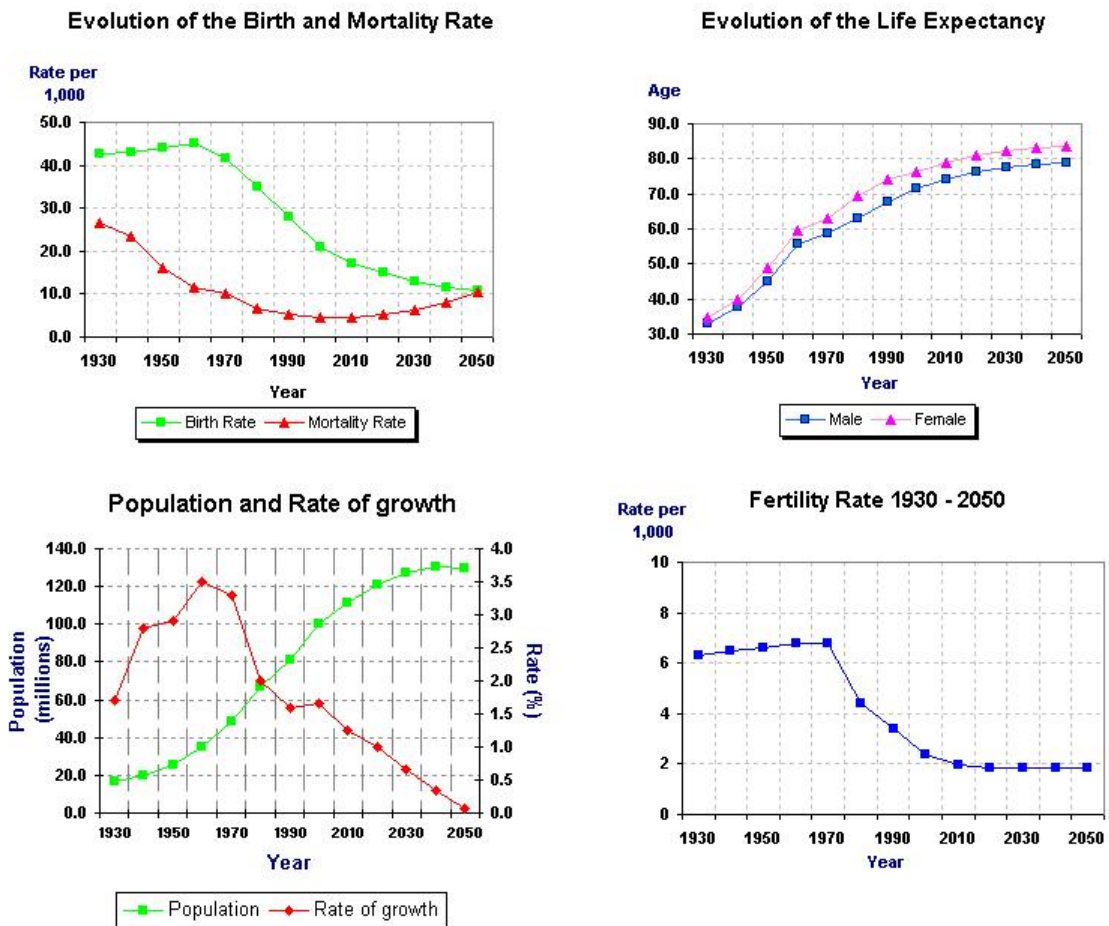
#### ◇ *Inadequate pensions*

In 1989, pensions were indexed to the minimum wage as an attempt to solve the problem of a decline in the real value of the pensions; however, this action introduced political risk via lags in the adjustment of the minimum wage in times of accelerating inflation. In fact, the experience of the last 30 years has shown that the minimum wage has lost real value by approximately 68 percent.

In 1990, the table to compute the amount of pensions was modified with new categories and percentages (1). If earnings are higher, the percentage of the pension base is reduced, which appears to be effective in redistributing income to low-income affiliates; however, the eligibility requirements allow some advantages for certain groups; for example, high-income workers needed to pay contributions for 10 years to receive a pension equal to that of a low-income worker who contributed for 20 years. Furthermore, to receive a retirement pension there was a vesting period of almost 10 years, which means that workers with high job rotation could lose their rights to a pension and the contributions were re-assigned to cover the benefits of the people that had paid contributions for more than 10 years.

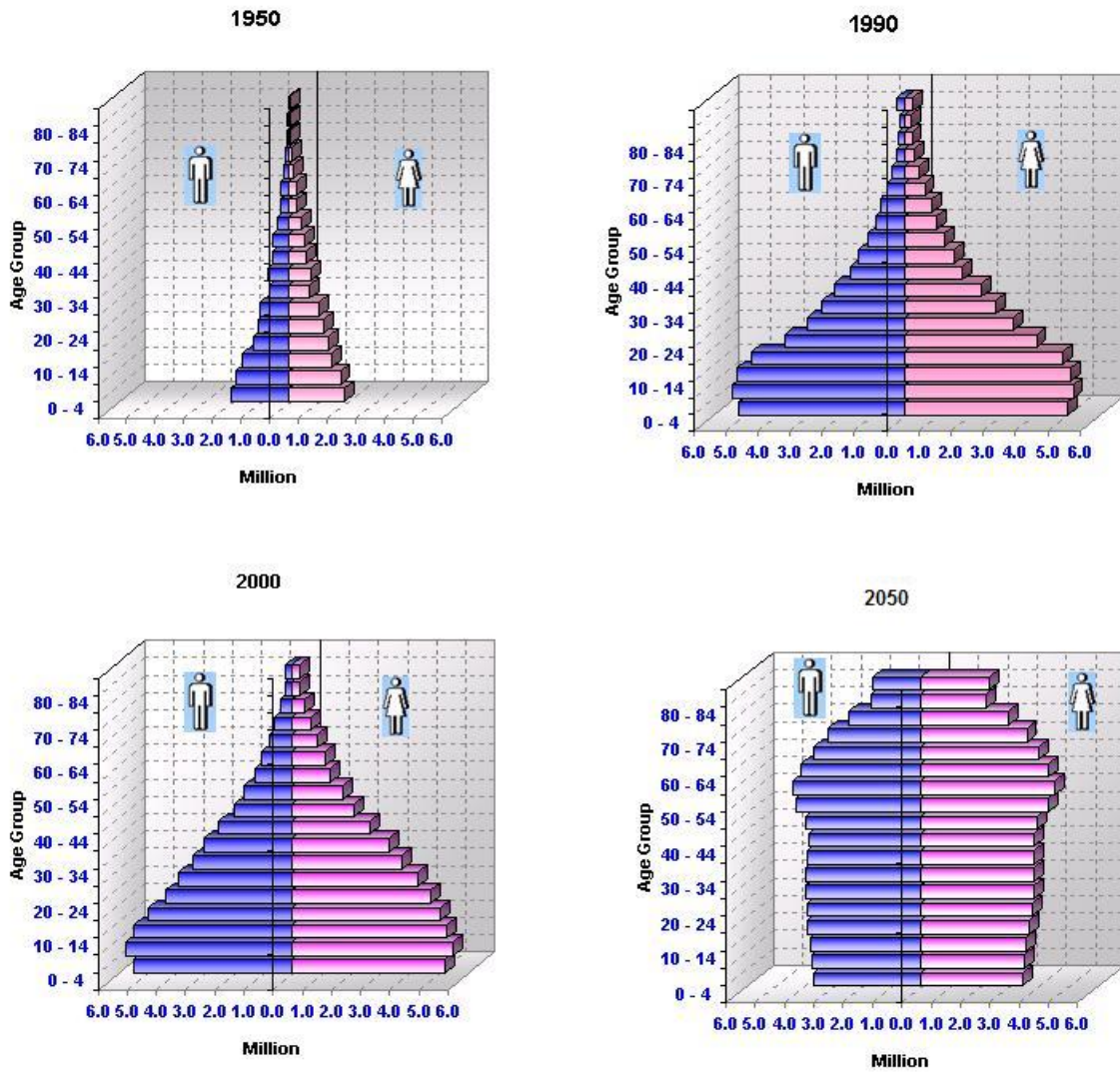
In relation to the benefits, the formula was an incentive to under-report income because high-income workers received the same pensions as those of low-income workers. In fact, there were cases where the high income-workers who belonged to the informal sector af-

Fig. 2: Demographic trends in Mexico: 1930 - 2050



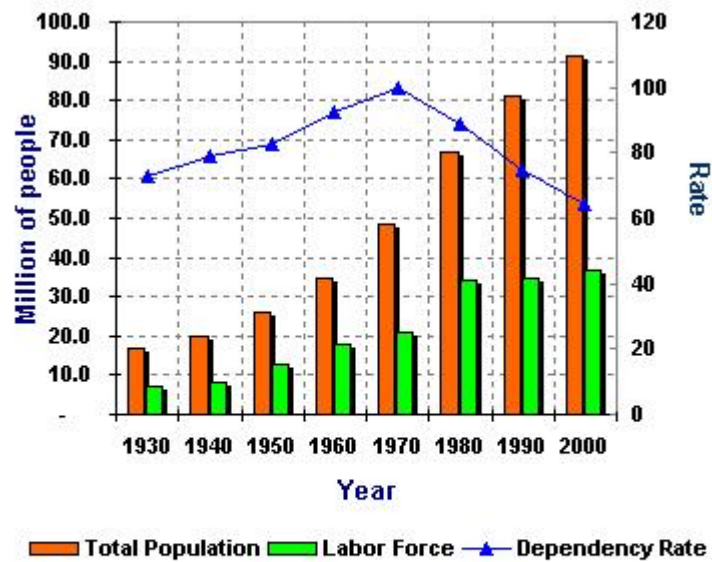
Source: Statistics from INEGI and CONAPO

