

DEVELOPING KUWAIT SOCIAL SECURITY SYSTEM

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1. Introduction

The Social Security Association, SSA of Kuwait was founded in 1976. The system was and still is funded by workers (5%), employers (10%), and the government (10%) based on the worker's monthly salary. Therefore, according to Beekman & Kabir (1997), $\theta^1 = 0.25$, fixed since 1976. The SSA uses this monthly income to pay benefits, transaction costs, other expenses and invest the rest for the future. The system is known as very generous but expected to face actuarial deficit in year 2019. There are four main methods to avoid actuarial deficit. Cutting pension benefits, increase retirement age, increase contributions to pension scheme, or apply a combination of the above three methods. However, some discussions in the Kuwaiti parliament thought of switching from the current funding system (investment) to *pay as you go* to avoid future actuarial deficit. The lack of detailed research to this concern caused to stay with the current system. Here, we provide an actuarial model to test for θ if such a switch is to be taken. This paper should assist to answer such a question. The comparison between *pay as you go* and the funded system only will apply with respect to the cost of the method.

2. Benefits by the SSA

The SSA commandment of benefits is explained in detail in the law 61/67. In the following, we brief the main aspects of these benefits that is the concern of this research.

The benefits aim at covering all Kuwaiti workers, unemployed and their dependents. A male worker can retire after working for 20 years and a female after 15 years². The age of retirement is not fixed but a small penalty is applicable at early retirement. A male retiring under 45 may lose 5 % of his monthly pension and 2 % if he is under 50 years old. Whereas, a female retiring under 40 may lose 5 % of her monthly pension and 2 % if she is under 45 years old.

¹ θ is the percentage of employees' monthly salary as a contribution to the social security system.

² In 1993 the law was changed, the minimum years of working became 25 years for male and 20 years for female.

Calculating the pension is based on number of years at work, age at retirement, and net last monthly salary³. The minimum pay is 65 % of the net last month's salary and the maximum is 95 % of it. If a retiree worked for 15 years he is eligible to achieve the 65 % rate and 2 % extra for each additional year of work. Therefore, the pension (P) formula is as follow:

$$P = NMS * [0.65 \text{ (for 15 years work)} + 0.02 \text{ (for each additional year of work)}] \dots (1).$$

In addition, retirees may apply to a low rate loan (usually it is 2 % per annum) which is calculated based on the amount of pension, age, years of service and health status.

Nevertheless, if a pensioner (male or female) dies, his/her dependents will continue to receive part of the pension (until they work or reach the age of 24 for male and 27 for female or, any of the dependent, got married or dies), plus twice a pension as a funeral allowance.

On average and as an example by looking at the data of year 2001, male pensioners received around KD. 810 (= US\$ 2,705) monthly and female pensioners received around KD. 413 (= US\$ 1,379)⁴. These figures basically show the generosity of the system as well as the long term high liability toward the society. Nevertheless, the average pension to wage ratio (accrual rate) was 88% for male and 76% for female during the years 1992 to 2000.

3. Hypothesis

We expect that switching the present funding system in the Kuwaiti social security system to *pay as you go* will cost less. Our test is that under *pay as you go* (θ) will be less than 0.25.

3.1 Assumptions

We list the following assumptions that will be applied in our model:

- 1) All Kuwaiti males retire at age 50 and females at age 45.

This assumption is based on the data available concerning the average age at retirement during the years 1991 to 1999.

³ Net Monthly Salary (NMS) = the weighted average for the last 60 months of (Total Salary – Extra allowances). The law defined these extra allowances, that is not the base salary or social allowances.

⁴ See Table 6, the annual statistical data for the Kuwaiti Social Security System, year 2001.

As the system does not have a projected age of retirement, and the members may retire between the age of 40 to 65, based on years of joining the system and members' gender, we assume that all members retire at average age of retirees at retirement. Thus, the following Table shows the average age at retirement for Kuwaiti male and female workers during the observed years.

