

ANEXOS

Anexo A

Para modelar las pensiones y la prima de un seguro de vida se necesitan ciertas medidas biométricas e hipótesis como:

Hipótesis

Demográficas: Experiencia Mexicana 2000-1.

Financieras: Tasa real de descuento (tasa de interés) 5.75%, 3% y 2%.

Tasa real de incremento a la pensión: 1%, 0%.

Tasa real de incremento al salario mínimo: 3%, 2% y 1%.

Notación biométrica

l_x :	Número de personas vivas a edad x .
P_x :	Probabilidad de que una persona de edad x llegue con vida a la edad $x+1$.
q_x :	Probabilidad de que una persona de edad x no llegue con vida a la edad $x+1$.
CA :	Capital asegurado.
gi :	Gastos de adquisición.
ge :	Gastos externos.
i :	Tasa de interés.
$v = \frac{1}{(1+i)^t}$:	Factor de actualización financiera, que sirve para actualizar cualquier capital futuro al momento actual.
t :	Número de años a actualizar.
PP :	Prima pura.
P'' :	Prima comercial.
Π :	Prima única.
Π'' :	Prima única comercial.

La fórmula para el cálculo de la prima de un seguro de vida temporal anual renovable es: $PP = q_x v^{1/2} CA$

$$= \frac{l_x - l_{x+1}}{l_x} v^{1/2} CA$$

El factor de actualización financiera se eleva a un medio porque se establece el supuesto de que el fallecimiento ocurre a la mitad del año.

La prima pura comercial vendría calculada como:

$$PP'' = \frac{PP}{1 - gi - ge}$$

Para calcular la prima única hay que considerar el total de años que se tome en la tabla de vida de la experiencia mexicana 2000-1 (100 años) para el caso de un seguro de vida entera, pero si se tiene un plan temporal, entonces la suma corre sobre el número de períodos considerados.

$$\Pi = \sum_{i=1}^{100} \frac{l_x - l_{x+1}}{l_x} v^{1/2} CA$$

La prima única comercial tendría como fórmula:

$$\Pi'' = \frac{\Pi}{1 - gi - ge}$$

Método de financiamiento de planes de pensiones

Los métodos de financiamiento tienen como objetivos distribuir los costos del plan a través del tiempo. Para que se pueda lograr es necesario llegar a construir a la edad de retiro del contratante el capital forzoso y suficiente para pagar las pensiones además de que se debió seguir patrones de ahorro fijados con anterioridad.

Para los planes de pensiones se hace necesario diseñarlos, lo mismo se debe realizar en el sentido de las micropensiones, por lo que se debe considerar elementos como:

El ***monto de la obligación total del plan***, conocido como valuación actuarial.

El ***tipo de beneficio***, usualmente se utiliza el beneficio definido, en los cuales se establece de antemano el monto de los mismos que se desean otorgar. Existen tres fórmulas para calcular este beneficio:

Beneficio cerrado. La cantidad que se destina para crear el fondo de retiro es constante e independiente del sueldo del participante. Sea $P(s)$ la pensión, su fórmula de cálculo es expresada por: $P(s) = \kappa$.

Porcentaje nivelado. La pensión es definida como un porcentaje del sueldo que se utilizará como base para otorgar la pensión. La fórmula es: $P(s) = \alpha S_p$; donde S_p es el sueldo pensionable y α el porcentaje de beneficio.

Crédito unitario. La pensión es calculada como un porcentaje del salario pensionable por cada año de servicio prestado en la empresa. Su fórmula es:

$$P(s) = \gamma n S_p; \text{ con } S_p = \frac{\sum_{i=0}^m S_i}{m}, \alpha \text{ el porcentaje definido por período de}$$

servicios, n el número de períodos reconocidos, S_p es el sueldo pensionable y S_i el sueldo del participante en el i -ésimo período anterior a la fecha de retiro, donde $m \leq n$.

Usualmente los planes de pensiones pueden manejar más de un tipo de beneficio definido y llegar a combinar los tres tipos.

El **costo normal**, es la porción de valor presente actuarial que se asigna a un año de valuación para financiar las obligaciones del plan.

El **pasivo actuarial acumulado**, es la porción del valor presente actuarial que no se cubre con los costos normales.

El **método de financiamiento**, describe el comportamiento del fondo del plan. Hay nueve formas que son (Aguilar, 2010):

- a) **Método de pago inmediato.** Consiste en pagar únicamente las pensiones que corresponden a un ejercicio determinado. Así las contribuciones se pagan precisamente en el momento en que se sufragan los beneficios provenientes del plan y son exactamente iguales al beneficio que se otorga;
- b) **Método de reserva terminal.** Se paga íntegramente el valor presente actuarial en el momento de ocurrir el retiro. O sea, la aportación de la

- empresa para cada jubilado es equivalente al valor presente actuarial de la pensión asignada a la persona que se retire;
- c) **Método de edad de entrada.** El beneficio que tiene derecho un participante se financia desde el momento que ingresa al grupo, mediante una serie de pagos periódicos iguales, así el valor presente actuarial de los beneficios a la edad de ingreso al plan se amortiza mediante aportaciones niveladas que se inician desde la fecha de ingreso al plan y finalizan en la fecha de retiro;
 - d) **Método de costo colectivo.** Se basa en el supuesto de que la relación existente entre el valor presente actuarial de los beneficios, que son financiados mediante el crédito unitario, y el valor presente actuarial de los sueldos futuros permanece constante. De esta manera el costo normal se obtiene multiplicando la nómina del personal elegible por el cociente que resulta de dividir el valor presente actuarial de los beneficios, entre el valor presente de los sueldos futuros;
 - e) **Método de edad alcanzada.** Es el mismo que el método de edad de entrada, salvo que el pasivo inicial es calculado mediante el método de crédito unitario;
 - f) **Método individual agregado.** El costo normal total es la suma de los costos normales individuales y considera un fondo para pensión;
 - g) **Método crédito unitario.** Consiste en dividir la pensión prevista a la fecha de retiro en tantas unidades como años de servicio tenga el participante desde su fecha de ingreso al grupo hasta la fecha de retiro, pagando cada año el costo total de unidad devengada. Así la pensión anual de una unidad monetaria se divide entre $z - y$, donde y representa la edad de entrada y z la de retiro, y el resultado compone las unidades cuyo valor presente deberá ser íntegramente pagado;
 - h) **Método de crédito unitario proyectado.** El salario corriente es proyectado a la fecha de retiro usando una escala salarial y el beneficio de retiro es distribuido uniformemente sobre la carrera del participante del plan si la unidad de beneficio es la misma para cada año de servicio, y
 - i) **Boletín D-3.** Este boletín establece un método de financiamiento que consiste en amortizar las obligaciones durante un período equivalente a la esperanza de vida laboral del grupo de personas, amortizando las variaciones que se producen por los supuestos, así como el costo de las obligaciones adquiridas.

A continuación se describe brevemente las fórmulas correspondientes al método de edad de entrada que sería uno de los más apropiados para el caso de las micropensiones el otro modelo sería el Boletín D-3.

x = edad de la persona
 r = edad de retiro = 65 años

Valor presente actuarial es el valor de las obligaciones futuras que el plan de pensiones tiene con el participante, están calculadas a la fecha de valuación. En este método es una anualidad.

Valor presente actuarial = VPA = anualidad diferida durante $r - x$ años, con

$$a \leq x < r$$

$$VPA = {}_{r-x|}\ddot{a}_x$$

$${}_{r-x|}\ddot{a}_x = \sum_{k=r-x}^{\infty} \left(\ddot{a}_{\overline{k+1}|} - \ddot{a}_{\overline{r-x}|} \right) {}_k|q_x$$

$$\ddot{a}_{\overline{n}|} = \frac{1 - v^n}{1 - v}$$

$${}_k|q_x = \frac{d_{x+t}}{l_x} = \frac{l_{x+t} - l_{x+t+1}}{l_x}$$

Costo normal es el monto de la contribución periódica del participante, éste puede ser mensual, trimestral, etc. como se haya convenido en el contrato correspondiente.

Costo normal (CN) es el valor presente actuarial del beneficio a la edad a de entrada al plan, dividido entre una anualidad contingente a la edad a durante un período $r - a$ años.

$$CN = \frac{{}_{r-a|}\ddot{a}_a}{\ddot{a}_{a:r-a|}}$$

$${}_{r-a|}\ddot{a}_a = CN \ddot{a}_{a:r-a|}$$

$$\ddot{a}_{a:r-a|} = \sum_{k=0}^{r-a-1} v^k p_a = \frac{N_a - N_{r-1}}{D_a}$$

$$D_x = l_x v^x$$

$$N_x = \sum_{t=0}^{w-x-1} D_{x+t}$$

Pasivo actuarial acumulado (PAA). Dada la existencia del período $x - a$ años, durante el cual no se pagó el costo normal, se generó un pasivo actuarial acumulado que es la diferencia entre el valor presente actuarial y los costos normales futuros.

$$PAA = \begin{cases} {}_{r-x}|\ddot{a}_x - \frac{{}_{r-a}|\ddot{a}_a}{{}_{a:r-a}|} \ddot{a}_{x:r-x}; & \text{si } a \leq x < r \\ \ddot{a}_x; & \text{si } r \leq x \leq w \end{cases}$$

Pasivo actuarial acumulado total del fondo (PAATF).

$$PAATF = \sum_{x=a}^{r-1} {}_{r-x}|\ddot{a}_x l_x + \sum_{x=r}^w \ddot{a}_x l_x - \frac{{}_{r-a}|\ddot{a}_a}{{}_{a:r-a}|} \ddot{a}_{x:r-x} l_x$$

Cuando el *PAATF* ha sido totalmente financiado, el valor actuarial de los activos F es:

$$F = \sum_{x=r}^w \ddot{a}_x l_x - \sum \left({}_{r-x}|\ddot{a}_x l_x - \frac{{}_{r-a}|\ddot{a}_a}{{}_{a:r-a}|} \ddot{a}_{x:r-x} \right)$$

Costo Total Normal (CT) permanece constante por la conformación estacionaria de la población.

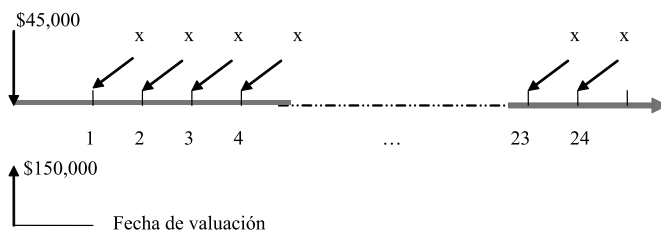
$$CT = \frac{{}_{r-a}|\ddot{a}_a}{{}_{a:r-a}|} \sum_{x=a}^{r-1} l_x$$

El valor presente actuarial es una anualidad, por lo que a continuación se presenta una breve explicación del concepto y de lo que significa traer a valor presente la renta.

Las anualidades representan una aplicación de las matemáticas financieras, principalmente en las operaciones de crédito tanto comerciales como financieras, donde se pactan una serie de pagos periódicos que habrán de

realizarse durante su vigencia. En el caso concreto del modelo actuarial este concepto se conserva pero se incluye la probabilidad de sobrevivir a un plazo determinado.

Una operación mercantil común es aquella en la que se hacen n pagos o abonos al final de cada uno de los n períodos a los que se haya pactado la operación, este concepto muestra una forma vencida, puede también pactarse de manera anticipada, o sea al principio del período. Para ejemplificar esto la figura indica el proceso que se hace con los pagos con una situación ficticia de un crédito sobre la compra de un automóvil, por el cual se va a pagar un cierto enganche y el saldo se pagará en, por ejemplo, 24 mensualidades iguales al inicio de cada mes, empezando al inicio del mes entrante después de pagar el enganche. Supóngase que el automóvil tiene un precio de \$150,000 y que se paga un enganche de \$45,000 (representa el 30% de ese precio), además se cobrará una tasa de interés efectiva mensual del 2% sobre lo que falta pagar.