Fig. 3: Demographic Structure by Age Group: 1930 - 2050



Source: Statistics from INEGI and CONAPO

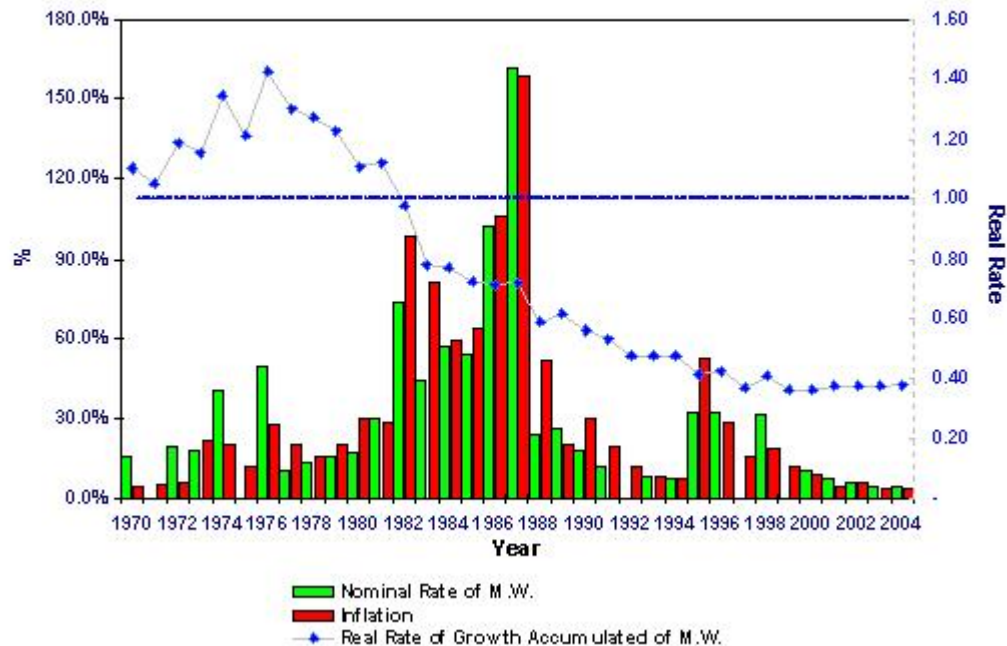
Fig. 4: Elderly Dependency Rate: 1930 - 2000



**Source:** Statistics from INEGI and CONAPO

The Elderly Dependency Rate represents the number of people (0 - 14 and 65 +) per each one hundred people in the Labor Force.

Fig. 5: Evolution of the Real Rate of Growth of the Minimum Wage: 1970 -2004



filiated to the voluntary regimen and paid contributions for only 10 years. At the end they received pensions equal to those of the low income-workers who paid for more than 10 years.

#### ◇ *Insufficient contributions*

In 1994, the level of actuarial reserves was not enough to finance the increasing cost associated with the aging population (2). The effect of the modifications of the original benefits over the course of the years, without a corresponding increase in contributions, altered the financial position of the IMSS. Examples of benefit improvements included worker's family benefits, a reduction in vesting times and the minimum wage indexation of the pensions; all of these changes were carried out without any increase in contributions. According to the Mexican government's own estimates, payroll taxes for the pension system would have had to increase from 8.5% in 1995 to almost 24% of total payroll by 2020 to keep actuarial balance.

In a pay-as-you-go system, the ability to pay retirement benefits rises in proportion to the

Tab. 1: Table to compute the amount of pensions in the old system

<b>Earning's Group in times the Minimum Wages</b>	<b>Basic Amount %</b>	<b>Annual increment %</b>
0.00 - 1.00	80.00	0.56
1.01 - 1.25	77.11	0.814
1.26 - 1.50	58.18	1.18
1.51 - 1.75	49.23	1.430
1.76 - 2.00	42.67	1.62
2.01 - 2.25	37.65	1.756
2.26 - 2.50	33.68	1.87
2.51 - 2.75	30.48	1.958
2.76 - 3.00	27.83	2.03
3.01 - 3.25	25.60	2.096
3.26 - 3.50	23.70	2.15
3.51 - 3.75	22.07	2.195
3.76 - 4.00	20.65	2.24
4.01 - 4.25	19.39	2.271
4.26 - 4.50	18.29	2.30
4.51 - 4.75	17.30	2.330
4.76 - 5.00	16.41	2.36
5.01 - 5.25	15.61	2.377
5.26 - 5.50	14.88	2.40
5.51 - 5.75	14.22	2.416
5.76 - 6.00	13.62	2.43
6.01 - 6.01 >	13.00	2.450

Tab. 2: Present Value of Future Pension Deficits at 12/31/1994 (\$USD 1,000 million)

<b>Reserves</b>	<b>0.8</b>	<b>Present value Old pensions</b>	<b>24.2</b>
<b>Present Value future contributions</b>	<b>170.7</b>	<b>Present value Future liabilities</b>	<b>596.8</b>
<b>Total Assets</b>	<b>171.5</b>	<b>Total Liabilities</b>	<b>621.0</b>
		<b>Present Value Future Deficits</b>	<b>449.5</b> <b>(141.5% of GDP)</b>

rate of the growth in the tax base, which in turn depends on the rate of growth in the labor force and the rate of growth in real wages per worker. The Mexican economy in the last 30 years has experienced cycles characterized by high rates of unemployment; therefore, the number of people in the informal sector increased faster than that in the formal sector. This phenomenon decreased the tax base and resulted in a deterioration of the financial situation of the IMSS (3).

### 2.3 The first experiment: SAR

According to the World Bank, financial security for the old and enhanced economic growth would both improve if governments developed three pillars of old age security: a public managed system with mandatory participation; a privately managed, mandatory savings system; and voluntary savings.<sup>3</sup>

In the case of Mexico, the first attempt to address the deficiencies of the first pillar was the creation of the Retirement Savings System (Sistema de Ahorro para el Retiro - SAR), which was included in the Social Security Law in Mexico in February 1992.

The SAR was a compulsory system that consisted of two sub-accounts:

<sup>3</sup> Report "Averting the Old Age Crisis", World Bank, 1994



Tab. 3: Place of Work in Mexican Labor Market 2002  
(Figures in million)

Type of Work	Number	%
<b>Informal Sector</b>		
Without working locale	1.0	2.4%
In a vehicle	1.1	2.7%
In home	7.6	18.9%
Semi-fixed stand or market	0.5	1.2%
Other	6.5	16.2%
Subtotal	<b>16.7</b>	41.4%
<b>Formal Sector</b>		
Small	7.5	18.6%
Medium and Large	16.0	39.6%
Other	0.1	0.4%
Not specified	0.0	0.0%
Subtotal	<b>23.6</b>	58.6%
<b>Total</b>	<b>40.3</b>	

Source: : INEGI, National Survey of Employment, 2002

1. A new employer contribution of two percent of total payroll. Contributions were deposited in individual accounts and managed by commercial banks; after four days the banks had to send the money to the Bank of Mexico (Central Bank), which guaranteed an interest rate of at least 2% a year over the inflation adjusted balance using the inflation rate of the previous month. Employee's contributions were allowed as voluntarily, but these did not occur.
2. A 5% employer contribution corresponds to the specialized housing benefits managed by the National Worker's Housing Fund Institute (Instituto del Fondo Nacional de la Vivienda de los Trabajadores - **INFONAVIT**). In this case, the Central Bank transfers these resources to INFONAVIT, which would pay interest according to the operational surplus for the corresponding year.

The main objectives of the SAR program were to improve the level of the pensions in Mexico, to finance the development of the economy, through the generation of long term internal savings and to provide unemployment insurance to the workers. However, this attempt proved to be unsuccessful because of substantial institutional and conceptual problems. The reasons for this failure were:

**a) *Lack of consistent supervision of accounts by commercial banks.***

The small amounts in the SAR and the low commissions for account administration were not sufficient incentive for the banks.

**b) *Multiple accounts.***

The commercial banks opened accounts for workers based on the Taxpayer Federal Registration Code (Registro Federal de Causantes - RFC); however, as these codes could be easily duplicated, there were some workers who had more than one account in the same bank. Furthermore, problems arose as a consequence of the ignorance of these contributions, in that most employees did not know where their contributions were deposited.

The lesson learned in this first experiment was that the solution to the social security problem was not a complementary system but a replacement of the old system to offer better benefits to the workers by giving them clearly defined ownership rights over their contributions.

## **2.4 The 1995 pension reform**

Despite the difficult issues relating to labor policies and the constitutional rights of the workers, in December of 1995 the Mexican Congress enacted the new social security law. In April 1996, a second package established the legal and organizational framework under which the new system of individual saving accounts eliminated the old pay-as-you-go system. The reform started on July 1, 1997, without any change for the affiliates who were pensioned before that date; and the private management of the pension fund began at the end of September 1997.

The new pension system in Mexico is a fully funded defined-contribution system and it is based on a multiple pillars: a basic pillar of defined benefits with public administration that grants a minimum pension; a complementary pillar of obligatory defined contributions with private administration; and a third pillar consisting of voluntary savings with private administration.

The first action in the reform was to split the old IVCM system into:

**a) Disability and Life insurance**

The IMSS retains responsibility over the management and the collection of contributions, but private insurance companies provide benefits through annuities. The main changes in this insurance are the eligibility requirements, the percentage of contributions and the benefits.

