Institute of Policy Studies

Scenarios of Future Population Growth and Change in Singapore

Demography and Family Cluster

Background

The Institute of Policy Studies (IPS) embarked on a project in 2007 to study scenarios of future population growth and change for Singapore[1]. This report highlights some of the project's findings.

Two questions are examined:

1) What will the future population of Singapore look like if the Total Fertility Rate (TFR) remains extremely low over the long term; and
2) What will be the likely effects of raising the TFR versus increasing immigration on the future population of Singapore?

Assumptions

Scenario 1: TFR remains at 1.24 births per woman and there is zero net migration throughout the projection period (Constant Low Fertility, Closed Population).

Scenario 2: TFR remains at 1.24 births per woman and 30,000 net migrants are added annually throughout the projection period (Constant Low Fertility, Low Migration).

Scenario 3: TFR remains at 1.24 births per woman and 60,000 net migrants are added annually throughout the projection period (Constant Low Fertility, Medium Migration).

[1] The Demography and Family Cluster at IPS acknowledges the contributions of Dr G. Shantakumar and Ms. Hazel Macadangdang in generating the population projections used in this article. The information presented here are part of a set of 48 scenarios generated. Dr Shantakumar is a Statistician/Demographer who has retired after serving as Associate Professor in the Department of Economics, National University of Singapore. Ms. Macadangdang worked under the supervision of Dr Shantakumar.

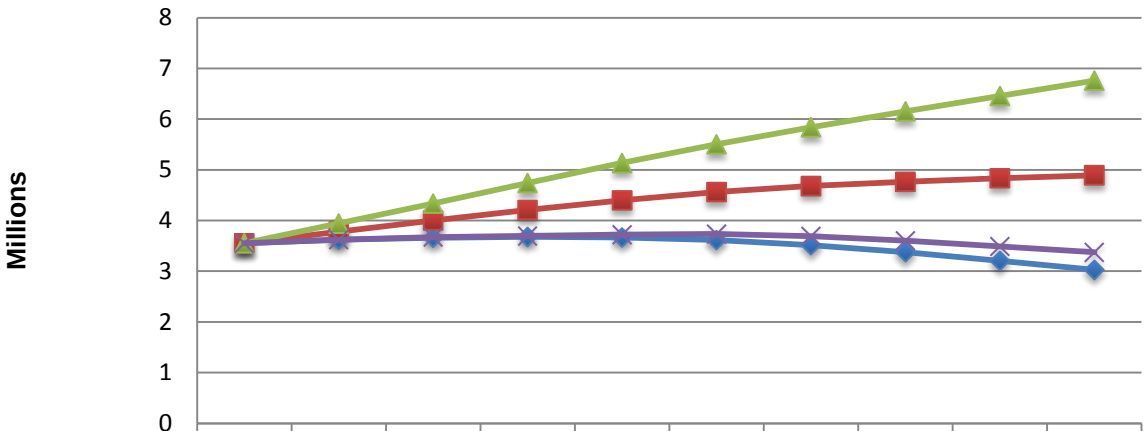
Scenario 4: TFR rises gradually from 1.24 to 1.85 births per woman by 2025 before stabilizing at this level and there is zero net migration throughout the projection period (Rising Fertility, Closed Population).

Mortality assumptions are common for all four scenarios. These are represented by life expectancy at birth that is assumed to increase from 77.4 years in 2005 to 79.7 years in 2050 for males, and from 81.3 to 84.6 years over the same period for females. The base year for all four scenarios is 2005.