Lo importante es que el diseño se hace en el momento actual por lo que la proyección debe traerse a tiempo presente, a esto se le conoce traer a valor presente los pagos, así la representación gráfica mostrará lo siguiente:

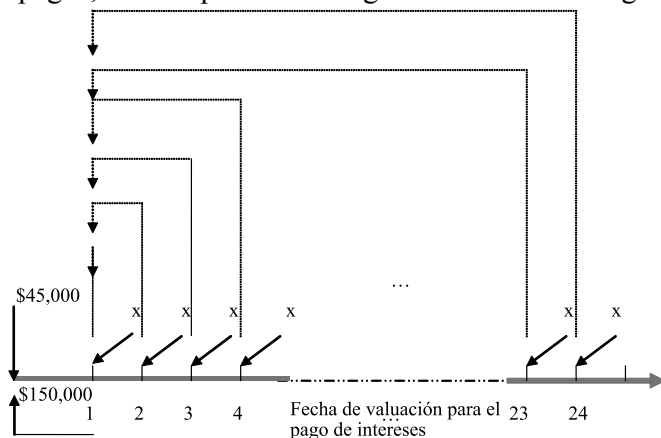


Tabla de mortalidad edad 25 y radix 5000

x	q_x	p_x	l_x	d_x	e_x	\dot{e}_x	μ_x
25	0.001041	0.998959	5000.000	5.205	50.649	51.149312	0.0005205
26	0.001121	0.998879	4994.795	5.599	49.702	50.2020929	0.00108154
27	0.001207	0.998793	4989.196	6.022	48.758	49.2578715	0.00116463
28	0.0013	0.9987	4983.174	6.478	47.817	48.3167933	0.00125423
29	0.0014	0.9986	4976.696	6.967	46.879	47.3790361	0.00135085
30	0.001508	0.998492	4969.728	7.494	45.945	46.4447587	0.00145498
31	0.001624	0.998376	4962.234	8.059	45.014	45.5141481	0.00156714
32	0.001749	0.998251	4954.175	8.665	44.087	44.58737	0.00168782
33	0.001884	0.998116	4945.511	9.317	43.165	43.6646139	0.00181803
34	0.002029	0.997971	4936.193	10.016	42.246	42.7460895	0.00195828
35	0.002186	0.997814	4926.178	10.769	41.332	41.8319811	0.00210956
36	0.002354	0.997646	4915.409	11.571	40.423	40.9225308	0.00227239
37	0.002535	0.997465	4903.838	12.431	39.518	40.0179099	0.00244728
38	0.00273	0.99727	4891.407	13.354	38.618	39.1183424	0.00263572
39	0.00294	0.99706	4878.053	14.341	37.724	38.2240591	0.00283874
40	0.003166	0.996834	4863.712	15.399	36.835	37.3352949	0.00305733
41	0.00341	0.99659	4848.313	16.533	35.952	36.4522858	0.00329303
42	0.003672	0.996328	4831.781	17.742	35.075	35.5753026	0.00354683
43	0.003954	0.996046	4814.038	19.035	34.205	34.7045738	0.00381977
44	0.004258	0.995742	4795.004	20.417	33.340	33.8403555	0.00411385
45	0.004585	0.995415	4774.586	21.891	32.483	32.9829258	0.0044306
46	0.004938	0.995062	4752.695	23.469	31.633	32.1325461	0.00477206
47	0.005317	0.994683	4729.226	25.145	30.790	31.2895227	0.00513975
48	0.005725	0.994275	4704.081	26.931	29.954	30.4541057	0.00553521
49	0.006164	0.993836	4677.150	28.830	29.127	29.6265804	0.00596098
50	0.006637	0.993363	4648.320	30.851	28.307	28.8072301	0.00641962
51	0.007145	0.992855	4617.469	32.992	27.496	27.9963605	0.00691317
52	0.007693	0.992307	4584.477	35.268	26.694	27.1942358	0.00744471
53	0.008282	0.991718	4549.209	37.677	25.901	26.4011866	0.00801732
54	0.008915	0.991085	4511.532	40.220	25.117	25.6174917	0.00863308
55	0.009597	0.990403	4471.312	42.911	24.343	24.8434284	0.0092961

56	0.01033	0.98967	4428.401	45.745	23.579	24.0793161	0.01001
57	0.011119	0.988881	4382.656	48.731	22.825	23.3254328	0.01077841
58	0.011967	0.988033	4333.925	51.864	22.082	22.5820825	0.01160551
59	0.012879	0.987121	4282.061	55.149	21.350	21.8495394	0.01249547
60	0.01386	0.98614	4226.912	58.585	20.628	21.1280875	0.01345352
61	0.014914	0.985086	4168.327	62.166	19.918	20.4180112	0.0144844
62	0.016048	0.983952	4106.161	65.896	19.220	19.7195658	0.0155939
63	0.017265	0.982735	4040.265	69.755	18.533	19.0330319	0.01678737
64	0.018574	0.981426	3970.510	73.748	17.859	18.358626	0.01807116
65	0.01998	0.98002	3896.762	77.857	17.197	17.6966099	0.01945276
66	0.02149	0.97851	3818.904	82.068	16.547	17.047203	0.02093867
67	0.023111	0.976889	3736.836	86.362	15.911	16.410612	0.02253648
68	0.024851	0.975149	3650.474	90.718	15.287	15.7870214	0.02425438
69	0.02672	0.97328	3559.756	95.117	14.677	15.1766006	0.02610216
70	0.028724	0.971276	3464.639	99.518	14.080	14.5795255	0.02808878
71	0.030874	0.969126	3365.121	103.895	13.496	13.9959059	0.03022373
72	0.03318	0.96682	3261.226	108.207	12.926	13.4258527	0.03251879
73	0.035651	0.964349	3153.019	112.408	12.369	12.8694511	0.03498485
74	0.0383	0.9617	3040.611	116.455	11.827	12.3267371	0.03763449
75	0.041136	0.958864	2924.155	120.288	11.298	11.7977406	0.04048065
76	0.044174	0.955826	2803.867	123.858	10.782	11.2824223	0.04353738
77	0.047424	0.952576	2680.009	127.097	10.281	10.7807376	0.04681976
78	0.050902	0.949098	2552.912	129.948	9.793	10.2925641	0.0503435
79	0.054619	0.945381	2422.964	132.340	9.318	9.8177587	0.05412549
80	0.058592	0.941408	2290.624	134.212	8.856	9.35608839	0.0581833
81	0.062834	0.937166	2156.412	135.496	8.407	8.90727972	0.06253634
82	0.067362	0.932638	2020.916	136.133	7.971	8.47096109	0.06720441
83	0.07219	0.92781	1884.783	136.062	7.547	8.04668273	0.07220869
84	0.077337	0.922663	1748.720	135.241	7.134	7.63386656	0.07757194
85	0.082817	0.917183	1613.480	133.624	6.732	7.23182252	0.08331817
86	0.088649	0.911351	1479.856	131.188	6.340	6.83967215	0.08947198
87	0.09485	0.90515	1348.668	127.921	5.956	6.45634519	0.09606104
88	0.101436	0.898564	1220.747	123.828	5.581	6.08050621	0.10311263
89	0.108424	0.891576	1096.919	118.932	5.210	5.7104716	0.11065539

90	0.115832	0.884168	977.987	113.282	4.844	5.3441138	0.11872069
91	0.123677	0.876323	864.705	106.944	4.479	4.97872554	0.12734189
92	0.131973	0.868027	757.761	100.004	4.111	4.61081592	0.13655238
93	0.140737	0.859263	657.757	92.571	3.736	4.23581572	0.14638745
94	0.149983	0.850017	565.186	84.768	3.348	3.84769765	0.15688552
95	0.159723	0.840277	480.418	76.734	2.938	3.43838905	0.16808503
96	0.16997	0.83003	403.684	68.614	2.497	2.99692905	0.18002687
97	0.180733	0.819267	335.070	60.558	2.008	2.50823952	0.19275437
98	0.19202	0.80798	274.512	52.712	1.451	1.95126378	0.20631165
99	0.203837	0.796163	221.800	45.211	0.796	1.296163	0.2207457
100	1	0	176.589	176.589	1.000	1.5	0.6280121

Tabla de mortalidad edad 30 y radix 1000

x	q_x	p_x	l_x	d_x	e_x	\dot{e}_x	μ_x
25	0.001041	0.998959	1000.000	1.041	50.649	51.149	0.0005205
26	0.001121	0.998879	998.959	1.120	49.702	50.202	0.00108154
27	0.001207	0.998793	997.839	1.204	48.758	49.258	0.00116463
28	0.0013	0.9987	996.635	1.296	47.817	48.317	0.00125423
29	0.0014	0.9986	995.339	1.393	46.879	47.379	0.00135085
30	0.001508	0.998492	993.946	1.499	45.945	46.445	0.00145498
31	0.001624	0.998376	992.447	1.612	45.014	45.514	0.00156714
32	0.001749	0.998251	990.835	1.733	44.087	44.587	0.00168782
33	0.001884	0.998116	989.102	1.863	43.165	43.665	0.00181803
34	0.002029	0.997971	987.239	2.003	42.246	42.746	0.00195828
35	0.002186	0.997814	985.236	2.154	41.332	41.832	0.00210956
36	0.002354	0.997646	983.082	2.314	40.423	40.923	0.00227239
37	0.002535	0.997465	980.768	2.486	39.518	40.018	0.00244728
38	0.00273	0.99727	978.281	2.671	38.618	39.118	0.00263572
39	0.00294	0.99706	975.611	2.868	37.724	38.224	0.00283874
40	0.003166	0.996834	972.742	3.080	36.835	37.335	0.00305733
41	0.00341	0.99659	969.663	3.307	35.952	36.452	0.00329303
42	0.003672	0.996328	966.356	3.548	35.075	35.575	0.00354683
43	0.003954	0.996046	962.808	3.807	34.205	34.705	0.00381977

44	0.004258	0.995742	959.001	4.083	33.340	33.840	0.00411385
45	0.004585	0.995415	954.917	4.378	32.483	32.983	0.0044306
46	0.004938	0.995062	950.539	4.694	31.633	32.133	0.00477206
47	0.005317	0.994683	945.845	5.029	30.790	31.290	0.00513975
48	0.005725	0.994275	940.816	5.386	29.954	30.454	0.00553521
49	0.006164	0.993836	935.430	5.766	29.127	29.627	0.00596098
50	0.006637	0.993363	929.664	6.170	28.307	28.807	0.00641962
51	0.007145	0.992855	923.494	6.598	27.496	27.996	0.00691317
52	0.007693	0.992307	916.895	7.054	26.694	27.194	0.00744471
53	0.008282	0.991718	909.842	7.535	25.901	26.401	0.00801732
54	0.008915	0.991085	902.306	8.044	25.117	25.617	0.00863308
55	0.009597	0.990403	894.262	8.582	24.343	24.843	0.0092961
56	0.01033	0.98967	885.680	9.149	23.579	24.079	0.01001
57	0.011119	0.988881	876.531	9.746	22.825	23.325	0.01077841
58	0.011967	0.988033	866.785	10.373	22.082	22.582	0.01160551
59	0.012879	0.987121	856.412	11.030	21.350	21.850	0.01249547
60	0.01386	0.98614	845.382	11.717	20.628	21.128	0.01345352
61	0.014914	0.985086	833.665	12.433	19.918	20.418	0.0144844
62	0.016048	0.983952	821.232	13.179	19.220	19.720	0.0155939
63	0.017265	0.982735	808.053	13.951	18.533	19.033	0.01678737
64	0.018574	0.981426	794.102	14.750	17.859	18.359	0.01807116
65	0.01998	0.98002	779.352	15.571	17.197	17.697	0.01945276
66	0.02149	0.97851	763.781	16.414	16.547	17.047	0.02093867
67	0.023111	0.976889	747.367	17.272	15.911	16.411	0.02253648
68	0.024851	0.975149	730.095	18.144	15.287	15.787	0.02425438
69	0.02672	0.97328	711.951	19.023	14.677	15.177	0.02610216
70	0.028724	0.971276	692.928	19.904	14.080	14.580	0.02808878
71	0.030874	0.969126	673.024	20.779	13.496	13.996	0.03022373
72	0.03318	0.96682	652.245	21.641	12.926	13.426	0.03251879
73	0.035651	0.964349	630.604	22.482	12.369	12.869	0.03498485
74	0.0383	0.9617	608.122	23.291	11.827	12.327	0.03763449
75	0.041136	0.958864	584.831	24.058	11.298	11.798	0.04048065
76	0.044174	0.955826	560.773	24.772	10.782	11.282	0.04353738

77	0.047424	0.952576	536.002	25.419	10.281	10.781	0.04681976
78	0.050902	0.949098	510.582	25.990	9.793	10.293	0.0503435
79	0.054619	0.945381	484.593	26.468	9.318	9.818	0.05412549
80	0.058592	0.941408	458.125	26.842	8.856	9.356	0.0581833
81	0.062834	0.937166	431.282	27.099	8.407	8.907	0.06253634
82	0.067362	0.932638	404.183	27.227	7.971	8.471	0.06720441
83	0.07219	0.92781	376.957	27.212	7.547	8.047	0.07220869
84	0.077337	0.922663	349.744	27.048	7.134	7.634	0.07757194
85	0.082817	0.917183	322.696	26.725	6.732	7.232	0.08331817
86	0.088649	0.911351	295.971	26.238	6.340	6.840	0.08947198
87	0.09485	0.90515	269.734	25.584	5.956	6.456	0.09606104
88	0.101436	0.898564	244.149	24.766	5.581	6.081	0.10311263
89	0.108424	0.891576	219.384	23.786	5.210	5.710	0.11065539
90	0.115832	0.884168	195.597	22.656	4.844	5.344	0.11872069
91	0.123677	0.876323	172.941	21.389	4.479	4.979	0.12734189
92	0.131973	0.868027	151.552	20.001	4.111	4.611	0.13655238
93	0.140737	0.859263	131.551	18.514	3.736	4.236	0.14638745
94	0.149983	0.850017	113.037	16.954	3.348	3.848	0.15688552
95	0.159723	0.840277	96.084	15.347	2.938	3.438	0.16808503
96	0.16997	0.83003	80.737	13.723	2.497	2.997	0.18002687
97	0.180733	0.819267	67.014	12.112	2.008	2.508	0.19275437
98	0.19202	0.80798	54.902	10.542	1.451	1.951	0.20631165
99	0.203837	0.796163	44.360	9.042	0.796	1.296	0.2207457
100	1	0	35.318	35.318	1.000	1.500	0.6280121

Tabla de mortalidad edad 30 y radix 5000

x	q_x	p_x	l_x	d_x	e_x	\dot{e}_x	μ_x
30	0.001508	0.998492	5000.000	7.540	45.945	46.445	0.000754
31	0.001624	0.998376	4992.460	8.108	45.014	45.514	0.00156714
32	0.001749	0.998251	4984.352	8.718	44.087	44.587	0.00168782
33	0.001884	0.998116	4975.635	9.374	43.165	43.665	0.00181803
34	0.002029	0.997971	4966.261	10.077	42.246	42.746	0.00195828
35	0.002186	0.997814	4956.184	10.834	41.332	41.832	0.00210956
36	0.002354	0.997646	4945.350	11.641	40.423	40.923	0.00227239