**b) Old Age and Severance insurance**

As in the previous disability and life insurance, the main changes in the Old Age and Severance insurance includes the eligibility requirements, the level of contributions and the benefits; however, several modifications deserve to be highlighted:

1. The social quota is the government's monthly contribution deposited to the individual account of the worker; its value is equivalent to 5.5% of the minimum wage on July 1, 1997 indexed to CPI from June 30, 1997. This quota does not depend on the worker's earnings so the impact in the total of the contributions is variable; for example, for a worker who earns the minimum wage this quota is almost 5.5% of his salary, but for a worker who earns three times the minimum wage that percentage is 1.9%.
2. The affiliates, called transition workers, who started contributing before the new law went into effect, have a life switch option at retirement; that means, they can choose the highest benefits computed under the two systems. If they choose the old pay as you go system, they surrender to the government all the funds of their accounts, except those that correspond to the accumulated balances in the INFONAVIT and SAR sub accounts, as well as the retirement contributions and returns made from July 1, 1997.
3. The Minimum Pension Guarantee (MPG) is equal to one minimum wage on July 1, 1997 indexed to inflation; therefore for workers whose funds at retirement are not enough to obtain this pension, the government will cover the difference to grant this benefit; this amount is called the fiscal cost of the transition to the new pension system.<sup>4</sup>

The IMSS collects and puts the contributions in the worker's account, but the private fund

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<sup>4</sup> On December 10, 2002 the Systems of Savings for Retirement Law was modified to allow withdrawing the funds that correspond to the retirement contributions to those workers that choose the old system.

Tab. 4: Disability and Life Insurance

Area	Old System	New System
<b>Eligibility Requirements</b>	- 150 weeks of contributions	- 250 weeks of contributions
<b>Contributions (% Wage)</b>	a) Employee : 1.12% b) Employer : 3.15% a) Government : <u>0.23%</u> <b>4.50%</b>	a) Employee : 1.00% b) Employer : 2.80% a) Government : <u>0.20%</u> <b>4.00%</b>
<b>Benefits Disability</b>	- The pension is equivalent to a percentage of the average wage of the last 5 years in nominal terms plus a fraction for each year in excess of the first 10 years.	- The pension is equivalent to 35% of the average wage of the last 500 weeks of contributions in real terms.
<b>Benefits Life</b>	- Widow 90% of the disability pension - Dependents 20% of the disability pension or 30% if both parents deceased. - If there are no dependents, the survivors have the right to 20% of the disability pension.	- The methods of the old system are applicable to the new one.
<b>Minimum Pension Guarantee</b>	- Equivalent to 90% of one minimum wage indexed to growth in the minimum wage.	- Equivalent to one minimum wage on July 1,1997 indexed to inflation (CPI).

Source: The Law of Social Security, 1994

(a) In addition to the pension benefit, pensioners and their dependents have access to health care services. Family assignments are an extra percentage that is granted to the dependents of the disabled pensioners (widow 15%, orphans younger than 16 years 10% for each one, or contributor's parents 10% for each one).

(b) Assistance is granted when the physical condition of the pensioners requires the attention of another person in a permanent or continuous way and it consists in an increment of 20% of the pension.

(c) The maximum contributions in the old system could not exceed 10 times the minimum wage; under the new system that limit is 25 times the minimum wage.

(d) From the inception of the new system, the benefits of these insurances are computed based in the new rules regardless of whether or not the worker was affiliated before the reform.

companies called AFORES (Administradoras de Fondos para el Retiro) are responsible for the management of these contributions, except for the part that corresponds to the housing sub account, which is managed by the INFONAVIT. The AFORES own at least one individual retirement fund called SIEFORE (Sociedades de Inversión Especializadas en Fondos de Retiro), where the contributions are invested. At the beginning, all transition workers had up to 2001 to choose an AFORE, and the contributions of those who did not choose between 1997 and 2001 were deposited in a special account at the Bank of Mexico until they choose an AFORE, or until 2001, at which the CONSAR assigned an AFORE for them.

The National Commission for the Retirement Saving System (Comisión de Ahorro para el Retiro - CONSAR) is an independent and specialized government agency, whose main functions are: to set general investment rules and supervise the investments made by the SIEFORE, to administer and operate the SAR national data bank, to levy fines on those participants who violate regulations and to mediate disputes between an AFORE and workers.

Tab. 5: Old Age and Severance Insurance

Area	Old System	New System
<b>Eligibility Requirements</b>	<p><b>Old Age :</b> - 500 weeks and 65 years old</p> <p><b>Severance:</b> - 500 weeks and 60 years old</p>	<p><b>Old Age :</b> - 1,250 weeks and 65 years old</p> <p><b>Severance:</b> - 1,250 weeks and 60 years old</p>
<b>Contributions (% Wage)</b>	<p><b>IVCM:</b> <b>4.00%</b></p> <p>a) Employee : 1.00%</p> <p>b) Employer : 2.80%</p> <p>a) Government : 0.20%</p> <p><b>IVCM (Employer): 2.00%</b></p> <p><b>INFONAVIT (Employer): 5.00%</b></p> <p><b>Total: 11.00%</b></p>	<p><b>Old Age and Severance: 6.50%</b></p> <p>a) Employee : 1.13%</p> <p>b) Employer : 3.15%</p> <p>a) Government : 2.22%</p> <p><b>Retirement (Employer): 2.00%</b></p> <p><b>INFONAVIT (Employer): 5.00%</b></p> <p><b>Total: 13.50%</b></p>
<b>Old Age Benefits</b>	<ul style="list-style-type: none"> <li>- The pension is equivalent to a percentage of the average wage of the last 5 years, plus a fraction for each year in excess of 10 years.</li> <li>- The pension is indexed to minimum wage's increments.</li> <li>- The pension can not be greater than the worker's last salary.</li> <li>- The worker can withdraw balances that correspond to the SAR and the INFONAVIT for the period 92 - 97.</li> </ul>	<p><b>* Transition Workers:</b></p> <ul style="list-style-type: none"> <li>- These workers can choose the greater of:               <ul style="list-style-type: none"> <li>a) Benefits under the old system, plus the funds that correspond to the retirement contributions from 1997 to the retirement date.</li> <li>b) Accumulated balances in the AFORES since 1997, plus the balances that correspond to the SAR and the INFONAVIT (92 - 97).</li> </ul> </li> </ul> <p><b>* New Workers:</b></p> <ul style="list-style-type: none"> <li>- The accumulated balances in the AFORES</li> <li>- The worker can buy an annuity or make gradual withdrawals from the individual account.</li> </ul>
<b>Severance Benefits</b>	<ul style="list-style-type: none"> <li>- The pension that the worker was entitled to at age 65 years old is reduced 5% for each year that the worker anticipates retires early.</li> </ul>	<ul style="list-style-type: none"> <li>- The balances must buy an annuity equivalent to 130% of the minimum pension guarantee</li> </ul>
<b>Minimum Pension Guarantee</b>	<ul style="list-style-type: none"> <li>- Equivalent to 90% of one minimum wage indexed the growth in the minimum wage.</li> </ul>	<ul style="list-style-type: none"> <li>- Equivalent to one minimum wage on July 1, 1997 indexed to inflation (CPI).</li> </ul>

Source: The Law of Social Security, 1994

(a) In this example, the social contribution to the old age and severance (5.5% of a minimum wage indexed to inflation) is equivalent (approximately) to 2.0% for a worker that earns 2.5 minimum wages.

(b) In the old system the IVCN contributions could not exceed 10 times the minimum wage, in the new system it is 22 for Old age and Severance, 22 for the retirement sub account and 25 for INFONAVIT during 2004; however, these contributions will be limited to 25 minimum wages in 2007.

### **3 THE CURRENT SITUATION OF THE PENSION SYSTEM**

In a defined contribution pension plan there are three elements that directly affect the final worker's balances: the total of the contributions, the level of commissions and the returns earned by the fund. The changes in any of these variables could impact directly on the amount of the pension. For that reason, this section is dedicated an analysis of these variables.

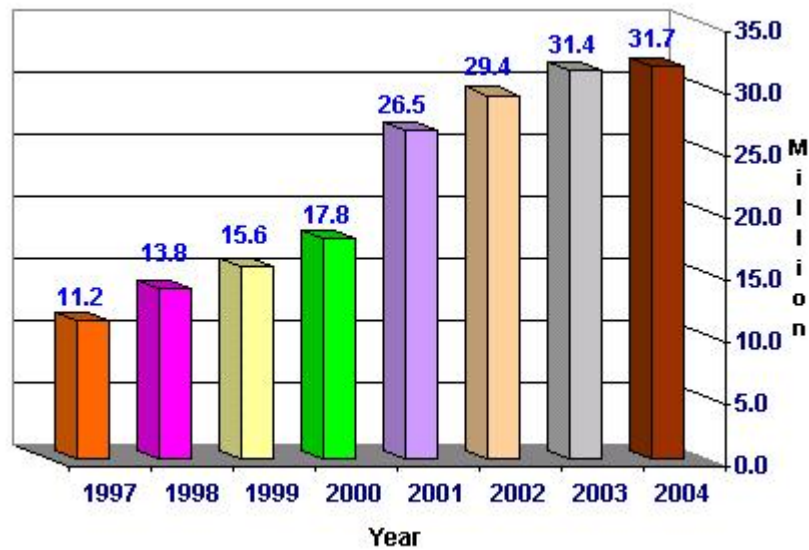
#### **3.1 Affiliation to the new system**

The first pillar of old age security is a public managed system with mandatory participation; therefore, the number of affiliates in the pension system provides enough information to determine the evolution of a pension system in a country.