Table 1: *Average age at retirement for Kuwaiti male and female for the years 1991 to 1999.*

Year	Male Average Age at Retirement	Female Average Age at Retirement
1991	47	42
1992	47	42
1993	48	42
1994	49	43
1995	49	43
1996	49	44
1997	49	45
1998	50	46
1999	51	46
Average	48.78	43.67

Source: The SSA Statistical year book from 1992 to 2000 (Table 5-A).

2) The average pension per male or female, number of survivors and deaths will increase, during the years 2001 to 2021, with the same trend of the years 1991 to 2000. This assumption is based on the data of the following Table.

Table 2: *Number of survivors (pensioners), deaths and mortality rate for the Kuwaiti members in the social security system during the years 1991 to 2000.*

Year	Male pensioners aged x (l_x^m)	Female pensioners aged x (l_x^f)	Male pensioners died at age x (d_x^m)	Male pensioners mortality rate at age x (q_x^m)	Female pensioners died at age x (d_x^f)	Female pensioners mortality rate at age x (q_x^f)
1991	17,612	3,503	236	0.0134	97	0.0277
1992	19,376	4,788	329	0.0170	86	0.0180
1993	21,548	5,715	328	0.0152	89	0.0156
1994	22,787	6,513	319	0.0140	94	0.0144
1995	23,598	7,512	367	0.0156	138	0.0184
1996	24,558	8,756	371	0.0151	137	0.0156
1997	25,177	9,566	383	0.0152	158	0.0165
1998	25,981	12,011	387	0.0149	179	0.0149
1999	26,427	13,175	392	0.0148	211	0.0160
2000	27,511	14,055	407	0.0148	253	0.0180
Average Annual increase	5.12 %	17.01%	Average	0.0164		0.0150

Source: the SSA annual statistical abstract (1992-2001)

3) Interest rates per annum is assumed to be fixed during the years 1991 to 2021 at 5.6 % . This is based on the average interest rate for the years 1994 to 2000, as the following Table shows.

Table 3: Average interest rate in Kuwait during the years 1994 – 2002.

Year	Interest Rate
1994	6.31
1995	7.43
1996	6.98
1997	6.00
1998	5.90
1999	5.30
2000	5.40
2001	3.70
2002	3.50
Average	5.613

Source: International Monetary Fund. Kuwait financial data . 1992 to 2002.

4) Other benefits than pensions are not covered in the model.

5) Workers join the system at the age of 25, for 25 years for female and 30 years for male. This is based on the following data:

A- Around 90 % of the workers join the system at the age between 20 to 29.

B- The majority of Female workers retire after working for 20 years (79 %). Therefore, the average age of female at retirement is 45.

C- The majority of Male workers retire after working for 25 years (73 %). Therefore, the average age of male at retirement is 50.

6) Testing the hypothesis assumes that the SSA applies *pay as you go* from 1991 to 2021.

7) The average annual investments return for the SSA (during the study years 2002 – 2021), will be equal to the average annual return during the years 1992 to 2001. We assume that the SSA will not increase the reserved amount for investment if *pay as you go* applied on 2002 as this paper aim to study. We assume that with a fixed amount invested the SSA investment return will remain fixed for the years 2002 to 2021 based on the average annual return during 1992 to 2001.

The following Table shows the indicator that will be used in the model of this research. It shows that the average investment annual return during the years 1991 to 2001 is KD. 20,307,100 which is equivalent to about US \$ 67,825,714. For simplicity,

we assume that the SSA will have an annual fixed investments return of KD 20.4 Million (= KD 1.7 Million per month) during the years 2002 to 2021.

Table 4: Investments' SSA reserve return during 1992 – 2001.

Year	Investment Annual Return in Kuwaiti Dinar
1992	12,923,100
1993	14,933,800
1994	15,021,800
1995	15,908,600
1996	22,207,100
1997	10,259,900
1998	29,293,000
1999	32,962,200
2000	40,182,000
2001	9,379,800
Average	20,307,100

Source: Annual Statistical Data for Kuwait (1992-2002).