37	0.002535	0.997465	4933.708	12.507	39.518	40.018	0.00244728
38	0.00273	0.99727	4921.201	13.435	38.618	39.118	0.00263572
39	0.00294	0.99706	4907.767	14.429	37.724	38.224	0.00283874
40	0.003166	0.996834	4893.338	15.492	36.835	37.335	0.00305733
41	0.00341	0.99659	4877.845	16.633	35.952	36.452	0.00329303
42	0.003672	0.996328	4861.212	17.850	35.075	35.575	0.00354683
43	0.003954	0.996046	4843.362	19.151	34.205	34.705	0.00381977
44	0.004258	0.995742	4824.211	20.541	33.340	33.840	0.00411385
45	0.004585	0.995415	4803.669	22.025	32.483	32.983	0.0044306
46	0.004938	0.995062	4781.645	23.612	31.633	32.133	0.00477206
47	0.005317	0.994683	4758.033	25.298	30.790	31.290	0.00513975
48	0.005725	0.994275	4732.734	27.095	29.954	30.454	0.00553521
49	0.006164	0.993836	4705.640	29.006	29.127	29.627	0.00596098
50	0.006637	0.993363	4676.634	31.039	28.307	28.807	0.00641962
51	0.007145	0.992855	4645.595	33.193	27.496	27.996	0.00691317
52	0.007693	0.992307	4612.402	35.483	26.694	27.194	0.00744471
53	0.008282	0.991718	4576.919	37.906	25.901	26.401	0.00801732
54	0.008915	0.991085	4539.013	40.465	25.117	25.617	0.00863308
55	0.009597	0.990403	4498.548	43.173	24.343	24.843	0.0092961
56	0.01033	0.98967	4455.375	46.024	23.579	24.079	0.01001
57	0.011119	0.988881	4409.351	49.028	22.825	23.325	0.01077841
58	0.011967	0.988033	4360.324	52.180	22.082	22.582	0.01160551
59	0.012879	0.987121	4308.144	55.485	21.350	21.850	0.01249547
60	0.01386	0.98614	4252.659	58.942	20.628	21.128	0.01345352
61	0.014914	0.985086	4193.717	62.545	19.918	20.418	0.0144844
62	0.016048	0.983952	4131.172	66.297	19.220	19.720	0.0155939
63	0.017265	0.982735	4064.875	70.180	18.533	19.033	0.01678737
64	0.018574	0.981426	3994.695	74.197	17.859	18.359	0.01807116
65	0.01998	0.98002	3920.498	78.332	17.197	17.697	0.01945276
66	0.02149	0.97851	3842.166	82.568	16.547	17.047	0.02093867
67	0.023111	0.976889	3759.598	86.888	15.911	16.411	0.02253648
68	0.024851	0.975149	3672.710	91.271	15.287	15.787	0.02425438
69	0.02672	0.97328	3581.439	95.696	14.677	15.177	0.02610216
70	0.028724	0.971276	3485.743	100.124	14.080	14.580	0.02808878
71	0.030874	0.969126	3385.619	104.528	13.496	13.996	0.03022373
72	0.03318	0.96682	3281.091	108.867	12.926	13.426	0.03251879
73	0.035651	0.964349	3172.225	113.093	12.369	12.869	0.03498485
74	0.0383	0.9617	3059.132	117.165	11.827	12.327	0.03763449
75	0.041136	0.958864	2941.967	121.021	11.298	11.798	0.04048065
76	0.044174	0.955826	2820.946	124.612	10.782	11.282	0.04353738

77	0.047424	0.952576	2696.334	127.871	10.281	10.781	0.04681976
78	0.050902	0.949098	2568.463	130.740	9.793	10.293	0.0503435
79	0.054619	0.945381	2437.723	133.146	9.318	9.818	0.05412549
80	0.058592	0.941408	2304.577	135.030	8.856	9.356	0.0581833
81	0.062834	0.937166	2169.547	136.321	8.407	8.907	0.06253634
82	0.067362	0.932638	2033.226	136.962	7.971	8.471	0.06720441
83	0.07219	0.92781	1896.264	136.891	7.547	8.047	0.07220869
84	0.077337	0.922663	1759.372	136.065	7.134	7.634	0.07757194
85	0.082817	0.917183	1623.308	134.437	6.732	7.232	0.08331817
86	0.088649	0.911351	1488.870	131.987	6.340	6.840	0.08947198
87	0.09485	0.90515	1356.883	128.700	5.956	6.456	0.09606104
88	0.101436	0.898564	1228.183	124.582	5.581	6.081	0.10311263
89	0.108424	0.891576	1103.601	119.657	5.210	5.710	0.11065539
90	0.115832	0.884168	983.944	113.972	4.844	5.344	0.11872069
91	0.123677	0.876323	869.972	107.596	4.479	4.979	0.12734189
92	0.131973	0.868027	762.376	100.613	4.111	4.611	0.13655238
93	0.140737	0.859263	661.763	93.135	3.736	4.236	0.14638745
94	0.149983	0.850017	568.629	85.285	3.348	3.848	0.15688552
95	0.159723	0.840277	483.344	77.201	2.938	3.438	0.16808503
96	0.16997	0.83003	406.143	69.032	2.497	2.997	0.18002687
97	0.180733	0.819267	337.111	60.927	2.008	2.508	0.19275437
98	0.19202	0.80798	276.184	53.033	1.451	1.951	0.20631165
99	0.203837	0.796163	223.151	45.486	0.796	1.296	0.2207457
100	1	0	177.665	177.665	1.000	1.500	0.6280121

Tabla de mortalidad edad 30 y radix 1000

x	q_x	p_x	l_x	d_x	e_x	\dot{e}_x	μ_x
30	0.001508	0.998492	1000.000	1.508	45.945	46.445	0.000754
31	0.001624	0.998376	998.492	1.622	45.014	45.514	0.00156714
32	0.001749	0.998251	996.870	1.744	44.087	44.587	0.00168782
33	0.001884	0.998116	995.127	1.875	43.165	43.665	0.00181803
34	0.002029	0.997971	993.252	2.015	42.246	42.746	0.00195828
35	0.002186	0.997814	991.237	2.167	41.332	41.832	0.00210956
36	0.002354	0.997646	989.070	2.328	40.423	40.923	0.00227239
37	0.002535	0.997465	986.742	2.501	39.518	40.018	0.00244728
38	0.00273	0.99727	984.240	2.687	38.618	39.118	0.00263572
39	0.00294	0.99706	981.553	2.886	37.724	38.224	0.00283874
40	0.003166	0.996834	978.668	3.098	36.835	37.335	0.00305733

41	0.00341	0.99659	975.569	3.327	35.952	36.452	0.00329303
42	0.003672	0.996328	972.242	3.570	35.075	35.575	0.00354683
43	0.003954	0.996046	968.672	3.830	34.205	34.705	0.00381977
44	0.004258	0.995742	964.842	4.108	33.340	33.840	0.00411385
45	0.004585	0.995415	960.734	4.405	32.483	32.983	0.0044306
46	0.004938	0.995062	956.329	4.722	31.633	32.133	0.00477206
47	0.005317	0.994683	951.607	5.060	30.790	31.290	0.00513975
48	0.005725	0.994275	946.547	5.419	29.954	30.454	0.00553521
49	0.006164	0.993836	941.128	5.801	29.127	29.627	0.00596098
50	0.006637	0.993363	935.327	6.208	28.307	28.807	0.00641962
51	0.007145	0.992855	929.119	6.639	27.496	27.996	0.00691317
52	0.007693	0.992307	922.480	7.097	26.694	27.194	0.00744471
53	0.008282	0.991718	915.384	7.581	25.901	26.401	0.00801732
54	0.008915	0.991085	907.803	8.093	25.117	25.617	0.00863308
55	0.009597	0.990403	899.710	8.635	24.343	24.843	0.0092961
56	0.01033	0.98967	891.075	9.205	23.579	24.079	0.01001
57	0.011119	0.988881	881.870	9.806	22.825	23.325	0.01077841
58	0.011967	0.988033	872.065	10.436	22.082	22.582	0.01160551
59	0.012879	0.987121	861.629	11.097	21.350	21.850	0.01249547
60	0.01386	0.98614	850.532	11.788	20.628	21.128	0.01345352
61	0.014914	0.985086	838.743	12.509	19.918	20.418	0.0144844
62	0.016048	0.983952	826.234	13.259	19.220	19.720	0.0155939
63	0.017265	0.982735	812.975	14.036	18.533	19.033	0.01678737
64	0.018574	0.981426	798.939	14.839	17.859	18.359	0.01807116
65	0.01998	0.98002	784.100	15.666	17.197	17.697	0.01945276
66	0.02149	0.97851	768.433	16.514	16.547	17.047	0.02093867
67	0.023111	0.976889	751.920	17.378	15.911	16.411	0.02253648
68	0.024851	0.975149	734.542	18.254	15.287	15.787	0.02425438
69	0.02672	0.97328	716.288	19.139	14.677	15.177	0.02610216
70	0.028724	0.971276	697.149	20.025	14.080	14.580	0.02808878
71	0.030874	0.969126	677.124	20.906	13.496	13.996	0.03022373
72	0.03318	0.96682	656.218	21.773	12.926	13.426	0.03251879
73	0.035651	0.964349	634.445	22.619	12.369	12.869	0.03498485
74	0.0383	0.9617	611.826	23.433	11.827	12.327	0.03763449
75	0.041136	0.958864	588.393	24.204	11.298	11.798	0.04048065
76	0.044174	0.955826	564.189	24.922	10.782	11.282	0.04353738
77	0.047424	0.952576	539.267	25.574	10.281	10.781	0.04681976
78	0.050902	0.949098	513.693	26.148	9.793	10.293	0.0503435
79	0.054619	0.945381	487.545	26.629	9.318	9.818	0.05412549
80	0.058592	0.941408	460.915	27.006	8.856	9.356	0.0581833

81	0.062834	0.937166	433.909	27.264	8.407	8.907	0.06253634
82	0.067362	0.932638	406.645	27.392	7.971	8.471	0.06720441
83	0.07219	0.92781	379.253	27.378	7.547	8.047	0.07220869
84	0.077337	0.922663	351.874	27.213	7.134	7.634	0.07757194
85	0.082817	0.917183	324.662	26.887	6.732	7.232	0.08331817
86	0.088649	0.911351	297.774	26.397	6.340	6.840	0.08947198
87	0.09485	0.90515	271.377	25.740	5.956	6.456	0.09606104
88	0.101436	0.898564	245.637	24.916	5.581	6.081	0.10311263
89	0.108424	0.891576	220.720	23.931	5.210	5.710	0.11065539
90	0.115832	0.884168	196.789	22.794	4.844	5.344	0.11872069
91	0.123677	0.876323	173.994	21.519	4.479	4.979	0.12734189
92	0.131973	0.868027	152.475	20.123	4.111	4.611	0.13655238
93	0.140737	0.859263	132.353	18.627	3.736	4.236	0.14638745
94	0.149983	0.850017	113.726	17.057	3.348	3.848	0.15688552
95	0.159723	0.840277	96.669	15.440	2.938	3.438	0.16808503
96	0.16997	0.83003	81.229	13.806	2.497	2.997	0.18002687
97	0.180733	0.819267	67.422	12.185	2.008	2.508	0.19275437
98	0.19202	0.80798	55.237	10.607	1.451	1.951	0.20631165
99	0.203837	0.796163	44.630	9.097	0.796	1.296	0.2207457
100	1	0	35.533	35.533	1.000	1.500	0.6280121

e_x = Vida media completa, es una medida de la esperanza de vida de las personas que tienen edad alcanzada x , considerando que se mueren uniformemente en el año.

e_x = Vida media abreviada, es una medida de la esperanza de vida de las personas que tienen edad alcanzada x , suponiendo que las personas fallecen al inicio de su aniversario.

μ_x = tasa de mortalidad.

**Prima única comercial considerando $gi = 2\%$ y $ge = 1\%$.
 Para edad de inicio 25 y radix 5000**

Edad	2%	2.50%	3%	5%
25	61.55	52.04	43.98	22.33
26	64.01	54.29	46.03	23.71
27	66.60	56.67	48.21	25.18

28	69.36	59.20	50.52	26.77
29	72.29	61.90	52.95	28.47
30	75.41	64.77	55.63	30.30
31	78.74	67.84	58.45	32.28
32	82.29	71.12	61.48	34.42
33	86.09	74.63	64.72	36.73
34	90.17	78.40	68.21	39.23
35	94.55	82.46	71.97	41.95
36	99.27	86.84	76.02	44.91
37	104.37	91.58	80.41	48.13
38	109.88	96.71	85.18	51.66
39	115.88	102.29	90.37	55.52
40	122.40	108.37	96.04	59.76
41	129.53	115.02	102.24	64.44
42	137.35	122.32	108.68	69.61
43	145.96	130.37	116.58	75.35
44	155.48	139.27	124.91	81.75
45	166.05	149.17	134.15	88.91
46	177.86	160.24	144.57	96.97
47	191.13	172.68	156.24	106.08
48	206.12	186.76	169.47	122.97
49	223.20	202.81	184.55	135.57
50	242.81	221.24	201.90	150.14
51	265.54	242.63	222.05	167.14
52	292.19	267.70	245.68	187.17
53	323.80	297.50	273.78	211.09
54	361.91	333.41	307.67	240.05
55	408.67	377.50	349.31	275.77
56	467.33	432.85	401.60	320.79
57	543.03	550.67	469.14	379.12
58	644.28	651.86	559.54	457.43
59	786.44	793.88	686.58	368.66
60	1000.22	1007.36	877.73	734.10
61	1357.29	1363.77	1197.16	1012.64
62	2072.63	2077.59	1837.35	1571.64
63	4221.17	4221.17	3760.68	3021.35