The AFORES system began to operate in the spring of 1997, with 17 pension plans (including one AFORE managed by the IMSS) that enrolled participants in anticipation of the first contribution in October 1997. From its inception until 2002 the number of individual accounts has grown from 11.2 million to 31.7 million at the end of 2003. Today, there are 13 AFORES that are operating in the market, which cover 99.9% of the potential market estimated by the CONSAR.

The problem of multiple accounts, which had great consequences in the SAR-92, disappeared in the new system. The national database of the SAR was centralized in "PROCESAR", which is a company that verifies exclusively the worker's affiliation. In this regard, this company ensures that the affiliated workers to the IMSS are incorporated or assigned to only one AFORE. In addition, the government implemented a new code that substitutes the RFC (Taxpayer Federal Registration Code) as a mechanism to identify the balances of the workers. The new code is called CURP (Clave Única de Registro de Población), and is used to identify all of the persons that live in Mexico; the main advantage of this code is that it is impossible that one person has two numbers or that two persons have the same

Fig. 6: Number of Individual Accounts in the New System



Source: CONSAR's Report April, 2004

code.

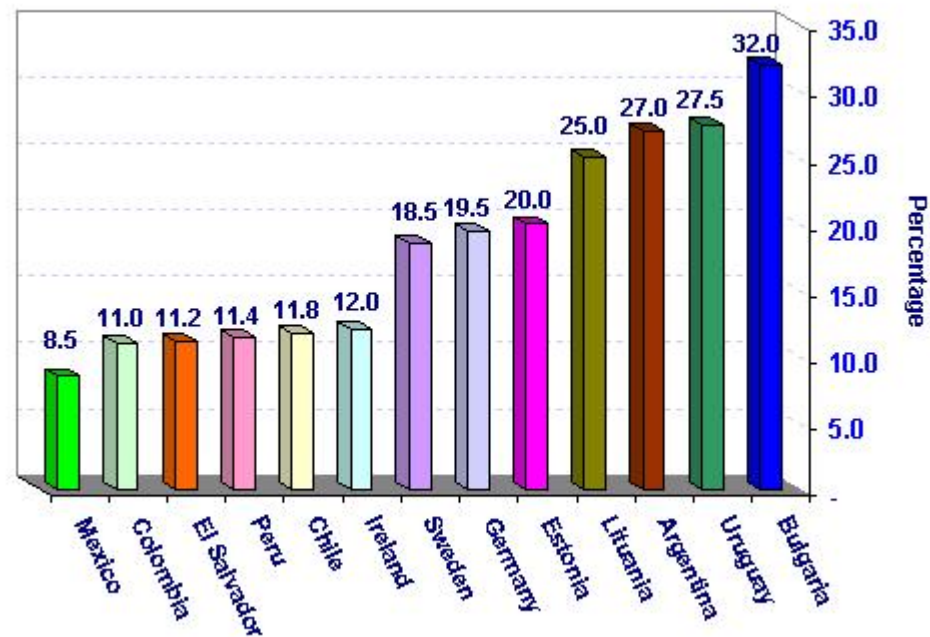
### 3.2 Contributions

The contribution to the Old Age and Severance insurance, without the 5% housing sub account, was increased from 6% to 8.50% on average; however, this percentage is less than that of other pension systems.

In terms of cash flows, the initial deposit of contributions as at the end of the first year of operation of the new system (1997) totaled USD \$ 972.0 million, of which 60.5% were contributions to the retirement and voluntary account, and the rest, 39.5%, were funds managed by INFONAVIT. This amounted to an average bi-monthly contribution per active worker of USD \$ 46. During 2004, bi-monthly total AFORES mandatory contributions averaged about USD \$ 860.2 millions, with fund totals standing at US\$ 39,153.9 millions. According to CONSAR's projections, it is expected that in 2030 the funds managed by the AFORES will represent 30% of the GDP.



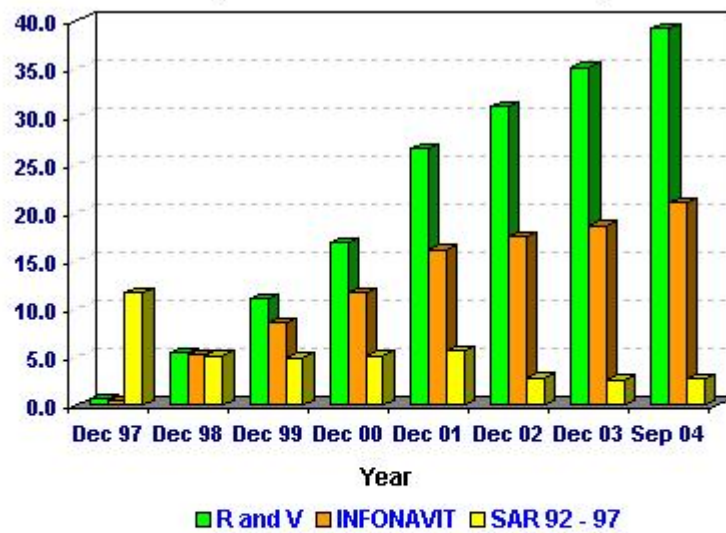
Fig. 7: Contributions to the Pension System as a percentage of the Wage



Source: CONSAR's Annual Report 2002

So at September 1997, there were no more contributions to the old SAR92-97 accounts and the balances that were identified were deposited in the new accounts. On December 2002, there was almost USD \$ 1,908.1 million in the old SAR accounts that had not been reclaimed by the workers. After five years from the inception of the new system, it was logical to assume that it was not likely that anybody would reclaim these resources. In view of this, the government published a decree that establishes that the USD\$ 1,908.1 million was distributed to other accounts of social benefits, mainly in the agricultural sector. The decree also stipulated the creation of a reserve (5% of the total resources), managed by the IMSS, to pay workers who prove to be owners of an account. This action was severely criticized because of the obscured transparency in the management of these resources since it was not understand why the resources were not used to alleviate the financial situation of the IMSS. The balance of SAR housing sub accounts that were not reclaimed is currently

Fig. 8: Total Funds in the Pension System  
(Thousands of million of dollars)



Source: CONSAR's Report, 1997 - 2003

- (a) R and V are the funds that correspond to the Old Age and Severance insurance and to the voluntary contributions.
- (b) Through this report we use the exchange rate (US dollars vs. pesos) prevailing at December 31 of each year and September 30, 2004.

managed by the INFONAVIT.

### 3.3 Commissions

In a mandatory individual account system, the pension administrative expenses demand attention for several reasons :

- a) A system that costs more to administer generates smaller net investment during the working life and hence produces lower retiree benefits.
- b) High administrative costs raise equity concerns regarding low-wage workers.
- c) Higher pension administrative costs can raise retiree claims on future government revenues.
- d) Higher pension expenses increase incentives for low wage workers to evade the pension system.

The CONSAR established that each AFORE can design its own commission's system, which could be a percentage of contributions, a percent of assets under management or a combination of these two. According to the last CONSAR's report, to September 2004, there are three AFORES that levy a one-time front loaded charge on invested assets and the others nine use a combination of a one pay-based charge and an additional annual percentage of assets charge. These commissions are intended to pay the AFORE's expenses as the money managers, the record keepers and the benefit payers. From January 2001 until June 2004, the commissions have decreased in average almost 34% mainly because the high costs that the AFORE had to pay for publicity have disappeared, and the process to sign up new participants have become more routine and hence less expensive. Moreover, the AFORES reduced commissions for loyal participation for the workers that remain over a long period of time.

### 3.4 Investment

In theory, the management of the investments in a public pension system faces a less regu-

Tab. 6: AFORES Commissions : June 2004

<u>AFORE</u>	<u>Front-Load % of Pay</u>	<u>Annual % of Assets</u>
1 Actinver	1.05	0.24
2 Azteca	1.10	0.15
3 Banamex	1.70	
4 Bancomer	1.68	
5 Banorte Generali	1.40	0.60
6 HSBC	1.60	0.40
7 Inbursa	0.50	0.50
8 ING	1.68	
9 IXE	1.10	0.35
10 Principal	1.60	0.45
11 Profuturo GNP	1.67	0.66
12 Santander Mexicano	1.60	0.80
13 XXI	1.30	0.20
<b>Average</b>	<b>1.38</b>	<b>0.44</b>

Source : CONSAR's Report, 2004

lated environment, so it shall prove to be more efficient than that of the privately managed schemes; however, evidence has proven to be the contrary.

In 1997 each AFORE offered only one SIEFORE, which was composed fundamentally of securities whose returns were indexed to the Consumer Price Index (Indice Nacional de Precios al Consumidor - INPC). This action had two objectives, to reduce the confusion among workers at the moment to choose a SIEFORE and to simplify supervision in the first year of the operations.

In the beginning the SIEFORES operated under a regulation of quantitative restriction which established that the SIEFORES must invest at least 51% in debt instruments indexed to the CPI. Maximum limits did not exist to invest in government's instruments, but there was a minimum of 65%; moreover, these instruments should have redemption less than or equal to 183 days or in the case of longer periods these instruments should offer a floating rate. The maximum limit for investment in eligible bank debt (issued or guaranteed by a commercial bank) was 10% and in the case of eligible private debt and development bank obligations the percentage allowed was 35%. Investments in equities or investment abroad was not allowed.