Results

a) Population Size and Growth Trends (Figure 1)

Figure 1 Singapore Resident Population 2005-2050



	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Scenario 1	3.55	3.62	3.66	3.68	3.66	3.62	3.52	3.37	3.21	3.03
Scenario 2	3.55	3.78	4.00	4.21	4.40	4.56	4.68	4.77	4.83	4.89
Scenario 3	3.55	3.94	4.34	4.74	5.13	5.50	5.84	6.16	6.46	6.76
Scenario 4	3.55	3.62	3.67	3.70	3.72	3.73	3.69	3.60	3.49	3.37

Under Scenario 1, the total resident population of Singapore is projected to grow from 3.55 million in 2005 to about 3.68 million in 2020 before declining to 3.52 million in 2035 and 3.03 million in 2050. The growth in the population beyond 2005 is due to population momentum. The number of babies added to the population will continue to exceed the number of people dying and exiting the population for some time due to the age-structure of the population. This excess of births over deaths will cease as fewer young people enter the reproductive ages and the number of deaths increases as the population ages.

If 30,000 net migrants are added annually and these reproduce at the same rate as the local population (Scenario 2), the total resident population can be expected to rise throughout the projection period, from 3.55 in 2005 to about 4.89 million in 2050.

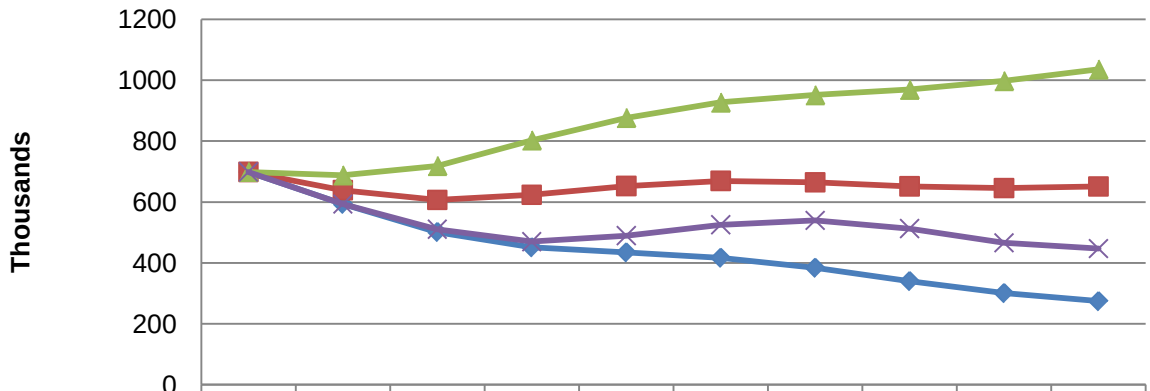
The resident population will grow further to 6.76 million in 2050 if 60,000 net migrants are added annually and these migrants reproduce at the same rate as the local population (Scenario 3).

However, if only the TFR is raised and the population is closed to migration (Scenario 4), the resident population peaks at 3.73 million in 2030 before declining to 3.37 million in 2050.

b) Changes in Age Structure in Numbers (Figures 2-4)

i. The Young (Figure 2)

Figure 2 Resident Young (0-14 years) 2005-2050

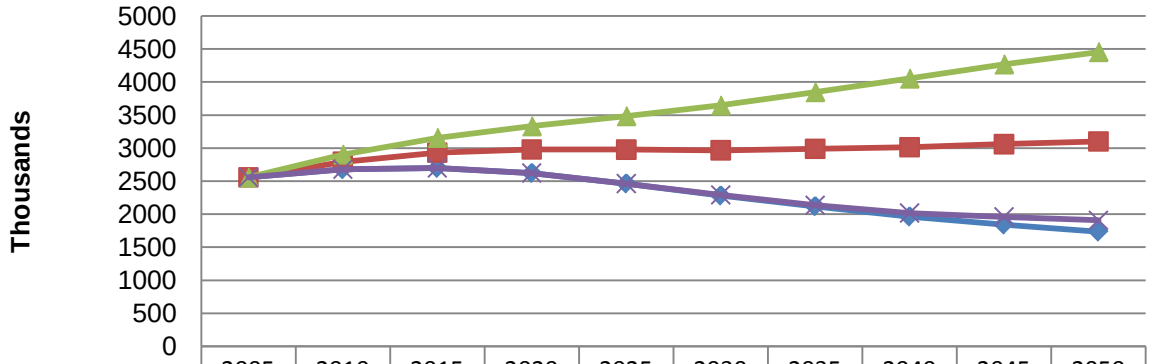


	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Scenario 1	699.0	593.4	501.3	451.1	434.5	416.8	384.0	340.4	301.0	274.4
Scenario 2	699.0	639.0	607.2	623.6	652.8	669.6	665.1	651.7	645.7	651.3
Scenario 3	699.0	687.7	718.6	802.7	876.7	927.2	951.4	969.3	997.9	1036.1
Scenario 4	699.0	593.4	510.8	469.9	489.7	525.6	539.7	512.9	465.9	447.1