**Prima única comercial considerando $gi = 2\%$ y $ge = 1\%$.
 Para edad de inicio 35 y radix 5000**

Edad	2%	2.50%	3%	5%
30	56.00	44.94	36.16	15.52
31	58.97	47.56	38.45	16.82
32	62.16	50.38	40.93	18.25
33	65.59	53.42	43.61	19.83
34	69.29	56.71	46.52	21.56
35	73.29	60.27	49.69	23.48
36	77.62	64.14	53.14	25.59
37	82.31	68.36	56.90	27.94
38	87.42	72.96	61.03	30.55
39	92.99	77.99	65.55	33.45
40	99.09	83.51	70.54	36.69
41	105.79	89.59	76.04	40.32
42	113.17	96.31	82.14	44.40
43	121.33	103.76	88.93	49.01
44	130.39	112.05	96.51	54.22
45	140.50	121.34	105.01	60.14
46	151.84	131.77	114.60	66.90
47	164.63	143.57	125.47	74.67
48	179.15	157.00	137.88	83.65
49	195.75	172.39	152.13	94.09
50	214.89	190.17	168.64	106.32
51	237.16	210.91	187.94	120.79
52	263.35	235.34	210.74	138.08
53	294.54	264.51	238.01	158.97
54	332.25	299.84	271.12	184.60
55	378.67	343.40	312.03	216.58
56	437.08	398.32	363.70	257.34
57	512.66	469.48	430.76	310.72
58	614.01	565.05	520.98	383.09
59	756.63	699.72	648.29	485.96
60	971.55	902.87	840.59	642.34
61	1331.12	1243.09	1162.99	905.96
62	2052.47	1926.14	1810.81	1438.00
63	4221.18	3980.78	3760.69	3044.43

Proyección de la prima única considerando la regresión al SMGDF (edad de entrada 25, radix 5000)

Años	25	26	27	28	29
2010	60.19	62.59	65.13	67.82	70.69
2011	72.25	75.18	78.29	81.60	85.12
2012	77.74	80.96	84.38	88.02	91.90
2013	83.63	87.16	90.92	94.93	99.21
2014	89.94	93.82	97.96	102.38	107.11
2015	96.72	100.99	105.54	110.42	115.65
2016	104.02	108.71	113.73	119.12	124.91
2017	111.87	117.04	122.58	128.54	134.96
2018	120.35	126.05	132.18	138.78	145.90
2019	129.52	135.82	142.60	149.92	157.84
2020	139.45	146.41	153.93	162.07	170.91
2021	150.23	157.94	166.29	175.36	185.24
2022	161.96	170.52	179.82	189.94	201.01
2023	174.75	184.28	194.65	205.99	218.43
2024	188.73	199.36	210.97	223.71	237.73
2025	204.07	215.95	228.99	243.34	259.21
2026	220.94	234.27	248.96	265.19	283.23
2027	239.56	254.57	271.17	289.61	310.21
2028	260.18	277.15	296.00	317.05	340.70

Años	30	31	32	33	34
2010	73.74	76.99	80.46	84.18	88.17
2011	88.87	92.88	97.18	101.78	106.72
2012	96.05	100.49	105.25	110.36	115.87
2013	103.80	108.71	114.00	119.69	125.83
2014	112.18	117.63	123.51	129.85	136.71
2015	121.27	127.32	133.86	140.94	148.62
2016	131.14	137.87	145.16	153.08	161.70
2017	141.89	149.39	157.54	166.41	176.10
2018	153.62	161.99	171.11	181.08	192.01
2019	166.45	175.82	186.06	197.30	209.66
2020	180.53	191.05	202.58	215.27	229.31
2021	196.03	207.86	220.89	235.29	251.30
2022	213.14	226.50	241.27	257.68	276.01
2023	232.11	247.25	264.07	282.85	303.95

2024	253.23	270.45	289.69	311.30	335.72
2025	276.84	296.53	318.65	343.65	372.12
2026	303.37	326.00	351.57	380.70	414.15
2027	333.35	359.50	389.29	423.49	463.14
2028	367.43	397.87	432.83	473.36	520.85

Años	35	36	37	38	39	40
2010	92.45	97.07	102.05	107.45	113.31	119.69
2011	112.05	117.81	124.03	130.80	138.16	146.21
2012	121.82	128.26	135.25	142.87	151.19	160.32
2013	132.49	139.71	147.58	156.17	165.60	175.98
2014	144.17	152.29	161.16	170.88	181.59	193.44
2015	156.99	166.14	176.17	187.21	199.42	212.98
2016	171.12	181.45	192.82	205.40	219.36	234.96
2017	186.73	198.43	211.38	225.75	241.81	259.84
2018	204.05	217.36	232.14	248.65	267.20	288.16
2019	223.34	238.52	255.49	274.55	296.08	320.61
2020	244.91	262.33	281.90	304.01	329.20	358.12
2021	269.17	289.25	311.94	337.78	367.46	401.87
2022	296.60	319.86	346.37	376.80	412.08	453.42
2023	327.79	354.95	386.14	422.29	464.66	514.94
2024	363.54	395.48	432.50	475.90	527.40	589.46
2025	404.81	442.72	487.13	539.85	603.38	681.33
2026	452.93	498.37	552.30	617.30	697.05	797.12
2027	509.61	564.76	631.22	712.77	815.09	947.11
2028	577.21	645.13	728.49	833.06	968.00	1148.48

Años	41	42	43	44	45
2010	126.66	134.30	142.72	152.03	162.37
2011	155.04	164.75	175.50	187.43	200.76
2012	170.37	181.48	193.82	207.60	223.09
2013	187.46	200.21	214.44	230.44	248.52
2014	206.59	221.28	237.79	256.45	277.69
2015	228.12	245.14	264.37	286.28	311.43
2016	252.49	272.30	294.86	320.77	350.80
2017	280.23	303.45	330.11	361.02	397.23
2018	312.03	339.45	371.23	408.47	452.68
2019	348.78	381.44	419.71	465.13	519.86
2020	391.65	430.95	477.58	533.78	602.75

2021	442.18	490.04	547.70	618.46	707.25
2022	502.49	561.62	634.18	725.22	842.69
2023	575.54	649.90	743.20	863.57	1024.58
2024	665.62	761.17	884.46	1049.36	1280.91
2025	779.14	905.34	1074.14	1311.15	1667.58
2026	926.23	1098.92	1341.40	1706.05	2315.08
2027	1123.70	1371.65	1744.52	2367.28	3614.93
2028	1401.89	1782.99	2419.48	3694.64	7524.61

**Proyección de la prima única considerando la regresión al SMGDF
(edad de entrada 25, radix 5000)**

Año	30	31	32	33	34
2010	73.74	76.99	80.46	84.18	88.17
2011	88.87	92.88	97.18	101.78	106.72
2012	96.05	100.49	105.25	110.36	115.87
2013	103.80	108.71	114.00	119.69	125.83
2014	112.18	117.63	123.51	129.85	136.71
2015	121.27	127.32	133.86	140.94	148.62
2016	131.14	137.88	145.17	153.08	161.70
2017	141.89	149.39	157.54	166.41	176.10
2018	153.62	161.99	171.11	181.08	192.01
2019	166.45	175.82	186.06	197.30	209.66
2020	180.53	191.05	202.58	215.27	229.31
2021	196.03	207.86	220.89	235.29	251.30
2022	213.14	226.50	241.27	257.68	276.01
2023	232.12	247.25	264.07	282.85	303.94
2024	253.23	270.45	289.69	311.29	335.72
2025	276.84	296.53	318.64	343.65	372.12
2026	303.37	325.99	351.57	380.70	414.15
2027	333.34	359.50	389.29	423.49	463.14
2028	367.43	397.87	432.83	473.35	520.84

Año	35	36	37	38	39
2010	92.45	97.07	102.05	107.45	113.31
2011	112.05	117.81	124.03	130.80	138.16
2012	121.82	128.26	135.25	142.87	151.19
2013	132.49	139.71	147.58	156.17	165.60
2014	144.17	152.29	161.16	170.88	181.59

2015	156.99	166.14	176.17	187.21	199.42
2016	171.12	181.45	192.82	205.40	219.36
2017	186.73	198.43	211.37	225.75	241.81
2018	204.05	217.35	232.14	248.65	267.19
2019	223.33	238.52	255.49	274.54	296.08
2020	244.91	262.33	281.89	304.01	329.20
2021	269.17	289.24	311.94	337.78	367.46
2022	296.59	319.86	346.37	376.80	412.08
2023	327.79	354.95	386.14	422.29	464.66
2024	363.54	395.48	432.50	475.89	527.40
2025	404.81	442.72	487.13	539.85	603.38
2026	452.93	498.37	552.31	617.30	697.05
2027	509.61	564.76	631.22	712.77	815.09
2028	577.21	645.14	728.49	833.07	968.00

Año	40	41	42	43	44	45
2010	119.69	126.66	134.30	142.72	152.03	162.37
2011	146.21	155.04	164.75	175.50	187.43	200.76
2012	160.32	170.37	181.48	193.82	207.60	223.09
2013	175.98	187.46	200.21	214.44	230.44	248.52
2014	193.44	206.59	221.28	237.79	256.45	277.69
2015	212.98	228.12	245.14	264.37	286.28	311.43
2016	234.97	252.49	272.30	294.86	320.77	350.80
2017	259.84	280.23	303.45	330.11	361.01	397.23
2018	288.15	312.03	339.45	371.23	408.47	452.68
2019	320.61	348.78	381.44	419.71	465.13	519.87
2020	358.12	391.65	430.95	477.58	533.79	602.75
2021	401.86	442.18	490.04	547.71	618.47	707.25
2022	453.42	502.49	561.62	634.18	725.23	842.69
2023	514.95	575.54	649.90	743.20	863.57	1024.59
2024	589.46	665.62	761.17	884.46	1049.37	1280.91
2025	681.34	779.15	905.34	1074.15	1311.16	1667.58
2026	797.12	926.23	1098.93	1341.40	1706.04	2315.08
2027	947.11	1123.70	1371.65	1744.51	2367.28	3614.92
2028	1148.48	1401.90	1782.98	2419.48	3694.63	7524.62

Anualidades contingentes para el cálculo del costo normal (edad de entrada 25, radix 5000)

Edad	2%		2.5%		3%		5% $\ddot{a}_{x:\overline{65-x} }$	
	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$
25	5.470	26.110	4.284	24.184	3.364	22.472	1.311	17.249
26	5.585	25.639	4.395	23.789	3.468	22.139	1.378	17.080
27	5.703	25.160	4.510	23.385	3.576	21.797	1.449	16.902
28	5.824	24.673	4.629	22.972	3.688	21.447	1.523	16.718
29	5.949	24.178	4.751	22.551	3.800	21.088	1.601	16.525
30	6.076	23.674	4.876	22.121	3.923	20.720	1.684	16.324
31	6.207	23.163	5.006	21.681	4.047	20.342	1.771	16.115
32	6.342	22.643	5.139	21.233	4.175	19.955	1.862	15.896
33	6.480	22.114	5.277	20.775	4.308	19.558	1.959	15.669
34	6.622	21.577	5.419	20.308	4.446	19.150	2.060	15.431
35	6.768	21.031	5.566	19.830	4.588	18.733	2.168	15.183
36	6.918	20.477	5.717	19.343	4.736	18.305	2.281	14.925
37	7.073	19.913	5.874	18.846	4.890	17.866	2.401	14.656
38	7.233	19.341	6.036	18.339	5.049	17.416	2.527	14.375
39	7.398	18.759	6.204	17.821	5.215	16.955	2.661	14.082
40	7.568	18.167	6.378	17.293	5.387	16.482	2.802	13.777

41	7.744	17.566	6.558	16.753	5.567	15.997	2.952	13.458
42	7.926	16.955	6.745	16.202	5.733	15.500	3.110	13.126
43	8.114	16.334	6.939	15.639	5.948	14.990	3.278	12.779
44	8.310	15.703	7.141	15.065	6.150	14.467	3.455	12.417
45	8.512	15.061	7.351	14.478	6.360	13.930	3.643	12.040
46	8.722	14.409	7.569	13.879	6.583	13.379	3.843	11.645
47	8.941	13.745	7.797	13.266	6.814	12.814	4.055	11.233
48	9.168	13.069	8.035	12.640	7.056	12.234	4.521	10.802
49	9.406	12.381	8.283	12.000	7.310	11.637	4.776	10.351
50	9.653	11.681	8.543	11.345	7.576	11.024	5.049	9.879
51	9.912	10.967	8.815	10.674	7.855	10.394	5.339	9.386
52	10.183	10.240	9.100	9.988	8.149	9.745	5.650	8.868
53	10.467	9.498	9.400	9.284	8.459	9.078	5.982	8.326
54	10.766	8.740	9.716	8.562	8.785	8.389	6.337	7.756
55	11.080	7.966	10.048	7.820	9.130	7.680	6.719	7.158
56	11.411	7.174	10.399	7.059	9.495	6.947	7.128	6.529
57	11.761	6.363	11.761	6.275	9.882	6.189	7.569	5.866
58	12.131	5.532	12.131	5.468	10.293	5.405	8.043	5.166
59	12.523	4.679	12.523	4.635	10.730	4.592	5.556	4.428
60	12.940	3.801	12.940	3.774	11.196	3.748	9.110	3.646
61	13.385	2.897	13.385	2.884	11.694	2.870	9.710	2.817
62	13.859	1.965	13.859	1.960	12.227	1.955	10.362	1.937
63	14.367	1.000	14.367	1.000	12.800	1.000	10.283	1.000
64	13.712	0.000	13.712	0.000	12.385	0.000	11.071	0.000

Anualidades contingentes para el cálculo del costo normal (edad de entrada 30, radix 5000)