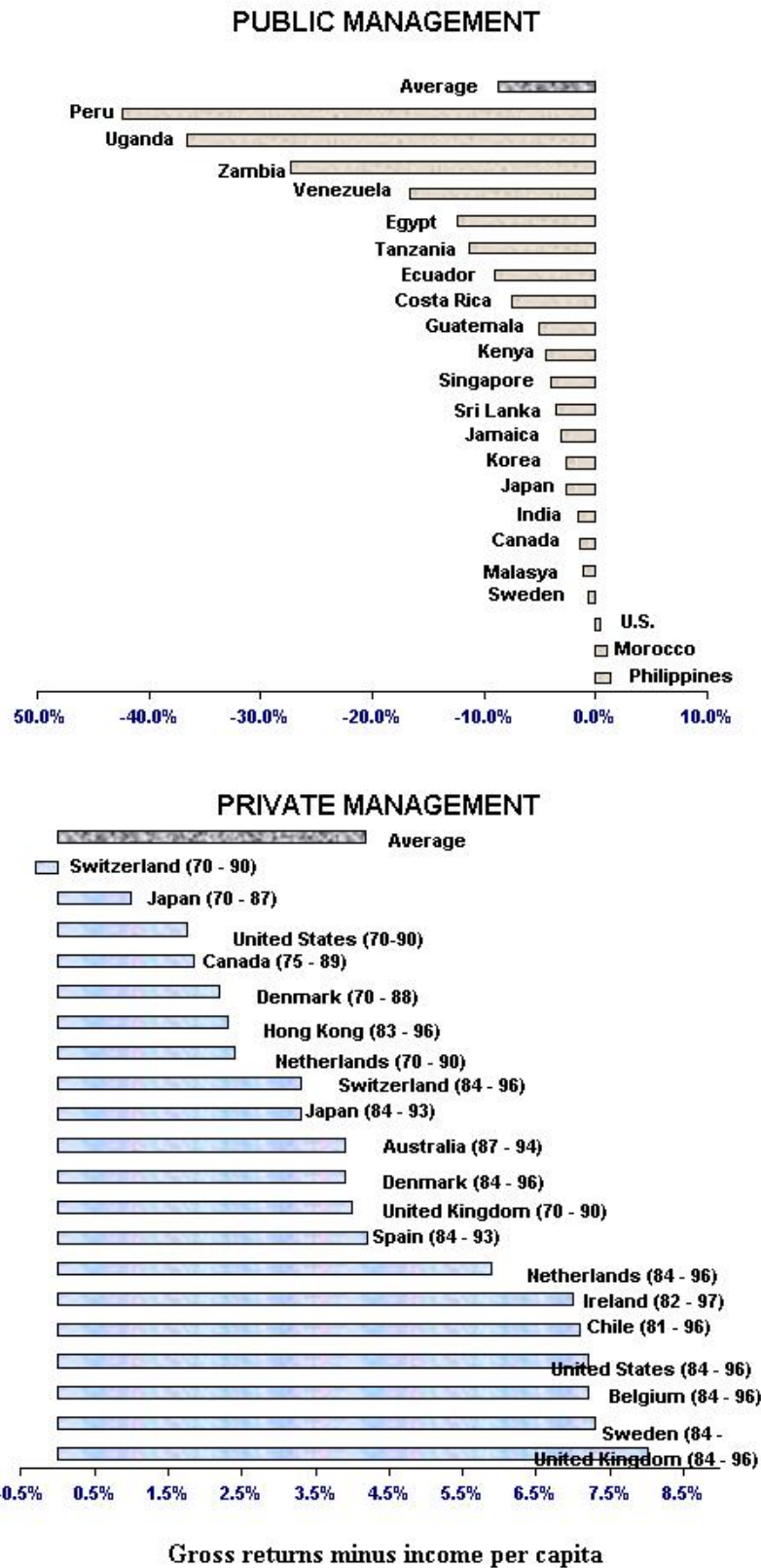
In 2001, the SIEFORE's investments started facing two problems:

- i) The investment proportion in government debt instruments produced a shortage of instruments of high quality.
- ii) The interest rate of the government instruments diminished, which would gradually affect the returns of the SIEFORES and, therefore future pensions.

In 2001, the government took action on the above problems by allowing investment in derivatives as well as instruments issued in yens and euros. In 2002, the limits to control the investment risk changed from a regulation based on limits per issuer, to one based in the quality credit of the issuers.

### **Portfolio Limits**

Fig. 9: Returns minus income Growth



Source: Public Management. World Bank Pension Reform Premier  
 "How well do governments invest pension reserves?"

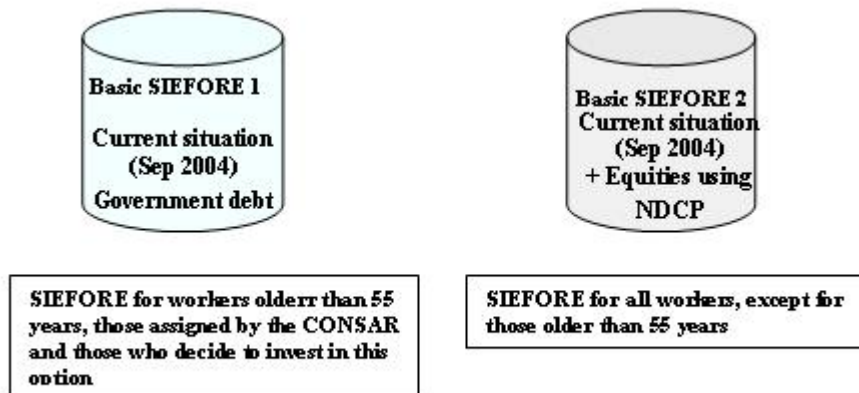
Qualification	Limit as % of the fud	Limits per issuer
AAA	100	5
AA	35	3
A	5	1

From 2003, the SIEFORES can acquire debt issued in denominations different from the Units of Investment (UDIS) by part of the state, the municipal governments, the Federal District and government companies. On April 30, 2004, the CONSAR decreed the new conditions that will be included to the operation of the SIEFORES from January 2005, which have the objective to offer higher returns on worker's funds, as well as, to diversify the portfolios of the SIEFORES. The main changes added to the investment regime are:

- a) Each AFORE will operate two SIEFORES, Basic SIEFORE 1 (BS1) and Basic SIEFORE 2 (BS2), that will offer alternative investments to the worker according to their preferences or their age.
- b) The Basic SIEFORE 2 can invest, with a maximum of 15% of its portfolio, in Debt Notes with Capital Protected at Maturity (Notas de Deuda con Capital Protegido al Vencimiento - NDCP), which have returns associated with equities indices. The BS1 cannot invest in such Notes.
- c) Both SIEFORES can invest up to 20% of their portfolios in international instruments issued by: a) Multilateral Financial Organizations such Inter-American Development Bank (I.D.B.), b) Governments, central banks and government agencies of country members of the Technical Committee of the International Organization of Commissions of Values (IOSCO) or of the European Union; and c) Corporations, provided the issue is carried out in a market of a country member of the Technical Committee of IOSCO or of the European Union. The minimum quality credit required to these instruments is A- on a global scale, which is a superior qualification to the minimum that is considered as investment grade (BBB).

The BS2 will be assigned to all workers younger than 56 years; however, they have the option to change to the BS1 without any cost. Moreover, they can change from one SIEFORE to the other (within the same AFORE), as many times as they wish through their working

Fig. 10: New Scheme of Investment in January 2005



lifetime.

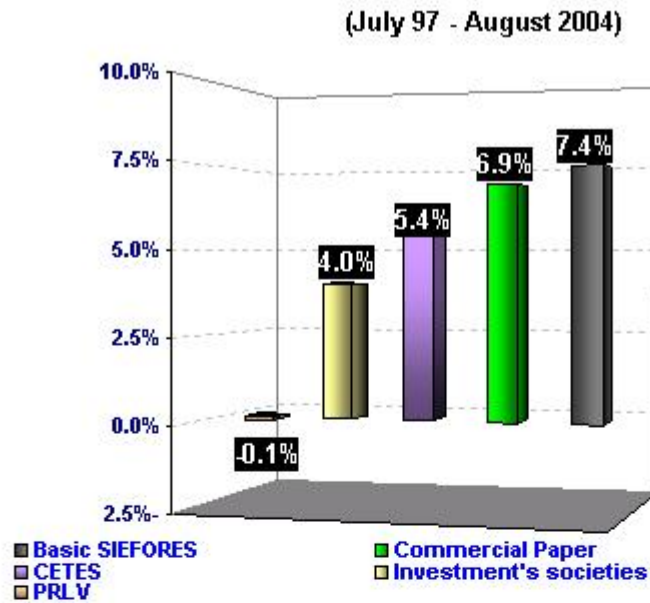
On September 2004, the total value of the SIEFORES was approximately USD\$ 40,967.9 million, which was invested in the following proportions: 81.5% in government debt instruments, and 18.5% in non-government instruments. The non-government instruments were corporate instruments, debt of financial institutions and entities (government's companies, states and municipalities).

From 1997 to 2004 (August), the SIEFORES have earned the highest real rate of return; therefore, they are the best instruments of investment accessible to most of the population.