With low fertility and no immigration (Scenario 1) the number of the young aged 0-14 years is likely to decline from 699,000 in 2005 to less than half this size (274,400) by 2050. Immigration ameliorates the decline under Scenario 2, with the number of the young in 2050 only slightly lower than that in 2005 (about 650,000). It, however, increases the population of resident young to 1.04 million in 2050 under Scenario 3. If fertility is raised but the population is closed to migration (Scenario 4), this segment of the population is also projected to decline, although less dramatically than under Scenario 1.

ii. The Working Age Population (Figure 3)

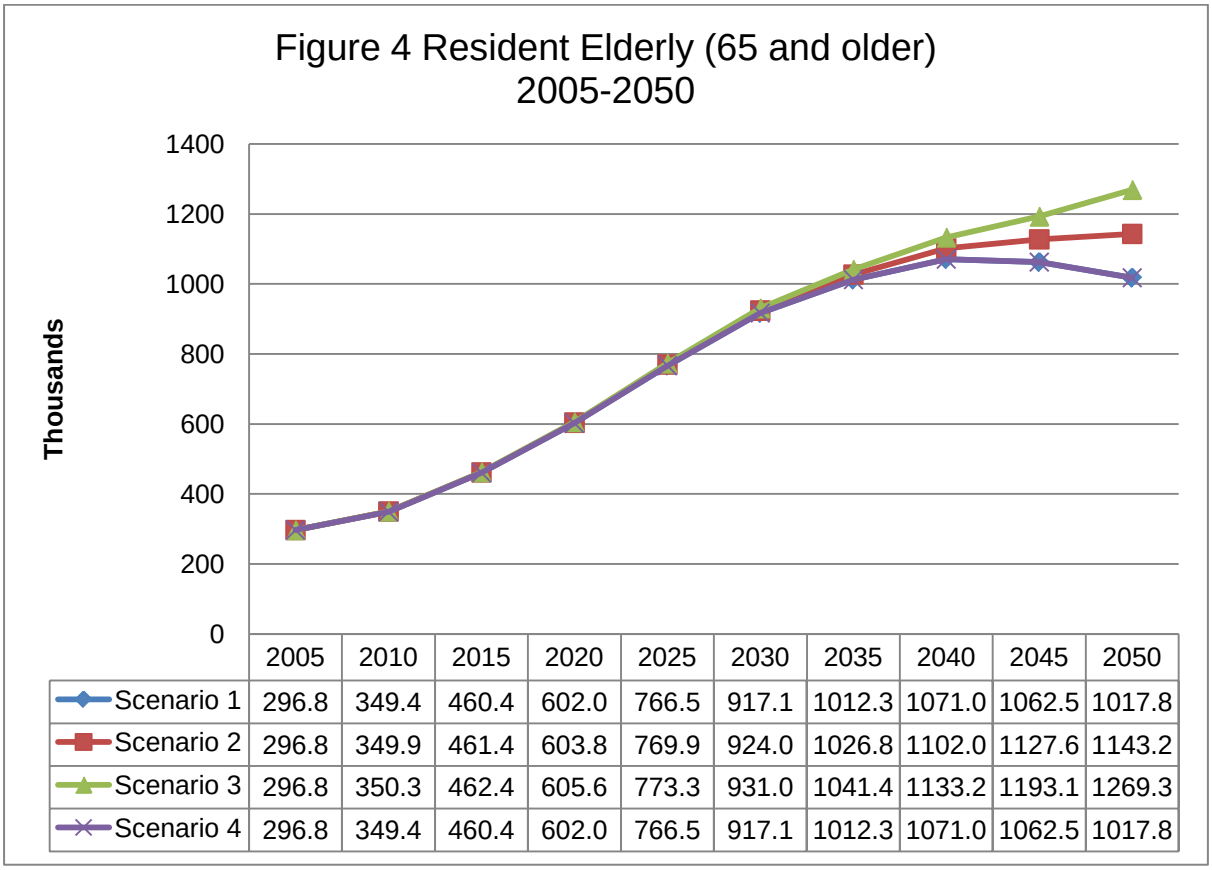
Figure 3 Resident Working Age Population (15-64 years) 2005-2050