Edad	2%		2.5%		3%		5% $\ddot{a}_{x:\overline{65-x} }$	
	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$	$r-x \ddot{a}_x$	$\ddot{a}_{x:\overline{65-x} }$
30	6.08	31.88	4.88	31.88	3.92	31.88	1.68	31.88
31	6.21	30.92	5.01	30.92	4.05	30.92	1.77	30.92
32	6.34	29.97	5.14	29.97	4.18	29.97	1.86	29.97
33	6.48	29.02	5.28	29.02	4.31	29.02	1.96	29.02
34	6.62	28.08	5.42	28.08	4.45	28.08	2.06	28.08
35	6.77	27.13	5.57	27.13	4.59	27.13	2.17	27.13
36	6.92	26.19	5.72	26.19	4.74	26.19	2.28	26.19
37	7.07	25.25	5.87	25.25	4.89	25.25	2.40	25.25
38	7.23	24.31	6.04	24.31	5.05	24.31	2.53	24.31
39	7.40	23.37	6.20	23.37	5.22	23.37	2.66	23.37
40	7.57	22.44	6.38	22.44	5.39	22.44	2.80	22.44
41	7.74	21.51	6.56	21.51	5.57	21.51	2.95	21.51
42	7.93	20.58	6.75	20.58	5.75	20.58	3.11	20.58
43	8.11	19.65	6.94	19.65	5.95	19.65	3.28	19.65
44	8.31	18.72	7.14	18.72	6.15	18.72	3.46	18.72

45	8.51	17.80	7.35	17.80	6.36	17.80	3.64	17.80
46	8.72	16.88	7.57	16.88	6.58	16.88	3.84	16.88
47	8.94	15.96	7.80	15.96	6.81	15.96	4.06	15.96
48	9.17	15.04	8.03	15.04	7.06	15.04	4.28	15.04
49	9.41	14.12	8.28	14.12	7.31	14.12	4.52	14.12
50	9.65	13.20	8.54	13.20	7.58	13.20	4.78	13.20
51	9.91	12.28	8.81	12.28	7.86	12.28	5.05	12.28
52	10.18	11.36	9.10	11.36	8.15	11.36	5.34	11.36
53	10.47	10.44	9.40	10.44	8.46	10.44	5.65	10.44
54	10.77	9.52	9.72	9.52	8.79	9.52	5.98	9.52
55	11.08	8.60	10.05	8.60	9.13	8.60	6.34	8.60
56	11.41	7.67	10.40	7.67	9.50	7.67	6.72	7.67
57	11.76	6.74	10.77	6.74	9.88	6.74	7.13	6.74
58	12.13	5.80	11.16	5.80	10.29	5.80	7.57	5.80
59	12.52	4.86	11.58	4.86	10.73	4.86	8.04	4.86
60	12.94	3.91	12.03	3.91	11.20	3.91	8.56	3.91
61	13.38	2.95	12.50	2.95	11.69	2.95	9.11	2.95
62	13.86	1.98	13.01	1.98	12.23	1.98	9.71	1.98
63	14.37	1.00	13.55	1.00	12.80	1.00	10.36	1.00
64	14.91	0.00	14.13	0.00	13.42	0.00	11.07	0.00

Anexo B

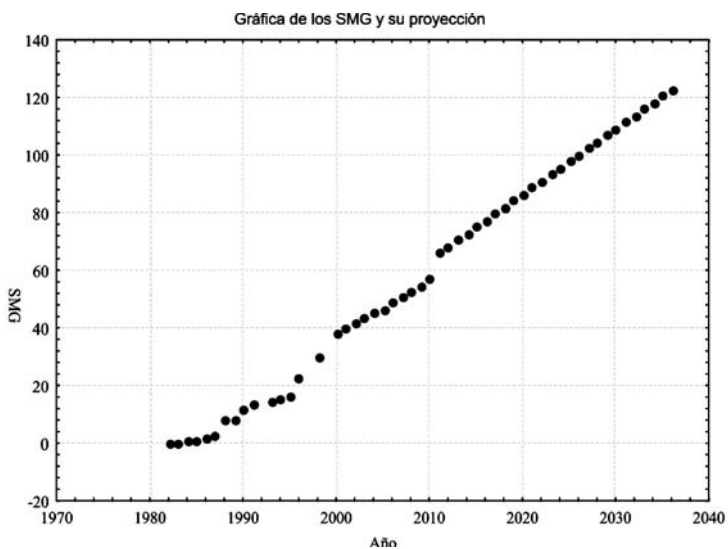
Resultados sobre el análisis de regresión para los salarios mínimos generales.

R= .98919908 (coeficiente de correlación),
 R²= .97851483 (coeficiente de determinación)
 Error estándar estimado: 3.0555

	Coefficientes	Error estándar de los coeficientes	t(24)	Nivel p
Intersección	-4478.53	136.2395	-32.8725	0.000000
Años	2.26	0.0683	33.0613	0.000000

ANOVA

	Suma de cuadrados	Grados de libertad	Cuadrados medios	F	Nivel p
Regresión	10205.03	1	10205.03	1093.049	0.000000
Residual	224.07	24	9.34		
Total	10429.10				



Anexo C

Estimación de la pensión por decrementos múltiples.

${}_k q_{x+h}^j$ = tasa de decremento múltiple

Las probabilidades de decremento múltiple significan la probabilidad de que una persona salga del grupo en los próximos k años a consecuencia de la causa j y estando sujeto a todas las causas.

x = Edad inicial de la persona
 k = Años transcurridos
 j = Causa de salida (muerte o invalidez: m, i)
 ${}_k q_{x+h}^j$ = Probabilidad neta de decremento

Las probabilidades netas de decremento se refieren a la probabilidad de que un participante del grupo de edad $x+h$ tiene de abandonar el grupo en los próximos k años a consecuencia de la causa j y estando sujeto a esa causa j .

${}_t p_x^{(T)}$ = Probabilidad conjunta de sobrevivencia de todas las causas (T) entre las edades x y $x+t$.

$${}_t p_x^{(T)} = (1 - {}_t q_x^m)(1 - {}_t q_x^i)$$

t = Años transcurridos

Costo normal con decrementos múltiples para el plan de pensiones por edad de entrada de 25 años, radix de 5000 (costo por 2 SMGDF como beneficio y pagadero mensualmente)

Edad	2%	2.50%	3%	5%
25	27.64	23.58	20.08	10.48
26	28.89	24.72	21.13	11.20
27	30.23	25.95	22.27	11.97
28	31.67	27.28	23.48	12.81

29	33.20	28.69	24.77	13.72
30	34.84	30.21	26.18	14.70
31	36.62	31.84	27.70	15.77
32	38.53	33.61	29.33	16.93
33	40.58	35.53	31.09	18.21
34	42.81	37.60	33.01	19.61
35	45.21	39.84	35.11	21.15
36	47.82	42.28	37.37	22.83
37	50.67	44.94	39.86	24.68
38	53.76	47.83	42.57	26.73
39	57.16	51.01	45.54	28.99
40	60.89	54.51	48.83	31.51
41	64.98	58.37	52.45	34.31
42	69.51	62.63	56.45	37.44
43	74.51	67.36	60.91	40.93
44	80.11	72.63	65.89	44.86
45	86.35	78.53	71.46	49.31
46	93.36	85.17	77.76	54.33
47	101.28	92.71	84.90	60.08
48	110.33	101.25	93.04	66.69
49	120.67	111.09	102.36	74.31
50	132.60	122.46	113.18	83.17
51	146.63	135.72	125.81	93.60
52	162.97	151.39	140.73	106.00
53	182.58	170.08	158.56	120.88
54	206.33	192.71	180.22	139.01
55	235.58	220.73	206.99	161.53
56	272.49	256.04	240.75	190.06
57	320.34	301.82	284.61	227.23
58	384.61	363.35	343.57	277.39
59	475.21	450.11	426.80	348.37
60	611.85	581.12	552.49	455.80

61	840.76	800.68	763.23	636.22
62	1300.45	1167.94	1186.48	999.39
63	2683.28	2568.14	2460.69	2093.04

Costo normal con decrementos múltiples para el plan de pensiones por edad de entrada de 30 años, radix de 5000 (costo por 2 SMGDF como beneficio y pagadero mensualmente)

Edad	2%	2.50%	3%	5%
30	34.84	30.21	26.18	14.70
31	36.59	31.84	27.70	15.77
32	38.53	33.61	29.33	16.93
33	40.58	35.53	31.12	18.21
34	42.81	37.60	33.01	19.61
35	45.21	39.84	35.11	21.15
36	47.82	42.28	37.37	22.83
37	50.67	44.94	39.86	24.68
38	53.76	47.85	42.57	26.73
39	57.16	51.01	45.54	28.99
40	60.89	54.51	48.83	31.51
41	64.96	58.35	52.45	34.31
42	69.51	62.63	56.45	37.44
43	74.51	67.36	60.91	40.93
44	80.11	72.63	65.89	44.86
45	86.35	78.53	71.46	49.31
46	93.36	85.17	77.76	54.33
47	101.30	92.71	84.90	60.08
48	110.33	101.25	93.01	66.66
49	120.67	111.09	102.36	74.31
50	132.63	94.60	113.18	83.17
51	146.54	135.72	125.81	93.60
52	162.97	151.39	140.73	106.00
53	182.58	170.08	158.56	120.88

54	206.33	192.74	180.22	139.01
55	235.58	220.73	206.99	161.53
56	272.49	256.04	196.84	190.06
57	320.34	301.82	284.61	227.23
58	384.61	363.35	343.57	277.39
59	475.21	450.11	426.80	348.37
60	611.85	581.12	552.49	455.80
61	840.76	800.68	763.23	636.22
62	1300.45	1241.55	1186.48	999.39
63	2683.28	2568.14	2460.69	2064.83

Anexo D

Cálculos del costo de la pensión universal distintos escenarios.

Costo de la pensión universal, según tasa de inversión, edad de entrada y base \$33.33 por día

Año	Base \$33.33 por día					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	6,412,123,724	4,122,178,741	6,412,123,724	4,122,178,741	6,412,123,724	4,122,178,741
2011	6,773,425,130	4,352,984,838	6,839,831,258	4,395,661,160	6,906,237,387	4,438,337,482
2012	7,157,508,762	4,597,542,222	7,298,540,029	4,688,132,010	7,440,947,210	4,779,605,601
2013	7,566,255,921	4,856,533,847	7,790,981,725	5,000,778,038	8,020,113,777	5,147,850,458
2014	8,001,592,576	5,130,853,937	8,320,025,283	5,335,042,252	8,647,869,044	5,545,265,209
2015	8,465,527,606	5,421,678,096	8,888,721,415	5,692,709,119	9,328,672,958	5,974,472,496
2016	8,961,428,635	5,731,698,220	9,501,661,802	6,077,229,452	10,068,766,184	6,439,947,420
2017	9,494,443,431	6,063,926,625	10,165,503,210	6,492,520,180	10,876,813,552	6,946,821,030
2018	10,069,282,327	6,420,289,162	10,886,667,063	6,941,462,985	11,761,531,018	7,499,286,212
2019	10,691,238,741	6,802,761,752	11,672,436,076	7,427,090,874	12,732,876,757	8,101,841,994
2020	11,364,131,130	7,213,383,868	12,528,721,799	7,952,607,962	13,799,644,923	8,759,326,597
2021	12,089,867,477	7,654,169,149	13,459,506,073	8,521,295,733	14,968,779,234	9,476,825,816
2022	12,871,197,022	8,128,733,627	14,469,834,821	9,138,344,529	16,248,637,454	10,261,737,540
2023	13,710,441,267	8,641,589,705	15,564,426,428	9,810,142,837	17,647,476,435	11,123,073,846
2024	14,608,949,173	9,197,785,422	16,747,026,954	10,543,917,879	19,172,702,066	12,071,121,440
2025	15,567,596,068	9,800,908,934	18,020,936,178	11,345,461,021	20,831,429,224	13,114,866,284
2026	16,586,842,000	10,452,550,305	19,389,051,083	12,218,421,795	22,630,512,451	14,261,097,430
2027	17,667,288,661	11,155,214,058	20,854,501,111	13,167,635,874	24,577,276,366	15,518,214,712
2028	18,808,760,443	11,910,900,949	22,419,562,224	14,197,489,823	26,678,240,957	16,894,355,505
2029	20,011,073,288	12,720,647,500	24,086,538,325	15,311,340,832	28,940,135,869	18,396,677,764
2030	21,275,872,162	13,585,016,517	25,859,994,669	16,512,058,920	31,372,615,213	20,031,963,561

2031	22,602,655,634	14,504,143,245	27,741,988,038	17,802,057,197	33,982,551,724	21,806,632,195
2032	23,990,410,576	15,478,266,071	29,733,966,334	19,183,925,211	36,776,243,514	23,727,500,636
2033	25,438,705,495	16,506,905,964	31,838,106,064	20,659,409,064	39,761,051,486	25,800,524,246
2034	26,944,337,569	17,589,555,005	34,053,110,018	22,230,238,551	42,940,147,484	28,031,792,735
2035	28,507,973,947	18,727,547,588	36,382,511,628	23,900,513,559	46,322,878,828	30,430,570,733
2036	30,134,098,563	19,920,065,506	38,834,845,434	25,671,671,026	49,925,285,881	33,002,977,112
2037	31,820,275,399	21,165,800,004	41,409,917,335	27,544,514,229	53,752,597,742	35,754,459,043
2038	33,559,754,908	22,464,051,598	44,101,794,663	29,520,626,525	57,802,613,011	38,691,607,992
2039	35,345,062,145	23,811,363,839	46,903,287,609	31,597,942,648	62,071,266,693	41,816,350,730
2040	37,168,661,182	25,208,246,739	49,806,784,678	33,779,578,750	66,553,660,069	45,137,517,226
2041	39,022,762,079	26,659,117,578	52,803,978,710	36,074,009,168	71,243,656,279	48,671,414,021
2042	40,901,615,604	28,161,328,016	55,888,976,583	38,480,333,327	76,138,063,027	52,422,109,391
2043	42,805,113,777	29,707,902,496	59,063,394,459	40,991,587,426	81,243,791,786	56,385,380,900
2044	44,737,523,474	31,291,210,910	62,334,967,782	43,599,566,369	86,576,422,409	60,555,008,034
2045	46,704,887,429	32,903,605,970	65,714,193,564	46,295,667,343	92,155,910,316	64,923,864,029
2046	48,712,829,511	34,537,254,559	69,211,340,765	49,070,639,467	98,002,552,662	69,483,525,032
2047	50,763,425,050	36,186,506,622	72,831,939,539	51,917,959,826	104,130,538,781	74,229,042,414
2048	52,854,693,298	37,851,547,667	76,575,804,632	54,839,268,536	110,546,226,746	79,166,967,208
2049	54,984,665,916	39,537,061,690	80,442,703,055	57,842,819,634	117,256,013,430	84,313,656,531
2050	57,151,380,427	41,249,644,572	84,432,343,263	60,939,982,971	124,266,316,799	89,690,596,481

