

Chapter 6

Improving the design of the pay-out phase in the Mexican pension system

This chapter discusses the current structure of the pay-out phase of the Mexican funded defined contribution pension system and proposes approaches to improve it. The chapter first introduces the main modalities that exist in Mexico to allocate assets accumulated in individual retirement accounts and thus finance retirement income. Individuals can generally choose between programmed withdrawals and life annuities. Only one type of life annuity is allowed. The chapter also discusses the problems with annuity markets and the management of longevity risk by insurance companies and occupational defined benefit pension plans. It concludes with recommendations regarding the management of longevity risk, the operation of the annuity market and the regulatory framework.

The statistical data for Israel are supplied under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

6.1. Modalities of allocating assets accumulated

6.1.1. Transitional workers choosing the old DB formula also receive lump sums from their DC account

Private-sector workers who were contributing to the PAYG system in place before 1 July 1997 have the right, upon retirement, to choose to get their pension benefits according to the old DB formula or according to the new DC rule. When choosing the old DB formula, private-sector workers must be 65 or older and only need 500 weeks of contributions to be entitled to a pension. Upon retirement, they receive as a lump sum any resources left in the housing sub-account, balances accumulated in the individual retirement account between 1992 and 1997, and the amount corresponding to the retirement insurance contribution in the retirement sub-account (2% of the base salary paid by the employer) accumulated since 1997. The remaining balances in the retirement sub-account (coming from the severance at old-age and old-age contributions) accumulated since 1997 are transferred to the federal government to pay the DB benefits (see Box 6.1).

Of the 2 072 518 public-sector workers affiliated to the ISSSTE in April 2007, only 294 736 (14.2%) chose the new DC system and received recognition bonds in their DC account. All the others (85.8%) decided to keep the old DB formula to calculate their pension benefits, with new rules regarding the minimum age of retirement and the contribution rate. Upon retirement, they receive as a lump sum any resources left in the housing sub-account, balances accumulated in the individual retirement account between 1992 and 2007, and the amount corresponding to the retirement insurance contribution in the retirement sub-account (2% of the base salary paid by the employer) accumulated since 2007. The federal government pays the DB benefits from the federal budget (severance at old-age and old-age contributions are not deposited in an individual retirement account for these workers, but are paid directly to the ISSSTE to finance the PAYG system).

In both cases, part of the resources accumulated in the individual retirement account is reverted to the worker upon retirement as a lump sum, because part of the accumulation took place before the implementation of the new Social Security Laws. This amount, originated from pension contributions, is eventually not used to finance pension benefits. Although such rule may be seen as an incentive for workers to participate in the pension system, diverting too much money that was initially intended to finance retirement may affect negatively retirement income adequacy.

6.1.2. Options available when retiring at 65 years old under the new DC scheme

To get an old-age pension under the new DC scheme, workers must be 65 or older and have contributed at least 1 250 weeks in the case of private-sector workers, or 25 years in the case of public-sector workers. When those requirements are met, the worker can choose to allocate all resources accumulated in the retirement sub-account, in the housing sub-account (in case there is money left) and in the voluntary savings sub-account (if the worker has made voluntary savings during his/her career) according to the following options:

- Programmed withdrawals: In this option, the AFORE pays a monthly pension using the resources left in the individual account (after deducting the amount needed to buy an immediate survivor annuity in favour of the member's beneficiaries if applicable) and

taking into account investment income and remaining life expectancy. The pension amount is variable and depends on the annuity factor (URV) by age and gender.¹ It is recalculated every year and paid until the balance in the account is depleted. In case the remaining assets are close to be inadequate to pay a pension equal to the guaranteed minimum pension, the member is informed and can opt for a guaranteed minimum pension using his/her remaining balance. In case of death, the remaining balance is distributed to the member's beneficiaries. This pay-out option is not indexed to consumer price inflation.

- Annuity: The member purchases an annuity from an insurance company with the amount saved in the AFORE. The annuity also covers the member's beneficiaries in case of death. The pension is updated with inflation every year in February.²
- Guaranteed minimum pension (PMG): If the resources accumulated in the individual account are not enough to buy a life annuity or to receive a pension in the form of programmed withdrawals of a minimum level, the worker is entitled to a guaranteed minimum pension granted by the federal government. The AFORE initially makes the payments of the PMG from the accumulated assets. Once these are depleted, the federal government pays the pension until the member passes away. At the pensioner's death, the federal government must purchase through the IMSS or the ISSSTE an immediate annuity granting the PMG for the member's beneficiaries.

When the worker does not meet the requirements for obtaining a pension, the IMSS or the ISSSTE gives a negative statement (*negativa de pensión*). In this case, at age 65 the member can withdraw the total accumulated balance in the individual account all at once.

Not all resources accumulated are used to finance retirement. Balances potentially accumulated between 1992 and the date of the reforms (respectively 1997 for private-sector workers and 2007 for public-sector workers) in the housing sub-account and in the individual retirement account are always surrendered to workers upon retirement in the form of a lump sum. For public-sector workers, even the potential resources left in the housing sub-account, accumulated since 2008, are surrendered to the worker as a lump sum and are not used as a complement to buy an annuity or to get programmed withdrawals.

Box 6.1. Destination of money deposited in individual retirement accounts for IMSS and ISSSTE affiliates depending on the pension scheme chosen

Type of account	IMSS workers – DB scheme	IMSS workers – DC scheme (3)	ISSSTE workers – DB scheme	ISSSTE workers – DC scheme (3)
SAR 92 (1)	Paid to the worker as a lump sum			
Housing sub-account 92 (2)	Paid to the worker as a lump sum			
Retirement insurance contribution (2%) in the retirement sub-account	Paid to the worker as a lump sum	Used to get an annuity, programmed withdrawal or PMG	Paid to the worker as a lump sum	Used to get an annuity, programmed withdrawal or PMG
Severance at old-age and old-age contributions in the retirement sub-account	Transferred to the federal government	Used to get an annuity, programmed withdrawal or PMG	Not accumulated in an individual account	Used to get an annuity, programmed withdrawal or PMG
Housing sub-account	Paid to the worker as a lump sum	Used to get an annuity, programmed withdrawal or PMG	Paid to the worker as a lump sum	Paid to the worker as a lump sum

Notes: (1) “SAR 92” represents the balances accumulated in the retirement sub-account before the respective reforms (1997 and 2007). (2) “Housing sub-account 92” represents the balances left in the housing sub-account from contributions made before the respective reforms. (3) Annuity is the only option available in case of disability or survivor pensions.

6.1.3. Early retirement is possible from age 60

Early retirement from age 60 is allowed both under the old DB system and the new DC system, provided that the worker is not employed and fulfils the minimum contribution period (respectively 500 weeks and 1 250 weeks). In the old DB system, workers suffer a 5-percentage points penalty in their pension benefit for each year of anticipation. In the new DC system, pension benefits depend on assets accumulated and are defined according to the same modalities as when people retire at 65.

The incentive to retire early is strong for low-income workers. Indeed, for those who are entitled to the PMG because the resources accumulated in the individual account are not enough to get a pension above that minimum, working beyond age 60 does not translate into higher pension benefits as long as the minimum contribution period criterion is already fulfilled at 60 years old. According to official statistics (*Sistema de Información Delegacional sobre las Prestaciones Económicas, Coordinación de Prestaciones Económicas del IMSS*), many workers opt for early retirement. Of the 162 308 new pensions in payment in 2014 for former private-sector workers (both under the old DB and the new DC systems), 79.0% corresponded to early retirement pensions.

Early retirement increases public pension liabilities related to the payment of the PMG. The PMG is indeed first paid by AFORE from the assets accumulated in the individual retirement account and then by the federal government. Therefore, early

retirement for PMG-entitled workers implies that the individual retirement account gets depleted more rapidly and that the cost of the PMG for the federal government increases because it needs to pay for it for a longer period.

In addition, as there is no plan so far to link the retirement age to life expectancy, public pension liabilities may increase further in the future. As showed in Chapter 3, large increases in life expectancy are expected to take place in Mexico. If the eligibility age to get the PMG stays constant, the number of years of retirement to be financed will increase. The cost of the PMG is therefore likely to increase for the federal government as it bears the tail risk.