	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Scenario 1	2557.5	2679.5	2699.2	2623.2	2463.6	2281.1	2119.2	1962.7	1841.8	1733.6
Scenario 2	2557.5	2793.0	2930.5	2981.3	2977.7	2967.3	2988.0	3012.9	3060.2	3099.6
Scenario 3	2557.5	2903.6	3156.2	3331.8	3484.3	3646.0	3848.4	4053.5	4268.1	4454.4
Scenario 4	2557.5	2679.5	2699.2	2623.3	2463.6	2290.6	2138.1	2017.8	1959.7	1907.7

Under Scenario 1, the working age population is projected to decline from 2.56 million in 2005 to 1.73 million in 2050 after peaking at about 2.7 million in 2015. In comparison, under Scenario 2, the working age population would increase gradually over the entire period, rising to nearly 3.1 million in 2050. Not unexpectedly, the growth in this population segment is much higher under Scenario 3, reaching nearly 4.5 million in 2050. Raising the TFR alone and closing the population to immigration (Scenario 4) adds little to the growth of the working age population compared to Scenario 1.

iii. The Elderly (Figure 4)

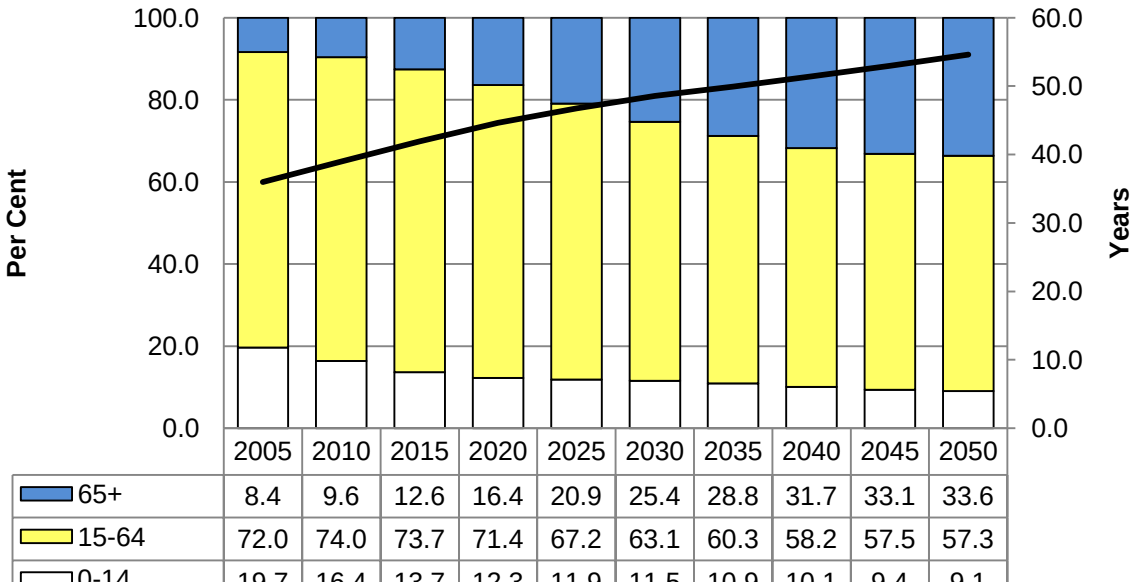


	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Scenario 1	296.8	349.4	460.4	602.0	766.5	917.1	1012.3	1071.0	1062.5	1017.8
Scenario 2	296.8	349.9	461.4	603.8	769.9	924.0	1026.8	1102.0	1127.6	1143.2
Scenario 3	296.8	350.3	462.4	605.6	773.3	931.0	1041.4	1133.2	1193.1	1269.3
Scenario 4	296.8	349.4	460.4	602.0	766.5	917.1	1012.3	1071.0	1062.5	1017.8

