POPULATION AND LABOUR FORCE: DYNAMICS AND POLICY IN SINGAPORE

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1. Introduction

Recent concerns on falling fertility rates have highlighted issues and problems of a future declining population. In 1987, a government committee recommended measures to arrest the fertility decline through *selective* pro-natalist policies. Several demographers then felt that the policies were pointedly *eugenic* or even ethnic-oriented, despite any such explicit emphasis (Palen, 1986; Chee and Chan , 1984; Hull and Larson, 1987). A 1987 study group(Lim Chong Yah, et al. (1988) [1] had actually foreseen most of the official policy recommendations of late 1987.

Events between 1987 and 2000 have proved somewhat contrary. Except for a limited fertility increase (including the "Dragon year" effect on Chinese births in 1988), the birth rates(CBR,TFR) have continuously fallen below replacement levels. Limited natural increase (and low population growth) and problems from population ageing need to be addressed now and then. This paper aims to clarify these issues and policy options.

2. Demographic Trends

Population Growth

Singapore's total population in 2000 was 4,017,733 persons, made up of citizens, permanent residents and non- residents (Table 1). The 1990-2000 period witnessed the highest growth within the post-independence period, with an annual average rate of 2.8% p.a. as against 1.5% p.a. during 1970-80 and 2.4% p.a. in 1980-90.

Table 1: Singapore total population growth, 1901-2000

Period	Growth Rate (% p.a.)
1901-1911	2.9
1911-1921	3.3
1921-1931	2.9
1931-1947	3.3
1947-1957	4.4
1957-1970	2.8
1970-1980	1.5
1980-1990	2.4
1990-2000	2.8

Source: Department of Statistics, *Singapore Census of Population 2000: a Quick Count*, Press Release, August 2000.
Note: The data relates to the Censuses.

The non-resident population grew by 9.3% p.a. during the last decade, in contrast to 1.8% p.a. for the *resident* population of citizens and permanent residents put together. In fact, citizens only registered a 1.3% p.a. growth, compared to 10.0% p.a. for permanent residents. Consequently, the share of the non-resident population in the total has increased from 10.2% to 18.8% (Table 2), while the share of permanent residents went up from 3.7% to 7.2%.

Table 2: Total population by residential status, 1990 and 2000.

Residential Status	Per Cent of Total		Annual Growth Rate (% p.a.)
	1990	2000	1990-2000
Residents	89.8	81.2	1.8
Citizens	86.1	74.0	1.3
PR	3.7	7.2	10.0
Non-residents	10.2	18.8	9.3
Total Population	100.0	100.0	2.8
Number ('000)	3,047	4,017	--

Source: As for Table 1.

Fertility Transition

It is well known that interventionist anti-natalist policies were enforced during 1966-80 through three family planning programmes. Various disincentives and measures discouraged large family size, alongside social policies in housing, school registration and employment (Lim, et al., 1988). Though not proven, such policies would have led to rapid fertility decline, which arose from the modernisation process including women development. The Chinese population symptomized this trend, while the rest may have been influenced by interventionist measures .

Indeed, the Princeton indices[2] (Coale, 1969, 1976) indicate that fertility decline from all factors were maximum between 1970 and 1980 (Shantakumar 1996). Decomposition indicates that marital fertility decline (due to spacing, contraception and limitation) was higher, but declines from nuptiality changes (increasing age at marriage, sex-ratio, proportion unmarried and changing marital distribution) were lower (Table 3). The situation was similar during the pro-natalist phase (up to 1990)

Table 3: Fertility decomposition by Princeton indices, by ethnic group, 1970-1995

Ethnic Group	Phases of Fertility Change				
	Anti-natalist Phase 1966-1980		Pro-natalist Phase 1980-1995		
	1970	1980	1985	1990	1995
	Percentage decline in total fertility $(1 - I_f)$				
Chinese	77	86	87	85	87
Malays	73	83	82	76	78
Indians	74	83	83	83	80
	Percentage decline in proportion married $(1 - I_m)$				
Chinese	49	51	47	48	47
Malays	37	48	51	40	38
Indians	38	49	50	47	29
	Percentage decline in marital fertility $(1 - I_g)$				
Chinese	55	71	76	72	75
Malays	57	66	60	60	65
Indians	58	67	65	68	72

Sources: Adapted from Shantakumar (1996a) for all years except 1995. Computed for 1995. See endnote 2 for formulae and concepts.

By 1995, it could be substantiated that both declining nuptial unions and marital fertility among Chinese women may have contributed to overall fertility decline, and the extent may be serious enough (Table 3). The proportion of single population has increased during 1990-2000 in various age groups for both sexes (Table 4), significantly among females in ages 20-29 and males in ages 30+.

