30th International Congress of Actuaries
30 March to 4 April 2014

THE FOUR-PILLAR HEALTHCARE FRAMEWORK

Washington DC, United States
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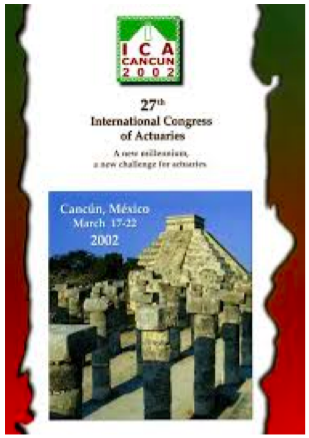
Do you know where ICAs 1988, 1992, 1995, 1998 were?



2002

2006

2010

2014

1988

1992

1995

1998

Agenda

- Understanding Health Care Systems
  - Distinctions Between Health Care and Pension
  - World Bank Five-pillar Pension Framework
  - i.e. Muhanna Proposed Pillars of Health Care
- Financial Sustainability of Health Care Systems
- Illustrating the Effect of Ageing Populations

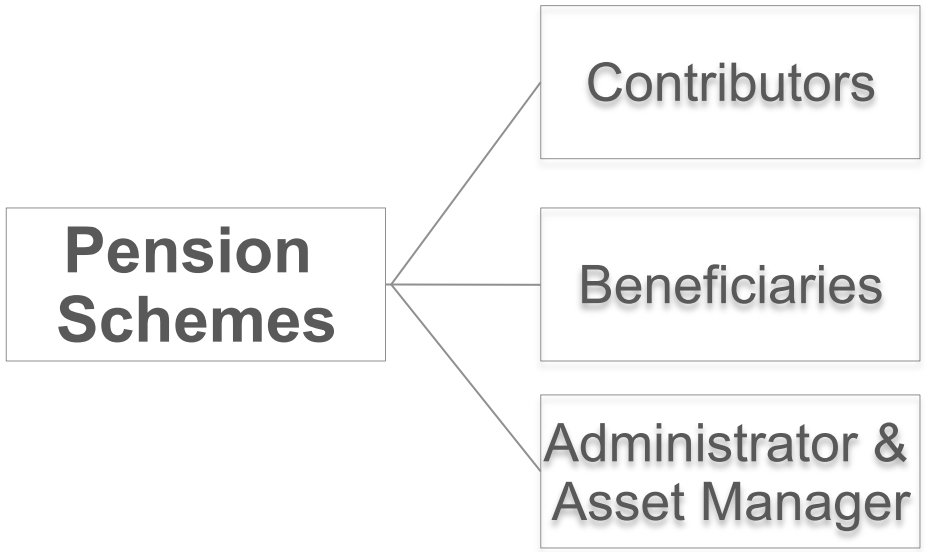
Understanding Health Care Systems

- Distinctions between pension and health care systems

Factor/Aspect	Pension	Health Care
Earnings	Directly Related	Indirectly Related
Contribution Period	Directly Related	Indirectly Related
Inflation	Indirect Effect	Direct (& Indirect) effect
Mortality	Direct Effect	Indirect effect
Morbidity	Lower effect	Higher effect
Anti-selection Risk due to eligibility	Low	High
Third Party	Little Effect	Large Effect
Benefits	Relatively easy to quantify	Harder to quantify