6.1.4. Partial early withdrawals for unemployment and marriage

In a view to help workers dealing with special circumstances, partial early withdrawals from the individual retirement account are allowed in case of unemployment and marriage. Table 6.1 summarises the requirements and details for such withdrawals.

Private-sector workers are entitled to make partial withdrawals from the balance in their individual retirement account in two cases: unemployment and marriage. Affiliates, who at the moment they marry for the first-time have complied with a minimum of 150 weeks of contribution payments, are entitled to a partial withdrawal of funds for an amount equivalent to 30 days of the current general minimum wage in Mexico City. This right can only be exercised once and cannot be requested for subsequent marriages. Exercising this benefit reduces the balance in the individual account as well as the number of weeks of contributions paid into the IMSS. In order to subsequently cover the number of lost weeks of contributions, the employee who exercised this right must deposit the amount withdrawn.

Affiliates who have been paying contributions into the IMSS, but are unemployed, are entitled to a partial withdrawal of funds as of the 46th calendar day of unemployment once every five years. The amount that can be withdrawn depends on how long the account has been opened:

- If the account has been open for at least three years, and the worker has paid contributions into the account for at least two years, the affiliate can receive the equivalent of 30 days of his/her last registered wage, with a limit of 10 times the current general minimum wage in Mexico City.
- If the account has been open for at least five years, the affiliate may withdraw the lower amount between the equivalent of 90 days of his/her wage and 11.5% of the retirement sub-account.

Like private-sector workers, public-sector workers are entitled to make partial withdrawals from the balance in their individual account in case of unemployment, but not for marriage. However, the benefit formula is slightly different. ISSSTE affiliates may withdraw the lower amount between the equivalent of 75 days of their wage and 10% of their account balance, as of the 46th calendar day of unemployment. Affiliates are entitled to this partial withdrawal once every five years.

Table 6.1. **Characteristics of partial early withdrawals**

	Unemployment	Marriage
Membership duration	IMSS: The account has been open at least 3 years before and at least 2 years of contribution ISSSTE: The account has been open for at least 5 years before	IMSS: 150 weeks of contributions to the RCV account
Amount withdrawn	IMSS: With 3 years of membership duration, 30 days of the last base salary up to 10 times the minimum wage. With 5 years of membership duration, the minimum between 90 days of the base salary and 11.5% of the accumulated balance. ISSSTE: The minimum between 75 days of the base salary and 10% of the accumulated balance.	IMSS: 30 days of minimum salary
Requirements	IMSS: Be certified as unemployed by IMSS (certification given from the 46 th day of unemployment) ISSSTE: Certificate issued by the institute, given from the 46 th day of unemployment	IMSS: Resolution from IMSS to help with marriage costs
Are weeks of contributions lost?	IMSS: Yes, however, these contributions can be recovered ISSSTE: Yes	IMSS: No
How often can this benefit be claimed?	IMSS: Every 5 years ISSSTE: Every 5 years	IMSS: Only once in life

6.1.5. *Withdrawals of voluntary savings*

Workers who made voluntary contributions may withdraw these resources as follows:

- Short-term voluntary contributions can be withdrawn from 2 to 6 months after the deposit;
- Complementary contributions to individual retirement accounts and long-term voluntary contributions can be withdrawn from the age of 65 only or when the worker receives a pension resolution.

6.2. A sluggish annuity market

6.2.1. *A low demand for annuity products and a few market players*

The potential demand for annuity products comes from the following individuals and cases:

- Disability and survivor insurance: The IMSS or the ISSSTE has to buy an annuity from a private insurance sector specialised annuity provider to cover the related benefits. However, the worker chooses the annuity provider.
- Severance at old-age and old-age pension insurance: Workers in the DC pension system³ can choose upon retirement between a programmed withdrawal⁴ offered by an AFORE or an annuity offered by a specialised annuity provider (provided they are

entitled to a pension and have accumulated enough in their individual retirement account).

Due to the difference in generosity between the old and new old-age benefits, it is expected that most transitional workers will elect the old DB formula. In other words, the short- to medium-term prospects for development of the annuity market in Mexico very much depend on the accumulated funds in the disability and survivorship lines of benefits only.

None of the transitional private-sector workers chose so far to retire under the DC system with either a programmed withdrawal or an annuity. Only 14 382 transitional private-sector workers have chosen to retire under the DC system because they were entitled to the minimum guaranteed pension. However, looking at public-sector workers, the vast majority (99.4%) of those who chose the DC system back in 2007 bought an annuity at retirement, as shown in Table 6.2.

Table 6.2. Choice at retirement of public-sector workers affiliated to the ISSSTE who chose the DC system

	Programmed withdrawal	Annuity	Total
2009	35	601	636
2010	8	1 513	1 521
2011	2	1 311	1 313
2012	1	1 261	1 262
2013	2	1 705	1 707
2014	6	2 247	2 253
Total	54	8 638	8 692

Source: CNSF.

Therefore, the annuity market is small and will remain so because there is no demand for annuities. Demand will increase as the transition period reaches its end in around 2035. In the meantime, the lack of demand drives the market and it is difficult to assess whether it is competitive or not. Nevertheless, it is important to assess the structure of the market to determine if there is room for improvements.

Annuity providers for the mandatory DC pension system are ring-fenced subsidiaries of insurance companies. Insurance companies can set up a separate entity to provide annuities to IMSS and ISSSTE. These annuity providers are ring-fenced from the other business of their parent insurance company (life and non-life business). They can only provide annuities to the DC pension system and not to individuals outside the pension system. The life business of insurance companies can provide annuities to individuals outside the DC pension system, but not to the DC pension system. Consequently, annuity companies cannot diversify risks (e.g. mortality) with other products as normal insurance companies offering annuities would do. These annuity companies are subjected to a more restrictive investment regime than insurance companies. This may remove incentives for insurance companies to create annuity providers. It also increases the cost of annuities (and thus reduces the amount of the pension payment) compared with what a life insurance would offer.

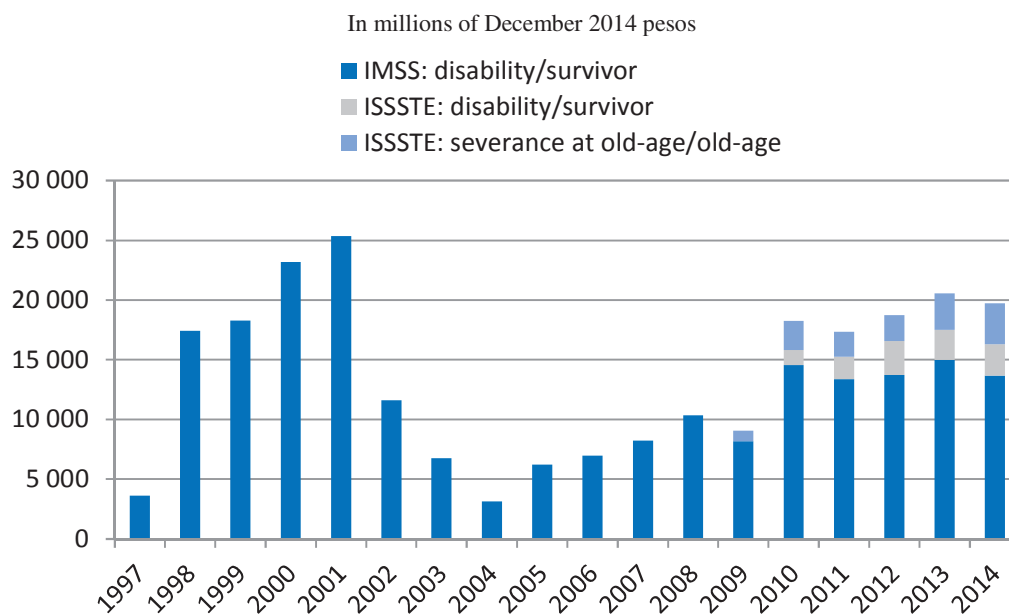
Ring-fencing these annuity providers from the general insurance business of the parent company may increase the security that they will fulfil their payment promises.

This greater security comes at a cost: lower annuity payments and lower diversification. However, the costs and benefits need to be carefully evaluated.