Table 4: Percentage changes in proportion single by sex, 1990-2000

Age-Group	Males 1990	Males 2000	Males Change	Females 1990	Females 2000	Females Change
20-24	94.2	95.2	+1.0	78.5	83.9	+5.4
25-29	64.1	66.9	+2.8	39.3	43.5	+4.2
30-34	34.0	39.5	+5.5	20.9	25.7	+4.8
35-39	18.1	27.0	+8.9	14.8	18.5	+3.7
40-44	10.9	18.3	+7.4	11.5	14.6	+3.1

Sources: Based on Census 2000 figures.

It is clear that Singapore fertility levels have bottomed out, as per age-specific fertility rates (ASFR) of the 1990s. In fact, the officially computed total fertility rate (TFR), an indicator of natural increase, is low at 1.58(now 1.42) . The declines in TFR also reflect falling gross reproduction rates (GRR), an indication of replacement of mothers by daughters. By 2000, the lack of replacement needed to be addressed again (Table).

Table 5: Age-specific fertility rates (per thousand females) and TFR 1990-1999

Year	Age-Group							
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
1990	8.38	60.47	139.05	112.75	44.86	7.44	0.06	1,865.03
1991	8.46	55.15	132.39	108.95	42.43	6.53	0.30	1,771.02
1992	7.92	53.53	131.54	109.60	42.54	6.81	0.18	1,760.60
1993	8.29	50.85	133.25	111.39	44.54	7.32	0.21	1,779.23
1994	7.37	47.47	132.68	111.74	43.59	6.88	0.15	1,749.36
1995	6.54	47.10	129.03	110.02	42.23	6.60	0.21	1,708.61
1996	6.77	44.66	125.91	111.05	43.65	7.14	0.16	1,696.77
1997	6.77	41.72	119.09	109.44	42.74	7.22	0.18	1,635.79
1998	7.52	39.22	106.35	98.11	40.73	6.82	0.20	1,494.71
1999	8.36	36.74	105.25	99.63	39.99	6.61	0.18	1,481.29
	Growth Rate (% p.a.): 1990-99							
ASFR	-0.0	-5.4	-3.0	-1.4	-1.4	-1.3	+13.0	-2.5

Source: As for Table 5.

Incidentally, TFR has been declining around the world (Table 6), including countries where the TFR is below Singapore's level of 1.5. Without corrective policy interventions, Singapore's fertility decline may eventually parallel the demographic transition of high-income countries, moving the age-structure towards a mature population.

Table 6: Total fertility rate (TFR): selected countries 1980 and 1997

Country	TFR: births per woman		
	1980	1997	Change (1980-97)
Australia	1.9	1.8	-1.0
Austria	1.6	1.4	-0.2
Belarus	2.0	1.2	-0.8
Belgium	1.7	1.6	-0.1
Bulgaria	2.0	1.1	-0.9
Canada	1.7	1.6	-0.1
China	2.5	1.9	-0.6
Hong Kong	2.0	1.3	-0.7
Czech Republic	2.1	1.2	-0.9
Denmark	1.5	1.8	+0.3
Estonia	2.0	1.2	-0.8
Finland	1.6	1.9	+0.3
France	1.9	1.7	-0.2
Germany	1.4	1.4	0.0
Hungary	1.9	1.4	-0.5
Italy	1.6	1.2	-0.4
Japan	1.8	1.4	-0.4
Latvia	2.0	1.1	-0.9
Netherlands	1.6	1.5	-0.1
New Zealand	2.0	1.9	-0.1
Norway	1.7	1.9	+0.2

Russia	1.9	1.3	-0.6
Singapore	1.7	1.7	0.0
Spain	2.2	1.1	-1.1
Sweden	1.7	1.7	0.0
Switzerland	1.5	1.5	0.0
UK	1.9	1.7	-0.2
USA	1.8	2.0	+0.2
High income Countries Average	*1.8*	*1.7*	*-0.1*

Source: World Bank, *World Development Report, 1999/2000*, Washington, 242-43.

Shifts in Age-Structure

Singapore's population (age) structure is now bell-shaped and maturation will lead to a rectangular population structure (Shantakumar 1994), characterised through the total dependency ratio (TDR), decomposed into youth dependency (YDR) and old-age dependency ratios (ODR). These movements can be traced to lower YDR and higher ODR (Table 7).

