

Una evaluación del desempeño de los
fondos de pensiones privados Mexicanos

An assessment of the performance of
the Mexican private pension funds

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Resumen

Hacia finales de la década de los noventas, México reformó una parte importante de su sistema de pensiones, transformándolo de un sistema de beneficio definido ("pay-as-you-go") administrado por el estado, a un sistema de cuentas individuales administrado por instituciones privadas. Poco se ha hecho para evaluar el desempeño de los fondos del nuevo sistema. Este trabajo evalúa el desempeño de los principales fondos en el nuevo sistema siguiendo a Elton et al. (1993) y Carhart (1997). En particular, el trabajo se enfoca en establecer si existen factores comunes que expliquen los retornos de los fondos, mayor habilidad de los administradores de los fondos en escoger sus activos, la relación entre el tamaño del fondo y la comisión con su desempeño y los costos de adquirir información.

En el trabajo se encuentra que un modelo de 2 factores captura adecuadamente los rendimientos de estos fondos. También se encuentra que los resultados no son sensibles a la medidas de desempeño utilizadas. Se encuentra que ningún administrador tiene habilidades superiores para elegir su cartera de activos o está mejor informado en términos de rendimientos extra normales, aunque los administradores de fondos pequeños tienden a tener un mejor desempeño. También se encuentra que existe un relación negativa (débil) entre la comisión y la α de Jensen. Este último resultado sugiere que las ganancias no justifican el costo en la adquisición de la información. También se derivan algunas de las implicaciones que tienen los resultados del trabajo en términos de las justificaciones de la reforma.

Abstract

Towards the end of the 1990s, Mexico reformed an important part of its pension system, transforming it from a pay-as-you-go system run by the government to a personal account system managed by private institutions. Little has been done to assess the performance of the funds in the new system. This paper evaluates the performance of the main funds in the new system along the lines of Elton et al. (1993) and Carhart (1997). In particular it focuses on establishing whether there are common factors that explain fund returns, potential superior asset picking skills of fund managers, the relationship between the size of the pension funds and the commission they charge with their performance, and information acquisitions cost.

We find that a 2-Factors model adequately captures the returns of these funds. Also, we find that the results are not sensitive to the measurements of performance considered. We find that no fund manager has superior asset picking skills or is better informed in terms of excess returns, although managers of smaller funds tend to perform relatively better. We also find there is a (weak) negative relationship between the management fee and Jensen's α , and a negative relationship between the size of the fund and its performance. The former result suggests that earnings do not justify their information acquisitions cost. We also discuss on some implications of our results in terms of the rationale of the reform.

1 Introduction

Due to changing populations dynamics, more developed financial markets and an inadequately funded public pension system, the need for a reform of the pay-as-you-go pension system of many countries has become a hard-pressing issue. Regardless of the particular reform implemented,¹ there exists a need to adequately assess the performance of the different systems. Moreover, since in most cases it is compulsory for workers to contribute to private funds as long-term saving vehicles, their performance assessment becomes even more relevant.

On July 1, 1997, a new private retirement system was adopted in Mexico. Under the new system, each worker may choose among different pension fund administrators firms, known as AFORES, to manage the mandatory deposits in their individual accounts. The firms charge a commission as a management fee.

This paper assesses the performance of the main pension funds in Mexico under the new system. We are particularly interested in determining what are the common factors determining pension fund returns, and what are the significant benchmarks in performance assessment. Also, we evaluate whether the results are sensitive to the measure of performance chosen. Additionally, we are interested in establishing if there is a fund manager with superior asset picking skills. Regarding the commissions the funds charge workers, we also evaluate their impact on performance. Finally, we assess if funds earn returns that justify their information acquisition costs (Grossman and Stiglitz, 1980).

The evaluation of the performance of the main pension funds in Mexico under the new pension system is relevant to the current social security reform debate in the United States. This is so because the individual retirement account system implemented in Mexico closely followed the three-pillar approach to social security reform advocated by the World Bank. As in many other countries in Latin America, this approach to pension reform has come

¹There are many issues to resolve in this debate. Among the central ones are: i) who should manage the funds (public or private sector); ii) pay-as-you-go or individual accounts; iii) transition costs; etc. All these issues, although relevant in their own right, are beyond the scope of this paper.

under intense criticism for the high concentration of most funds' portfolios in government debt securities, and the high fees charged by the funds to workers. Given that this system is similar to some of the reform proposals in the United States, the assessment here should also be useful in informing the debate in the U.S.²

The rest of the paper is organized as follows. Part 2 describes the database, presents some basic descriptive statistics and some relevant facts about the pension fund system in Mexico. Part 3 describes the model. Part 4 contains the main components of the performance assessment, while Part 5 concludes.