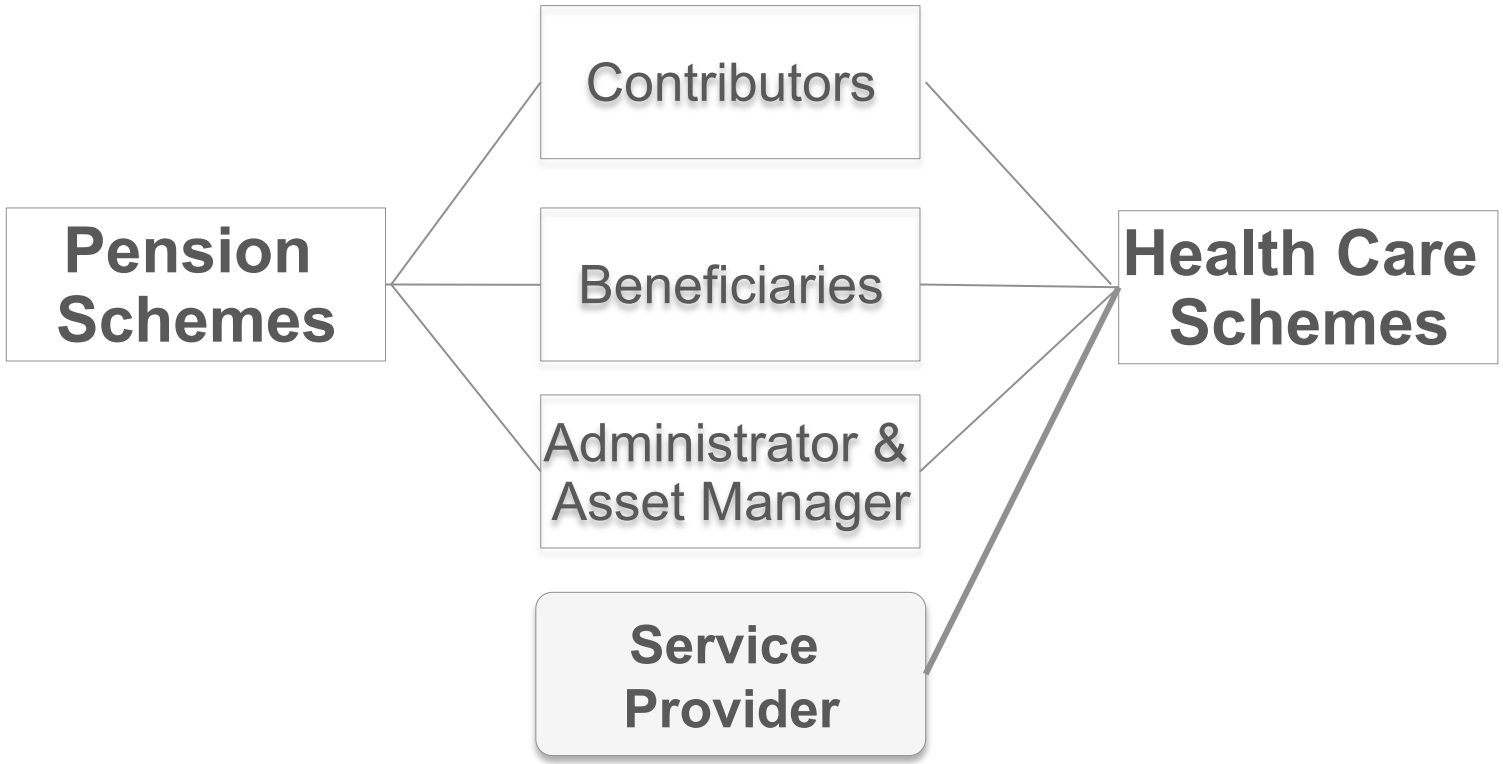
Understanding Health Care Systems

- Stakeholders involved



Understanding Health Care Systems

- Stakeholders involved



Understanding Health Care Systems

- World Bank Five-pillar Pension Framework

PILLAR	0	1	2	3	4
Description	**Basic, social pension, or social assistance**	**Public pension plan (Publicly managed)**	**Occupational or personal pension plans**	**Private schemes (Individual savings)**	**Informal support, other formal social programs (e.g. health) & other individual assets**
Who is covered	Life-time poor, Informal and formal sector	Formal sector	Formal sector	Middle & higher income persons	Life-time poor, informal and formal sector
What is covered	Basic protection for the elderly	Basic benefit replacing a portion of pre-retirement income *(40%)*	Additional benefit replacing an extra portion of pre-retirement income *(+30%)*	Savings & investments	Non Financial: Health, Homeownership, lands
Participation & Funding	Universal / General budget	Mandated / Contributions linked to earnings	Mandated / Defined Contributions	Voluntary / Contributions, Ind. savings or employer sponsored	Voluntary / Government and Individual assets

Understanding Health Care Systems

- i.e. Muhanna Proposed Pillars of Health Care

PILLAR	0	1	2	3
Description	**Welfare and Basic Health Care Benefits**	**Social Insurance Benefits**	**Occupational Health Care Benefits**	**Private Health Insurance and OOP payments**
Who is covered	Low income, Informal and formal sector	Formal Sector	Formal Sector	Middle & higher income
What is covered	Basic and primary health care services, (Preventive care, Maternity & Chronic Diseases)	Medical necessities, secondary, and tertiary care benefits with co-pays, class C	Top-up insurance, covering the co-pays, & costs not covered by pillar 1 & 2, Class B	Benefits covering extra amenities, elective coverage, Class A
Participation & Funding	Universal / General budget	Mandated / Contributions linked to earnings & sometimes General Budget	Mandated / Sponsor's and member's contributions	Voluntary / Individual Savings and OOP payments

Financial Sustainability of Health Care Systems

- **Problem of Financial Sustainability:** addressed today due to demographic changes and ageing populations, but the actual effect of these factors has not been quantified yet

- **Proposed Financing Mechanism:**
  - Setting up a hybrid health system that caters for ageing populations
  - Prefunding of health benefits of the elderly in the population
  - Continue paying benefits of the currently active on a pay-as-you-go basis

Illustrating the Effect of Ageing Populations

- **Methodology:**
  - 4 cases representing different ageing profiles
  - Simulate actual populations of countries that resemble the ageing profile required
  - Assumptions concerning burning costs, medical inflation and income related to age
  - Base projection year: 2010

Illustrating the Effect of Ageing Populations

- 4 cases of ageing population profiles

Cases	Demographic Indicators (year 2010)						
	as % of Total Population			Fertility Rates	Average Age	Life Expectancy	Ageing Stage
	Pop 0-18	Pop 19-64	Pop >65				
Base case	34%	56%	10%	1.8	31	73	Middle-aged
Case 1	44%	52%	4%	3.1	25	69	Young
Case 2	23%	65%	11%	1.2	37	81	Ageing
Case 3	17%	62%	21%	1.4	43	80	Ageing (Advanced stage)

- Cases simulate actual populations of 2010 that resemble the demographic profile required (Data Source: United Nations, 2010 Revision World Population Prospect)
  - Base Case: Lebanon's Population
  - Case 1: Philippines' Population
  - Case 2: Rep. of Korea's Population
  - Case 3: Germany's Population

Illustrating the Effect of Ageing Populations

- Assumptions Used
  - Income and Pensions

Age Bracket	Salaries & Pensions - 2010
0 - 15	-
16 - 25	4,500
26 - 35	5,600
36 - 45	**6,000**
46 - 55	6,600
56 - 65	7,500
66 - 75	4,500
76 - 85	4,500

  - Income Increase = 5% p.a (increase=inflation + merit)
  - Pension Increase= 3% p.a (increase=inflation)
  - Pension = 60% of last salary

Illustrating the Effect of Ageing Populations

- **Assumptions Used**
  - Subsequently, for a country with such income and pension distribution, the expected inpatient cost distribution would be:

Illustrating the Effect of Ageing Populations

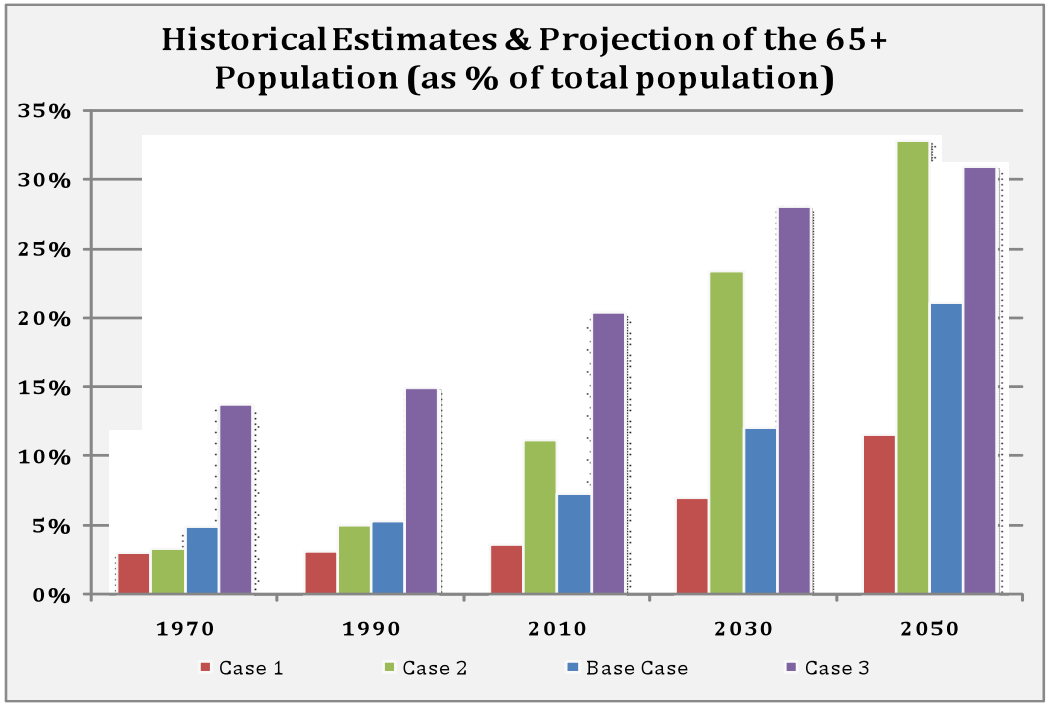
- **Assumptions Used**
  - Inpatient cost, utilization rates, and age-sensitive medical inflation

Age Bracket	Indexed Average Cost	Utilization Rate	Inpatient Burning Cost	Age-Sensitive Medical Inflation
0 - 15	520	15%	78	2.0%
16 - 25	670	8%	54	1.5%
26 - 35	1,090	10%	109	1.0%
36 - 45	**1,000**	13%	**130**	**0.5%**
46 - 55	1,270	15%	191	1.0%
56 - 65	1,690	23%	389	1.5%
66 - 75	2,150	26%	559	2.0%
76 - 85	2,700	29%	783	2.5%

  - Total Medical Inflation = Age-Sensitive Medical Inflation + 3.5%

Illustrating the Effect of Ageing Populations

- Demographic Projections



  - Trend towards ageing populations
  - Expected faster trend towards ageing populations than observed historically

Illustrating the Effect of Ageing Populations

- **Demographic Projections**
  - Average age projection

Case	Average Age				
	1970	1990	2010	2030	2050
Base Case	24	25	**31**	37	43.
Case 1	21	22	**25**	29	35
Case 2	23	29	**37**	44	48
Case 3	36	39	**43**	46	47

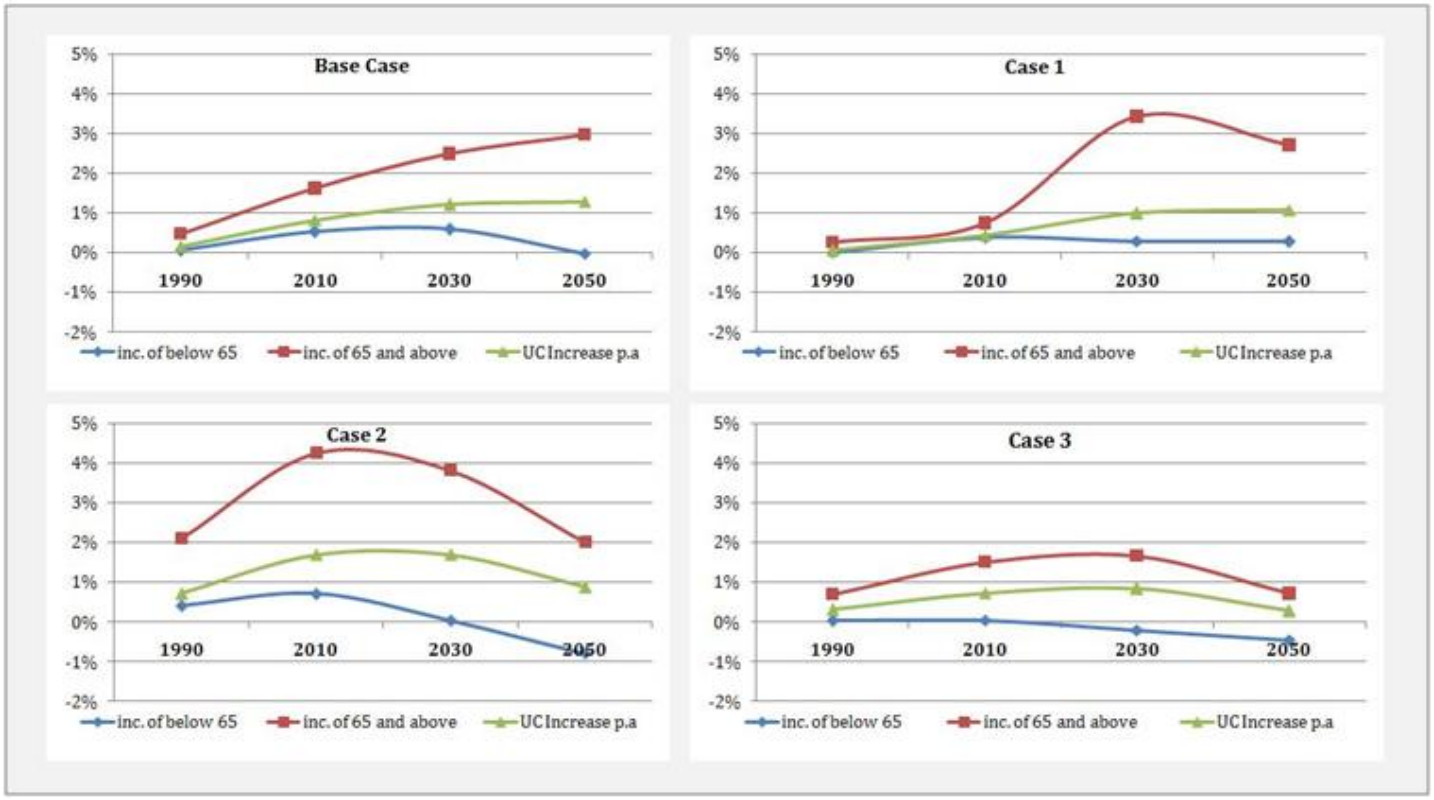
Illustrating the Effect of Ageing Populations