Table 7: Dependency ratio, 1980-2000

Year	YDR %	ODR %	TDR %	(1/ODR) per aged person
	Based on age cut-offs 15 and 65			
1980	397	6.9	46.6	14.5
1990	32.7	8.6	41.3	11.6
1995	32.4	9.5	41.9	10.5
2000	30.1	10.2	40.4	9.8
	Based on age cut-offs 15 and 60			
1980	425	11.6	54.1	8.6
1990	34.3	13.4	47.7	7.6
1995	34.0	14.8	48.8	6.8
2000	31.7	15.8	47.5	6.3

Sources: Computed from official census data.
Notes: YDR = Young Dependency Ratio
ODR = Old Dependency Ratio
TDR = Total Dependency Ratio = YDR + ODR

The erstwhile dependency ratio was reckoned with an age cut-off at 60+, and the current official practice *assumes* that 65 years of age is more in line with developed countries' experience. Developed countries' definition of age-dependency is in tune with their work and retirement practices. In Singapore, current mandated retirement age is 62 years to be revised in stages to 67. Many firms and even the public sector may still be adhering to the earlier norms of 55 and 60. The dependency burden computed on the basis of 60+-age cut-off is still useful. TDR based on the cutoff of 60 was 54% in 1980 compared to 49% in 1995, declining to 47% by 2000. ODR has risen from 12% to 16% in the last two decades, signalling age maturation . This would mean that 8.6 persons in working ages 15-59 were sustaining an older person (of 60+ years) in 1980. By 2000, only 6.3 persons were available. If the age cut-off of 65 were used, the burden is shared by more working adults (15-64 age group), since those in ages 60-64 would be included in the economically active population.

3. Policy Interventions: Past and Present

Population Policy

Demographic transition in Singapore virtually followed transitions experienced in developed countries; the difference was in the compression of time spread over a 30 to 40 year period in contrast to 200 to 300 years in developed economies.

Before implementation of anti-natalist measures (pre-1966), the government was set on reducing the fertility level to avoid both population “explosion” and “implosion”, the first from high birth rates and declining death rates and the second from population pressure on limited land and other resources of an island-state. Over the policy period (1966-80), anti-natalism aimed to reduce fertility through spread of education and information, social and institutional changes, voluntary programmes, incentives and disincentives, and even some coercion through social policies in housing allocation and schooling. Policies such as the high accouchement fees at maternity hospitals was aimed at high-parity families, while liberalised abortion laws, restricted maternity leave, postpartum counselling for family limitation or spacing were also in place. Meanwhile, modernisation of the economy continued to have a moderating and reducing effect on the family size .

In the 1980s and beyond, selective pro-natalist policies tried to reverse rapid fertility declines, but high maternity charges affected low-income and less-educated families. The *selective* pro-natalist policies (various incentives for educated mothers to procreate) may have had a short-term effect in the late 1980s and early 1990s. That such policies were less successful can be seen from the low TFR of the late 1990s, prompting the government to reconsider alternatives. Meanwhile, population policy was extended to cover *selective* immigration during the last 15 years.

Present policies have increasingly become pro-family: housing priority for large and multi-generation families, flexi-time for mothers to nurture their children, cash (or baby bonus) incentives, fiscal incentives, child-care subsidies, and enhanced child reliefs in income taxation. The committee of government "experts" studying further ways and means to encourage higher fertility and nuptiality has yet to announce their recommendations. It is stressed that any new policy interventions(if at all) must be in consultation with women, the key players in family formation.

Selective Immigration

An immigration influx of skilled manpower is nothing new. For smaller countries, large-scale immigration may lead to implosion and pressures through high density. With an objective figure of a future population size, skilled immigration is manageable provided economic growth is dependent on it. The influx actually increased the total population growth rate, since the resident population growth was low. One way to control skilled immigration is to agree upon *the* population growth rate that would be considered as necessary or optimum. Immigration may be fine-tuned and periodically adjusted. At the moment, 35,000 skilled workers are allowed annually, and encouraged to consider permanent residence in Singapore.

4. The Future Population and Labour Force: Assumptions and Scenarios

During the demographic transition, the emphasis was on zero population growth to reach 3.2 million by about 2030. By 1987, this objective could not be met, calling for immigration . By 1990, planners revised the target to 4.3 million, a figure predicted for year 2030 (Lim, et al., 1988), and officially stated (Government of Singapore, 1991). In fact, it was then predicted that the population in year 2000 would reach some 3 million (Lim, et al., 1988), which was only exceeded by 0.263 million according to the recent Census (DOS, 2000), referring to the resident population. An earlier prediction, using a logistic model, forecasted the resident population to reach 4.3 million by year 2030, which may yet be realisable, but lower replacement rate may counter the trend. A recent study projects the resident population to reach 3.3 to 3.5 million by year 2030 (Saw, 1999).

As the parameters of population growth have changed dramatically within the last decade, and migration policy allows around 30-35 thousand persons annually into Singapore, there is a need for a fresh set of population scenarios. Hitherto, most (if not all) population projections did not factor the migration component into the projection exercise. The new projections include scenarios of between 30-50 thousand immigrants in annual terms, assuming a base population age-sex structure, full replacement and lower replacement. Six sets of projections have been selected to study possible implications for the future. Assumptions of the components of growth and the basic features of the projections are summarised (Table 8).