There is not much difference in the number of the elderly regardless of scenarios until after 2030. This is because up until then, the future elderly are already born and existing in the population and the results of in-migration will only be felt later.

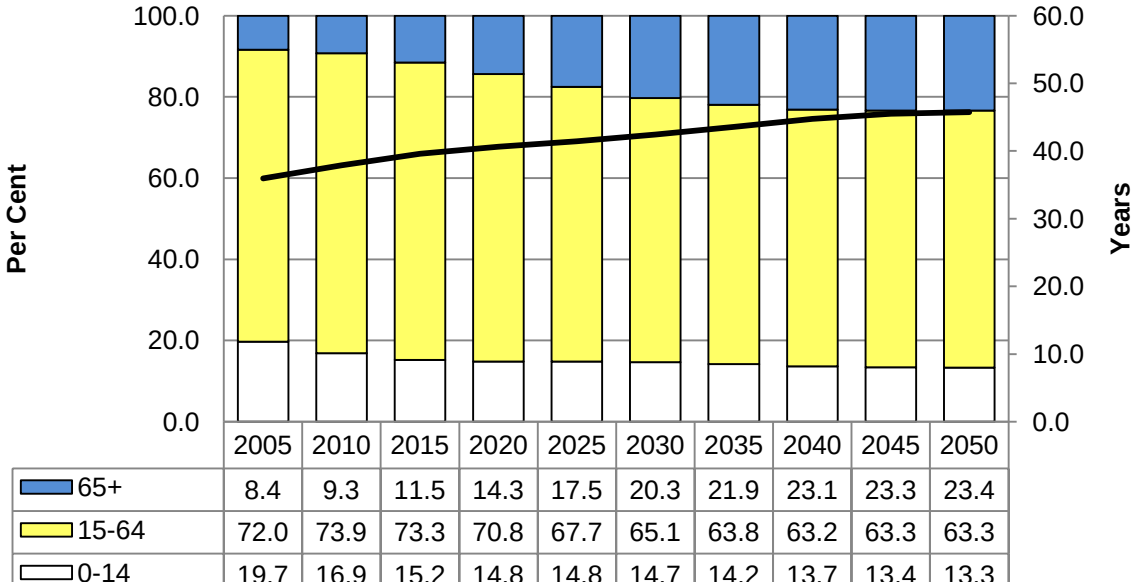
c) Changes in Age Structure in Proportionate Terms (Figures 5-8)