- **Effect on Burning Cost**
  - Projected Burning Costs – No-Inflation Scenario

Case	Inpatient Burning Costs – No-Inflation Scenario				
	1970	1990	2010	2030	2050
Base Case	135	139	**163**	207	267
Increase p.a.		***0.15%***	***0.81%***	***1.20%***	***1.28%***
Inc. of below 65		*0.06%*	*0.52%*	*0.59%*	*-0.03%*
Inc. of 65 and Above		*0.47%*	*1.62%*	*2.49%*	*2.97%*
Case 1	118	119	**130**	159	196
Increase p.a.		***0.06%***	***0.45%***	***0.99%***	***1.08%***
Inc. of below 65		*0.02%*	*0.39%*	*0.29%*	*0.28%*
Inc. of 65 and Above		*0.26%*	*0.75%*	*3.42%*	*2.70%*
Case 2	125	144	**202**	283	338
Increase p.a.		***0.73%***	***1.70%***	***1.70%***	***0.89%***
Inc. of below 65		*0.41%*	*0.71%*	*0.03%*	*-0.79%*
Inc. of 65 and Above		*2.10%*	*4.24%*	*3.81%*	*2.02%*
Case 3	212	225	**261**	308	326
Increase p.a.		***0.31%***	***0.73%***	***0.84%***	***0.28%***
Inc. of below 65		*0.03%*	*0.04%*	*-0.20%*	*-0.45%*
Inc. of 65 and Above		*0.70%*	*1.50%*	*1.67%*	*0.71%*

Illustrating the Effect of Ageing Populations

- **Effect on Burning Cost**
  - Projected Burning Costs – No-Inflation Scenario



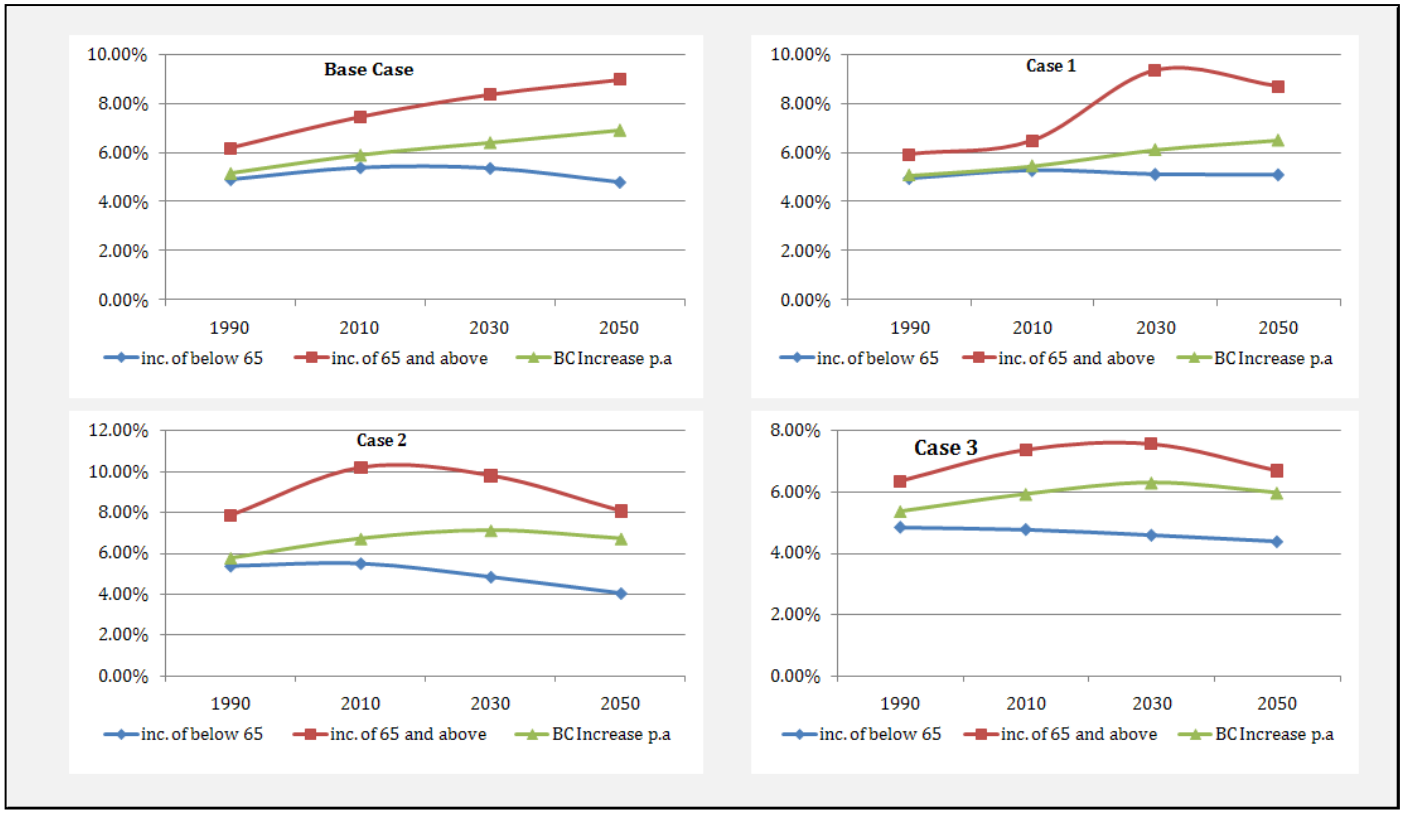
Illustrating the Effect of Ageing Populations