2 Data

Our dataset contains the historical returns for all the private pension funds that have existed.³ Yet only eight of them have operated continuously since the inception of the new system. Historical data are available since October 1998. Naturally, there has been entry and exit of participant in the pension funds administrators markets: some funds have disappeared, some have been acquired by other funds and others have just been recently created. Our aim is to focus on those eight funds that have survived since the beginning.⁴ This raises the problem of sample selection (survivorship) bias if we were to analyze all the system.⁵ Note that these eight funds account today for more than 89% of the market (in terms of assets).

The funds we study are regulated and have some limitations regarding the type of assets each fund can invest in. This has important implications in

²See Kotlikoff (1999) for a description and criticism of the World Bank approach to pension reform.

³The data were obtained from the following url's: www.consar.gob.mx and www.precios.com.mx.

⁴We do not use their official name, nor that of the institution: a short name serves our purposes.

⁵Note that those funds that have been created after the transition have their (historic) return measured with the average of returns of all the funds that exist prior to its creation. Thus, for the same reason, this artificially introduces a upward bias in its returns, since it only takes into account those funds that have survived.

at least one respect. The search for the proxy for the market portfolio has to account for this fact. We believe that the data on the funds are reliable since every fund by law has to inform the authorities about its main accounting and financial data.⁶ We considered the historical returns of each fund and transformed them to the equivalent monthly return, to be able to compare them to the benchmarks used.

Additionally, we obtained a set of benchmarks returns. These benchmarks are created by an institution known as a price vendor.⁷ Unfortunately, the benchmarks time series only starts in December 2000, limiting the range for which all of the series we use coincide. This fact leaves us with about 51 observations to run the time series regressions. Moreover, estimating a CAPM or other linear model in this context should not make use of a long time series. We would expect stationarity to hold for a short period of time. Yet, we plan to continue our research in the future when more data will be available. For the risk-free rate, we use a benchmark called PiP-Fondeo-G, which replicates a portfolio composed of government debt with a one day maturity. In similar models the rate that is typically used is the government debt with a 28 day maturity. The time series for this variable does not extend as far back as the rest of our time series. Thus, our best option was to use PiP-Fondeo-G.

Each personal account is subject to two fees. The first fee is allocated to pay the transition cost, i.e. use to pay the present retirees who are part of the former (pay-as-you-go) system. This is a general fee regardless of the institution managing the account. For our purposes this fee is irrelevant.⁸ The second fee is levied as a function of the stock, the annual flow that goes into the account, the return in the account or a combination of

⁶We did find some discrepancies on the data regarding the base the returns were in. For example, historical returns for the month of January 2003 are presented in simple base as it is explicitly stated. However, for the first months of 2000, returns are apparently presented in simple base yet not indicated.

⁷The price vendors provide as a service to the financial institutions with financial data; so by law in books, they have to price the assets in their portfolio based on these financial data.

⁸Nevertheless, this implicit cost has been harshly criticize in the case for the U.S. by Krugman and others, (see Social Security Notes web.mit.edu/krugman/www/socsec.html)

these three.⁹ There is, however, an equivalent measure for the commission. This equivalency assumes that each fund just charges one type of commission. Accordingly, there are an equivalent measure on the annual flow and an equivalent measure on the stock. We chose the equivalent measure on the annual flow *as a proxy* to an annual management fees and refer to it generically as the "commission" in this paper.

The basic statistics for the funds are presented in the following table:

⁹It would be an interesting problem to analyze using a principal agent framework the incentives for fund manager performance created under these three schemes.