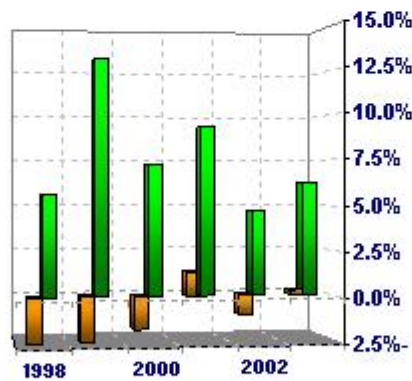
Finally, it is important to mention the role of the housing account in the pension system. According to article 139 of the INFONAVIT's Law, the balance of the housing sub account will earn an interest rate determined by Council of Administration of the Institute; that interest should be superior to the increase in the minimum wage. This is exactly the main problem in the management of this sub account since in the case that the increment in the minimum wages follows the current trend, the interest rates derived from the housing sub account will be negative in real terms, considerably affecting the final worker's balances.



Fig. 11: Historical Real Rate of Returns



INFONAVIT vs SIEFORES



	1998	1999	2000	2001	2002	2003
■ INFONAVIT	-3.2%	-2.7%	-1.8%	1.3%	-1.1%	0.3%
■ SIEFORES	5.6%	13.1%	7.2%	9.3%	4.7%	6.2%

Source: CONSAR's Report, 2004

- PRLV (Pagaré con rendimiento liquidable al vencimiento) is a Promissory note with returns at maturity
- The INFONAVIT's real rates according to the conditions of the article 39 of the INFONAVIT's Law with information from the Bank of Mexico.

## 4 THE FUTURE OF THE PENSION SYSTEM

Based on the previous figures, the new pension system looks to have achieved its objectives. However, there is one more important result that has to be analyzed before validating the above statement: the replacement rate.

### 4.1 Retirement, Severance and Old Age

A convenient method to measure the adequacy of retirement income is to calculate the replacement rate, which is the ratio of retirement income just after retirement to compensation just before retirement. The main sources of income at retirement are the employer sponsored pension plans, the public pension system, personal savings plans and post retirement income. Therefore, the replacement rate for public pension plans is a useful indicator to promote actions to improve retirement benefits.

In the new pension system, the replacement rate is determined by three variables: a) Contributions, b) Returns and c) Expectation of Life. Therefore, to analyze the impact of each of these variables on retirement benefits, it is necessary to carry out projections assuming different scenarios.

<b>Country</b>	<b>%</b>	<b>Country</b>	<b>%</b>
<b>Denmark</b>	29	<b>United States</b>	44
<b>Canada</b>	34	<b>Japan</b>	47
<b>United Kingdom</b>	31	<b>Germany</b>	49
<b>Switzerland</b>	37	<b>Sweden</b>	68
<b>Netherlands</b>	44	<b>Italy</b>	69

**Source:** Statistics from the Organization for Economic Cooperation and Development (O.E.C.D.)

**Example II.**

Age:	35 years
Age at retirement:	65 years
Salary:	USD 354.7 (3 minimum wages)
Credited Service:	30 years
Annual salary's increment:	1% in real terms
Minimum Pension Guaranteed:	USD 122.6
Real rate of return AFORE:	average of the real rate earned by the SIEFORE during the last 36 months

Actinver 6.13%	Azteca 4.75%	Banamex 5.76%
Bancomer 5.62%	HSBC 5.30%	Inbursa 3.90%
ING 5.70%	IXE 5.39%	Principal 5.51%
Profuturo 5.52%	Banorte 5.72%	XXI 5.67%
Santander 5.38%	Avg: 5.43%	

Real rate of return INFONAVIT: First two years of projection 0%  
From 2006 up to the last year of projection 4%

**Projection of the Balances:**

a) Total Contributions Retirement, Old Age and Severance sub account: USD **\$ 12,216.09**

	AFORE's Balance at Retirement		Subtotal Retirement Old Age and Severance
	( US Dollars ) Comissions	Returns	
1 Actinver	\$1,112.71	\$20,196.88	\$31,300.26
2 Azteca	\$1,223.97	\$12,134.82	\$23,126.94
3 Banamex	\$2,180.53	\$15,010.84	\$25,046.40
4 Bancomer	\$2,455.00	\$14,702.20	\$24,463.29
5 Banorte	\$2,191.63	\$14,780.05	\$24,804.50
6 HSBC	\$2,083.38	\$13,266.97	\$23,399.68
7 Inbursa	\$446.27	\$9,660.16	\$21,429.98
8 ING	\$2,378.00	\$14,704.03	\$24,542.12
9 IXE	\$1,347.52	\$14,721.74	\$25,590.31
10 Principal	\$1,867.08	\$14,318.34	\$24,667.34
11 Profuturo	\$1,839.99	\$14,278.56	\$24,654.66
12 Santander	\$1,956.70	\$13,711.06	\$23,970.45
13 XXI	\$1,654.21	\$15,463.47	\$26,025.35
		<b>Maximum</b>	<b>USD \$ 31,300.26</b> a)

b) Total Contributions to Housing sub account: USD **\$ 7,510.54**

1 INFONAVIT	\$0.00	\$6,371.17	<b>USD \$ 13,881.71</b> b)
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b) Total Voluntary Contributions: USD **\$0.00**

1 Voluntary	\$0.00	\$0.00	<b>\$0.00</b> c)
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**Maximum resources available at retirement: USD \$ 45,181.97** e)=(a)+(b)+(c)

**Value of an annuity: USD \$ 264.95**

**Total Pension : USD \$ 170.53**

**Salary at Retirement : USD \$ 478.04**

**Rate of Replacement: 35.7%**

The results in the same scenario but for different levels of wages are:

<b>Salary – multiple of MW</b>	<b>Final Balance</b>	<b>Fiscal Cost</b>	<b>Rate of Replacement</b>
<b>1</b>	47.0%	29.9%	76.9%
<b>2</b>	38.5%	0.0%	38.5%
<b>3</b>	35.7%	0.0%	35.7%
<b>4</b>	34.3%	0.0%	34.3%
<b>5</b>	33.4%	0.0%	33.4%
<b>10</b>	31.7%	0.0%	31.7%
<b>15</b>	31.1%	0.0%	31.1%
<b>20</b>	30.7%	0.0%	30.7%
<b>25</b>	27.0%	0.0%	27.0%

In relation to the above example, there are several points that should be stressed:

- a) The correct election of an AFORE represents an increment of 18% in the amount of pension; therefore, the worker should be cautious when choosing an AFORE.
- b) The contributions and returns of the housing sub account represent 28% of the final balance; therefore, any change in the assumptions of returns or in the use of these resources to buy a house will have a great impact in the replacement rate. Continuing with the example, but assuming that the rate of return for sources managed by INFONAVIT is 0%:

<b>Salary – multiple of MW</b>	<b>Final Balance</b>	<b>Fiscal Cost</b>	<b>Rate of Replacement</b>
<b>1</b>	42.0%	34.9%	76.9%
<b>2</b>	33.5%	5.0%	38.5%
<b>3</b>	30.6%	0.0%	30.6%
<b>4</b>	29.2%	0.0%	29.2%
<b>5</b>	28.4%	0.0%	28.4%
<b>10</b>	26.7%	0.0%	26.7%
<b>15</b>	26.1%	0.0%	26.1%
<b>20</b>	25.7%	0.0%	25.7%
<b>25</b>	22.5%	0.0%	22.5%

Furthermore, suppose that the worker uses the balance of the sub housing account to buy a house and at retirement there are no additional sources of retirement benefits:

Salary – multiple of MW	Final Balance	Fiscal Cost	Rate of Replacement
1	36.1%	40.9%	76.9%
2	27.6%	10.9%	38.5%
3	24.7%	0.9%	25.6%
4	23.3%	0.0%	23.3%
5	22.4%	0.0%	22.4%
10	20.7%	0.0%	20.7%
15	20.2%	0.0%	20.2%
20	19.8%	0.0%	19.8%
25	17.5%	0.0%	17.5%

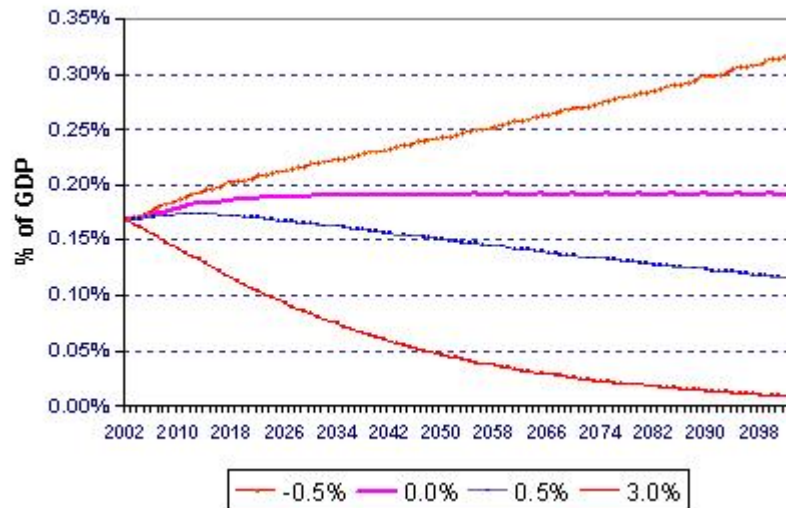
c) The returns of the AFORES represent almost the 51.8% of the final balance, so any variation in this parameter changes the replacement rate. Following the example, but now assuming that all AFORES earn a real rate of return of 4% and 8%:

Salary - multiple of MW.	Real rate of return: 4%			Real rate of return: 8%		
	Final Balance	Fiscal Cost	Rate of Replacement	Final Balance	Fiscal Cost	Rate of Replacement
1	24.6%	52.4%	76.9%	49.5%	27.4%	76.9%
2	19.0%	19.4%	38.5%	38.2%	0.3%	38.5%
3	17.2%	8.4%	25.6%	34.4%	0.0%	34.4%
4	16.3%	2.9%	19.2%	32.5%	0.0%	32.5%
5	15.7%	0.0%	15.7%	31.4%	0.0%	31.4%
10	14.6%	0.0%	14.6%	29.1%	0.0%	29.1%
15	14.3%	0.0%	14.3%	28.4%	0.0%	28.4%
20	14.0%	0.0%	14.0%	27.9%	0.0%	27.9%
25	12.2%	0.0%	12.2%	24.8%	0.0%	24.8%

In the above results, the replacement rate is equal to the percentage from the final balance plus the percentage that corresponds to the fiscal cost. As it was mentioned, the fiscal cost is a measure that represents the total that the government has to contribute to the pension system to guarantee the full cost of the benefits. In the case of Mexico, three elements are considered as fiscal cost in the new system:

1. The costs of providing the minimum guaranteed pension. In the above examples, it can be seen that the closer worker's salaries are to the minimum wage, the more costly will be this benefit. It is expected that the government will have to find other ways

Tab. 7: Fiscal Cost of the Social Quota



to cover the fiscal cost for most of the current workers by increasing the retirement age (more contributions) or by improving rates of return. However, these approaches are not easy to implement since, on the one hand, the labor unions in Mexico will not allow an increase in the retirement age without any extra benefit; and on the other hand, Mexico's economy is not as stable as that of a developed country. Therefore, the rates of return are affected by any variation in any one of the macro-economic factors and it is not realistic to assume fixed rates in the long term.

2. The costs of the social quota - that is, the amount of resources that the government has to contribute to the pension system. The total impact of this cost depends on the number of workers who are covered under the system and on the growth of the CPI. For this analysis, the calculation of this cost was carried out by considering the demographic projections of the IMSS (average growth rate of 0.38% for the next one hundred years) and assuming several assumptions for the annual real increase in GDP.
3. The costs of providing benefits to the group of these affiliated workers who are **transition workers**. To compute the fiscal costs of the transition workers, it is necessary to analyze the data on worker who affiliated before the reform of pension system.

The transition workers have the right to choose the highest benefit between the old and the new system. Based on the above information, the age group that will have the highest impact on fiscal costs are workers who are between age 35 and 39, earn a

Tab. 8: Demographic structure in the pension system by age group: December 2003

Age Group	TRANSITION WORKERS				WORKERS AFFILIATED TO THE NEW SYSTEM				Total # Affiliates
	# Affiliates	% on Total Affiliates	Avg. Years in the system	Avg. Salary Times M.W.	# Affiliates	% on Total Affiliates	Avg. Years in the system	Avg. Salary Times M.W.	
15 - 19	-	0.0%	0.0	0.0	639,139	5.3%	0.8	1.7	639,139
20 - 24	316,780	2.6%	6.9	2.6	1,644,518	13.6%	2.7	2.3	1,961,298
25 - 29	1,494,236	12.3%	8.6	3.6	733,850	6.1%	3.2	3.4	2,228,086
30 - 34	1,789,390	14.8%	11.5	4.4	282,684	2.3%	3.1	4.4	2,072,074
35 - 39	1,477,602	12.2%	15.0	4.8	159,946	1.3%	2.8	4.8	1,637,548
40 - 44	1,183,041	9.8%	18.8	5.0	105,385	0.9%	2.8	5.0	1,288,426
45 - 49	870,875	7.2%	22.3	5.1	66,380	0.5%	2.7	5.1	937,255
50 - 54	588,419	4.9%	25.8	4.9	40,050	0.3%	2.7	4.9	628,469
55 - 59	399,464	3.3%	28.9	4.2	25,295	0.2%	2.8	4.2	424,759
60 - 64	161,667	1.3%	29.6	3.8	15,153	0.1%	2.9	3.8	176,820
65 - 69	53,476	0.4%	27.2	3.3	9,011	0.1%	2.9	3.3	62,487
70 - 74	21,062	0.2%	23.5	2.9	5,452	0.0%	2.9	2.8	26,514
75 - 79	8,831	0.1%	20.8	2.5	2,577	0.0%	3.0	2.5	11,408
80 - 84	3,994	0.0%	19.5	2.4	1,777	0.0%	2.6	2.4	5,771
85 - 89	1,479	0.0%	16.3	2.5	198	0.0%	5.4	2.4	1,677
<b>Total</b>	<b>8,370,316.0</b>	<b>69.2%</b>	<b>15.9</b>	<b>4.4</b>	<b>3,731,415.0</b>	<b>30.8%</b>	<b>2.5</b>	<b>2.9</b>	<b>12,101,731.0</b>

salary of 4 M.W. and have 11 years of contributions to the IMSS.

### Example III.

Age:	25 years
Age at retirement:	65 years
Salary:	USD 354.7 (3 minimum wages)
Credited Service:	30 years (New system 22 years, Old system 8 years)
Annual salary's increment:	1% in real terms
Minimum Pension Guaranteed:	USD 122.6
Real rate of return AFORE:	average of the real rate earned by the SIEFORE during the last 36 months

Actinver 6.13%	Azteca 4.75%	Banamex 5.76%
Bancomer 5.62%	HSBC 5.30%	Inbursa 3.90%
ING 5.70%	IXE 5.39%	Principal 5.51%
Profuturo 5.52%	Banorte 5.72%	XXI 5.67%
Santander 5.38%	Avg: 5.43%	



Real rate of return INFONAVIT: First two years of projection 0%

From 2006 up to the last year of projection 4%

### i) Pension in the new system for a transition worker

a) Total Contributions Retirement, USD **\$ 8,667.44**

Old Age and Severance sub account:

	AFORE's Balance at Retirement		Subtotal Retirement Old Age and Severance
	( US Dollars ) Comissions	Returns	
1 Actinver	\$777.05	\$34,623.46	\$42,513.85
2 Azteca	\$837.11	\$19,112.15	\$26,942.48
3 Banamex	\$1,502.73	\$24,840.94	\$32,005.65
4 Bancomer	\$1,722.53	\$23,953.49	\$30,898.40
5 Banorte	\$1,622.82	\$23,891.08	\$30,935.70
6 HSBC	\$1,482.80	\$21,437.42	\$28,622.06
7 Inbursa	\$322.58	\$14,567.51	\$22,912.36
8 ING	\$1,653.78	\$24,056.70	\$31,070.36
9 IXE	\$944.92	\$23,821.69	\$31,544.20
10 Principal	\$1,324.52	\$23,568.17	\$30,911.10
11 Profuturo	\$1,307.05	\$23,682.69	\$31,043.08
12 Santander	\$1,410.96	\$22,428.32	\$29,684.80
13 XXI	\$1,158.33	\$25,416.93	\$32,926.03
		<b>Maximum</b>	<b>USD \$ 42,513.85</b> a)

b) Total Contributions to Housing sub account: USD **\$ 5,552.40**

1 INFONAVIT	\$0.00	\$66,188.68	<b>\$ 15,302.01</b> b)
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b) Total Voluntary Contributions: USD **\$0.00**

1 Voluntary	\$0.00	\$0.00	<b>\$0.00</b> c)
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**Maximum resources available at retirement: USD \$ 57,815.86** e)=(a)+(b)+(c)

**Value of an annuity: USD \$ 264.95**

**Total Pension : USD \$ 218.22**

**Salary at Retirement : USD \$ 411.76**

**Ratio of Replacement: 53.0%**

**Fiscal Cost: 0.0%**

### ii) Pension in the old system for a transition worker

a) Nominal Average over the last five years indent before retirement:	USD \$	381.07
b) Minimum Wage at retirement	USD \$	118.22
c) Nominal Average in multiple of M.W.		3.22
d) Basic Amount (Table I)		25.60 %
e) Increment in excess for the first years of contributions (Table I)		41.92 %
f) Factor that applies over the nominal average		67.52 %
f) Total pension:	USD \$	257.30
f) Salary at retirement:	USD \$	411.76
	<b>Ratio of Replacement:</b>	62.5%
	<b>Fiscal Cost:</b>	45.4%

In the above scenarios, the transition worker will take the pension computed under the old system. Therefore, the government will pay the fiscal cost of most of them. It is important to mention that in addition the transition worker can withdraw all at once the final balances of the housing sub account, as well as the funds that correspond to the retirement sub account (contributions and returns). This action favors the worker but increases the fiscal cost.

Finally, voluntary contributions could improve the level of pensions but as the worker's wages are low it is not very likely that workers will save money in the AFORES.

## 4.2 Disability and Life Insurance

The benefits for a disabled person and his (her) beneficiaries are provided by an insurance company. Therefore, the IMSS calculates the necessary amounts to be deposited in those companies, which compete to offer the service to the pensioners through offering bigger benefits and guaranteeing real rates of interest higher than 3.5 percent during the time that

they have to cover the benefits, using the same demographic assumptions.

**a) Disability pension benefit**

$${}_{NS}AP_x = \text{Max}[\text{Min}(0.35SBA_x, SBA_x), MW_{PMW}]$$

where:

${}_{NS}AP_x$  = amount of the disability pension for a worker aged x

$SBA_x$  = average wage in real terms over the last 10 years

$MW_{PMW}$  = Minimum Wage on 7/1/97 indexed to CPI

**b) Life pension benefit**

The life pension is equal to a percentage of the disability pension entitlement at the moment of death. The percentages are: widow 90% and dependents 20%.