4. The Data

We created the following Table based on the available data from SSA for the observed years 1991-2001. The data covered number of male and female members, average salaries, average pensions and number of retirees. We assumed that the increase or the decrease in all of the available data for the years 2002-2021 will follow the same trend for the years 1991-2001.

Let;

L_{x_m} = number of alive male members aged x to the nearest birthday.

L'_{x_m} = number of alive male retirees aged x to the nearest birthday.

L_{x_f} = number of alive female members aged x to the nearest birthday.

L'_{x_f} = number of alive female retirees aged x to the nearest birthday.

Then, the following Table presents the available data from the years 1992 to 2001 and the estimated data for the period 2002 to 2021.

Table 5: Number of workers, pensioners and their average pension.

Year	$L_{x_m}=25-50$	$L'_{x_m} > 51$	$L_{x_f}=25-45$	$L'_{x_f} > 46$	Average Male Salary	Average Male Pension	Average Female Salary	Average Female Pension
1991	62,791	14,459	37,542	1,690	567	536	382	296
1992	64,894	15,251	38,931	2,203	737	626	446	352
1993	67,068	16,454	40,372	2,692	747	640	452	354
1994	69,315	17,194	41,865	3,221	753	654	462	358
1995	71,637	17,810	43,414	3,780	760	677	475	362
1996	74,037	18,463	45,021	4,468	767	683	480	367
1997	76,517	19,171	46,686	5,092	781	688	487	370
1998	79,081	19,842	48,414	5,709	797	702	493	376
1999	81,730	20,527	50,205	6,943	810	717	501	381
2000	84,468	21,755	52,063	8,339	819	731	505	385
2001	87,298	22,625	53,989	8,839	827	746	508	389
2002	90,222	23,530	55,987	9,370	835	761	513	393
2003	93,244	24,471	58,058	9,932	844	776	518	397
2004	96,368	25,450	60,206	10,528	852	791	523	401
2005	99,597	26,468	62,434	11,159	861	807	528	405
2006	102,933	27,527	64,744	11,829	869	823	534	409
2007	106,381	28,628	67,139	12,539	878	839	539	413
2008	109,945	29,773	69,624	13,291	887	855	545	417
2009	113,628	30,964	72,200	14,089	896	872	550	421
2010	117,435	32,203	74,871	14,934	905	889	556	425
2011	121,369	33,491	77,641	15,830	914	907	561	430
2012	125,435	34,830	80,514	16,780	923	925	566	434
2013	129,637	36,224	83,493	17,786	932	943	572	438
2014	133,980	37,673	86,582	18,854	941	962	578	443
2015	138,468	39,180	89,786	19,985	951	982	584	447
2016	143,107	40,747	93,108	21,184	960	1,001	589	451
2017	147,901	42,377	96,553	22,455	970	1,021	596	456
2018	152,855	44,072	100,125	23,802	980	1,042	602	461
2019	157,976	45,835	103,830	25,230	989	1,063	608	465
2020	163,268	47,668	107,672	26,744	999	1,084	614	470
2021	168,738	49,575	111,655	28,349	1,009	1,106	620	474

Source: The SSA, statistical abstract for the years 1992 to 2001. And estimations for the years 2001-2021.

5. The Model of Pay As You Go

Beekman and Kabir (1997), Nesbitt et al (1996) and Nesbitt et al (1995) introduced several models for projection of social security systems' funding. In the following we use their methodology and adjust it to fit the Kuwaiti system to test our hypothesis.

Beekman and Kabir (1997) applied a model to project an old age social security program for Bangladesh for the next 25 years. We will use the same model and modify it to fit the actual social security system in Kuwait to test our hypothesis based on our own assumptions.