Table I: Funds summary statistics

This table presents the pension funds that have existed since July, 1997 to date, the current value of their assets as of March 2003 (in millions of Mexican pesos) and the % of assets with respect to the value of the private pension system's assets. The columns present the average excess return, R^e , and the Sharpe ratio, SR, for the time series of the funds' stocks returns, from December 2000 to March 2005, using monthly data, (N=51.) In all tables excess returns are defined as the annual return of the variable minus the annual return of the benchmark PiP-Fondeo-G. The last two columns are the average excess return, NR^e , and the Sharpe ratio, NSR, for the same time series but net of commission. The numbers in brackets below the returns are the standard deviations. The total returns are value-weighted averages.

Fund	Assets	R^e	SR	NR^e	NSR
Banamex	4,374	0.0347	0.3397	0.0180	0.1769
	25.32%	[0.1021]		[0.1020]	
Bancomer	2,959	0.0354	0.3893	0.0190	0.2092
	17.13%	[0.0911]		[0.0911]	
Profuturo	1,954	0.0364	0.3975	0.0164	0.1793
	11.31%	[0.0916]		[0.09163]	
Principal	1,809	0.0344	0.3746	0.0164	0.18376
	10.47%	[0.0917]		[0.0916]	
Santander	1,418	0.0349	0.3848	0.0137	0.1517
	8.21%	[0.0907]		[0.0905]	
Banorte	1,142	0.0346	0.4040	0.0163	0.1908
	6.61%	[0.0857]		[0.0856]	
Inbursa	961	0.02359	0.5465	0.01545	0.3577
	5.56%	[0.0431]		[0.04320]	
Afore XXI	791	0.0382	0.4178	0.0234	0.2564
	4.58%	[0.0907]		[0.0914]	
Total	17,277	0.0350	0.3463	0.01853	0.1837
	100.00%	[0.1010]		[0.1008]	

As can be seen from Table I, the private pension funds market is dominated by a few participants. The top three administrators account for 50% of all assets. What strikes us as odd is that Inbursa and Afore XXI, although they keep the best record (before and after commission) in terms of Sharpe Ratio, only account for a very small size of the market. A larger proportion of users would be expected to choose these funds based on their performance, as measured by the Sharpe ratio.¹⁰ By contrast Banamex administers the largest fund, but ranks next-to-last in terms of the (after commission) Sharpe ratio.

In terms of average excess returns, Profuturo and Santander perform well before the commission but apparently pass this cost on to the workers, worsening their relative position after commission. Bancomer, Banamex and Principal, although performing close to the average before commission, improve in relative terms after it. Finally, Banorte with Profuturo and Santander could be charging their users for the information acquisition costs based on their returns. We will further examine these statements below.

3 The model

In principle, there is no well established model for evaluating the performance of these funds. Our first task is to identify the common factors explaining the funds' returns. We start off from a database of around 50 benchmarks, the analysis of the portfolios of the funds, and the universe of assets in which they can invest. Although nowadays the regulations are more flexible, the funds could initially only invest in government issued instruments. Thus, a benchmark that captures the returns of the government instruments would be, in principal, adequate. Our basic model thus uses the general government benchmark (Pip-Guber) as our market portfolio. The results of estimating the parameters of the standard CAPM model are shown in Table II.

¹⁰A plausible explanation is that most of these institutions offer other services. Thus, the pension management might just be part of a bundle of services.

Table II
CAPM regressions

The table reports the results from a simple regression of the fund's excess returns against the excess return of the government benchmark, Pip-Guber, $R_i^e = \alpha_i + \beta_{i,Guber} R_m^e + \xi_i$. The estimates of the slope coefficient, β , and the constant, α , the standard errors (in parentheses), and the R^2 are shown. The number of observations in the time series is N=51. Estimates indicated with an * are significant at the 10% confidence level and those indicated with a ** are significant at the 5% confidence level.

Fund	β	α	R^2
Banamex	1.7328** (0.1233)	-0.0050 (0.0070)	0.80
Bancomer	1.6012** (0.0924)	-0.0012 (0.0052)	0.85
Profuturo	1.6056** (0.0948)	-0.0004 (0.0054)	0.85
Principal	1.6228** (0.0889)	-0.0028 (0.0050)	0.87
Santander	1.6052** (0.087)	-0.0019 (0.0050)	0.87
Banorte	1.4924** (0.0921)	0.0003 (0.0052)	0.84
Inbursa	0.5913** (0.0807)	0.0100 (0.0046)	0.52
Afore XXI	1.5965** (0.0976)	0.0016 (0.0055)	0.84

We ran the GRS test, which has as a null hypothesis $\alpha_n = 0$ for all n . We rejected the GRS (numerical procedure and statistic not reported) at the 5% significance level. Thus, the CAPM fails to explain the cross-sectional variation in returns.