Table 8: Assumptions behind six sets of population projections

Base population: 1999 estimated resident population by age-group and sex		
Mortality assumptions: Expectation of life (years) at birth ($\overline{e_0^0}$)		
1999	Males 73	Females 79
2049	Males 77	Females 83
Fertility assumptions (TFR levels)		
I	1999	1.475
	2049	1.475
II	1999	1.475
	2019	2.100
	2049	2.100
III	1999	1.475
	2019	1.200
	2049	1.200
Net immigration assumptions		
I	1999	30,000 per annum
	2049	50,000 per annum
II	1999	30,000 per annum
	2049	30,000 per annum
III	NIL	
The six sets of projections		
I	Fertility I	Migration III
II	Fertility II	Migration III
III	Fertility I	Migration II
IV	Fertility I	Migration I
V	Fertility III	Migration II
VI	Fertility II	Migration II

The methodology for the projection exercise follows the Projection Matrix Operator (Keyfitz, 1968) using components of population growth. The UN PEOPLE software was utilised to derive the various scenarios.

Population Projections: 1999-2049

The six scenarios labelled PROJ I to PROJ VI are utilised in the following analyses.[3] Of the six projections (Table 9),PROJ I reaches 3.4 million in 2029 without any further immigration and the TFR (1.475) remaining constant. Eventually, population growth will be negative from 2024 onwards, finally reducing the population size to 2.9 million in 2049.

Table 9: Projected resident population: 1999-2049, by variant

Year	PROJ I	PROJ II	PROJ III	PROJ IV	PROJ V	PROJ VI
	Projected Population ('000)					
1999[a]	3,218	3,218	3,218	3,218	3,218	3,218
2000[b]	3,263	3,263	3,263	3,263	3,263	3,263
2004	3,312	3,315	3,471	3,471	3,461	3,476
2009	3,375	3,401	3,714	3,714	3,689	3,751
2014	3,413	3,483	3,956	3,983	3,908	4,053
2019	3,435	3,569	4,200	4,256	4,115	4,386
2024	3,438	3,640	4,436	4,553	4,302	4,724
2029	3,410	3,674	4,646	4,831	4,458	5,039
2034	3,338	3,670	4,823	5,106	4,579	5,333
2039	3,228	3,639	4,969	5,360	4,667	5,623
2044	3,093	3,600	5,100	5,631	4,734	5,924
2049	2,952	3,563	5,227	5,909	4,789	6,246
Period	Growth Rate (% p.a.)					
1999-2004	0.58	0.60	1.53	1.53	1.47	1.56
2004-2009	0.38	0.51	1.37	1.37	1.28	1.53
2009-2019	0.18	0.48	1.24	1.37	1.10	1.58
2019-2029	-0.07	0.29	1.01	1.28	0.80	1.40
2029-2039	-0.55	-0.10	0.67	1.04	0.46	1.10
2039-2049	-0.89	-0.21	0.51	0.98	0.26	1.05

Notes:
[a] 1999 official estimates
[b] 2000 Census count.

Set II assumes nil immigration and TFR (2.1) at replacement level, assuming that pro-natalist policies are indeed successful. In 2029, population will reach 3.7 million. Thereafter, declining population size is evident.

If current replacement is assured with a moderate annual influx of 30,000 persons, the year 2029 will witness 4.6 million people (PROJ III) up from the current figure of 3.3 million (in 2000). This path will increase the population size to 5.2 million by 2049 despite a declining trend .

PROJ IV again assumes current TFR but allows influx of 30,000 incremented by 5,000 every decade to reach 50,000 by 2049. By 2029, another 0.2 million are added, but in 2049, 0.7 million would be the additional population. It is thus clear that even with a liberal immigration influx, long-term growth is equated to decline from low replacement fertility, unless immigrant fertility levels are higher, but this is doubtful.

By PROJ V, with very low replacement fertility (TFR 1.475 in 1999, declining to 1.2 thereafter), and current policy of 30,000 immigrants, population size in 2029 will be 4.5 million, progressing to 4.8 million by 2049. Here, there is total dependence on immigration. If TFR is at replacement level (2.1), 30,000 annual immigrants would increase the population to 5.0 million by 2029, thence to 6.2 million by 2049, a scenario provided by PROJ VI. All projections indicate eventual declines in growth rates but PROJ IV and PROJ VI seem to assure at least 1% to 1.6% per annum growth, despite slight declines after 2019.

In our opinion, the optimal path, if it can be realised, is PROJ VI. That is, TFR has to be brought up to replacement level, with 30,000 annual immigrants. In PROJ IV, even at current TFR of 1.475, a high immigration (30,000 reaching 50,000 in period 1999-2049) will provide a population size close enough to PROJ VI.

Labour Force: 1999-2049

Labour force was derived by superimposing age-sex-specific labour force participation rates (LFPR) on corresponding population projections I to VI . Time trends in LFPRs from 1973-1999 were projected, after removing outliers. Linear extrapolation based on group-specific ceilings and floors provided future LFPRs. The experiences of Germany, Japan, Sweden and Hong Kong were the criteria for the ceilings and floors.