So, let

$$L_x^K = \int_0^1 L_{x+1}^K dt \approx L_{x+1/2}^K \quad \dots(1)$$

Where L_x^K is the average number of pensioners aged x last birthday and expected to live for K years. Also, we recall that the value of i (interest rate = 5.6 % per annum) is as assumed above and retirees aim to retire at the age of 45 for female and 50 for male. The following is the present value of future benefits for pensioners at year K :

$$O_K = \int_{x_f=50}^{\alpha} \int_{x_m=55}^{\alpha} L_{x_j} 12 \beta^{(12)} a_{1/i} \quad \dots(2)$$

where $j = m$ for male or f for female. Notice that the annuity function of β per month for one year is⁵ 12β , where β is the monthly pension amount for each retiree. Then,

$$12\beta^{(12)} a_{1/i} = \beta(1 + v_K^{1/12} + v_K^{2/12} + v_K^{3/12} + v_K^{4/12} + v_K^{5/12} + v_K^{6/12} + v_K^{7/12} + v_K^{8/12} + v_K^{9/12} + v_K^{10/12} + v_K^{11/12})$$

$$\text{and } v_K = (1 + i_K)^{-1}$$

So, based on Nesbitt et al (1995 & 1996) , let

O_k = the summation (2) , where O_k is the present value of the monetary outgo (pensions and other expenses) at the beginning of the year k . However, O_k is actual for the years 1991-2001 and estimated for the years 2002-2021 based on the previous assumptions.

The following T able shows O_k for both male and female members and the SSA income and actuarial deficit during the years 1991-2021.

⁵ See Beekman and Kabir (1997) page 98.

Table 6: *Total Monthly Contribution, Income and Actuarial Deficit.*

Year	O_{K_m}	O_{K_r}	Contributions & other Income & R_K	Actuarial (Deficit)
1991	8,198,253	5,870,823	43,095,479	29,026,403
1992	11,239,987	9,100,761	53,046,329	32,705,581
1993	12,291,138	11,184,044	56,732,318	33,257,136
1994	12,947,082	13,533,007	59,300,600	32,820,511
1995	13,535,600	16,059,089	61,711,880	32,117,191
1996	14,161,121	19,284,869	64,402,631	30,956,641
1997	14,972,551	22,157,848	67,569,773	30,439,374
1998	15,814,074	25,245,579	70,881,974	29,822,321
1999	16,626,870	31,110,687	74,816,459	27,078,902
2000	17,817,345	37,758,276	80,083,580	24,507,959
2001	18,715,339	40,512,277	83,457,550	24,229,933
2002	19,658,592	43,372,444	87,015,303	23,984,267
2003	20,649,385	46,434,539	90,767,073	23,683,149
2004	21,690,114	49,712,817	94,723,675	23,320,744
2005	22,783,296	53,222,542	98,896,546	22,890,708
2006	23,931,574	56,980,053	103,297,774	22,386,147
2007	25,137,726	61,002,845	107,940,144	21,799,573
2008	26,404,667	65,309,646	112,837,172	21,122,859
2009	27,735,462	69,920,507	118,003,153	20,347,184
2010	29,133,329	74,856,895	123,453,207	19,462,983
2011	30,601,649	79,967,181	129,203,324	18,634,493
2012	32,143,972	85,612,864	135,270,418	17,513,582
2013	33,764,029	91,657,133	141,672,385	16,251,224
2014	35,465,736	98,128,126	148,428,155	14,834,294
2015	37,253,209	105,055,972	155,557,759	13,248,579
2016	39,130,770	112,235,714	163,082,393	11,715,909
2017	41,102,961	120,159,555	171,024,485	9,761,969
2018	43,174,551	128,642,820	179,407,774	7,590,404
2019	45,350,548	137,725,003	188,257,385	5,181,835
2020	47,636,215	147,448,388	197,599,914	2,515,310
2021	50,037,081	157,858,244	207,463,513	(431,812)

Source: The SSA, statistical abstract for the years 1992 to 2001, and estimations for the years 2001-2021.

Now, let's assume that for each member (assuming that all members joined the system at age 25) of the SSA, the present value of annual pensions is:

$$\int_{x_0=46}^{\infty} \int_{x_w=51}^{\infty} L_{x_1} 12\beta\theta^{(12)} a^{1/\theta} \dots$$

where $0 < \theta < 1$

....(3)

where θ is a unit of money, x_f is the age of female pensioner and x_m is the age a male pensioner.