Annuity providers in the market today in Mexico are a small number. There were 14 companies operating during the period 1997 to 2001. This number dropped from 12 to 3 between 2002 and July 2009. Today there are only four active insurance companies in the annuity market and there are six other companies managing their annuities portfolio. Initially the market for annuities grew driven by a surge in demand as all disability and survival pensions granted by IMSS were issued as insurance contracts. However, following the amendment of the Social Security Law on 20 December 2001 providing IMSS with more power to select annuity providers, most IMSS affiliates retiring the years following this reform chose to get their benefits following the old PAYG DB rule, paid by the government. Therefore, the annuity market is now driven by the almost inexistent demand coming from transitional workers.

Insurers' lack of interest in participating in the annuity market can also be due to other reasons. First, the absence of financial instruments to hedge longevity risk; second, the regulator imposed a minimum discount rate from 1997 to 2008 of 3.5%. Insurers that left the market pointed to the increasing difficulty to obtain similar returns on investment for reserves. However, 10-year government bonds yielded much more during that period. Finally, high administration costs generated by small pensions (descent and orphans) may have led to unattractive profit margins. Figure 6.1 and Figure 6.2 show respectively the annuity premiums paid and the number of annuity contracts since 1997 under the DC system and illustrate the drop in the annuity market after 2001. In 2014, written premiums were MXN 19 736 million for 21 027 annuitants.

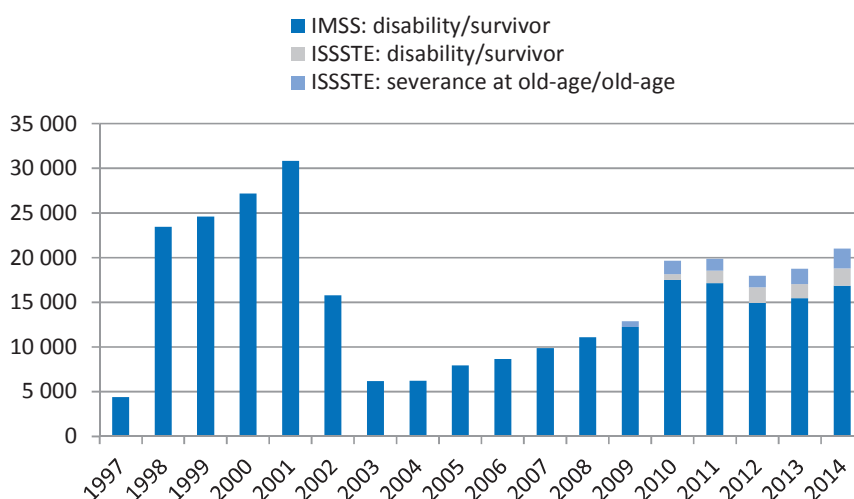
Figure 6.1. **Annuity premiums paid, 1997-2014**



Notes: “IMSS: disability/survivor” refers to premiums for disability and survivor pensions for IMSS affiliates; “ISSSTE: disability/survivor” refers to premiums for disability and survivor pensions for ISSSTE affiliates; “ISSSTE: severance at old-age/old-age” refers to premiums for severance at old-age and old-age pensions for ISSSTE affiliates.

Source: CNSF.

Figure 6.2. Number of annuity contracts, 1997-2014



Notes: “IMSS: disability/survivor” refers to annuity contracts for disability and survivor pensions for IMSS affiliates; “ISSSTE: disability/survivor” refers to annuity contracts for disability and survivor pensions for ISSSTE affiliates; “ISSSTE: severance at old-age/old-age” refers to annuity contracts for severance at old-age and old-age pensions for ISSSTE affiliates.

Source: CNSF.

Finally there is a severe product restriction. By law, annuity providers can only offer one annuity product to workers retiring from the IMSS or the ISSSTE: a single premium annuity that provides pensioners a flow of payments throughout their lifetime, indexed to inflation.

6.2.2. Pricing of annuities: towards more competition in the market

A committee composed of officials from the Ministry of Finance and Public Credit, the IMSS, the ISSSTE, CONSAR and the National Insurance and Surety Commission (*Comisión Nacional de Seguros y Fianzas, CNSF*), named *Comité del Artículo 81 de la Ley del SAR*, agreed on the implementation of a new operative scheme for the annuity market in 2009. One of the main aspects was the establishment of a market mechanism in order to determine the price of annuities, by which annuity providers could compete through discount rates estimations that would reflect financial market conditions. The market mechanism intends to:

- Capture market fluctuations of real rate long-term risk-free bonds so that annuity providers could offer a discount interest rate in line with the financial conditions at the moment of the underwriting of annuity contracts;
- Switch from a fixed price scheme where discount interest rates and biometric assumptions (mortality tables) were pre-defined to a scheme in which the premium depends on parameters offered by each annuity provider such as discount interest rates and mortality tables;
- Define an homogenous methodology for the determination of the annuity price; and

- Try to align incentives so that pensioners elect the annuity provider that bid the bigger discount interest rate, and therefore a lower amount of assets are needed to pay the DB promises.

Additionally, in order to mitigate longevity risk, prudential regulation applicable to annuities was strengthened by:

- Updating the mortality tables for disabled, injured and non-disabled pensioners with “ad-hoc” data (transition from population mortality data to pensioners’ mortality data). In the case of non-disabled pensioners, generational mortality tables were introduced and all mortality tables are subject to a periodically revision mechanism with data provided by the social security institutes as well as annuity providers.
- Introducing the use of derivatives, exclusively for hedge purposes, in order to:
 - Enhance asset-liability matching to reduce the insurers’ risk exposure. Transactions with derivatives must be carried out exclusively for coverage purposes. In this respect, all the transactions performed with derivatives have to be associated to financial securities assigned, to technical provisions or to the solvency capital requirement;
 - Get senior officers and committee members elected by the Board of Directors to be involved in the oversee of market’s risks administration, liquidity and other relevant risks;
 - Assure that financial operators of annuity providers have the necessary background for operating derivatives, as they must be certified by an independent third-party determined by the CNSF. Similarly, the responsible area of comprehensive risk management must be certified by an independent third-party.

In the first stage of the implementation of this market mechanism, annuity providers were able to (i) make their pricing and bid using the discount interest rate that they were able to offer looking at the prevailing conditions of the long-term financial market, and (ii) offer their own biometric assumptions on the survival of pensioners.

However, the bidding scheme had two restrictions. First, the discount interest rate offered by insurers could not be lower than a reference interest rate.⁵ And second, mortality tables that insurers used for pricing purposes could be neither more conservative than the mortality tables used for the calculation of the solvency capital requirement, nor less conservative than the mortality tables used for the valuation of technical provisions. As shown in Table 6.3, between 2011 and 2013, the deviation of the rates offered by insurers with respect to the reference interest rate was negligible (0 or 1 basis point). There was no incentive for insurers to offer a better rate.

Table 6.3. Reference interest rate and average difference with observed rates in the annuity market

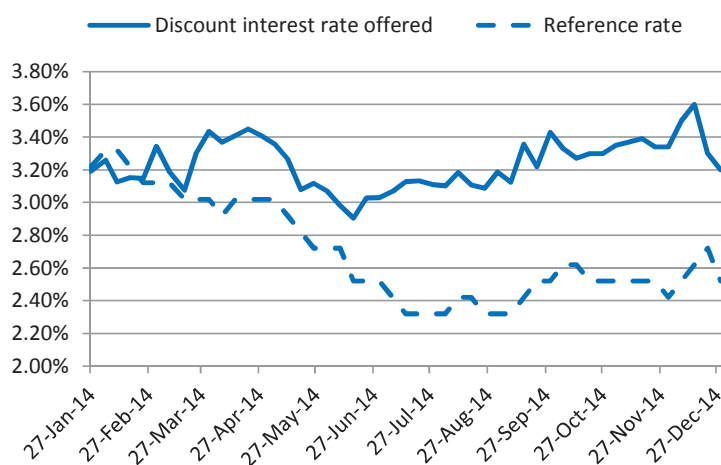
In per cent and difference in basis points

	IMSS		ISSSTE	
	Reference rate (%)	Market rate – Reference rate (bp)	Reference rate (%)	Market rate – Reference rate (bp)
2009	3.51	8	3.58	15
2010	2.83	17	2.88	22
2011	3.41	0	3.41	0
2012	2.48	0	2.48	0
2013	2.34	0	2.35	1

Source: CNSF.