- **Effect on Burning Cost**
  - Projected Burning Costs – Inflation Scenario

Case	Inpatient Burning Costs – No-Inflation Scenario				
	1970	1990	2010	2030	2050
Base Case	19	52	**163**	563	2,139
Increase p.a.		***5.16%***	***5.89%***	***6.39%***	***6.90%***
Inc. of below 65		*4.91%*	*5.39%*	*5.36%*	*4.81%*
Inc. of 65 and Above		*6.17%*	*7.44%*	*8.35%*	*8.96%*
Case 1	17	45	**130**	427	1,504
Increase p.a.		***5.08%***	***5.46%***	***6.11%***	***6.50%***
Inc. of below 65		*4.95%*	*5.26%*	*5.11%*	*5.09%*
Inc. of 65 and Above		*5.92%*	*6.48%*	*9.34%*	*8.68%*
Case 2	18	55	**202**	798	2,924
Increase p.a.		***5.74%***	***6.71%***	***7.11%***	***6.71%***
Inc. of below 65		*5.36%*	*5.48%*	*4.82%*	*4.01%*
Inc. of 65 and Above		*7.87%*	*10.17%*	*9.78%*	*8.07%*
Case 3	29	82	**261**	885	2,820
Increase p.a.		***5.37%***	***5.93%***	***6.30%***	***5.97%***
Inc. of below 65		*4.83%*	*4.76%*	*4.58%*	*4.37%*
Inc. of 65 and Above		*6.34%*	*7.36%*	*7.55%*	*6.67%*

Illustrating the Effect of Ageing Populations

- **Effect on Burning Cost**
  - Projected Burning Costs – Inflation Scenario



Illustrating the Effect of Ageing Populations

- **Ageing effect on medical inflation Burning Cost**
  - Medical inflation projection

Case	Medical Inflation				
	1970	1990	2010	2030	2050
Base Case	5.0%	5.00%	**4.9%**	4.9%	5.0%
Weighted Inflation of less than 65	*4.8%*	*4.7%*	*4.5%*	*4.2%*	*3.8%*
Weighted Inflation of 65 and above	*0.3%*	*0.3%*	*0.4%*	*0.7%*	*1.2%*
Case 1	5.1%	5.0%	**5.0%**	4.9%	4.9%
Weighted Inflation of less than 65	*4.9%*	*4.8%*	*4.8%*	*4.5%*	*4.3%*
Weighted Inflation of 65 and above	*0.2%*	*0.2%*	*0.2%*	*0.4%*	*0.7%*
Case 2	5.0%	4.9%	**4.9%**	5.0%	5.0%
Weighted Inflation of less than 65	*4.8%*	*4.6%*	*4.2%*	*3.7%*	*3.2%*
Weighted Inflation of 65 and above	*0.2%*	*0.3%*	*0.6%*	*1.3%*	*1.9%*
Case 3	5.0%	4.9%	**4.9%**	5.0%	5.1%
Weighted Inflation of less than 65	*4.2%*	*4.1%*	*3.8%*	*3.4%*	*3.3%*
Weighted Inflation of 65 and above	*0.8%*	*0.9%*	*1.2%*	*1.6%*	*1.8%*

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Base Case

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.86%	3.79%	3.84%	4.66%	6.94%
Population Below 65	3.17%	2.98%	2.74%	2.74%	2.75%
Population 65 and Above	0.68%	0.81%	1.10%	1.92%	4.19%

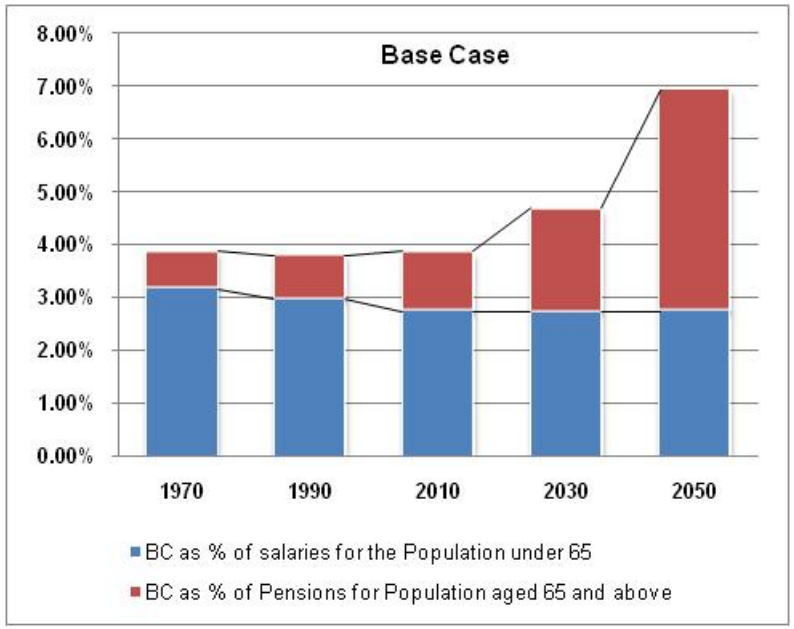
Illustrating the Effect of Ageing Populations

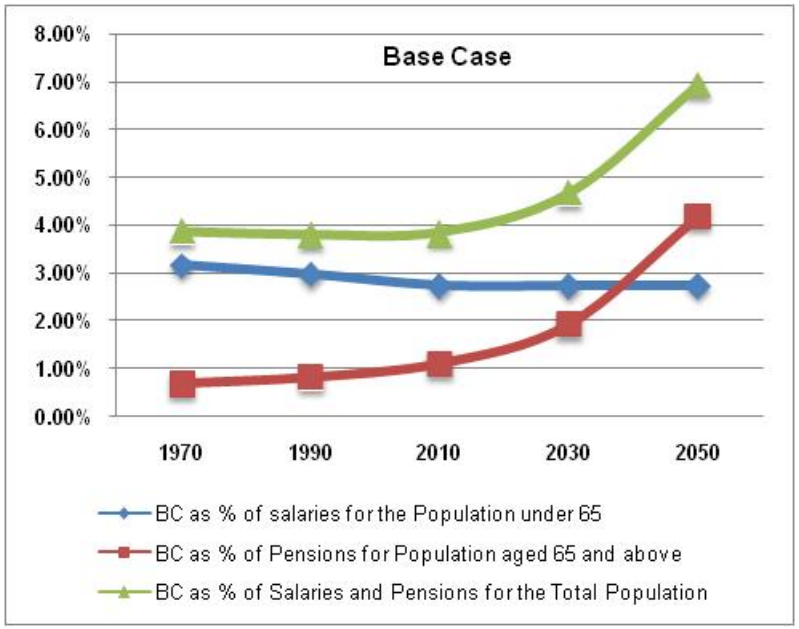
- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Base Case