Projected labour force for the six population scenarios is provided (Table 10). Projections III to VI indicate increases in labour force over the period up to 2019; labour force growth rates of at least 1.37% per annum may be registered by these projection paths. Projections IV and VI promise more optimistic labour supply scenarios, arising from skills immigration policy. It is clear that population policies enacted through pro-natalism and selective skills immigration are promising as far as labour supply growth is concerned. Policy-wise, PROJ IV and PROJ VI are worthwhile adopting to meet the future needs of the economy.

Table 10: Projected labour force by variant: 1999-2049

Year	PROJ I	PROJ II	PROJ III	PROJ IV	PROJ V	PROJ VI
	Labour Force (millions)					
1999	1.64	1.64	1.64	1.64	1.64	1.64
2004	1.72	1.72	1.82	1.82	1.82	1.82
2009	1.78	1.78	1.99	1.99	1.99	1.99
2014	1.82	1.82	2.16	2.18	2.16	2.16
2019	1.81	1.81	2.28	2.31	2.28	2.28
2024	1.74	1.74	2.35	2.42	2.34	2.36
2029	1.64	1.67	2.40	2.51	2.37	2.43
2034	1.56	1.62	2.46	2.64	2.42	2.55

2039	1.50	1.62	2.54	2.79	2.46	2.72
2044	1.44	1.63	2.61	2.94	2.49	2.88
2049	1.37	1.62	2.66	3.08	2.48	3.03
Period			Growth Rate (% p.a.)			
1999-2004	0.96	0.96	2.05	2.05	2.05	2.05
2004-2009	0.71	0.71	1.89	1.89	1.89	1.89
2009-2019	0.20	0.17	1.37	1.50	1.37	1.37
2019-2029	-0.98	-0.80	0.51	0.83	0.39	0.64
2029-2039	-0.89	-0.30	0.57	1.06	0.37	1.13
2039-2049	-0.90	0.00	0.46	0.99	0.08	1.09

Trends in Dependency Ratio

The dependency ratios are derived for selected projections: PROJ I ,II, IV and VI (Table 11). The 1999 total dependency ratio (TDR) at 48.9% will be exceeded in 2029 and 2049, reaching 81%-88% and 86% respectively in PROJ I and II.. The aged dependency ratio would have overtaken youth dependency (ODR *versus* YDR). These are based on the age cut-off 60+, following current UN conventions, still applicable to Singapore.

At the 65+ age cut-off, TDR will reach 64%-68% in 2049 up from the current 43% (1999). It implies that persons in ages 60-64 will still be in the labour market and are not a dependent group, in contrast to the TDR with 60+ age cut-off.

PROJ IV and VI are more optimistic scenarios for the dependency ratios, when the ODR is only slightly greater than the YDR, sometimes lower, using the 60+ cut-off. For the 65+ cut-off, PROJ IV and VI result in more tolerable TDR, arising from even lower ODR, and YDR favours a youthful population. Also, extension of retirement ages beyond 60 or even 65 will help reduce the ODR and the TDR, increasing the support base for the older population

Table 11: Projected dependency ratios: 1999-2049, selected years

Year	Ratio	Age cut-off 60+			
		PROJ I	PROJ II	PROJ IV	PROJ VI
1999	YDR	33.2	33.2	33.2	33.2
	ODR	15.7	15.7	15.7	15.7
	TDR	48.9	48.9	48.9	48.9
	1/ODR	6.4	6.4	6.4	6.4
2009	YDR	26.0	27.1	26.5	34.3
	ODR	20.9	20.9	18.8	23.1
	TDR	46.9	48.0	45.3	57.4
	1/ODR	4.8	4.8	5.3	4.3

2019	YDR	22.9	28.8	26.2	32.7
	ODR	36.3	36.2	28.6	29.0
	TDR	59.2	65.0	54.8	61.7
	1/ODR	2.8	2.8	3.4	3.4
2029	YDR	25.6	34.6	28.8	37.7
	ODR	55.3	53.4	36.7	37.1
	TDR	80.9	88.0	65.5	74.8
	1/ODR	1.8	1.9	2.7	2.7
2049	YDR	22.5	33.3	27.3	36.8
	ODR	63.3	52.4	36.7	36.0
	TDR	85.8	85.7	64.0	72.8
	1/ODR	1.6	1.9	2.7	2.8
Year	Ratio	Age cut-off 65+			
		PROJ I	PROJ II	PROJ V	PROJ VI
1999	YDR	31.7	31.7	31.7	31.7
	ODR	10.4	10.4	10.4	10.4
	TDR	42.1	42.1	42.1	42.1
	1/ODR	9.6	9.6	9.6	9.6
2009	YDR	24.2	25.3	24.9	31.8
	ODR	12.8	12.8	11.6	14.0
	TDR	37.0	38.1	36.5	45.8
	1/ODR	7.8	7.8	8.6	7.1
2019	YDR	20.3	25.6	23.8	29.7
	ODR	21.1	21.0	16.9	17.2
	TDR	41.4	46.6	40.7	46.9
	1/ODR	4.7	4.8	5.9	5.8
2029	YDR	22.4	30.5	26.3	34.4
	ODR	36.4	35.2	24.7	25.0
	TDR	58.8	65.7	51.0	59.4
	1/ODR	2.7	2.8	4.0	4.0
2049	YDR	19.9	30.1	25.0	33.8
	ODR	44.5	37.6	25.1	24.8
	TDR	64.4	67.7	50.1	58.6
	1/ODR	2.2	2.7	4.0	4.0