After running a series of regressions with benchmarks accounting for corporate bonds, banks instruments, investment funds, difference of returns as a function of the fund's size, among others (results not reported), we arrived at a 2-Factors model. Surprisingly, the benchmark that measures the return of corporate bonds was not significant as a third factor, despite the fact pension funds have nowadays important holdings in corporate debt, averaging around 20%.

The results of the 2-Factors model are shown in Table III.

Table III**2-Factors model regression**

The table reports the results from a multiple regression of the funds' excess return against the excess annual return of Pip-Guber and the excess annual return of PipG-Real, a benchmark that replicates a portfolio of inflation protected government debt and public works government debt, $R_i^e = \alpha_i + \beta_{i,Guber}R_{Guber}^e + \beta_{i,Real}R_{Real}^e + \xi_i$. Estimates indicated with an * are significant at the 10% confidence level and those indicated with an ** are significant at the 5% confidence level.

Fund	β_{Guber}	β_{Real}	α	R^2
Banamex	1.0765** (0.1316)	0.2323** (0.0342)	-0.0051 (0.0050)	0.89
Bancomer	1.3444** (0.1285)	0.0909** (0.0334)	-0.0013 (0.0049)	0.87
Profuturo	1.2117** (0.1186)	0.1394** (0.0309)	-0.0004 (0.0045)	0.89
Principal	1.2953** (0.1162)	0.1159** (0.0302)	-0.0029 (0.0044)	0.90
Santander	1.26** (0.1133)	0.1196** (0.0295)	-0.00196 (0.0043)	0.90
Banorte	1.1904** (0.1240)	0.1069** (0.0323)	0.0003 (0.0047)	0.87
Inbursa	0.4304** (0.1163)	0.0569* (0.0303)	0.0100 (0.0044)	0.55
Afore XXI	1.2680** (0.1308)	0.1162** (0.0340)	0.0016 (0.0050)	0.87

The pension funds allocate a significant proportion of their portfolio to inflation protected government debt that the general government benchmark, Pip-Guber, does not capture, and this factor is picked up by PipG-Real.

Note that the estimated α 's are very similar to those estimated by the CAPM model (Table II). This finding reminds us of the results in Roll (1971), since the performance measures behave in a similar way with these two set of market portfolios (i.e. the CAPM and 2-Factors). This could perhaps, the result of not yet having a model that accounts for all the factors in the pension fund returns.

We ran the GRS (procedure's calculations and statistic are not reported) and we fail to reject at the 5% confidence level. Thus, this 2-Factors model seems to capture well the common factors of the pension funds' returns. Also, keep in mind that any evidence on performance hinges on the joint hypothesis of testing market efficiency and having the correct model; consequently, most of our results are dependent on having the correct model specification.

Inbursa seems to stand apart from the rest of the administrators, since it has an estimated of β around a half; thus, it does not co-vary very strongly with the market. This perhaps explains the relative success of Inbursa, which although it has gained a low return, it manages to stay detached from the general trend. The rest the funds share very similar statistics. Note that for some funds the R^2 has increased, meaning that an important part of their variation is explained by changes in the PipG-Real benchmarks. Also, note that (except for Inbursa) the sum of the factors weights are similar. We will further examine these results in the next section.

4 Performance

Once we have established the 2-Factors model as an acceptable working model, we are ready to focus on the funds' performance and other issues of interest that have been hitherto have not been analyzed.

Due to the small number of funds in the sample we prefer to document the performance graphically rather than to run cross sectional regressions which have low statistical power.