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.86%	3.79%	3.84%	4.66%	6.94%
Increase p.a.		*-0.08%*	*0.06%*	*0.97%*	*2.01%*
Population Below 65	3.17%	2.98%	2.74%	2.74%	2.75%
Increase p.a.		*-0.31%*	*-0.42%*	*-0.01%*	*0.01%*
Population 65 and Above	0.68%	0.81%	1.10%	1.92%	4.19%
Increase p.a.		*0.88%*	*1.53%*	*2.83%*	*3.97%*

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Base Case





  - Burning cost as % of pensions (65+) exceeds the burning cost as % of salaries (65-) in 2040 under the model's assumptions

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 1

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.79%	3.64%	3.63%	4.11%	5.22%
Population Below 65	3.33%	3.12%	3.00%	2.80%	2.73%
Population 65 and Above	0.47%	0.52%	0.63%	1.31%	2.49%

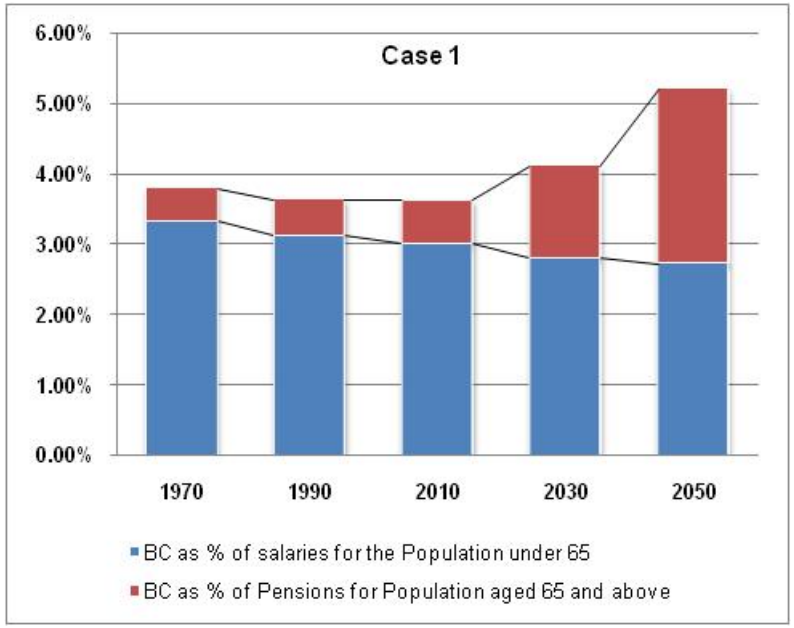
Illustrating the Effect of Ageing Populations

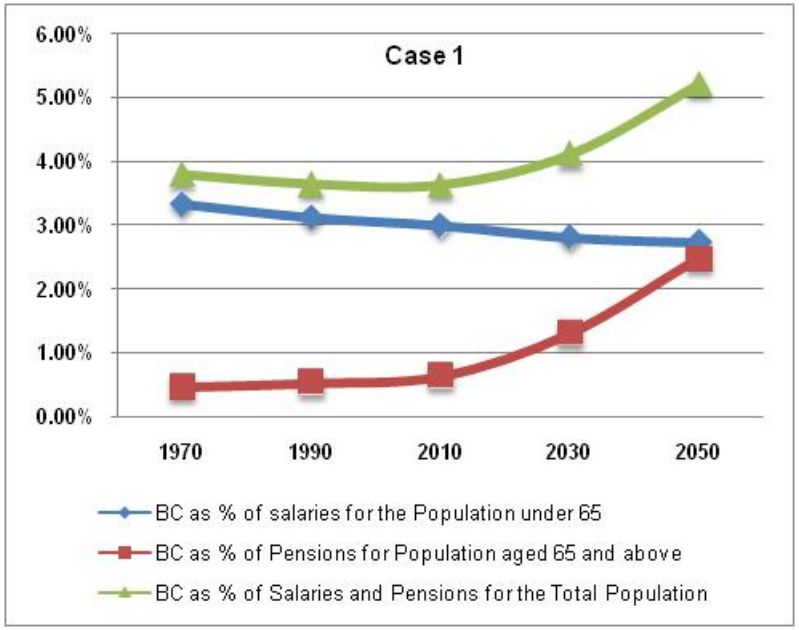
- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 1

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.79%	3.64%	3.63%	4.11%	5.22%
Increase p.a.		*-0.20%*	*-0.02%*	*0.62%*	*1.20%*
Population Below 65	3.33%	3.12%	3.00%	2.80%	2.73%
Increase p.a.		*-0.32%*	*-0.20%*	*-0.33%*	*-0.14%*
Population 65 and Above	0.47%	0.52%	0.63%	1.31%	2.49%
Increase p.a.		*0.60%*	*0.95%*	*3.68%*	*3.28%*

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 1





  - Burning cost as % of pensions (65+) exceeds the burning cost as % of salaries (65-) in 2050 under the model's assumptions

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 2

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.75%	3.43%	4.18%	6.54%	10.37%
Population Below 65	3.28%	2.79%	2.70%	2.74%	2.60%
Population 65 and Above	0.47%	0.64%	1.48%	3.80%	7.76%