Clearly, PROJ IV and VI indicate the best population policy paths in terms of natural increase and immigration, both at constant or accelerated levels. These policy pathways may guarantee positive results for population size and containment of the dependency burden, thus providing opportunities to introduce and maintain the dynamics of growth in total population. It may also mean that policies will have to be strategically fine-tuned every quinquennium, if there is any slackening in population growth.

Whichever the projection path, the size of the would-be older population will escalate in absolute terms (Table 12). By PROJ I and II, the year 2019 may witness some 512 thousand aged 65+, escalating to 800 thousand by 2049, in the absence of further immigration and current low or replacement fertility. Clearly, this is not a conducive policy path.

Table 12: Size of older population by sex: 1999-2049

Year	Age-group	Males ('000)	Females ('000)	Total ('000)	% in Population	Sex-Ratio: Males per 1000 females
			PROJ I/PROJ II			
1999	60-64	50.7	53.0	103.7	3.2	957
	65+	105.9	129.2	235.1	7.3	820
2009	60-64	81.6	84.5	166.1	4.9	966
	65+	139.6	175.2	314.8	9.2	797
2019	60-64	133.3	137.8	271.1	7.6	967
	65+	230.2	281.8	512.0	14.3	817
2029	60-64	124.8	137.1	261.9	7.1	910
	65+	349.0	432.0	781.0	21.3	808
2049	60-64	102.5	103.5	206.0	5.8	990
	65+	337.0	462.7	799.7	22.4	728
			PROJ IV			
1999	60-64	50.7	53.0	103.7	3.2	957
	65+	105.9	129.2	235.1	7.3	820
2009	60-64	81.6	84.5	166.1	4.9	966
	65+	139.6	175.2	314.8	9.2	797
2019	60-64	135.1	138.6	273.7	6.4	975
	65+	230.4	282.0	512.4	12.1	817
2029	60-64	135.5	144.0	279.5	5.8	941
	65+	355.1	435.6	790.7	16.4	815
2049	60-64	159.5	175.9	335.4	5.7	907
	65+	426.9	561.0	987.9	16.7	761
			PROJ VI			
2049	60-64	152.3	169.8	322.2	5.2	897
	65+	420.8	556.5	977.3	15.6	756

Source: Derived by author.

Despite a large population size of older persons aged 65+ by PROJ IV and VI (beyond 2020), say 791 thousand (2029) and 988 thousand (2049) by PROJ IV and slightly lower by PROJ VI , the dependency ratios are tolerable due to higher YDR and increases in the working population in ages 15-64. If the size of the aged can be contained through the labour market and increasing economic contribution by the young, middle and even the young-old, then policy paths through PROJ D or F are the choice.

5. Issues and Problems

Changing Demographic Dynamics

The size of the future older population will be considerable and must be accommodated through social and economic policies. How well population can be made "younger" in terms of additions to the youthful and working categories? There is some justification in immigration, due to a dire need for adequate labour supply to meet demand . Phased immigration may work well for the short and middle term. In the long run, skills may go elsewhere if local conditions are not encouraging enough. Thus, even immigration policy must be carefully nurtured and fine-tuned through adequate incentives.

Changes in age-structures will increase the median age of the population and the workforce and eventually means that relatively more people will retire and the labour market paradigms will have to shift likewise. There is no alternative for policy makers but to be proactive through pro-natalist measures, however unpalatable.

Composition of Older Population

There will be more people entering advancing ages within the aged spectrum of 60+ (Table 13). The 60+ population will comprise 28% to 34% in terms of PROJ I and II by 2049, compared to 11% in 1999. By PROJ IV and VI , the older population will comprise some 21%-22% in 2049, or double the percentage points from 1999. Progression of persons into old-old and very old from young-old categories has its ramifications. Old age security concerns, including health care financing is a serious concern, besides the amount and quality of eldercare that will be available from the younger generation. It also means that rapid age-progression into frail ages leaves a larger residue of older women to be supported by families or the state.