In November 2012, the committee approved adjustments for the annuity market, with the introduction of a fully market mechanism for DC severance at old-age and old-age pensions. Since January 2014, this market mechanism expanded to disability and survivor pensions. As a result of the strategy adopted, there is an evident competition between the market participants that has generated savings for the social security system explained by the spread between the discount interest rate offered by market participants and the reference rate used previously (see Figure 6.3).

Figure 6.3. Discount interest rate offered by annuity providers in 2014 and former reference rate



Source: CNSF.

In December 2013, the CNSF also approved the introduction of a mechanism of repeated auction to guarantee price competition. The process is described below:

- Annuity providers receive electronically on a weekly basis information about pension applicants and their beneficiaries, without personal identification data but with elements that allow them to bid the amount of pension.
- They bid pension payments for each pension applicant, disclosing the discount interest rate that they are able to offer and the biometric assumptions that reflect the estimation

of survival for each individual into a webpage that hosts the Offers and Resolution Management System (*Sistema Administrador de Ofertas y Resoluciones*, SAOR).

- The SAOR processes under a homogeneous basis the bidding of the annuity providers and gathers them in a single offer document so that pension applicants can compare all the different pension offers (the old DB formula and the new DC rule for transitional private-sector workers, programmed withdrawals,⁶ survivor benefits, disability benefits) and select the one that best suits them. For DB pensions, the offer document displays the pension paid by the social security institute (either IMSS or ISSSTE) and the lump sum that the pension applicant can receive. For DC pensions, the offer document displays the amount of pension derived from the annuity or programmed withdrawal.
- The offer document includes a clear and visible legend highlighting the “optimal choice”. In the case of disability and survivor pensions, the optimal choice is the one offering the promised benefit for the lowest lump sum possible. In the case of severance at old-age and old-age pensions, the optimal choice is the one offering the larger pension.

There is a financial incentive for workers to select the optimal choice in the case of disability and survivor pensions. Indeed, these pensions are funded by social security institutes (i.e. IMSS and ISSSTE), but the choice of the annuity provider is done by the worker, who will receive the same pension payment, independently of this choice. The IMSS and the ISSSTE therefore pay a lump sum of up to MXN 9 000 to workers choosing the optimal choice, i.e. the cheapest choice.⁷ The offer document also includes a section that must be filled in and signed by the pensioner in case of not selecting the optimal choice, to make sure he/she is fully aware of his/her decision.

6.3. Assessment of the potential longevity risk in standard mortality tables used by pension funds and annuity providers

6.3.1. Mortality tables, regulatory requirements and market practice

There are no minimum requirements for mortality assumptions imposed on occupational plan sponsors in Mexico, who typically rely on the EMSSA 97 table.^{8,9} This table is based on population mortality experience and in practice is typically improved to 2011 for males and 2013 for females based on projections by CONAPO (the National Council of Population) from 1990-2030.

Annuity providers have to use generational mortality tables for the valuation of their liabilities. The insurance company must perform the valuation of its reserves for non-disabled pensioners with the EMSSAH-Rva-09 (for men) and EMSSAM-Rva-09 (for women) tables. However, if they apply any other more conservative assumption, they must use the EMSSAH-CMG-09 (for men) and EMSSAM-CMG-09 (for women) tables.¹⁰ These tables were updated in 2009 based on data provided by IMSS and ISSSTE rather than population data. Future mortality improvements in these tables are specified by age and gender. Given that the market has adopted the more conservative tables for pricing (EMSSAH-CMG-09 and EMSSAM-CMG-09), they must use these mortality tables for the purpose of valuing liabilities. The same tables are used by AFORE offering programmed withdrawals.

Insurers generally price their annuity products using their own set of assumptions, though they have been free to do so only since August 2009. The insurers frequently use the generational 2009 tables listed above for non-disabled pensioners. These tables are

updated from time to time in an effort to ensure that they appropriately reflect up-to-date experience of mortality rates.

The Mexican regulatory framework includes an additional level of provision for improvements in longevity above and beyond those already included in the standard tables in their financial reporting or in their embedded value metrics, and are required to hold an additional reserve of 2% of the mathematical reserve to cover the possibility of unexpected demographic experience. However, an additional reserve would not typically be applied for pricing or solvency purposes.

To provide additional protection to policyholders, regulation has also set up a special fund to assist insurers in the case that an external event, such as a variation in the financial markets that impedes insurance institutions to obtain the financial products covering the technical reserves and to guarantee the appropriate resources to fulfil their obligations regarding the policyholders, or in the case of demographic experience deviations, threatens the ability of the insurer to meet its obligations to the policyholder. This special fund can only be used if the insurance company has already used the special mathematical reserve and the contingency reserve.

Table 6.4. **Mortality tables and improvements required by regulation and used in practice in Mexico**

		Required
Minimum table required by regulation	Annuity providers	Yes
	Occupational pension plans	No
Mortality improvements required by regulation	Annuity providers	Yes
	Occupational pension plans	No
Mortality improvements used in practice	Annuity providers	Yes
	Occupational pension plans	No

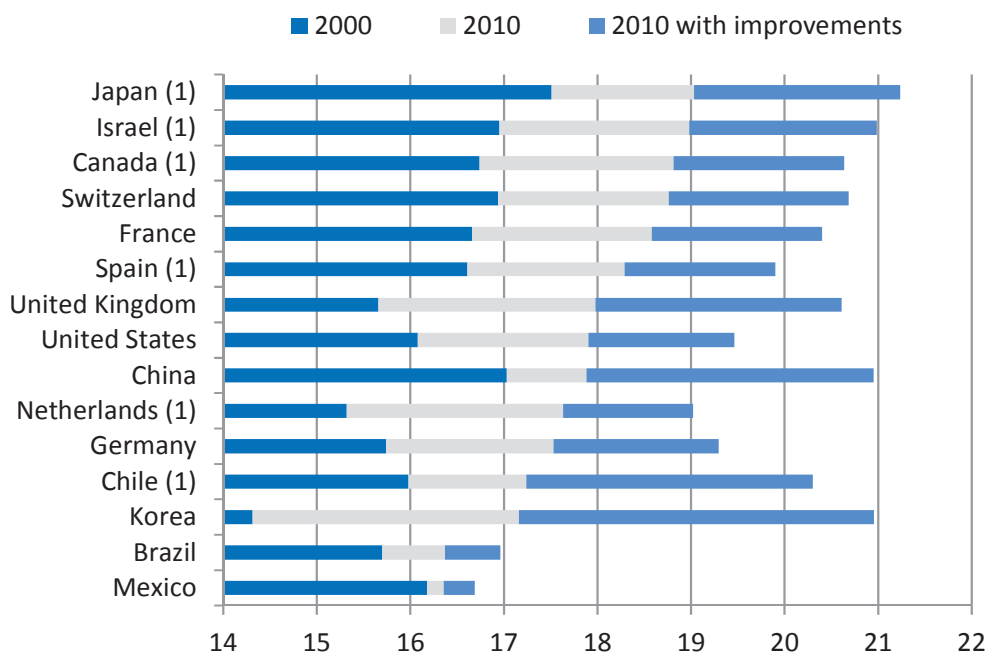
Source: OECD (2014).

6.3.2. *Recent trends in life expectancy and mortality improvements*

Mexico has relatively low life expectancy for both men and women. Moreover, projected improvements are also relatively low. Nevertheless, there is room for life expectancy to catch up with that of other countries and mortality improvements to accelerate in the near future. If this were to happen, the longevity risk that annuity providers and occupational pensions would be exposed to will be much higher than the one assessed below.