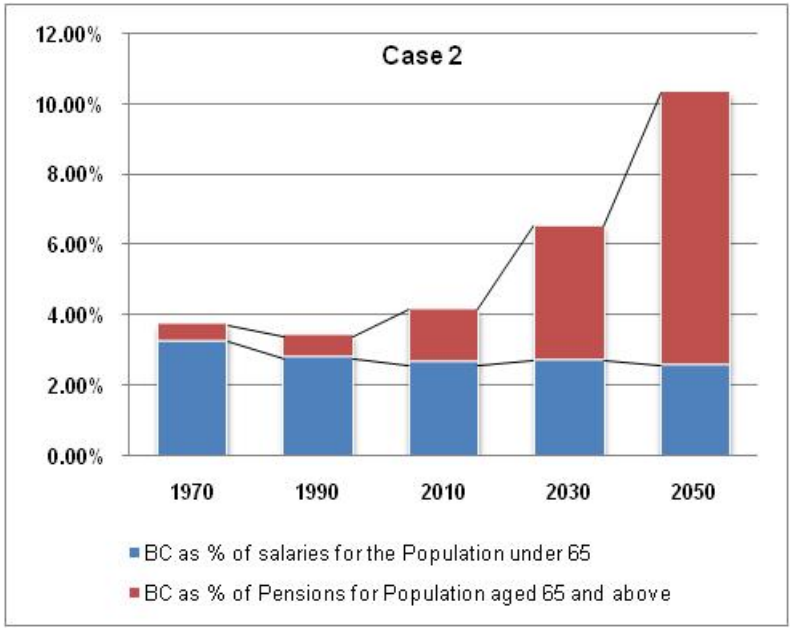
Illustrating the Effect of Ageing Populations

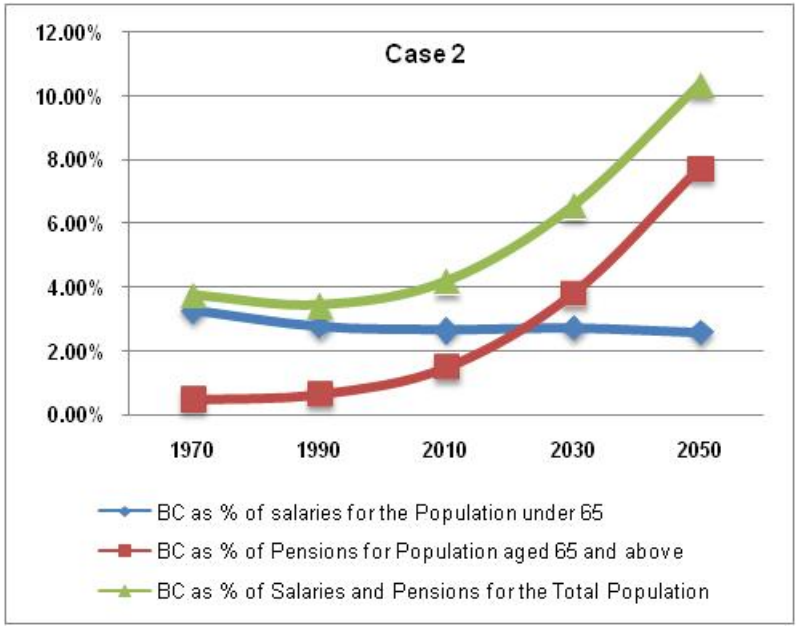
- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 2

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.75%	3.43%	4.18%	6.54%	10.37%
Increase p.a.		*-0.44%*	*0.98%*	*2.27%*	*2.33%*
Population Below 65	3.28%	2.79%	2.70%	2.74%	2.60%
Increase p.a.		*-0.80%*	*-0.17%*	*0.08%*	*-0.26%*
Population 65 and Above	0.47%	0.64%	1.48%	3.80%	7.76%
Increase p.a.		*1.56%*	*4.26%*	*4.82%*	*3.63%*

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 2





  - Burning cost as % of pensions (65+) exceeds the burning cost as % of salaries (65-) in 2020 under the model's assumptions

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 3

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.99%	4.28%	5.27%	7.48%	10.06%
Population Below 65	2.69%	2.60%	2.57%	2.63%	2.61%
Population 65 and Above	1.30%	1.68%	2.70%	4.85%	7.45%

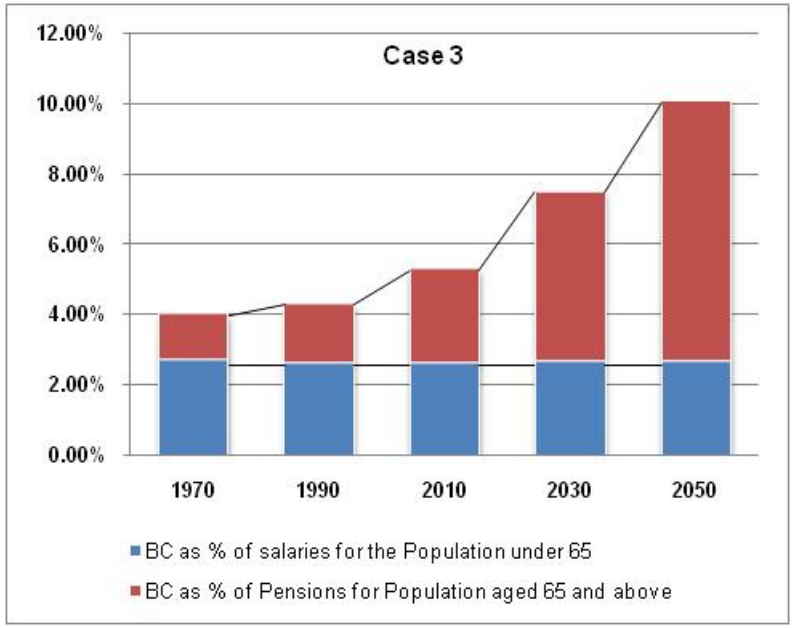
Illustrating the Effect of Ageing Populations