Now we need to solve for θ assuming that the contribution for each year is paid at the beginning of the year, and benefits are paid at the end of each year. So,

$$\theta_j = \frac{(1+i)^{-1} \int_{x_f=46}^{\alpha} \int_{x_m=51}^{\alpha} L_{x_f}^{K+1} 12\beta_j^{(12)} a^{1/i}}{\int_{x_f=25}^{45} \int_{x_m=25}^{50} L_{x_f}^K 12S_j^{(12)} a^{1/i}} \quad \dots(4)$$

Where, S_j is the average monthly salary for male or female worker based on the data on Table 5.

Therefore, we introduce the following equations which are modified to be applied on the Kuwait social security system and consider the annual return of the system investment⁶ when *pay as you go* is applied.

$$\theta_m^K = \frac{(1+i)^{-1} \int_{x_m=51}^{\alpha} L_{x_m}^{K+1} (12\beta_m - R_k/L_{x_f}^K)^{(12)} a^{1/i}}{\int_{x_m=25}^{50} L_{x_m}^K (12S_m)^{(12)} a^{1/i}} \quad \dots(5)$$

$$\theta_f^K = \frac{(1+i)^{-1} \int_{x_f=46}^{\alpha} L_{x_f}^{K+1} (12\beta_f - R_k/L_{x_m}^K)^{(12)} a^{1/i}}{\int_{x_f=25}^{45} L_{x_f}^K (12S_f)^{(12)} a^{1/i}} \quad \dots(6)$$

Then we apply the following equation to estimate θ_j by a balance between the number of male and female members as follows:

$$\theta_j^K = \theta_m^K \left(\frac{L_{x_m}^K}{L_{x_m}^K + L_{x_f}^K} \right) + \theta_f^K \left(\frac{L_{x_f}^K}{L_{x_m}^K + L_{x_f}^K} \right) \quad \dots\dots\dots (7)$$

⁶ We assume that each pensioners' monthly pension is subsidized with a portion of the investments' return as $R_k/L_{x_f}^K$.

In the following Table and based on the data on Table 1, we solve equation 4 for θ_j^* for the years 1991-2021.

Table 7: θ_j^* when applying *pay as you go* for the years 1991 – 2021.

Year	θ_j^*
1991	0.18
1992	0.18
1993	0.18
1994	0.18
1995	0.18
1996	0.18
1997	0.18
1998	0.18
1999	0.18
2000	0.18
2001	0.18
2002	0.18
2003	0.18
2004	0.18
2005	0.18
2006	0.18
2007	0.18
2008	0.18
2009	0.18
2010	0.18
2011	0.19
2012	0.19
2013	0.19
2014	0.19
2015	0.19
2016	0.19
2017	0.19
2018	0.19
2019	0.19
2020	0.20
2021	0.20

6. Conclusions and Suggestions

The present θ_j^* (total monthly contribution for the social security system) is fixed at 0.25, where the government contributes by 0.10, the employers contribute by 0.10 and the employees contribute by 0.05. The study found that it is possible to switch from the present fund system to *pay as you go* in the Kuwaiti social security system, as θ_j^* will be between 0.18 to 0.20 rather than 0.25 in the present system.

Based on the above, we suggest that the SSA should switch from the present funding system to *pay as you go* to avoid future actuarial deficit and to reduce the cost of funding the system.

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Abstract

Kuwait Social Security Association (SSA) expects to face actuarial deficit by year 2019. The SSA applies a long term investment fund system since 1977. The generosity of the system so far is not affecting the wealth of this funding plan. However, many studies expect that the SSA will face an actuarial deficit by year 2019. This paper modifies an actuarial model by Beekman and Kabir (1997) to test the possibility of applying pay as you go method in the Kuwaiti system. The paper also modifies a model by Booth et al (1998) to be applied on present Kuwaiti system. The aim is to compare the required contribution by the applied fund system with pay as you go method based on the actual and speculated pay out in Kuwait.

Keywords: Social Security, Actuarial Science, Kuwait Social Security Funding System.