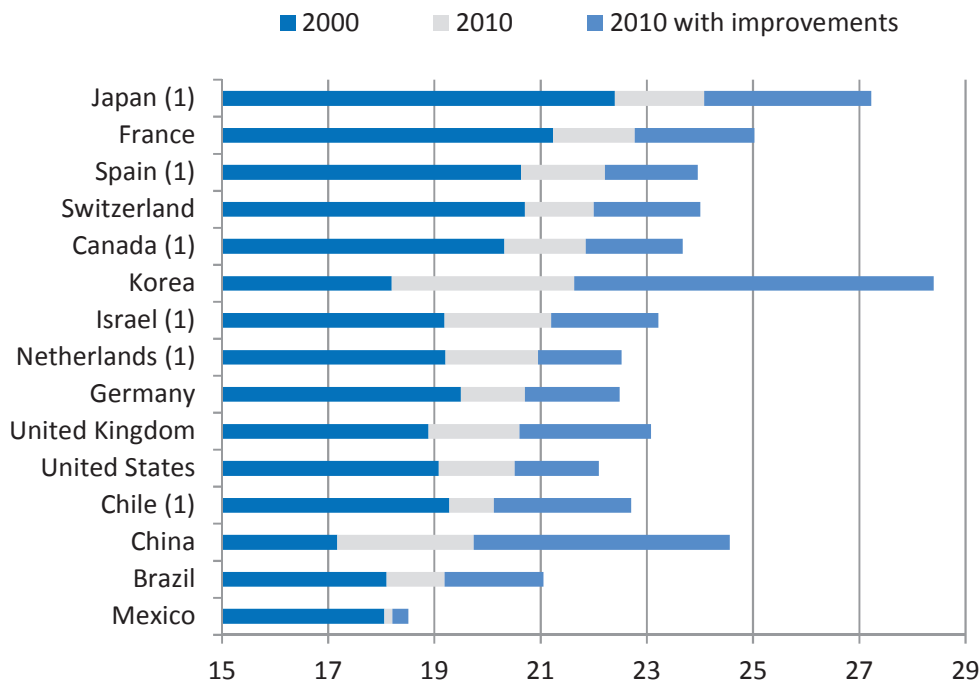
Figure 6.4 and Figure 6.5 show the evolution in population life expectancy at age 65 for males and females for fifteen selected countries, including Mexico, demonstrating the increase in period life expectancy from 2000 to 2010 as well as average additional life expectancy taking into account future mortality improvements as predicted by projection models (i.e. cohort life expectancy for 2010).¹¹

Figure 6.4. Male population life expectancy at age 65



1. Period life expectancy 2010 estimated based on the average increase of the last five years available data.
 Source: OECD (2014).

Figure 6.5. Female population life expectancy at age 65

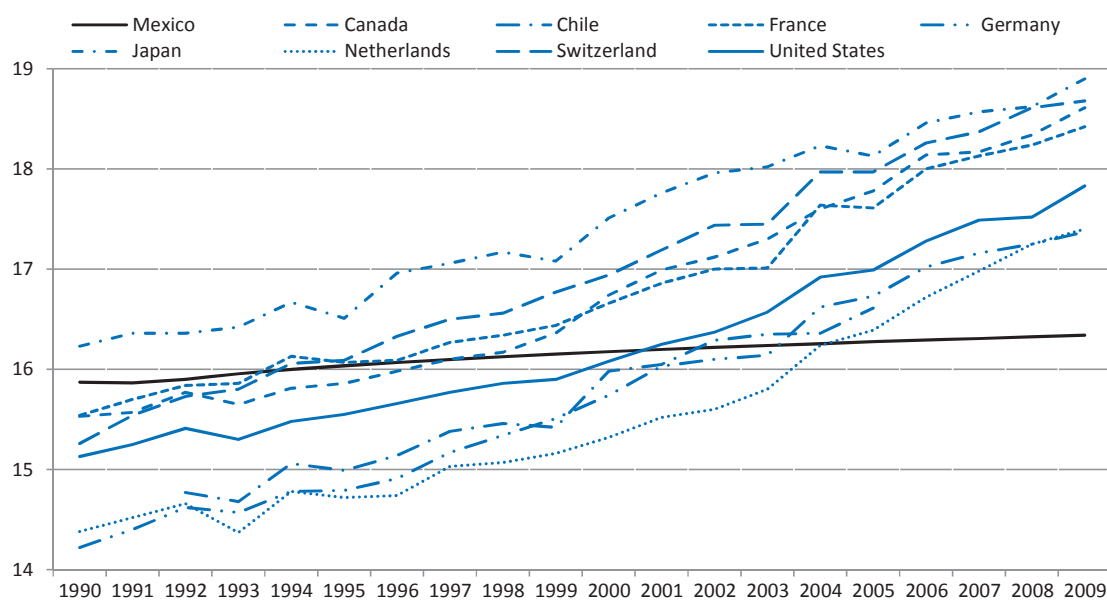


1. Period life expectancy 2010 estimated based on the average increase of the last five years available data.
 Source: OECD (2014).

The difference between the period life expectancy and the cohort life expectancy of 2010 shows the impact that future improvements are expected to have on life expectancy. On average, the projected mortality improvements add two years of life expectancy for males and 2.5 years for females. Chile, China, Japan, Korea and the United Kingdom are expected overall to have the highest increase in life expectancy for both genders. Of these countries, Chile, China and Korea have relatively low life expectancies compared to that in other countries, and the high improvements projected by the models likely reflect the fact that life expectancy in these countries is catching up with the other countries, particularly for Korea for whom projected improvements have the largest impact on life expectancy. Once life expectancy is more in line with the other countries, it could be expected that the mortality improvement beyond that point will also align with average levels, thus the analysis presented here may overstate somewhat the longevity risk in these countries.

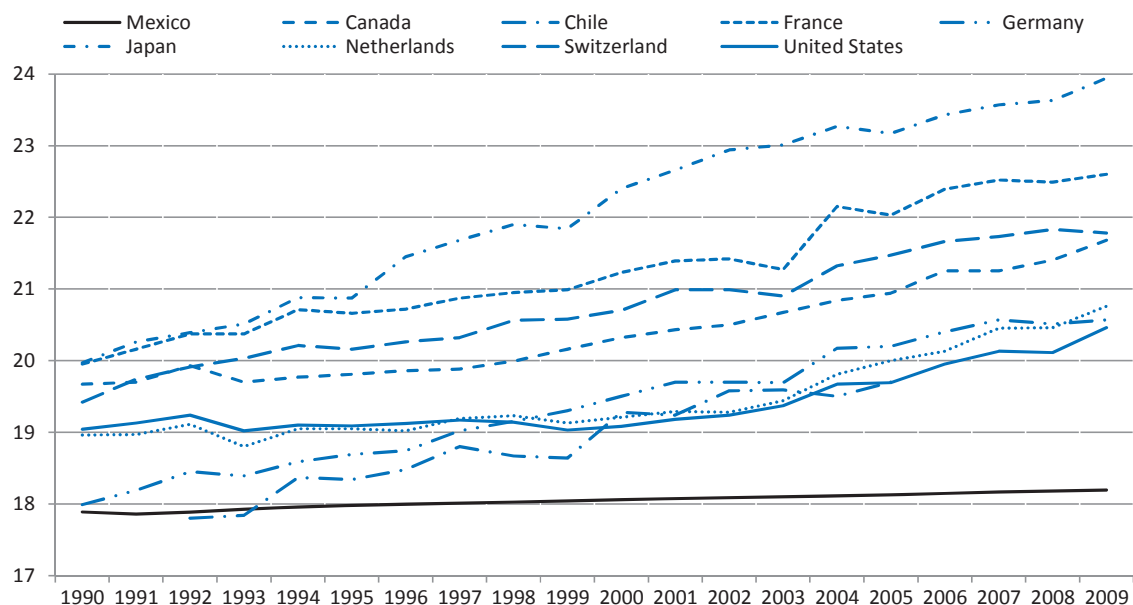
Figure 6.6 and Figure 6.7 show that life expectancy has been increasing in Mexico, for both men and women, albeit at a rather slower pace over the last two decades than other selected OECD countries. For example, male life expectancy at 65 increased by 0.5 years between 1990 and 2009 in Mexico, by 3.1 years in Canada, 1.8 years in Chile (between 1992 and 2005), 2.9 years in France, 3.2 years in Germany, 2.7 years in Japan, 3 years in the Netherlands, 3.4 years in Switzerland and 2.7 years in the United States. The gap in life expectancy between the two genders in Mexico has decreased slightly but has been overall stable at just under two years.¹²

Figure 6.6. Life expectancy at age 65, males, selected OECD countries, 1990-2009



Source: OECD (2014).