**c) Present value of the disability benefits**

$${}_nPV_x = {}_iVPA_x * [{}_{NS}AP_x \text{ or } {}_{OS}AP_x]$$

where:

${}_nPV_x$  = Present value of the disability benefits based on the conditions of the new (NS) or the old system (OS) for a worker aged x and with n years of contributions to the IMSS

${}_iVPA_x$  = The gross premium of a reversionary annuity at age x, where the spouse is aged y and one child aged z, using the probabilities of the mortality tables for disables (EMSSI-97) to x, and the mortality tables (EMSSA-97) to y and z.

$\alpha$  = 1% administration and acquisition expense

$\beta$  = 2% contingency reserve

$i$  = 3.5% real rate

$${}_iVPA_x = [{}_i a_x^{(m)} + 0.9 * [{}_i a_y^{(m)} - {}_i a_{xy}^{(m)}] + 0.1 * [{}_i a_{\overline{xyz}:25-z}^{(m)} - {}_i a_{\overline{xz}:25-z}^{(m)}]] * (1 + \alpha + \beta)$$

**d) Amount deposited in an insurance company to cover the disability benefits**

$$AD_x = {}_n PV_x - {}_n FV_x$$

where:

${}_n FV_x$  = The final balance in the retirement sub account for a worker who suffered disability at age  $x$ .

In this insurance, transition workers do not have the lifetime switching option as in the Old Age and Severance insurance; therefore, the benefits are computed under the new system. The fiscal cost is analyzed considering the risk premium of the disability and life benefits, which could be computed using the following expression:

$$\kappa_t = \frac{E_t * \sum_{x=15}^{\infty} \sum_t^n {}_t AD_x}{E_t * \sum_{x=15}^{\infty} \sum_t^n {}_t SAL_x}$$

In the above formula  $E_t$  is a parameter that is based on information available to project the present value of the amount deposited in the insurance and the total of the salaries for the period  $t$ . As can be seen, this premium will be bigger if the frequencies or severity of disability events are increasing.

Generally, to avoid the recalculation of the risk premium from period to period, a premium is defined for all years of projection. In 1995, the Security Social defined a contribution of 2.5% to cover these benefits. However, this percentage was established arbitrarily since the technical criteria were not published until 1997.

According to the actuarial valuation of the IMSS at December 2003, the percentage of the contributions is enough to cover the disability and life benefits. However, these results are based on optimistic scenarios of projections of real rates of return for the resources managed by the IMSS and INFONAVIT of 4% and an annual rate of growth of the affiliates of 0.38%. In addition, the IMSS estimated that the present value of the fiscal cost for the transition workers is equivalent to 8.76% of GDP.

### 4.3 Weaknesses of the system

Tab. 9: Summary of Actuarial Valuation IMSS : December, 2003

(million of dollars)

<b>Year of Projection</b>	<b>Total Salaries Affiliates</b>	<b>Value Benefits</b>	<b>Risk's Premium</b>
2003	\$63,916.38	\$240.85	0.4%
2004	\$60,913.59	\$721.25	1.2%
2005	\$64,047.04	\$742.51	1.2%
2006	\$66,946.25	\$789.37	1.2%
2010	\$79,155.49	\$986.24	1.2%
2020	\$107,030.84	\$1,396.17	1.3%
2030	\$129,012.11	\$2,085.02	1.6%
2040	\$150,764.46	\$2,753.22	1.8%
2050	\$181,729.53	\$3,292.60	1.8%
2060	\$220,596.34	\$4,242.16	1.9%
2070	\$255,843.73	\$5,341.55	2.1%
2080	\$293,739.46	\$6,144.43	2.1%
2090	\$339,783.62	\$6,607.58	1.9%
2100	\$406,911.24	\$8,034.32	2.0%
2103	\$428,864.02	\$8,609.15	2.0%

**Source:** Annual report of IMSS, 2003

In the previous sections several concerns that affect the function of the pension system and the final replacement ratio have been raised. Therefore, this analysis can not conclude without stressing the following limitations.

1. The IMSS controls most of the functions of the pension system with respect to the collection of data and contributions, provides life and disability insurance, pays out pensions to workers already in retirement, has an AFORE (XXI), is responsible for covering the health insurance for its affiliates and is responsible for providing the MPG.

The centralized collection system was implemented to reduce administrative costs. However, the experience in other countries, such as Argentina, has shown that this kind of scheme can lead to operation and incentive problems. Moreover, the experience in Mexico has proven that there is a considerable risk in conferring such broad powers to this institute. In the past, IMSS used its contributions to finance other government programs. The solution appears to be the creation of another institute that manages only the issues related to the pension scheme while the IMSS provides health care, workers' compensation and childcare benefits.

2. The lifetime switch option given to all transition workers creates adverse selection, especially because the AFORES are not required to guarantee a minimum return. Under the new system it is guaranteed that everyone will do at least as well as they would have done under the old system; therefore, the transition workers have incentives to make riskier investments.
3. The fiscal cost is uncertain since it could be higher if the returns of the AFORES and INFONAVIT are not high enough to ensure that the transition workers choose the new system, or it could be lower because the system is saving on the use of the recognition bonds that other countries gave to workers who moved to the new pension system. In relation to these bonds, the Mexican government recognizes the potential liability by making contributions (social quota). However, this quota is flat and universal because all workers receive the same amount regardless of how much they contributed to the old system.
4. As shown, the contributions to the AFORES are not enough to reach an acceptable replacement rate. In addition, the returns of almost 43.5% of the total contributions managed depend on the operating surplus of INFONAVIT, which during recent years

has been negative. The solutions to this problem are: a) The INFONAVIT is financed by other social programs and the contribution of 5% should be deposited in the SIEFORES; and b) the INFONAVIT is managed by the AFORES, but it keeps the same responsibilities as in the current system.

5. Today, there are some public institutions that offer pension benefits to almost 4 million people. Therefore, when workers switch from private to public institutions, they do not contribute to the private system and these resources are available only until retirement. The solution is the creation of a national system of pensions that includes the private and public workers. However, this is not likely to happen since the replacement rate in those institutions is equal to or greater than 100% of the salary at retirement and the labor unions won't allow a change in those benefits.
6. The probabilities of mortality and disability are the basis for computing the value of the benefits (the annuities). In 1997, the CONSAR established these probabilities. However, these have not been modified since then. The solution is a periodic recalibration of these probabilities to acknowledge demographic trends.
7. Finally, the most serious weakness of the new system is the lack of information given to the workers. The recent modifications related to the changes in the investments of the resources are not understandable for most of the people. Therefore, most of the affiliates do not recognize the importance of the reform to their future. The solution consists in providing educational campaigns supported by the government. The more information available to the workers, the more participation will occur in the pension system.

## 5 CONCLUSIONS

The reform of the pension system in Mexico replaced the bankrupt old system by a new private system based on the multi-pillar design suggested by the World Bank. During the early years, the pension system reached its macro-economic goals and the level of savings will be translated into capital that will favor growth of Mexico's economy. In addition, workers now know the resources that are available at retirement, and can invest in instruments with real rate of returns.

The improvement of the replacement rate is another objective of the new pension system. In the old pay-as-you-go system, the lack of resources to cover the benefits of the pensioners was one of the causes of reform. In the new system, the main problem is the investment risk implicit in a defined contribution system. The returns earned by the SIEFORES have been favorable for the workers. However, the pension system has not faced the economic cycles with high devaluation that the old system experienced during three decades. The success of the reform will depend on the role of the government in keeping economic stability for future years in order to achieve the optimistic financial valuation assumptions.

During recent years, the government has modified some areas of the pension system with the intention of improving the benefits at retirement. However, other changes must be included to increase returns to workers and to reduce the cost that the government has to cover for the transition workers and the minimum pension wage. One critical modification to ensure the long term feasibility of the pension system is related to the situation of the INFONAVIT. The housing sub account represents a mistake in the design of the system since it mixes a housing program that grants cheap credits for workers to buy houses with a pension system based on defined contributions. The objectives of these programs are incompatible and the situation of the workers could be worse if the INFONAVIT continues offering negative rates of return for the contributions. The improvement in this sub account will provide better benefits at retirement.

In the case of the disability and life pensions, annual actuarial valuations are necessary to ensure there are sufficient resources. The fiscal cost could increase if the return on



investments decreases.

Finally, any future modification should be focused on increasing the economic security of old age and in providing protection and retirement benefits to most of the population in Mexico.

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## **6.1 Electronic Links**

1. Instituto Nacional de Estadística, Geografía e Informática (INEGI)

<http://www.inegi.gob.mx>

2. Consejo Nacional de Población (CONAPO)

<http://www.conapo.gob.mx>

3. Comisión Nacional del Sistema de Ahorro para el Retiro (CONSAR)

<http://www.consar.gob.mx>

4. Instituto Mexicano del Seguro Social (IMSS)

<http://www.imss.gob.mx>

5. Secretaría de Hacienda y Crédito Público (SHCP)

<http://www.shcp.gob.mx>

6. Secretaría de Salud

<http://www.salud.gob.mx/apps/htdocs/estadisticas/poblacion/poblacion.htm>

7. World Bank

<http://www.worldbank.org/>

8. Comisión Nacional de los Salarios Mínimos (CNSM)

<http://www.conasami.gob.mx/>

9. Instituto del Fondo Nacional de la Vivienda para los Trabajadores (INFONAVIT)

<http://www.infonavit.gob.mx>

10. Comisión Nacional de Seguros y Fianzas (CNSF)

<http://www.cnsf.gob.mx>

11. Diario Oficial de la Federación

<http://www.gobernacion.gob.mx/dof/pop.php>