Our first step is to analyze if there is a fund manager with superior asset

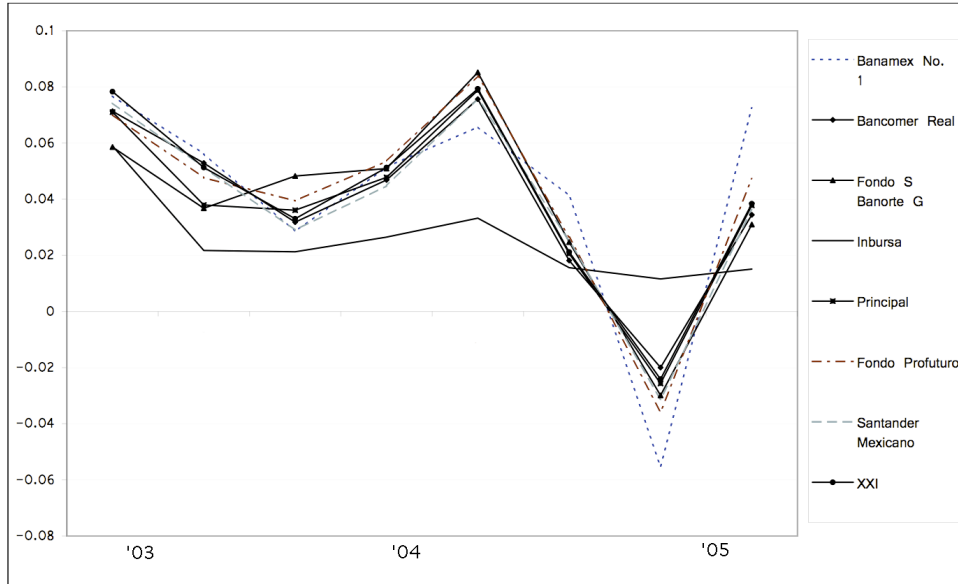


Figure 1: **Average Returns.** This figure captures the average quarterly returns for the last eight quarters for all the funds in our analysis. These are gross returns, in the sense that they *do not* account for the commission.

picking skills. As we have seen from the results in Table I and Table III, all of the funds' returns behave very similarly, except for Inbursa. This last administrator achieves average returns, but successfully detaches itself from the trend. This could be potentially related to managerial skill, better information, or the size of the fund.

Leaving the case of Inbursa aside for the moment, a quick glance at Figure 1 and Table III casts doubts regarding the asset management services these institutions are rendering. Basically all of the funds perform very similarly, so there is no difference from the perspective of the worker from choosing among them. They are delivering, before commission, an α statistically equal to 0.

Our second step is to analyze if the commission charged and the size of the pension fund are related to performance. Figure 2, which depicts the $\hat{\alpha}$, the average performance, against the commission, suggesting a negative relationship between these variables. This relationship is basically lost when an outlier (Inbursa) is removed from the sample. This implies that, in general, the difference in performance among the funds cannot be attributed to the (small) difference in commissions.

As for the size and the performance of the funds, there is a negative relationship: smaller funds tend to perform better, as seen in Figure 3. This strongly suggests an explanation for the good performance of Inbursa and Afore XXI. This relationship, unlike that with the commission, is robust to the exclusion of outliers. A plausible explanation is that given the small size of the market -relative to the positions of the bigger funds- and, therefore, the lack of liquidity, small funds are able to change their positions with much more flexibility in respond to changes in market conditions.

The third step is to analyze if funds earn returns that justify the acquisition cost of information. As suggested by the Sharpe ratio in Table I, there are no significant differences in the ranking before and after the commissions. Inbursa and Afore XXI stay on top in both cases. The relative performance for Banorte, Santander and Profuturo is hurt after considering the commissions, while those of Bancomer, Principal and Banamex have, in relative terms, improved. Figure 2 provides evidence against the hypothesis of earned excess returns, as measured by α , justifying the acquisition cost of information. Except for Inbursa, no administrator seems to be better in-