Figure 6.7. Life expectancy at age 65, females, selected OECD countries, 1990-2009



Source: OECD (2014).

6.3.3. Assessment of the potential longevity risk in the standard mortality tables

OECD (2014) examines the mortality tables commonly used by pension funds and annuity providers against several well-known mortality projection models (the Lee-Carter, the Cairns-Blake-Dowd, P-splines and the CMI models) with the purpose of assessing the potential shortfall in provisions. The main results of this analysis for Mexico are provided below.

Table 6.5 shows the annualised improvement to mortality rates in Mexico for age groups of five years. The evolution of mortality improvement from one decade to the next shows the shift of mortality improvement across age groups over time.¹³ This aids not only in judging the appropriateness of assumptions given in existing tables, but also the appropriateness of the model outputs. From the left of Table 6.5, historical improvements in the population's mortality are shown. Improvements in mortality have slowed in the last decade for both genders, with the assumptions in the EMSSA-CMG-09 being optimistic compared to recent experience. The stochastic models (Lee-Carter and Cairns-Blake-Dowd) project forward a pattern in line with the overall average improvements, while the P-splines model continues the low improvements of the recent decade, and the CMI converges to the 1% long-term improvement which has been assumed for Mexico in the longer term.

Table 6.5. Historical and future mortality improvements predicted by tables and projection models

	Population		EMSSA09		LC		CBD		PS		CMI	
	1990-2000	2000-2009	2010-2020	2020-2030	2010-2020	2020-2030	2010-2020	2020-2030	2010-2020	2020-2030	2010-2020	2020-2030
Males												
55-59	1.5%	0.5%	1.3%	1.3%	1.0%	1.0%	1.0%	1.0%	0.5%	0.5%	0.8%	1.0%
60-64	1.2%	0.4%	1.1%	1.1%	0.8%	0.8%	0.8%	0.8%	0.4%	0.4%	0.6%	0.9%
65-69	0.9%	0.3%	0.9%	0.9%	0.6%	0.6%	0.6%	0.6%	0.3%	0.3%	0.5%	0.9%
70-74	0.6%	0.3%	0.8%	0.8%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.4%	0.8%
75-79	0.3%	0.2%	0.6%	0.6%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.5%	0.9%
80-84	0.0%	0.2%	0.6%	0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.6%	1.0%
85-89	-0.2%	0.0%	0.6%	0.6%	0.0%	0.0%	-0.1%	-0.1%	0.2%	0.2%	0.8%	1.0%
90-94	-0.5%	0.0%	0.5%	0.5%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	-0.1%	0.9%	1.0%
95-99	-0.6%	0.0%	0.4%	0.4%	-0.3%	-0.3%	-0.3%	-0.3%	-0.1%	-0.1%	0.8%	0.8%
100-104	-0.7%	-0.1%	0.0%	0.0%	-0.3%	-0.3%	-0.4%	-0.4%	-0.2%	-0.2%	0.6%	0.6%
105-110	-0.8%	-0.1%	0.0%	0.0%	-0.4%	-0.4%	-0.5%	-0.5%	-0.4%	-0.3%	0.4%	0.4%
Female												
55-59	1.3%	0.5%	1.8%	1.8%	0.9%	0.9%	0.9%	0.9%	0.5%	0.5%	0.8%	1.0%
60-64	1.0%	0.4%	1.5%	1.5%	0.8%	0.8%	0.7%	0.7%	0.4%	0.4%	0.6%	0.9%
65-69	0.7%	0.3%	1.3%	1.3%	0.6%	0.6%	0.5%	0.5%	0.3%	0.3%	0.5%	0.9%
70-74	0.5%	0.3%	1.0%	1.0%	0.4%	0.4%	0.4%	0.4%	0.3%	0.2%	0.5%	0.9%
75-79	0.2%	0.2%	0.9%	0.9%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.4%	0.9%
80-84	0.0%	0.2%	0.7%	0.7%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.5%	1.0%
85-89	0.0%	0.0%	0.6%	0.6%	0.1%	0.1%	-0.1%	-0.1%	0.1%	0.1%	0.8%	1.0%
90-94	-0.6%	0.0%	0.5%	0.5%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	0.0%	0.9%	1.0%
95-99	-0.7%	-0.1%	0.3%	0.3%	-0.3%	-0.3%	-0.4%	-0.4%	0.0%	-0.1%	0.8%	0.8%
100-104	-0.8%	-0.1%	0.0%	0.0%	-0.4%	-0.4%	-0.4%	-0.4%	-0.1%	-0.1%	0.6%	0.6%
105-110	-0.8%	-0.1%	0.0%	0.0%	-0.4%	-0.4%	-0.5%	-0.5%	-0.3%	-0.3%	0.4%	0.4%

Notes: Darker shades indicate higher improvements.

LC = Lee-Carter model;

CBD = Cairns-Blake-Dowd model;

PS = P-splines model;

CMI = CMI model.

Source: OECD (2014).

The Tables 6.6 and 6.7 show the values for the cohort life expectancy, the annuity value based on a 4.5% nominal discount rate, and the annuity payment as a per cent of the initial investment (net of margins and fees).¹⁴ Life expectancy and annuity values are key indicators of pension and annuity liabilities. The two are closely related, with the latter taking into account the time value of money. The figures given for each of the projection models applied are shown for the general population as well as adjusted to the level of insured and pensioner mortality (see OECD, 2014 for details on the methodology).

Table 6.6. Cohort life expectancy, annuity values and payments at age 55, 65 and 75 – males

Mortality tables		Life expectancy 2010			Annuity factors			Annuity payment		
		55	65	75	55	65	75	55	65	75
EMSSA97		25.3	17.1	10.3	7.0	11.8	8.3	14.4%	8.5%	12.1%
EMSSA09		29.6	21.7	14.8	7.9	13.5	10.6	12.6%	7.4%	9.4%
Modelled Mortality										
Population	LC	23.8	16.5	10.6	6.4	11.3	8.3	15.7%	8.8%	12.0%
	CBD	23.8	16.5	10.8	6.4	11.3	8.5	15.7%	8.8%	11.8%
	P-Spline	23.8	16.5	10.7	6.3	11.3	8.4	15.8%	8.8%	11.9%
	CMI	25.0	17.2	11.1	6.6	11.5	8.6	15.1%	8.7%	11.7%
Adjusted										
EMSSA97: 1997	LC	25.0	16.8	10.1	6.9	11.6	8.1	14.5%	8.6%	12.3%
	CBD	25.0	16.8	10.1	6.9	11.7	8.1	14.5%	8.6%	12.3%
	P-Spline	25.0	16.9	10.1	6.9	11.7	8.2	14.6%	8.6%	12.2%
	CMI	26.1	17.5	10.4	7.1	11.9	8.3	14.1%	8.4%	12.0%
EMSSA09: 2009	LC	28.6	21.0	14.4	7.7	13.2	10.5	12.9%	7.6%	9.6%
	CBD	28.5	20.9	14.3	7.7	13.2	10.4	13.0%	7.6%	9.6%
	P-Spline	28.5	21.0	14.5	7.7	13.2	10.5	13.0%	7.6%	9.5%
	CMI	29.9	22.0	15.0	8.0	13.5	10.7	12.6%	7.4%	9.3%

Notes: LC = Lee-Carter model; CBD = Cairns-Blake-Dowd model; CMI = CMI model.

Source: OECD (2014).