Figure 5: Population Structure and Median Age of Population
-- Scenario 1 --



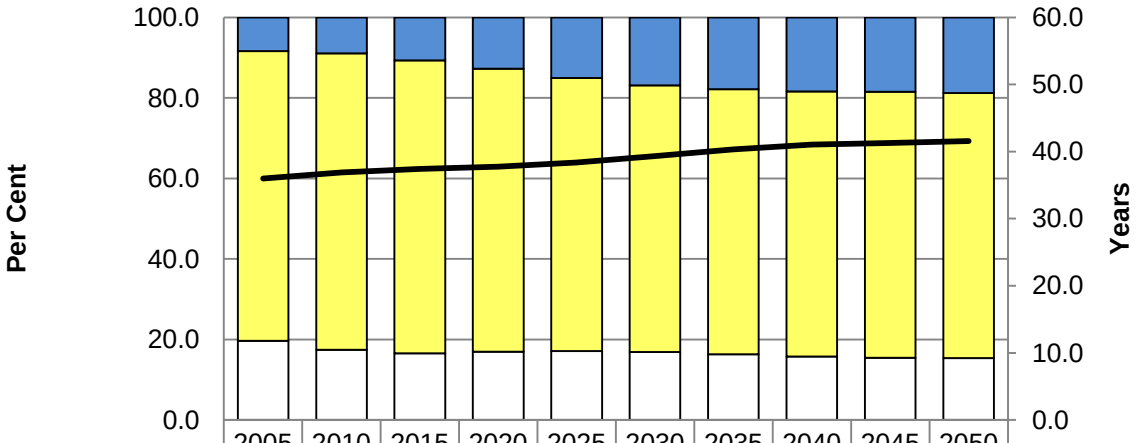
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
65+	8.4	9.6	12.6	16.4	20.9	25.4	28.8	31.7	33.1	33.6
15-64	72.0	74.0	73.7	71.4	67.2	63.1	60.3	58.2	57.5	57.3
0-14	19.7	16.4	13.7	12.3	11.9	11.5	10.9	10.1	9.4	9.1
Median age	36.0	39.0	41.9	44.6	46.8	48.6	50.0	51.4	53.0	54.6

Figure 6: Population Structure and Median Age of Population
-- Scenario 2 --



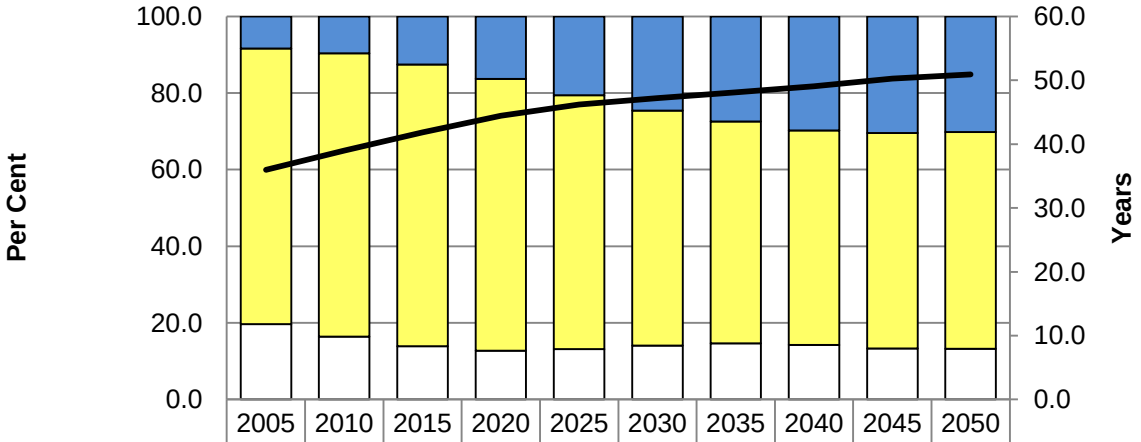
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
65+	8.4	9.3	11.5	14.3	17.5	20.3	21.9	23.1	23.3	23.4
15-64	72.0	73.9	73.3	70.8	67.7	65.1	63.8	63.2	63.3	63.3
0-14	19.7	16.9	15.2	14.8	14.8	14.7	14.2	13.7	13.4	13.3
Median age	36.0	37.9	39.6	40.7	41.4	42.4	43.6	44.7	45.5	45.7

Figure 7: Population Structure and Median Age of Population
-- Scenario 3 --



	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
65+	8.4	8.9	10.7	12.8	15.1	16.9	17.8	18.4	18.5	18.8
15-64	72.0	73.7	72.8	70.3	67.9	66.2	65.9	65.8	66.1	65.9
0-14	19.7	17.4	16.6	16.9	17.1	16.8	16.3	15.7	15.4	15.3
Median age	36.0	36.9	37.4	37.8	38.4	39.3	40.4	41.0	41.3	41.6