Table 13: Distribution of the older population: 1999-2049

Age-group	1999	2009	2019	2029	2049
	PROJ I- % in total population				
60-64	3.2	4.9	7.9	7.7	7.0
65-69	2.6	3.4	6.1	7.8	6.0
70-74	1.9	2.5	4.0	6.7	5.7
75-79	1.3	1.7	2.4	4.6	6.1
80+	1.5	1.7	2.3	3.9	9.2
Total	10.5	14.2	22.8	30.6	34.1
	PROJ II- % in total population				
60-64	3.2	4.9	7.6	7.1	5.8
65-69	2.6	3.3	5.9	7.3	5.0
70-74	1.9	2.5	3.9	6.2	4.7

75-79	1.3	1.7	2.3	4.3	5.1
80+	1.5	1.7	2.2	3.8	7.7
Total	10.5	14.1	21.9	28.4	28.2
	PROJ IV- % in total population				
60-64	3.2	4.5	6.4	5.8	5.7
65-69	2.6	3.1	5.0	5.7	4.7
70-74	1.9	2.3	3.2	4.8	3.8
75-79	1.3	1.6	1.9	3.3	3.5
80+	1.5	1.5	1.9	2.7	4.8
Total	10.5	12.9	18.5	22.2	22.4
	PROJ VI - % in total population				
60-64	3.2	4.4	6.2	5.5	5.2
65-69	2.6	3.0	4.8	5.4	4.3
70-74	1.9	2.3	3.1	4.6	3.5
75-79	1.3	1.6	1.9	3.1	3.3
80+	1.5	1.5	1.8	2.5	4.5
Total	10.5	12.8	17.9	21.2	20.8

Work, Retirement and Unretirement

Current retirement age is 62, to be raised to 67 eventually. Despite this provision, employers in public and private sectors continue to implement retirement at 55 or 60 years of age. That is, there is no real compulsion to keep workers until 62 years of age. In 1990, it was observed that 20% of those in ages 60+ were enumerated as "working" and 0.1% were actually looking for employment (Shantakumar 1994). These are not very encouraging "signs" for the continued employment of older workers. By 1995, (GHS, 1995), the corresponding figures were 18% and 0.3%, the latter for the aged 55+.

The labour force participation rates of older persons (beyond 50 years) had been declining for males, but slightly increasing for females. Many factors may account for such declines: higher social security benefits, indexation to inflation rates, inclination for leisure, mandatory clauses of pension and retirement agreements, morbidity and disability and a host of miscellaneous factors including preferences for part-time, flexi-time and self-employment (Clark, et al., 1978; Hurd, 1990; Clark and Anker, 1992). In Singapore , there is scant research on the causative factors. It may be speculated that some factors must be related to mandatory retirement practices or legal agreements (at age 55 or 60 in most cases), availability of savings (including CPF, where substantial), universal home equity (especially for the aged), and even declines in health status with age-progression, and certainly the desire for increased leisure (for those who could afford it).

The labour market dictates retirement decisions, and the employment market is dictated by external forces (globalization). Changing technology requires new skills, and most older workers may be deficient in this respect. Local employers, including the public sector, are reluctant to keep older workers at the top-end of their wages or salaries, as they perceive high operating costs, including any subsidised healthcare.

Most of the older workers lack commensurate educational or work skills for employment in new technology industries. In 1990, 66% of the non-working aged population had no formal education, while another 23% had less than secondary education. In 1995, 33% of the economically active in ages 60+ had no formal education, while 47% had below secondary education attainment; for the non-working aged, the corresponding figures were 58% and 30%. Future improvements may be perceived but concerted effort and affirmative action may improve educational attainment and work skills among the ageing (middle ages+) and aged population. The process of "unretirement" must be encouraged to keep the ever-increasing older population meaningfully engaged and provide a *modicum* of social security in post-retirement.

At present, family support to the extent of 85% is available for the aged population. The Medisave accounts of children or siblings can be used to finance healthcare and hospitalisation of parents or grandparents. There is a feeling of security through the family mechanism, filial responsibility being strongly mooted by government policies on housing, health and infrastructure. Combined with inadequate skills background, smaller savings (due to lower wages and salaries in the past, and lower CPF balances arising from withdrawals for housing in particular), filial support may assure some social security in old age, but may not last forever, as older generations may increasingly prefer independent living arrangements, while the family size has diminished from low fertility levels. Available home equity, which can be substantial if liquidated or reverse-mortgaged, may also offer alternatives to older persons some assurance of old age security, although some downgrading is inevitable.

The process of "unretirement" has to be thought through innovative work and labour packages to accommodate the growing numbers of the elderly. This is a challenge to policy makers in Singapore, and a measured government response may be necessary from time to time.