Costo de la pensión universal, según tasa de inversión, edad de entrada y base \$57.46 por día

Año	Base \$57.46 por día (1 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	11,054,324,307	7,106,522,366	11,054,324,307	7,106,522,366	11,054,324,307	7,106,522,366
2011	11,677,197,958	7,504,425,706	11,791,680,291	7,577,998,507	11,906,162,624	7,651,571,308
2012	12,339,347,539	7,926,035,886	12,582,481,550	8,082,210,180	12,827,987,599	8,239,908,126
2013	13,044,016,359	8,372,530,298	13,431,437,441	8,621,203,303	13,826,454,774	8,874,752,095

2014	13,794,524,736	8,845,450,561	14,343,493,933	9,197,465,581	14,908,687,527	9,559,884,156
2015	14,594,335,921	9,346,823,385	15,323,910,366	9,814,073,386	16,082,374,683	10,299,825,671
2016	15,449,255,606	9,881,289,521	16,380,602,674	10,476,975,828	17,358,274,975	11,102,291,591
2017	16,368,158,402	10,454,042,121	17,525,046,939	11,192,925,580	18,751,326,333	11,976,127,704
2018	17,359,164,791	11,068,401,297	18,768,313,515	11,966,890,582	20,276,554,824	12,928,562,429
2019	18,431,400,482	11,727,773,485	20,122,957,603	12,804,099,658	21,951,128,067	13,967,351,964
2020	19,591,448,387	12,435,674,678	21,599,170,554	13,710,076,613	23,790,206,938	15,100,837,272
2021	20,842,597,817	13,195,576,338	23,203,816,950	14,690,478,633	25,805,762,220	16,337,786,120
2022	22,189,588,385	14,013,712,397	24,945,595,825	15,754,253,724	28,012,202,463	17,690,952,266
2023	23,636,422,298	14,897,862,119	26,832,641,541	16,912,415,464	30,423,762,254	19,175,872,283
2024	25,185,425,126	15,856,728,184	28,871,412,204	18,177,423,383	33,053,209,142	20,810,280,166
2025	26,838,105,913	16,896,496,470	31,067,596,543	19,559,261,635	35,912,808,978	22,609,667,467
2026	28,595,257,765	18,019,908,206	33,426,188,875	21,064,221,913	39,014,378,801	24,585,738,324
2027	30,457,917,986	19,231,281,122	35,952,584,274	22,700,640,784	42,370,546,054	26,752,973,819
2028	32,425,783,829	20,534,064,462	38,650,706,432	24,476,080,565	45,992,551,016	29,125,402,560
2029	34,498,537,988	21,930,045,165	41,524,527,217	26,396,328,959	49,891,995,410	31,715,364,666
2030	36,679,016,334	23,420,193,492	44,581,917,002	28,466,333,800	54,085,522,657	34,534,552,241
2031	38,966,354,418	25,004,742,600	47,826,421,623	30,690,255,222	58,584,981,161	37,594,031,980
2032	41,358,805,631	26,684,103,464	51,260,537,221	33,072,557,535	63,401,228,692	40,905,556,152
2033	43,855,626,095	28,457,450,246	54,888,016,034	35,616,250,969	68,546,955,246	44,479,391,635
2034	46,451,294,231	30,323,907,309	58,706,621,711	38,324,317,646	74,027,628,996	48,326,036,920
2035	49,146,960,187	32,285,775,109	62,722,445,789	41,203,825,656	79,859,364,460	52,461,463,975
2036	51,950,354,139	34,341,643,084	66,950,201,579	44,257,252,239	86,069,814,783	56,896,221,568
2037	54,857,276,460	36,489,254,972	71,389,554,458	47,485,982,226	92,667,994,787	61,639,700,468
2038	57,856,091,119	38,727,404,886	76,030,276,668	50,892,745,278	99,650,109,319	66,703,264,183
2039	60,933,911,517	41,050,134,000	80,859,973,178	54,473,980,934	107,009,150,441	72,090,234,411
2040	64,077,745,921	43,458,321,561	85,865,521,979	58,235,061,355	114,736,672,894	77,815,833,778
2041	67,274,164,688	45,959,582,839	91,032,601,761	62,190,596,064	122,822,096,903	83,908,174,307
2042	70,513,256,303	48,549,352,170	96,351,052,938	66,339,032,492	131,259,919,038	90,374,269,594

2043	73,794,834,612	51,215,603,883	101,823,661,735	70,668,365,242	140,062,054,487	97,206,840,280
2044	77,126,255,590	53,945,183,885	107,463,763,838	75,164,448,952	149,255,362,484	104,395,162,365
2045	80,517,936,743	56,724,908,463	113,289,455,812	79,812,452,612	158,874,245,628	111,926,949,508
2046	83,979,573,469	59,541,273,536	119,318,441,054	84,596,427,957	168,953,695,648	119,787,679,219
2047	87,514,743,575	62,384,538,568	125,560,253,402	89,505,129,662	179,518,174,569	127,968,820,196
2048	91,120,032,310	65,255,023,371	132,014,573,481	94,541,385,241	190,578,643,529	136,481,666,239
2049	94,792,046,311	68,160,803,022	138,680,999,626	99,719,424,427	202,146,130,564	145,354,416,570
2050	98,527,402,320	71,113,248,637	145,559,029,220	105,058,848,530	214,231,700,069	154,624,112,625

Costo de la pensión universal, según tasa de inversión, edad de entrada y base \$114.92 por día

Año	Base \$114.92 por día (2 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	22,108,648,614	14,213,044,732	22,108,648,614	14,213,044,732	22,108,648,614	14,213,044,732
2011	23,354,395,917	15,008,851,413	23,583,360,583	15,155,997,015	23,812,325,249	15,303,142,617
2012	24,678,695,079	15,852,071,772	25,164,963,100	16,164,420,361	25,655,975,199	16,479,816,252
2013	26,088,032,717	16,745,060,596	26,862,874,881	17,242,406,606	27,652,909,547	17,749,504,190
2014	27,589,049,471	17,690,901,122	28,686,987,866	18,394,931,161	29,817,375,055	19,119,768,311
2015	29,188,671,842	18,693,646,769	30,647,820,732	19,628,146,773	32,164,749,365	20,599,651,341
2016	30,898,511,212	19,762,579,041	32,761,205,348	20,953,951,656	34,716,549,950	22,204,583,182
2017	32,736,316,803	20,908,084,241	35,050,093,878	22,385,851,159	37,502,652,666	23,952,255,409
2018	34,718,329,582	22,136,802,594	37,536,627,029	23,933,781,164	40,553,109,648	25,857,124,857
2019	36,862,800,965	23,455,546,971	40,245,915,206	25,608,199,317	43,902,256,134	27,934,703,927
2020	39,182,896,774	24,871,349,357	43,198,341,109	27,420,153,225	47,580,413,876	30,201,674,544
2021	41,685,195,634	26,391,152,675	46,407,633,899	29,380,957,266	51,611,524,441	32,675,572,241
2022	44,379,176,771	28,027,424,794	49,891,191,649	31,508,507,448	56,024,404,927	35,381,904,532
2023	47,272,844,595	29,795,724,239	53,665,283,081	33,824,830,927	60,847,524,508	38,351,744,567
2024	50,370,850,253	31,713,456,368	57,742,824,407	36,354,846,765	66,106,418,285	41,620,560,331
2025	53,676,211,825	33,792,992,940	62,135,193,086	39,118,523,269	71,825,617,955	45,219,334,933

2026	57,190,515,531	36,039,816,413	66,852,377,751	42,128,443,825	78,028,757,602	49,171,476,648
2027	60,915,835,972	38,462,562,244	71,905,168,548	45,401,281,568	84,741,092,109	53,505,947,637
2028	64,851,567,658	41,068,128,925	77,301,412,864	48,952,161,130	91,985,102,032	58,250,805,120
2029	68,997,075,976	43,860,090,331	83,049,054,435	52,792,657,919	99,783,990,820	63,430,729,332
2030	73,358,032,667	46,840,386,984	89,163,834,004	56,932,667,601	108,171,045,314	69,069,104,482
2031	77,932,708,835	50,009,485,200	95,652,843,245	61,380,510,444	117,169,962,321	75,188,063,961
2032	82,717,611,263	53,368,206,928	102,521,074,442	66,145,115,070	126,802,457,384	81,811,112,305
2033	87,711,252,189	56,914,900,492	109,776,032,068	71,232,501,939	137,093,910,493	88,958,783,270
2034	92,902,588,463	60,647,814,618	117,413,243,422	76,648,635,293	148,055,257,992	96,652,073,840
2035	98,293,920,373	64,571,550,218	125,444,891,577	82,407,651,311	159,718,728,921	104,922,927,951
2036	103,900,708,278	68,683,286,168	133,900,403,158	88,514,504,478	172,139,629,567	113,792,443,135
2037	109,714,552,921	72,978,509,944	142,779,108,915	94,971,964,451	185,335,989,573	123,279,400,936
2038	115,712,182,238	77,454,809,771	152,060,553,336	101,785,490,556	199,300,218,639	133,406,528,367
2039	121,867,823,033	82,100,268,000	161,719,946,357	108,947,961,868	214,018,300,882	144,180,468,822
2040	128,155,491,842	86,916,643,122	171,731,043,959	116,470,122,710	229,473,345,788	155,631,667,557
2041	134,548,329,377	91,919,165,677	182,065,203,522	124,381,192,127	245,644,193,806	167,816,348,614
2042	141,026,512,607	97,098,704,339	192,702,105,876	132,678,064,984	262,519,838,076	180,748,539,189
2043	147,589,669,225	102,431,207,766	203,647,323,469	141,336,730,484	280,124,108,973	194,413,680,560
2044	154,252,511,180	107,890,367,769	214,927,527,677	150,328,897,905	298,510,724,968	208,790,324,731
2045	161,035,873,486	113,449,816,925	226,578,911,623	159,624,905,224	317,748,491,256	223,853,899,016
2046	167,959,146,937	119,082,547,073	238,636,882,109	169,192,855,913	337,907,391,297	239,575,358,438
2047	175,029,487,150	124,769,077,136	251,120,506,804	179,010,259,323	359,036,349,137	255,937,640,392
2048	182,240,064,621	130,510,046,742	264,029,146,963	189,082,770,483	381,157,287,057	272,963,332,479
2049	189,584,092,622	136,321,606,044	277,361,999,251	199,438,848,854	404,292,261,128	290,708,833,141
2050	197,054,804,640	142,226,497,275	291,118,058,440	210,117,697,059	428,463,400,137	309,248,225,251

Pensión Universal como porcentaje del PIB proyectado con datos del Banco de México a pesos de 1993

Año	Base \$33.33 por día					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.21	0.14	0.21	0.14	0.21	0.14
2011	0.22	0.14	0.22	0.14	0.22	0.14
2012	0.23	0.15	0.23	0.15	0.24	0.15
2013	0.24	0.15	0.24	0.16	0.25	0.16
2014	0.24	0.16	0.25	0.16	0.26	0.17
2015	0.25	0.16	0.27	0.17	0.28	0.18
2016	0.26	0.17	0.28	0.18	0.30	0.19
2017	0.27	0.17	0.29	0.19	0.31	0.20
2018	0.29	0.18	0.31	0.20	0.33	0.21
2019	0.30	0.19	0.32	0.21	0.35	0.23
2020	0.31	0.20	0.34	0.22	0.38	0.24
2021	0.32	0.21	0.36	0.23	0.40	0.25
2022	0.34	0.21	0.38	0.24	0.43	0.27
2023	0.36	0.22	0.40	0.25	0.46	0.29
2024	0.37	0.23	0.43	0.27	0.49	0.31
2025	0.39	0.25	0.45	0.29	0.52	0.33
2026	0.41	0.26	0.48	0.30	0.56	0.35
2027	0.43	0.27	0.51	0.32	0.60	0.38
2028	0.45	0.29	0.54	0.34	0.64	0.40
2029	0.47	0.30	0.57	0.36	0.68	0.43
2030	0.49	0.32	0.60	0.38	0.73	0.47
2031	0.52	0.33	0.64	0.41	0.78	0.50
2032	0.54	0.35	0.67	0.43	0.83	0.54
2033	0.57	0.37	0.71	0.46	0.89	0.57
2034	0.59	0.39	0.75	0.49	0.94	0.62
2035	0.62	0.41	0.79	0.52	1.00	0.66
2036	0.64	0.43	0.83	0.55	1.07	0.70
2037	0.67	0.45	0.87	0.58	1.13	0.75
2038	0.70	0.47	0.92	0.61	1.20	0.80

2039	0.72	0.49	0.96	0.65	1.27	0.86
2040	0.75	0.51	1.01	0.68	1.35	0.91
2041	0.78	0.53	1.06	0.72	1.42	0.97
2042	0.81	0.56	1.10	0.76	1.50	1.03
2043	0.83	0.58	1.15	0.80	1.58	1.10
2044	0.86	0.60	1.20	0.84	1.67	1.17
2045	0.89	0.63	1.25	0.88	1.75	1.23
2046	0.91	0.65	1.30	0.92	1.84	1.31
2047	0.94	0.67	1.35	0.96	1.93	1.38
2048	0.97	0.69	1.40	1.01	2.03	1.45
2049	1.00	0.72	1.46	1.05	2.13	1.53
2050	1.02	0.74	1.51	1.09	2.23	1.61