Book reviews

Revue bibliographique

The Triangle of Microfinance Financial Sustainability, Outreach, and Impact

Edited by Manfred Zeller and Richard L. Meyer

The Johns Hopkins University Press, Baltimore, 2003.

0-8018-7226-X \$ 35.00 paperback

0-8018-7148-4 \$ 70.00 hardcover

The term microfinance is relatively new, while the idea that finance matters in the process of development and in poverty alleviation has been shared among academics, policy makers and practitioners for long. How finance matters, however, has been overly discussed but, in the past decades, we witnessed some successes and many failures in credit projects aiming at achieving socio-economic improvement in poorest countries. Microfinance came in when the lessons learnt from past experiences had already produced some common views on how to promote successful financial development; some of these lessons are considered in microfinance projects, some are not. Open questions concern the role of domestic savings in microfinance or the role of public/foreign aid.

The idea of depicting microfinance as a triangle with three equally important objectives – sustainability, outreach and impact –, somehow conflicting but also synergistic, is appealing: how can an MFI maximize its outreach consistently with sustainability? What is the role of public support to microfinance? Should public funds foster financial sustainability of MFIs? Should this imply greater social benefits and greater impact? Useful suggestions for both the financial institutions and policy makers can be found in the book.

The book represents an interesting, guided collection of qualified contributions with empirical studies and related theoretical views. While it offers a comprehensive overview of shared paradigms of microfinance, it also opens new avenues for reflection and research. It is of great value not only for practitioners or academicians but also for those that are about to approach the subject.

Book reviews

Revue bibliographique

Replicating Microfinance in the United States

Edited by James H. Carr and Zhong Yi Tong, foreword by Richard Taub

Published by the Woodrow Wilson Center Press, Washington, D.C.

The Johns Hopkins University Press, Baltimore, 2002.

1-930365-11-X \$ 19.95 paperback

1-930365-10-1 \$ 45.00 hardcover

The fast change in the social structure in industrialised countries has, among other phenomena, increased the presence of "marginal segments" in the society who are often excluded from main economic and financial processes. In the United States, as well as in Europe, this may be related to recent immigration, but social and economic exclusion may also derive from other social discomforts. Most marginal segments are lacking appropriate access to financial services.

The book explores to which extent microfinance in the United States is effectively serving low and moderate-income populations. Despite some lessons learnt from the developing countries experiences, the book shows the specificity of the microfinance market in the U.S. both from the demand and from the supply side. For example, on the demand side, in the U.S., the creation of microenterprises is more difficult than in developing countries and business training is much more demanded; on the supply side, it is essential to integrate microfinance activities into community development strategies.

Very qualified contributors offer analyses and experiences on these and other issues. Finally, some reflections are offered on how the U.S. microfinance should evolve in the future (for example, through scale increase, a stronger focus on performance, the innovation in organisation, an in-depth market research) and on the links between microfinance and welfare policies.

While not implying acceptance, payment of fees, responsibility for loss or return, the Editor encourages the submission of manuscripts concerning money, financial intermediaries, financial techniques, and experiments in savings mobilization in developing countries. Manuscripts submitted for publication (two copies) should be in English, 4,000 - 10,000 words in length with a 200-400 word summary, typed on one side only of the sheet and double-spaced. Footnotes should be indicated by consecutive numbers throughout the paper. References in the text should be quoted by the author's last name and year of publication, e.g. Shaw (1973) or (Shaw, 1973). The title should be as compact as possible. Submission of the paper implies that it is an un-published work, not yet submitted for publication elsewhere. Sections and subsections of the paper should be indicated in cardinal numbers (e.g. 1.; 1.1; 1.2; etc.). Mathematical formulas should be numbered consecutively as [1], [2] etc. Figures should be limited in number and submitted in a form ready for the printer. References at the end should be listed alphabetically and quoted as follows:

- for articles: Galbis Vicente, "Monetary and Related Policies in Ministates", *Savings and Development* Vol. VIII, No. 4, 1984, pp.291-350;
- for books: McKinnon Ronald, *Money and Capital in Economic Development*, The Brookings Institution, Washington D.C., 1973. All communications should be sent to the Editor:

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