Figure 8: Population Structure and Median Age of Population
-- Scenario 4 --



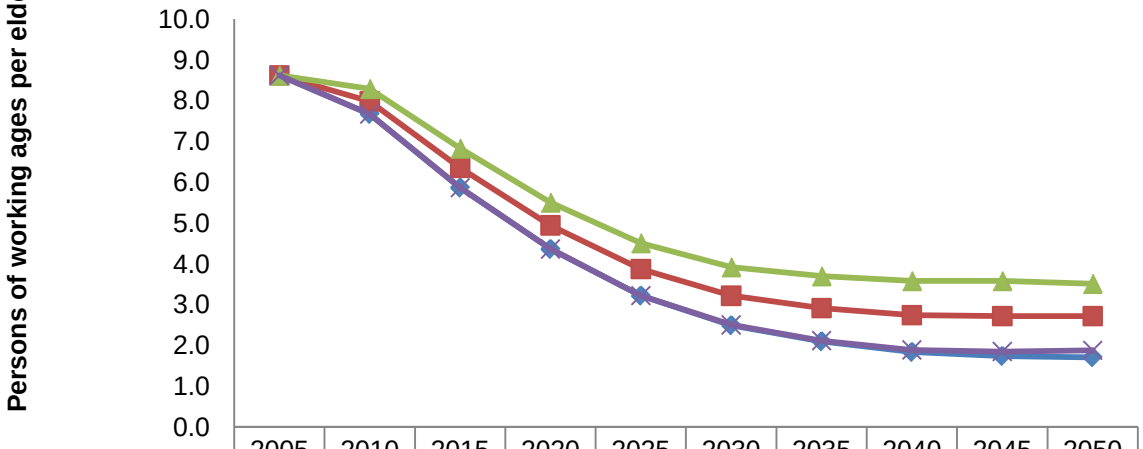
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
65+	8.4	9.6	12.5	16.3	20.6	24.6	27.4	29.7	30.5	30.2
15-64	72.0	74.0	73.5	71.0	66.2	61.4	57.9	56.0	56.2	56.6
0-14	19.7	16.4	13.9	12.7	13.2	14.1	14.6	14.2	13.4	13.3
Median Age	36.0	39.0	41.8	44.4	46.2	47.2	48.1	49.1	50.2	50.9

Figures 5-8 show the shifts in the relative shares of the three broad age components under the four scenarios. Both the proportion of the young and the proportion in the working ages are projected to decline from their 2005 levels for all scenarios, while the proportion of the elderly is projected to rise. The median age is also projected to rise in all four scenarios.

The extent of population ageing, however, varies across the four scenarios. The population will age the most under scenario 1. In-migration reduces the pace of population ageing, especially as the level of in-migration is raised. Raising the TFR would have a smaller effect on population ageing.

d) Changes in the Support Ratio (Figure 9)

Figure 9: Potential Support Ratio



	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Scenario 1	8.6	7.7	5.9	4.4	3.2	2.5	2.1	1.8	1.7	1.7
Scenario 2	8.6	8.0	6.4	4.9	3.9	3.2	2.9	2.7	2.7	2.7
Scenario 3	8.6	8.3	6.8	5.5	4.5	3.9	3.7	3.6	3.6	3.5
Scenario 4	8.6	7.7	5.9	4.4	3.2	2.5	2.1	1.9	1.8	1.9

Figure 9 shows that the number of persons of working ages available to support each elderly is projected to decline from 8.6 in 2005 to only 1.7 by 2045-2050 under scenario 1. Raising the TFR to 1.85 has little effect. However, in-migration would ameliorate this decline, with the potential support ratio in 2050 being 2.7 under scenario 2 and 3.5 under scenario 3.

Conclusion

If the resident TFR for Singapore remains extremely low over the long term and there is no in-migration, the resident population can be expected to decline and it will also be extremely aged. The results of this exercise suggest that raising the TFR alone will ameliorate the situation marginally. Immigration helps to reduce the dependency burden and raise the support ratio.

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(Final Version – 9 September 2011) For more information, please email ips.publicaffairs@nus.edu.sg

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