Table 6.7. Cohort life expectancy, annuity values and payments at age 55, 65 and 75 – females

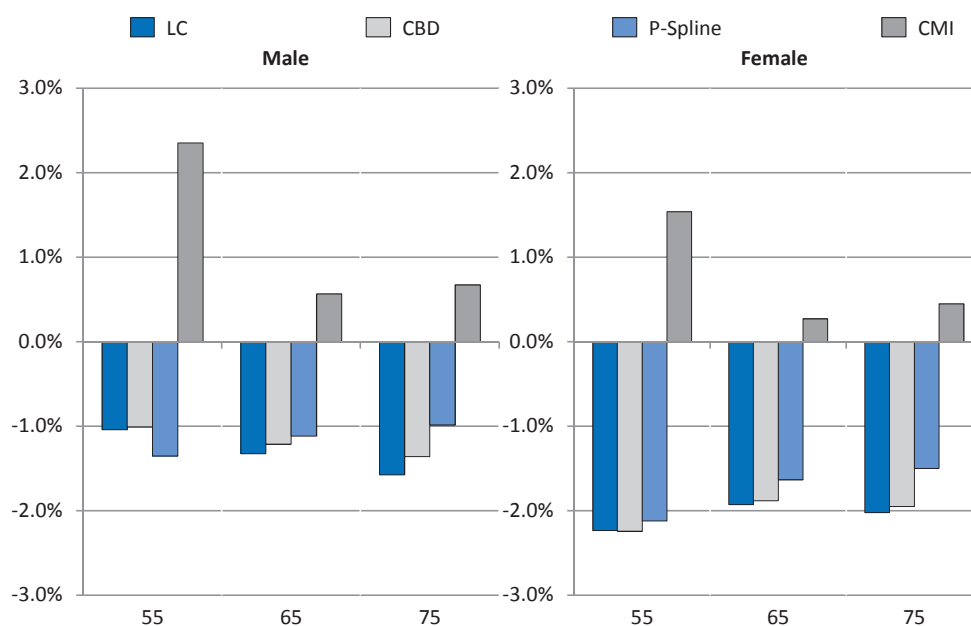
Mortality tables		Life expectancy 2010			Annuity factors			Annuity payment		
		55	65	75	55	65	75	55	65	75
EMSSA97		29.3	20.6	13.0	8.1	13.3	9.8	12.3%	7.5%	10.2%
EMSSA09		34.0	24.3	15.1	9.5	15.0	11.1	10.5%	6.7%	9.0%
Modelled Mortality										
Population	LC	26.2	18.2	11.8	7.1	12.2	9.0	14.0%	8.2%	11.1%
	CBD	26.2	18.3	11.9	7.1	12.2	9.1	14.0%	8.2%	11.0%
	P-Spline	26.3	18.3	11.9	7.1	12.2	9.1	14.0%	8.2%	11.0%
	CMI	27.6	19.2	12.3	7.4	12.4	9.3	13.5%	8.0%	10.8%
Adjusted										
EMSSA97: 1997	LC	28.7	20.0	12.6	8.0	13.0	9.6	12.6%	7.7%	10.4%
	CBD	28.7	20.0	12.6	8.0	13.1	9.6	12.6%	7.7%	10.4%
	P-Spline	28.8	20.1	12.7	8.0	13.1	9.6	12.6%	7.6%	10.4%
	CMI	30.2	21.0	13.2	8.3	13.3	9.8	12.1%	7.5%	10.2%
EMSSA09: 2009	LC	32.9	23.6	14.7	9.3	14.7	10.9	10.8%	6.8%	9.1%
	CBD	32.8	23.5	14.7	9.2	14.7	10.9	10.8%	6.8%	9.2%
	P-Spline	33.0	23.7	14.8	9.3	14.7	11.0	10.8%	6.8%	9.1%
	CMI	34.3	24.5	15.2	9.5	15.0	11.2	10.5%	6.7%	9.0%

Notes: LC = Lee-Carter model; CBD = Cairns-Blake-Dowd model; CMI = CMI model.

Source: OECD (2014).

The analysis shows little to no potential shortfall in provisions. A proxy for the change in the liability value can be directly estimated by taking the ratios of the annuity values given by the models over those computed with the standard mortality tables. This corresponds to the change in reserves or funding needed to meet future pension and annuity payments as estimated by the alternative model. Figures 6.8 and 6.9 show the change in liability value given by the models studied based on the annuity values presented for the standard mortality tables and the adjusted model outputs in Tables 6.6 and 6.7. Both graphs show little to no potential shortfall in provisions. On the other hand, the recent low mortality improvements in Mexico result in a slight over-provisioning for longevity for annuities as measured here, as the improvements assumed are more conservative than recent population experience shows.

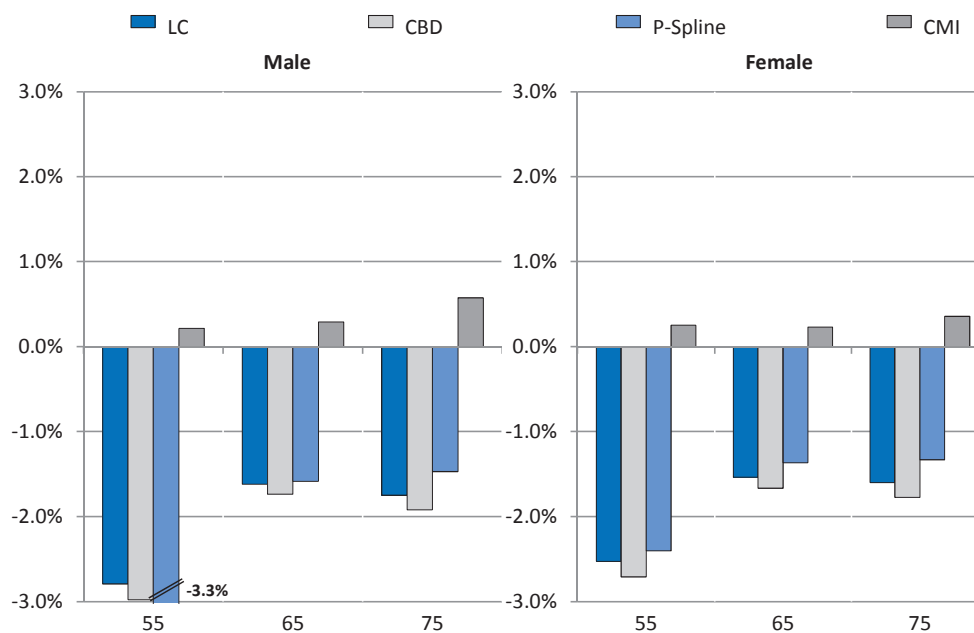
Figure 6.8. Potential shortfall from EMSSA 97 tables for pensioners in Mexico



Notes: LC = Lee-Carter model; CBD = Cairns-Blake-Dowd model; CMI = CMI model.

Source: OECD (2014).

Figure 6.9. Potential shortfall from EMSSA 09 tables for annuitants in Mexico



Notes: LC = Lee-Carter model; CBD = Cairns-Blake-Dowd model; CMI = CMI model.

Source: OECD (2014).

To put it in a nutshell, while the tables used by annuity providers in Mexico seem to sufficiently provision for expected mortality improvements for now, recent improvements in mortality have been slowing and the country currently has rather low life expectancy compared to other OECD countries. Therefore, the potential for longevity to accelerate in Mexico and life expectancy to catch up to other OECD countries exists, and mortality experience should be closely monitored for changing patterns to ensure that the tables remain adequate.

Occupational DB pension funds are not subject to any minimum mortality requirements, including using tables accounting for future improvements in mortality. A close monitoring of mortality is even more relevant for pension funds to make sure any mortality improvement acceleration is reported and assumptions updated accordingly.

6.4. Proposals to improve the design of the pay-out phase

6.4.1. Maximise the resources used to finance retirement

Allowing workers to withdraw part of their retirement savings to face contingencies can be seen as an incentive for workers to participate in the pension system. For individuals, a major worry about putting money into private pension arrangements, whether mandatory or not, is that they are not able to withdraw it until retirement. Yet, there may be cases where accessing some of those funds could help solvent a major shock, such as defraying health expenses that are not covered by the health system. For this reason, some countries allow withdrawals from retirement savings systems under specific, exceptional circumstances. For example, KiwiSaver plan members in New Zealand may withdraw all of their funds at any time in the event of serious illness or permanent disability, or if they face significant financial hardship (such as dependent's medical care or education). Similar rules on so-called hardship withdrawals apply in the United States for 401(k) plans, Individual Retirement Accounts and other qualified plans. In Mexico, partial early withdrawals from the individual retirement account are allowed in case of unemployment and marriage.

However, one needs to be careful as enabling access to savings may divert too much money that was initially intended to finance retirement and affect negatively retirement income adequacy. Considering this negative impact, marriage may not be a circumstance critical enough to allow for early withdrawals. In addition, allowing partial withdrawals in case of unemployment once every five years may be too frequent. Workers should access their pension savings only under specific, exceptional circumstances. Serious illness, permanent disability and significant financial hardship may be more appropriate causes to allow for early withdrawals.