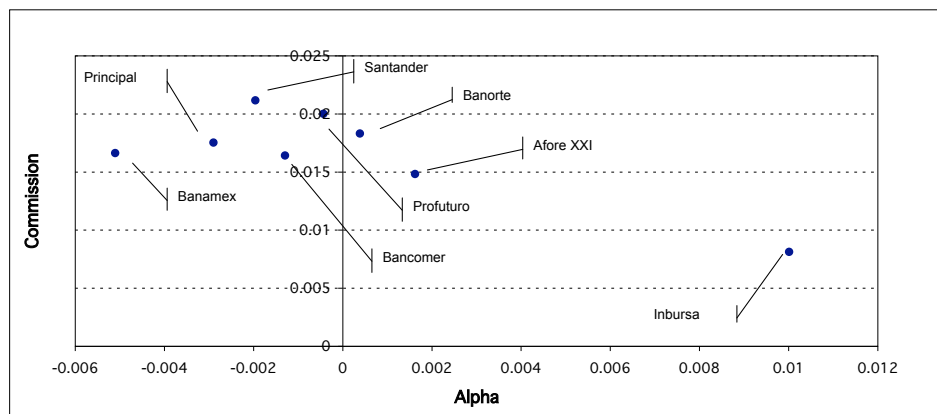


Figure 2: **Performance vs. Commission.** The plot contains the annual average commission percentage against the α estimated from the 2-Factors model for the funds we analyzed.

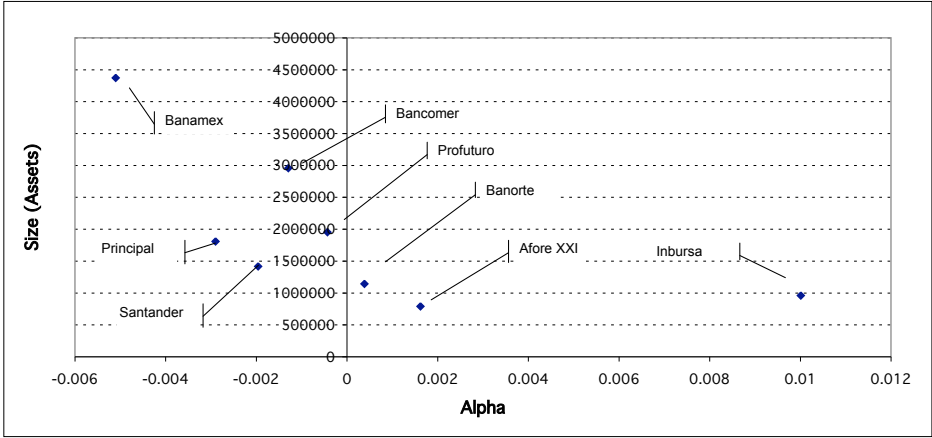


Figure 3: **Size vs. Commission.** The plot has the size of each fund as of March 2003 (assets in thousands of pesos) against the α obtained from the 2-Factors model.

formed and their commission does not relate systematically to performance. In addition, Inbursa's case, of having the lowest commission is evidence on the contrary. Finally, managers do not pass on the cost of becoming informed to investors. A positive relationship would be evidence of managers doing this. Yet, in Figure 2 we find that this is not the case. Also, as explained above, no fund manager seems to be better informed.

5 Conclusions

In this paper we take a step towards a more systematic assessment of the returns of the Mexican pensions funds. We documented which factors account for the returns and arrived to an acceptable 2-Factors model. We find that no manager has superior asset picking skills or is better informed in terms of the excess returns accrued. Moreover, small fund managers tend to perform better relative to managers of large funds. A possible explanation of this phenomena is that smaller funds are able to change their positions with greater ease in a small -relative to the size of their positions- and, hence, illiquid market. We also find there is basically no relationship between the management fee and α . This suggests that earnings do not justify their information acquisitions cost.

Two caveats are in place. First, these results have to be interpreted with caution. We perform our analysis with a limited number of observations and, as such, the tests lack statistical power. However we believe that the importance of the topic justifies the interest in it and, thus, insisted on performing an evaluation despite the limitations. Second, we could have considered other variables in the analysis, such as turnover on the funds' portfolios, specific portfolio holdings, etc. We leave these for future research.

There is an important implication of our results in terms of the rationale of the reform. With the restrictions imposed on these funds, their returns are bounded by the returns of the universe of assets in which they can invest in. Moreover, as our results have suggested, the fund administrators hardly add value as asset managers. Thus, one wonders about the real purpose of going from one pension system to the other: the government is still the main debtor in the system and there is little choice as to the type of assets these

funds can invest in.

The main purpose of the reform was to avoid the solvency problem that the previous pay-as-you-go system was facing. Yet, restrictions to the private system results in the fact that funds are forced to invest in government debt, so the problem still prevails. As we showed before, the common factors driving the returns of the private funds are directly related to government debt. Also, recall that we found that the corporate benchmark was statistically insignificant when trying a 3-Factors model.