Pensión Universal como porcentaje del PIB proyectado con datos del Banco de México a pesos de 1993

Año	Base \$57.46 por día (1 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.37	0.24	0.37	0.24	0.37	0.24
2011	0.38	0.24	0.38	0.25	0.39	0.25
2012	0.39	0.25	0.40	0.26	0.41	0.26
2013	0.41	0.26	0.42	0.27	0.43	0.28
2014	0.42	0.27	0.44	0.28	0.46	0.29
2015	0.44	0.28	0.46	0.29	0.48	0.31
2016	0.45	0.29	0.48	0.31	0.51	0.33
2017	0.47	0.30	0.51	0.32	0.54	0.35
2018	0.49	0.31	0.53	0.34	0.57	0.37
2019	0.51	0.33	0.56	0.36	0.61	0.39
2020	0.54	0.34	0.59	0.37	0.65	0.41
2021	0.56	0.35	0.62	0.39	0.69	0.44
2022	0.59	0.37	0.66	0.42	0.74	0.47
2023	0.61	0.39	0.70	0.44	0.79	0.50
2024	0.64	0.40	0.74	0.46	0.84	0.53
2025	0.67	0.42	0.78	0.49	0.90	0.57

2026	0.71	0.45	0.83	0.52	0.96	0.61
2027	0.74	0.47	0.88	0.55	1.03	0.65
2028	0.78	0.49	0.93	0.59	1.10	0.70
2029	0.81	0.52	0.98	0.62	1.18	0.75
2030	0.85	0.54	1.04	0.66	1.26	0.80
2031	0.89	0.57	1.10	0.70	1.34	0.86
2032	0.93	0.60	1.16	0.75	1.43	0.92
2033	0.98	0.63	1.22	0.79	1.53	0.99
2034	1.02	0.67	1.29	0.84	1.62	1.06
2035	1.06	0.70	1.36	0.89	1.73	1.14
2036	1.11	0.73	1.43	0.94	1.84	1.21
2037	1.16	0.77	1.50	1.00	1.95	1.30
2038	1.20	0.80	1.58	1.06	2.07	1.39
2039	1.25	0.84	1.66	1.12	2.19	1.48
2040	1.30	0.88	1.74	1.18	2.32	1.58
2041	1.34	0.92	1.82	1.24	2.45	1.68
2042	1.39	0.96	1.90	1.31	2.59	1.78
2043	1.44	1.00	1.98	1.38	2.73	1.89
2044	1.48	1.04	2.07	1.45	2.87	2.01
2045	1.53	1.08	2.15	1.52	3.02	2.13
2046	1.58	1.12	2.24	1.59	3.17	2.25
2047	1.62	1.16	2.33	1.66	3.33	2.38
2048	1.67	1.20	2.42	1.73	3.50	2.50
2049	1.72	1.24	2.51	1.81	3.66	2.64
2050	1.77	1.27	2.61	1.88	3.84	2.77

Pensión Universal como porcentaje del PIB proyectado con datos del Banco de México a pesos de 1993

Año	Base \$114.92 por día (2 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.73	0.47	0.73	0.47	0.73	0.47
2011	0.76	0.49	0.76	0.49	0.77	0.50
2012	0.78	0.50	0.80	0.51	0.81	0.52

2013	0.81	0.52	0.84	0.54	0.86	0.55
2014	0.84	0.54	0.88	0.56	0.91	0.58
2015	0.87	0.56	0.92	0.59	0.96	0.62
2016	0.91	0.58	0.96	0.62	1.02	0.65
2017	0.94	0.60	1.01	0.65	1.08	0.69
2018	0.98	0.63	1.06	0.68	1.15	0.73
2019	1.02	0.65	1.12	0.71	1.22	0.78
2020	1.07	0.68	1.18	0.75	1.30	0.83
2021	1.12	0.71	1.25	0.79	1.39	0.88
2022	1.17	0.74	1.32	0.83	1.48	0.93
2023	1.23	0.77	1.39	0.88	1.58	1.00
2024	1.29	0.81	1.47	0.93	1.69	1.06
2025	1.35	0.85	1.56	0.98	1.80	1.14
2026	1.41	0.89	1.65	1.04	1.93	1.22
2027	1.48	0.94	1.75	1.11	2.06	1.30
2028	1.55	0.98	1.85	1.17	2.20	1.40
2029	1.63	1.04	1.96	1.25	2.36	1.50
2030	1.71	1.09	2.07	1.32	2.52	1.61
2031	1.79	1.15	2.19	1.41	2.68	1.72
2032	1.87	1.21	2.32	1.49	2.86	1.85
2033	1.95	1.27	2.44	1.59	3.05	1.98
2034	2.04	1.33	2.58	1.68	3.25	2.12
2035	2.13	1.40	2.72	1.78	3.46	2.27
2036	2.22	1.47	2.86	1.89	3.67	2.43
2037	2.31	1.54	3.01	2.00	3.90	2.60
2038	2.40	1.61	3.16	2.12	4.14	2.77
2039	2.50	1.68	3.32	2.23	4.39	2.96
2040	2.59	1.76	3.48	2.36	4.65	3.15
2041	2.69	1.84	3.64	2.49	4.91	3.35
2042	2.78	1.92	3.80	2.62	5.18	3.57
2043	2.88	2.00	3.97	2.75	5.46	3.79
2044	2.97	2.08	4.14	2.89	5.74	4.02
2045	3.06	2.16	4.31	3.03	6.04	4.26
2046	3.15	2.24	4.48	3.18	6.35	4.50
2047	3.25	2.32	4.66	3.32	6.66	4.75

2048	3.34	2.39	4.84	3.47	6.99	5.01
2049	3.44	2.47	5.03	3.62	7.33	5.27
2050	3.53	2.55	5.22	3.77	7.68	5.54

Pensión Universal como porcentaje del PIB proyectado con datos del Termómetro de la Economía Mexicana, 1935-2010 a pesos de 2003

Año	Base \$33.33 por día					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.08	0.05	0.08	0.05	0.08	0.05
2011	0.08	0.05	0.09	0.05	0.09	0.06
2012	0.09	0.06	0.09	0.06	0.09	0.06
2013	0.09	0.06	0.09	0.06	0.10	0.06
2014	0.10	0.06	0.10	0.06	0.10	0.07
2015	0.10	0.06	0.10	0.07	0.11	0.07
2016	0.10	0.07	0.11	0.07	0.12	0.07
2017	0.11	0.07	0.12	0.07	0.12	0.08
2018	0.11	0.07	0.12	0.08	0.13	0.08
2019	0.12	0.08	0.13	0.08	0.14	0.09
2020	0.12	0.08	0.14	0.09	0.15	0.10
2021	0.13	0.08	0.15	0.09	0.16	0.10
2022	0.14	0.09	0.15	0.10	0.17	0.11
2023	0.14	0.09	0.16	0.10	0.19	0.12
2024	0.15	0.10	0.17	0.11	0.20	0.13
2025	0.16	0.10	0.19	0.12	0.21	0.13
2026	0.17	0.11	0.20	0.12	0.23	0.14
2027	0.18	0.11	0.21	0.13	0.25	0.16
2028	0.19	0.12	0.22	0.14	0.26	0.17
2029	0.20	0.12	0.24	0.15	0.28	0.18
2030	0.21	0.13	0.25	0.16	0.30	0.19
2031	0.22	0.14	0.27	0.17	0.33	0.21
2032	0.23	0.15	0.28	0.18	0.35	0.22
2033	0.24	0.15	0.30	0.19	0.37	0.24
2034	0.25	0.16	0.31	0.21	0.40	0.26
2035	0.26	0.17	0.33	0.22	0.42	0.28

2036	0.27	0.18	0.35	0.23	0.45	0.30
2037	0.28	0.19	0.37	0.25	0.48	0.32
2038	0.30	0.20	0.39	0.26	0.51	0.34
2039	0.31	0.21	0.41	0.28	0.54	0.37
2040	0.32	0.22	0.43	0.29	0.58	0.39
2041	0.33	0.23	0.45	0.31	0.61	0.42
2042	0.35	0.24	0.47	0.33	0.65	0.45
2043	0.36	0.25	0.50	0.34	0.68	0.47
2044	0.37	0.26	0.52	0.36	0.72	0.50
2045	0.38	0.27	0.54	0.38	0.76	0.53
2046	0.40	0.28	0.56	0.40	0.80	0.57
2047	0.41	0.29	0.59	0.42	0.84	0.60
2048	0.42	0.30	0.61	0.44	0.88	0.63
2049	0.44	0.31	0.64	0.46	0.93	0.67
2050	0.45	0.32	0.66	0.48	0.98	0.70

Pensión Universal como porcentaje del PIB proyectado con datos del Termómetro de la Economía Mexicana, 1935-2010 a pesos de 2003

Año	Base \$57.46 por día (1 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.14	0.09	0.14	0.09	0.14	0.09
2011	0.15	0.09	0.15	0.09	0.15	0.10
2012	0.15	0.10	0.15	0.10	0.16	0.10
2013	0.16	0.10	0.16	0.10	0.17	0.11
2014	0.16	0.11	0.17	0.11	0.18	0.11
2015	0.17	0.11	0.18	0.12	0.19	0.12
2016	0.18	0.11	0.19	0.12	0.20	0.13
2017	0.19	0.12	0.20	0.13	0.21	0.14
2018	0.20	0.12	0.21	0.13	0.23	0.15
2019	0.20	0.13	0.22	0.14	0.24	0.16
2020	0.21	0.14	0.24	0.15	0.26	0.17
2021	0.23	0.14	0.25	0.16	0.28	0.18
2022	0.24	0.15	0.27	0.17	0.30	0.19
2023	0.25	0.16	0.28	0.18	0.32	0.20

2024	0.26	0.17	0.30	0.19	0.34	0.22
2025	0.28	0.17	0.32	0.20	0.37	0.23
2026	0.29	0.18	0.34	0.21	0.40	0.25
2027	0.31	0.19	0.36	0.23	0.43	0.27
2028	0.32	0.20	0.38	0.24	0.46	0.29
2029	0.34	0.21	0.41	0.26	0.49	0.31
2030	0.36	0.23	0.43	0.28	0.52	0.33
2031	0.37	0.24	0.46	0.29	0.56	0.36
2032	0.39	0.25	0.48	0.31	0.60	0.39
2033	0.41	0.27	0.51	0.33	0.64	0.42
2034	0.43	0.28	0.54	0.35	0.68	0.45
2035	0.45	0.30	0.57	0.38	0.73	0.48
2036	0.47	0.31	0.61	0.40	0.78	0.51
2037	0.49	0.33	0.64	0.43	0.83	0.55
2038	0.51	0.34	0.67	0.45	0.88	0.59
2039	0.53	0.36	0.71	0.48	0.94	0.63
2040	0.56	0.38	0.74	0.50	0.99	0.67
2041	0.58	0.39	0.78	0.53	1.05	0.72
2042	0.60	0.41	0.82	0.56	1.11	0.77
2043	0.62	0.43	0.86	0.59	1.18	0.82
2044	0.64	0.45	0.89	0.63	1.24	0.87
2045	0.66	0.47	0.93	0.66	1.31	0.92
2046	0.69	0.49	0.97	0.69	1.38	0.98
2047	0.71	0.50	1.01	0.72	1.45	1.03
2048	0.73	0.52	1.06	0.76	1.52	1.09
2049	0.75	0.54	1.10	0.79	1.60	1.15
2050	0.77	0.56	1.14	0.82	1.68	1.21

Pensión Universal como porcentaje del PIB proyectado con datos del Termómetro de la Economía Mexicana 1935-2010 a pesos de 2003

Año	Base \$114.92 por día (2 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.28	0.18	0.28	0.18	0.28	0.18
2011	0.29	0.19	0.29	0.19	0.30	0.19

2012	0.30	0.19	0.31	0.20	0.31	0.20
2013	0.32	0.20	0.32	0.21	0.33	0.21
2014	0.33	0.21	0.34	0.22	0.35	0.23
2015	0.34	0.22	0.36	0.23	0.38	0.24
2016	0.36	0.23	0.38	0.24	0.40	0.26
2017	0.37	0.24	0.40	0.26	0.43	0.27
2018	0.39	0.25	0.42	0.27	0.46	0.29
2019	0.41	0.26	0.45	0.28	0.49	0.31
2020	0.43	0.27	0.47	0.30	0.52	0.33
2021	0.45	0.29	0.50	0.32	0.56	0.35
2022	0.47	0.30	0.53	0.34	0.60	0.38
2023	0.50	0.31	0.57	0.36	0.64	0.40
2024	0.52	0.33	0.60	0.38	0.69	0.43
2025	0.55	0.35	0.64	0.40	0.74	0.46
2026	0.58	0.37	0.68	0.43	0.79	0.50
2027	0.61	0.39	0.72	0.46	0.85	0.54
2028	0.64	0.41	0.77	0.49	0.91	0.58
2029	0.68	0.43	0.81	0.52	0.98	0.62
2030	0.71	0.45	0.86	0.55	1.05	0.67
2031	0.75	0.48	0.92	0.59	1.12	0.72
2032	0.78	0.50	0.97	0.63	1.20	0.77
2033	0.82	0.53	1.03	0.67	1.28	0.83
2034	0.86	0.56	1.09	0.71	1.37	0.89
2035	0.90	0.59	1.15	0.75	1.46	0.96
2036	0.94	0.62	1.21	0.80	1.56	1.03
2037	0.98	0.65	1.28	0.85	1.66	1.10
2038	1.02	0.69	1.35	0.90	1.76	1.18
2039	1.07	0.72	1.42	0.95	1.88	1.26
2040	1.11	0.75	1.49	1.01	1.99	1.35
2041	1.15	0.79	1.56	1.07	2.11	1.44
2042	1.20	0.82	1.64	1.13	2.23	1.54
2043	1.24	0.86	1.71	1.19	2.35	1.63
2044	1.28	0.90	1.79	1.25	2.48	1.74
2045	1.33	0.93	1.87	1.32	2.62	1.84
2046	1.37	0.97	1.95	1.38	2.76	1.95