Potentially large pots of assets are not used to finance retirement, possibly affecting negatively retirement income adequacy. For example, balances accumulated between 1992 and the date of the reforms (respectively 1997 for private-sector workers and 2007 for public-sector workers) in the housing sub-account and in the individual retirement account are always surrendered to workers upon retirement in the form of a lump sum. Transitional workers choosing a DB pension also get back the amount corresponding to the retirement insurance contribution in the retirement sub-account (2% of the base salary paid by the employer) as a lump sum. These assets have been accumulated in the pension system but are not combined with other retirement assets to buy a life annuity or get programmed withdrawals. Although such rule may be seen as an incentive for workers to

participate in the pension system, diverting too much money that was initially intended to finance retirement many affect negatively retirement income adequacy.

These lump sum payments also increase public pension liabilities. In the case of transitional workers choosing to receive a pension calculated according to the old DB formula, the federal government is responsible for paying the pension. All the money accumulated in the pension system should therefore be transferred to the government and used to finance the DB pension, in particular the retirement insurance contribution. The federal government is also responsible for paying for the PMG once the assets in the individual retirement account are depleted and it is difficult to understand why all the assets accumulated in the pension system are not used to finance the minimum pension, leaving an additional burden on the state.

In addition, linking retirement age to life expectancy increases would allow keeping the cost of the PMG for the federal government constant. As said earlier, the federal government only starts paying the PMG at late ages, once the assets in the individual retirement account are depleted. The longer people live, the more likely is the government to finance a larger part of the PMG. In addition, if workers keep retiring at 65, the assets accumulated in the individual retirement account need to finance a longer retirement period as life expectancy increases. This would translate into lower pension payments and an increased likelihood to be entitled to the PMG.

Finally, pensioners should be allowed to choose an insurance company within the set of companies offering the same coverage and guarantees at the same price. This would limit pensioners' choice of the insurance companies providing disability and survivors' benefits but it would balance premiums to be paid by the social security institutes and the extent of the protection provided. As a result, pensioners could not choose insurance companies that provide the same coverage at a higher cost. Today, pensioners have a financial incentive to select the optimal choice (a lump sum of up to MXN 9 000), but there is no rule that prevent them from choosing an annuity provider charging a higher premium to the IMSS or the ISSSTE for the same coverage than other providers.

6.4.2. Improve prospects for the annuity market

Insurance companies should be allowed to offer different types of annuity products.¹⁵ With only one annuity product available (a single premium inflation-indexed annuity), the annuity market in Mexico is unattractive to both insurance companies and plan members. On the one hand, annuity providers cannot compete by offering to people innovative annuity products. On the other hand, life annuities are usually perceived by people as costly. In addition, they are illiquid and inflexible, and do not allow for bequests. There are therefore strong incentives against taking-up a life annuity at retirement and choose a programmed withdrawal instead. This means a risk that workers retiring under the new DC system may be more exposed to longevity risk than those retiring today under the DB system.

An additional modality to allocate pension assets at retirement, achieving a balance between protection from longevity risk, flexibility, and liquidity, may reinvigorate the Mexican annuity market. Life annuities may need to be part of any default arrangement for the pay-out phase, depending on the overall pension system, as they provide insurance against longevity risk. A combination of programmed withdrawals with a deferred life annuity (e.g. starting payments at the age of 80-85) that offers protection against inflation could be seen as an appropriate default. This combination achieves a balance between

protection from longevity risk, flexibility, liquidity, possibility of bequests, and access to portfolio gains.

The annuity market regulator should consider allowing a wider variety of annuity products to be offered in the market. The CNSF should make sure though that annuity providers adequately reserve for the potential additional risks that those additional annuity products may carry.

Finally, regulators should examine the possibility of changing the institutional set-up of annuity providers to bring economies of scale and risk diversification. Today, insurance companies need to create separate entities to offer annuities. This separated entity is regulated differently from insurance companies and cannot take advantage of economies of scale by merging its business with the parent company. Associating annuity providers and life insurance companies in the same branch could be considered. In addition, insurance companies in most other OECD countries can mitigate the life expectancy risk associated with the provision of life annuities by offering other products, such as life insurance policies. Indeed, while an increase in life expectancy increases the liabilities of the annuity provider stemming from life annuities (the annuitant will receive payments for a period of time longer than anticipated), it increases premiums paid in life insurance products and postpones the payment of the life insurance policy. In the same way, Mexican annuity providers should be allowed to diversify the range of products they can offer to diversify risks.

6.4.3. Better account for future improvements in mortality and life expectancy and improve the management of longevity risk

Following the main recommendations put forward by the OECD study on Mortality Assumptions and Longevity Risk (OECD, 2014) and the way annuity providers and pension funds in Mexico account for future improvements in mortality and life expectancy, the main recommendations are:

- Regularly update mortality tables to accurately reflect the most recent experience and avoid significant increases in reserves.
- Use the mortality experience of the relevant population to establish mortality tables.
- The Mexican government should facilitate the measurement of mortality for the purposes of assumption setting and the evaluation of basis risk of index-based hedging instruments. In this regard, accurate and timely mortality data should be publicly available, and mortality data by a socio-economic indicator should be made publically available when possible.
- Occupational pension funds should use mortality tables to calculate their liabilities and reserve accordingly. These mortality tables should include expected future improvements in mortality. They should use mortality tables in line with those used by annuity providers.

The Mexican regulatory framework should provide incentives to manage and mitigate longevity risk. For example, capital and funding requirements should be based on the risks faced in order to account for the specific exposure to longevity risk and allow institutions using instruments to hedge longevity risk to adjust their requirements accordingly. These requirements could be based on results from stochastic models, which

provide probability distributions. Additionally, accounting standards should ensure the appropriate valuation of longevity hedging instruments.

Finally, the Mexican government should encourage the development of a market for instruments to hedge longevity following the approach laid out in OECD (2014), in order to ensure the capacity for pension plans and annuity providers to continue to provide longevity protection to individuals.

Notes

1. The annuity factor (*Unidad de Renta Vitalicia*) is defined as the actuarial value necessary to finance a unit of annual pension. The value of the URV changes periodically, due to updates to the mortality tables and to fluctuations in interest rates used to discount the future flow of payments.
2. The 12-month December to December evolution of the Consumer Price Index is used.
3. New entrants in the private sector after July 1997, new entrants in the public sector after April 2007, transitional workers choosing the DC system.
4. In case the worker chooses the programmed withdrawal option, a survivor insurance annuity must still be purchased in order to pay the pension that arises from the pensioner's death.
5. The reference rate was defined periodically using a moving average of the level of real discount rates associated with a benchmark of selected long-term risk-free instruments of 10, 20 and 30 years.
6. Programmed withdrawals only apply for severance at old-age and old-age pensions.
7. This financial incentive is called "*Beneficio Adicional Único*".
8. See the OECD (2014) study on mortality assumptions and longevity risk.
9. According to CONSAR (2014), 49.6% of DB occupational pension plans use the EMSSA 97 table, while 27.3% use the EMSSA 09.
10. Indeed, annuity providers can use a table having as a minimum the EMSSAH-Rva-09 and as a maximum the EMSSAH-CMG-09 (for men) and the EMSSAM-Rva-09 and the EMSSAM-CMG-09 (for women). The tables EMSSAH-CMG-09 and EMSSAM-CMG-09 are used for capital purposes.
11. Period life expectancy makes no allowance for changes in mortality beyond the year in question, whereas cohort life expectancy is calculated taking into account future improvements in mortality and uses probabilities of death which follow a given group of the population. The cohort life expectancy shown here is the average given by four projection models. See OECD (2014) for more details.
12. Data for Mexico are based on Mexican population and death estimates from 1990 to 2009 published by CONAPO.
13. Figures are shown for age groups of five years, ages 55 to 110. It should be noted however that limited data is available at the very high ages and the improvements at these ages for the historical data are heavily dependent on the methodology used to extrapolate the mortality to these ages.

14. All annuities are calculated assuming a discount rate of 4.5%, and annuity values for age 55 are assumed to begin payment at age 65.
15. The new SAR Law approved by the Lower Chamber but stuck in the senate allows insurance companies to offer different types of annuity products.

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