Presumably, allowing the financial institutions to have all type of instruments could potentially create a moral hazard problem and, thus, adequate regulation has to be put in place. Perhaps, political hurdles avoid completing the initial reform. We can then interpret these results in two different ways:

- The reform as a half-hearted commitment. Although it was intended to liberate the public sector of the burden of the growing debt, while diversifying the risk and improving the returns of the pension funds, we found that these funds are: i) not adding much value as asset managers; ii) hold mostly government debt, making the government still liable; and iii) are not well diversified, in the sense that the risk is strongly correlated with the risk of the government.
- These results reflect a transition stage and the rest of the reform is due soon, where relevant elements are consolidated and a more competitive pension system is set in place.

We prefer to think it is the latter case.

6 Appendix

This appendix succinctly describes the CAPM model and other relevant terms for the reader's convenience.

CAPM

The CAPM uses a time series regression of the the excess return of an asset (or portfolio) on the excess return of the market. Thus, it relates the excess return of the asset (or portfolio) to the excess return of the market via a measure that quantifies the tendency of the asset (or portfolio) to move with the market, known as β . Consider an asset i at dates $t = 1, 2, \dots, T$. The regression equation is

$$R_t^i - R_t^f = a_i + \beta_{i,m}(R_t^m - R_t^f) + \xi_t^i,$$

and the CAPM predicts that

$$E(R_t^i - R_t^f) = \beta_{i,m}E(R_t^m - R_t^f).$$

for all the assets (or portfolios), where $E(R_t^m - R_t^f)$ is the market excess return.

The CAPM holds under restrictive assumptions. It was originally derived either assuming a quadratic utility function or normality of the returns. A more straightforward derivation is assuming a linear stochastic discount factor in 1 factor. More generally, assuming a linear stochastic discount factor in n factors gets us the n-Factor model. The existence of the stochastic discount factor is provided assuming no arbitrage, a central result in the asset pricing literature. The interested reader is referred to Cochrane (2005) for further details.

The 2-Factors (or n-Factors) model is a simple extension of the CAPM where other factors beside the market excess return are included in the regression. Thus, it quantifies the tendency of the return of the asset to move with the 2 (n) factors considered.

Also, we do not make a difference between conditional and unconditional CAPM, which in many cases makes a difference whether the model itself holds and the implications derived from it. Finally, the CAPM extends and generalizes in various directions, e.g. the Intertemporal CAPM (ICAPM), and Consumption based CAPM (CCAPM), among others. Again, we refer the interested reader to Cochrane (2005).

Some terms

Excess returns (Rendimientos extra normales) is the difference between the return of a given risky asset or portfolio, r_i , above the appropriate risk-free return, r_f ,

$$r_i - r_f.$$

Note that using excess returns accounts for inflation. Strictly speaking one should, for any given nominal return, r_n use r , the real return, defined as $1+r = (1+r_n)/(1+\pi)$ where π is a measure of inflation. Yet for small values for r_n and π , we have that $r_n - r_f = r_n - \pi - (r_f - \pi) \approx (1+r_n)/(1+\pi) - (1+r_f)/(1+\pi)$. This follows from the first term of the McLaurin expansion: $\log(1+x) \approx x$ for small values of x .

Sharpe ratio is the ratio of the excess return and the standard deviation of the return, σ_r . Measuring the risk by the standard deviation it gives the return the investor obtains (looses) for each unit of risk it takes (avoids). In a more general context it is known as the market prices of risk.

$$\frac{r_i - r_f}{\sigma_r}$$

Jensen's α it is the return the investor receives over and above the return predicted by the CAPM, or more generally the n-Factor model (in our case 2-Factors). Specifically it is the constant, a_i in the regression

$$R_t^i - R_t^f = a_i + \beta_{i,m}(R_t^m - R_t^f) + \xi_t^i,$$

In our case for each model and each fund we obtain an estimate of α with \hat{a}_i .

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- [9] www.consar.gob.mx, **CONSAR - Comisión Nacional del Seguro de Ahorro para el Retiro (website)**, (agency that depends on the Treasury that regulates the pension funds).
- [10] www.precios.com.mx, **PIP - Proveedor integral de Precios, PiP's website.** (price vendor)