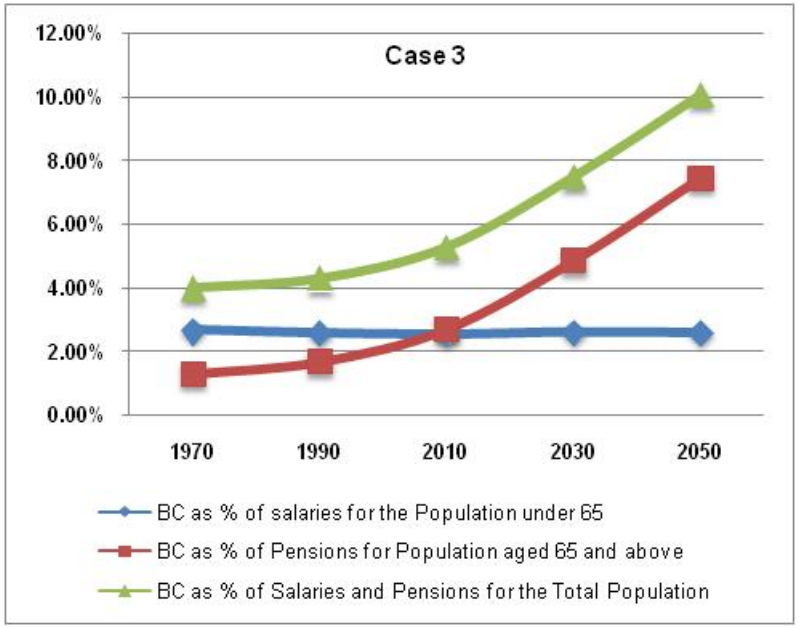
- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 3

Population Segment	Burning Cost as % of Salaries & Pensions				
	1970	1990	2010	2030	2050
Total Population	3.99%	4.28%	5.27%	7.48%	10.06%
Increase p.a.		*0.35%*	*1.04%*	*1.76%*	*1.50%*
Population Below 65	2.69%	2.60%	2.57%	2.63%	2.61%
Increase p.a.		*-0.16%*	*-0.07%*	*0.12%*	*-0.03%*
Population 65 and Above	1.30%	1.68%	2.70%	4.85%	7.45%
Increase p.a.		*1.27%*	*2.41%*	*2.96%*	*2.17%*

Illustrating the Effect of Ageing Populations

- Effect of ageing on contribution rates
  - Projected burning costs as % of salaries & pensions – Case 3





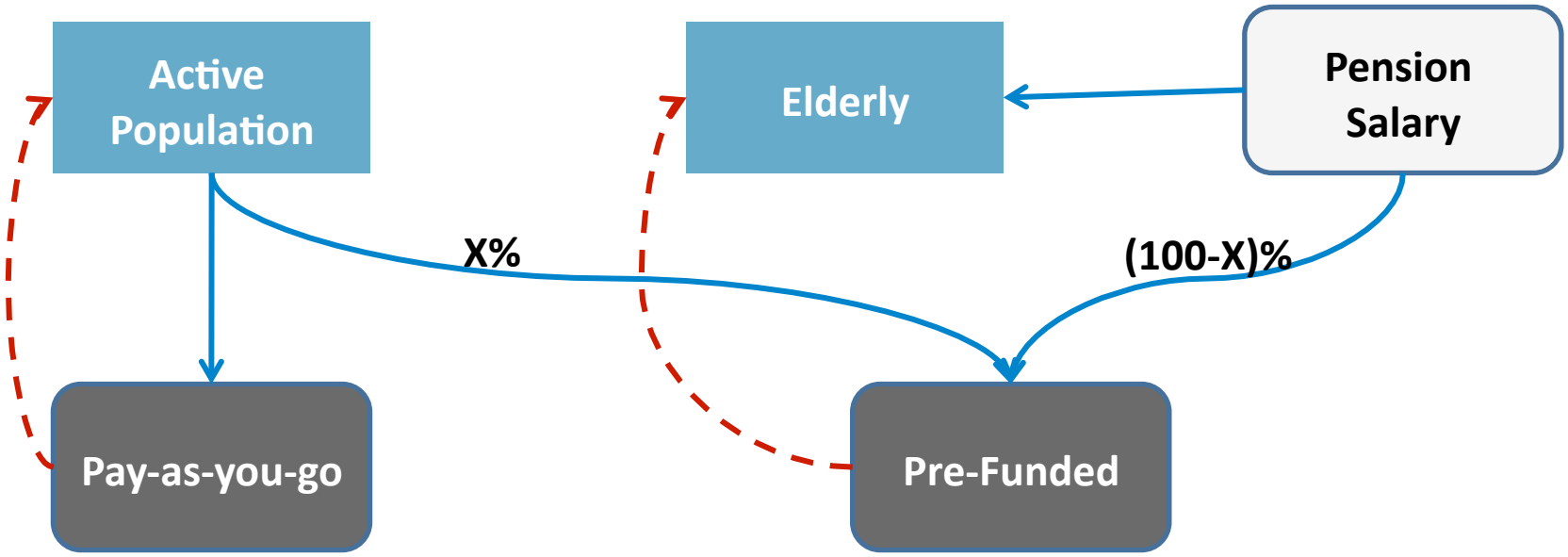
  - Burning cost as % of pensions (65+) had already exceeded the burning cost as % of salaries (65-) by 2010 under the model's assumptions

Illustrating the Effect of Ageing Populations

- Young and middle-aged populations show a future tendency in demographic changes towards becoming ageing populations
- The increase in retirees leads to an increase in burning costs, irrespective of all other parameters
- The medical inflation increases at a faster rate than normal due to the ageing of populations which causes additional increases to the burning costs
- Prefunding for post-retirement health care benefits within a hybrid model for elderly

Illustrating the Effect of Ageing Populations

- Hybrid Pre-Funded Model
  - Active population: Pay-as-you-go funding
  - Elderly: funded partly through pension and partly from active population



Illustrating the Effect of Ageing Populations

- **Hybrid Pre-Funded Model**

- **Main Advantage**
  - Active population is held accountable to their choices of future benefits while keeping a buffer for adjustments in the future

- **Main Disadvantage**
  - Difficulty in administering vesting of benefits

Thank you for your time

Any questions?

Full paper could be found on

www.muhanna.org

www.issa.int