2047	1.41	1.01	2.03	1.45	2.90	2.07
2048	1.46	1.04	2.11	1.51	3.05	2.18
2049	1.50	1.08	2.20	1.58	3.20	2.30
2050	1.55	1.12	2.29	1.65	3.36	2.43

Pensión Universal como porcentaje del PIB proyectado con datos del Termómetro de la Economía Mexicana, 1960-2010 a pesos de 2003

Año	Base \$33.33 por día					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.07	0.05	0.07	0.05	0.07	0.05
2011	0.08	0.05	0.08	0.05	0.08	0.05
2012	0.08	0.05	0.08	0.05	0.08	0.05
2013	0.08	0.05	0.09	0.05	0.09	0.06
2014	0.09	0.06	0.09	0.06	0.09	0.06
2015	0.09	0.06	0.09	0.06	0.10	0.06
2016	0.09	0.06	0.10	0.06	0.10	0.07
2017	0.10	0.06	0.10	0.07	0.11	0.07
2018	0.10	0.06	0.11	0.07	0.12	0.08
2019	0.11	0.07	0.12	0.07	0.13	0.08
2020	0.11	0.07	0.12	0.08	0.13	0.09
2021	0.12	0.07	0.13	0.08	0.14	0.09
2022	0.12	0.08	0.14	0.09	0.15	0.10
2023	0.13	0.08	0.15	0.09	0.16	0.10
2024	0.13	0.08	0.15	0.10	0.18	0.11
2025	0.14	0.09	0.16	0.10	0.19	0.12
2026	0.15	0.09	0.17	0.11	0.20	0.13
2027	0.16	0.10	0.18	0.12	0.22	0.14
2028	0.16	0.10	0.20	0.12	0.23	0.15
2029	0.17	0.11	0.21	0.13	0.25	0.16
2030	0.18	0.12	0.22	0.14	0.27	0.17
2031	0.19	0.12	0.23	0.15	0.28	0.18
2032	0.20	0.13	0.25	0.16	0.30	0.20
2033	0.21	0.13	0.26	0.17	0.32	0.21

2034	0.22	0.14	0.27	0.18	0.35	0.23
2035	0.23	0.15	0.29	0.19	0.37	0.24
2036	0.24	0.16	0.31	0.20	0.39	0.26
2037	0.25	0.16	0.32	0.21	0.42	0.28
2038	0.26	0.17	0.34	0.23	0.44	0.30
2039	0.27	0.18	0.36	0.24	0.47	0.32
2040	0.28	0.19	0.37	0.25	0.50	0.34
2041	0.29	0.20	0.39	0.27	0.53	0.36
2042	0.30	0.21	0.41	0.28	0.56	0.38
2043	0.31	0.21	0.43	0.30	0.59	0.41
2044	0.32	0.22	0.45	0.31	0.62	0.43
2045	0.33	0.23	0.46	0.33	0.65	0.46
2046	0.34	0.24	0.48	0.34	0.69	0.49
2047	0.35	0.25	0.50	0.36	0.72	0.51
2048	0.36	0.26	0.52	0.38	0.76	0.54
2049	0.37	0.27	0.55	0.39	0.79	0.57
2050	0.38	0.28	0.57	0.41	0.83	0.60

Pensión Universal como porcentaje del PIB proyectado con datos del Termómetro de la Economía Mexicana, 1960-2010 a pesos de 2003

Año	Base \$57.46 por día (1 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.13	0.08	0.13	0.08	0.13	0.08
2011	0.13	0.09	0.13	0.09	0.13	0.09
2012	0.14	0.09	0.14	0.09	0.14	0.09
2013	0.14	0.09	0.15	0.09	0.15	0.10
2014	0.15	0.10	0.15	0.10	0.16	0.10
2015	0.15	0.10	0.16	0.10	0.17	0.11
2016	0.16	0.10	0.17	0.11	0.18	0.12
2017	0.17	0.11	0.18	0.11	0.19	0.12
2018	0.18	0.11	0.19	0.12	0.20	0.13
2019	0.18	0.12	0.20	0.13	0.22	0.14

2020	0.19	0.12	0.21	0.13	0.23	0.15
2021	0.20	0.13	0.22	0.14	0.25	0.16
2022	0.21	0.13	0.24	0.15	0.27	0.17
2023	0.22	0.14	0.25	0.16	0.28	0.18
2024	0.23	0.15	0.27	0.17	0.30	0.19
2025	0.24	0.15	0.28	0.18	0.33	0.21
2026	0.26	0.16	0.30	0.19	0.35	0.22
2027	0.27	0.17	0.32	0.20	0.37	0.24
2028	0.28	0.18	0.34	0.21	0.40	0.25
2029	0.30	0.19	0.36	0.23	0.43	0.27
2030	0.31	0.20	0.38	0.24	0.46	0.29
2031	0.33	0.21	0.40	0.26	0.49	0.31
2032	0.34	0.22	0.42	0.27	0.52	0.34
2033	0.36	0.23	0.45	0.29	0.56	0.36
2034	0.37	0.24	0.47	0.31	0.60	0.39
2035	0.39	0.26	0.50	0.33	0.64	0.42
2036	0.41	0.27	0.53	0.35	0.68	0.45
2037	0.43	0.28	0.55	0.37	0.72	0.48
2038	0.44	0.30	0.58	0.39	0.76	0.51
2039	0.46	0.31	0.61	0.41	0.81	0.55
2040	0.48	0.33	0.64	0.44	0.86	0.58
2041	0.50	0.34	0.67	0.46	0.91	0.62
2042	0.52	0.36	0.71	0.49	0.96	0.66
2043	0.53	0.37	0.74	0.51	1.01	0.70
2044	0.55	0.39	0.77	0.54	1.07	0.75
2045	0.57	0.40	0.80	0.56	1.12	0.79
2046	0.59	0.42	0.84	0.59	1.18	0.84
2047	0.61	0.43	0.87	0.62	1.24	0.89
2048	0.62	0.45	0.90	0.65	1.31	0.93
2049	0.64	0.46	0.94	0.68	1.37	0.98
2050	0.66	0.48	0.98	0.70	1.44	1.04

Pensión Universal como porcentaje del PIB proyectado con datos del Termómetro de la Economía Mexicana 1960-2010 a pesos de 2003

Año	Base \$114.92 por día (2 SDMGDF)					
	2%, 65 años	2%, 70 años	3%, 65 años	3%, 70 años	4%, 65 años	4%, 70 años
2010	0.26	0.16	0.26	0.16	0.26	0.16
2011	0.26	0.17	0.27	0.17	0.27	0.17
2012	0.27	0.18	0.28	0.18	0.29	0.18
2013	0.29	0.18	0.29	0.19	0.30	0.19
2014	0.30	0.19	0.31	0.20	0.32	0.21
2015	0.31	0.20	0.32	0.21	0.34	0.22
2016	0.32	0.21	0.34	0.22	0.36	0.23
2017	0.34	0.21	0.36	0.23	0.38	0.25
2018	0.35	0.22	0.38	0.24	0.41	0.26
2019	0.37	0.23	0.40	0.25	0.44	0.28
2020	0.38	0.24	0.42	0.27	0.47	0.30
2021	0.40	0.25	0.45	0.28	0.50	0.31
2022	0.42	0.27	0.47	0.30	0.53	0.34
2023	0.44	0.28	0.50	0.32	0.57	0.36
2024	0.46	0.29	0.53	0.33	0.61	0.38
2025	0.49	0.31	0.56	0.36	0.65	0.41
2026	0.51	0.32	0.60	0.38	0.70	0.44
2027	0.54	0.34	0.64	0.40	0.75	0.47
2028	0.57	0.36	0.67	0.43	0.80	0.51
2029	0.59	0.38	0.71	0.45	0.86	0.55
2030	0.62	0.40	0.76	0.48	0.92	0.59
2031	0.65	0.42	0.80	0.51	0.98	0.63
2032	0.68	0.44	0.85	0.55	1.05	0.68
2033	0.72	0.46	0.90	0.58	1.12	0.73
2034	0.75	0.49	0.95	0.62	1.19	0.78
2035	0.78	0.51	1.00	0.66	1.27	0.83
2036	0.82	0.54	1.05	0.70	1.35	0.89

2037	0.85	0.57	1.11	0.74	1.44	0.96
2038	0.89	0.59	1.17	0.78	1.53	1.02
2039	0.92	0.62	1.23	0.83	1.62	1.09
2040	0.96	0.65	1.29	0.87	1.72	1.17
2041	1.00	0.68	1.35	0.92	1.82	1.24
2042	1.03	0.71	1.41	0.97	1.92	1.32
2043	1.07	0.74	1.47	1.02	2.03	1.41
2044	1.10	0.77	1.54	1.08	2.14	1.49
2045	1.14	0.80	1.60	1.13	2.25	1.58
2046	1.18	0.83	1.67	1.18	2.36	1.68
2047	1.21	0.86	1.74	1.24	2.49	1.77
2048	1.25	0.89	1.81	1.29	2.61	1.87
2049	1.28	0.92	1.88	1.35	2.74	1.97
2050	1.32	0.95	1.95	1.41	2.87	2.07

Anexo E

Regresión sobre PIB histórico del Banco de México

R= .95812825 R²= .91800974 R² ajustada = .91680400
 F(1,68)=761.37 p<0.0000. Error estándar estimado: 2940E2

	Coefficientes	Error estándar de los coeficientes	t(68)	p-level
Intersección	5677923	71046.95	79.91789	0.000000
perconsX	47993	1739.33	27.59288	0.000000

ANOVA

	Suma de cuadrados	Grados de libertad	Cuadrados medios	F	Nivel p
Regresión	6.582379E+13	1	6.582379E+13	761.3668	0.000000
Residual	5.878924E+12	68	8.645477E+10		
Total	7.170271E+13				

Regresión sobre Termómetro de la Economía Mexicana, 1935-2010

R= .97201342 R²= .9481009 R² ajustada = .94406428
 F(1,74)=1266.82 p<0.0000. Error estándar estimado: 647.27

	Coefficientes	Error estándar de los coeficientes	t(68)	p-level
Intersección	-234312.73	6676.41277	-35.08062	0.000000
perconsX	120.46408	3.38453734	35.5924812	0.000000

ANOVA

	Suma de cuadrados	Grados de libertad	Cuadrados medios	F	Nivel p
Regresión	530761584	1	530761584	1266.82471	0.000000
Residual	31003782	74	418970.027		
Total	561765366				

Regresión sobre Termómetro de la Economía Mexicana, 1960-2010

R= .99306611 R²= .9461803 R² ajustada = .988998
 F(1,49)=3496.66 p<0.0000. Error estándar estimado: 277.605

	Coefficientes	Error estándar de los coeficientes	t(68)	p-level
Intersección	-305216.8541	5242.261569	-58.22236264	0.000000
perconsX	156.16121	2.640865211	59.13259386	0.000000

ANOVA

	Suma de cuadrados	Grados de libertad	Cuadrados medios	F	Nivel p
Regresión	269468874.6	1	269468874.6	3496.663657	0.000000
Residual	3776163.838	49	77064.56813		
Total	273245038.5				

Anexo F

Modelo Autorregresivo

Un modelo autorregresivo de orden uno, denotado por AR(1) se representa como: $\tilde{Z}_t - \phi\tilde{Z}_{t-1} = a_t$, donde la serie discreta se toma en los momentos $\tau_1, \tau_2, \dots, \tau_N$ y el proceso estocástico se denota con $\{Z(\tau_1), Z(\tau_2), \dots, Z(\tau_N)\}$ y $\{a_t\}$ un proceso de ruido blanco con media cero y varianza σ_a^2 . Para que la serie sea estacionaria se requiere que la raíz de la ecuación $1 - \phi x = 0$ se encuentre fuera del círculo unitario, por lo que se requiere que $|\phi| < 1$ para asegurar la estacionariedad (una forma de resumir lo que la Ley de los Grandes Números y el Teorema del Límite Central hacen) del proceso AR(1).

En la siguiente tabla se muestra la estimación de los parámetros del modelo, los intervalos de confianza al 95% como el nivel de significancia de los estimadores de los parámetros.

	Parámetros	p	Límite inferior del intervalo de confianza	Límite superior del intervalo de confianza
Constante	8.007100	0.000000	5.898925	10.11527
p(1)	0.982972	0.000000	0.897711	1.06823

Se estimaron con el modelo 15 pronósticos los cuales son presentados en la tabla que a continuación sigue.

	Pronóstico	Límite inferior del intervalo de confianza	Límite superior del intervalo de confianza	Error estándar
35	4.982398	3.333825	6.63097	0.973248
36	5.033904	2.722234	7.34557	1.364712
37	5.084533	2.277191	7.89187	1.657335
38	5.134299	1.919826	8.34877	1.897689
39	5.183218	1.619270	8.74717	2.104004
40	5.231304	1.359532	9.10308	2.285730
41	5.278572	1.131015	9.42613	2.448542
42	5.325034	0.927403	9.72267	2.596175
43	5.370706	0.744267	9.99714	2.731253
44	5.415599	0.578350	10.25285	2.855707

45	5.459728	0.427167	10.49229	2.971010
46	5.503106	0.288774	10.71744	3.078320
47	5.545745	0.161605	10.92988	3.178567
48	5.587658	0.044383	11.13093	3.272514
49	5.628857	-0.063954	11.32167	3.360794