Another impediment is the set of prejudices that dictate notions of low or nil productivity among the older and experienced workers. If older workers are expected to settle for smaller wages or salaries during their retirement employment, there is less incentive for retraining. Such policies are to placate employers and to encourage them to employ older workers past mandatory retirement age. Employers will use this opportunity to seek cheaper alternatives, without helping the "unretirement" process. There is a need to demonstrate that re-employing older workers will not cost more in real terms, given the parameters of the labour market (Bauer, 1996). If older workers become disengaged, they may clamour for empowerment and affirmative policy (Shantakumar , 1999).

Social Security and Safety-nets

Though not considered a real social security system as in developed countries, the Central Provident Fund is a mandatory scheme for the working population where savings are accumulated through employer and employee monthly payroll contributions in the ratio of 20:20 subject to ceilings. The employer contribution has recently been lowered to reduce operating costs in the last recession, and is to be restored over the years. Nevertheless, it is equivalent to pay-cuts during periods of recession, eroding the savings level. In a working lifetime, withdrawals are allowed for housing, shares, and approved investments, with provisions for hospitalisation and certain medical expenses. An optional Medishield insurance scheme may be paid from Medisave, while an endowment called the Medifund is available for the absolute needy for hospitalisation based on a means test. At withdrawal age of 55, a minimum sum is set aside for mandatory purchase of annuities, payable from age 60, and only a few have substantial savings to make up this sum. Properties can be pledged *in lieu* of the minimum sum.

As it stands, the CPF is the main social security arrangement in Singapore. Work participation is a necessary condition to accumulate savings. A large share of the CPF balances is held by a few large earners, thus paralleling the income distribution. Housing purchases have also taken up a large portion of the CPF savings, as loans can be paid through future CPF savings. Thus, CPF has helped build up real assets through home equity for the present elderly, and may be the main source of wealth, besides private savings. The interest rate accruing on the savings is pegged to the monthly prime rates of the four largest local banks, and the real rate is considered low or even negative (Asher, 1995).

Though international recommendations (ILO, 1959) included a minimum pension besides the CPF, the government has not heeded . With ageing and the recognition that the CPF may just be sufficient for old age, alternatives must enhance the value of CPF savings. Home equity among the older generation helps obtain some filial piety in return for services and benefits. The Maintenance of Parents Bill advocates filial responsibility of children to their elders, and a tribunal settles such disputes brought to notice. In the long run, this Bill may prove to be effective in implementing filial responsibility.

In a 1995 Survey of Senior Citizens (MCD, 1995), the CPF has been evaluated as being insufficient and other savings insubstantial, thereby espousing the necessity for familial support. Some of the deficiencies of the social security system can be seen from the survey findings (Table 14). The elderly's dependence on the family mechanism is virtually total despite the CPF being touted as a social security system.

Table 14: Fact Sheet: Population in Ages 60 and above, 1995 Survey

Characteristics	%
Living in public flats	93.3
No qualification	66.9
Secondary + qualification	9.7
Home Ownership (self, spouse or jointly with family members)	64.5
Household size (1 or 2)	20.0
Household size (3 to 5)	53.7
Household size (6+)	26.2
Living Arrangements:	
Alone	3.3
With spouse only	5.8
With spouse and children	28.6
With extended family	56.3
Other arrangements	6.0
Source of Income:	
Salary, Business	19.0
Interest, Dividend, Rent	16.0
Income:	
From children	80.2
From spouse	4.8
Most important income source:	
Children	73.3
Spouse	2.0
Work	17.6
Others	7.1
Monthly income (all sources):	
<S$1,000	84.0
≥S$1,000	15.0
Received maintenance from children, relatives	68.0
Reasons for inadequate income (includes 55 years of age and above):	
High cost of living	57.7
High medical costs	16.5
Income too low	11.1

Children not giving enough	11.2
Others	3.5
Ownership of assets:	
Savings/fixed assets	66.3
Own house	63.1
Stocks and shares	6.1
Income	3.1
Most important assets:	
Own house	48.4
Savings	36.4
Main reason for inadequate security:	
Low savings	20.6
High living costs	37.8
Low income	17.3
High medical costs	9.4
Inadequate support from children	9.2
With plans for financial security	10.5
Main reason for not planning for security:	
Children can provide	81.0
Insufficient income	10.0
CPF savings	3.8
Others	5.2
Sufficiency of CPF savings:	
Without CPF	66.5
Adequacy of CPF savings	50.6
Use of CPF withdrawn:	
Bank deposits	49.7
Household expenses	38.8
Property purchase	20.0
Children's education	6.0

Source: Culled from MCD, *1995 National Survey of Senior Citizens*, Singapore.

An earlier proposal (Howe, 1984) to revise the CPF withdrawal age *in tandem* with higher retirement age was so unpopular that the government had to issue a guarantee on the *status quo* . The developments in age-structure seem to justify the proposal; the minimum sum scheme does exactly that, by mandating retirees at 55 to purchase annuities to be effective from age 60, and if otherwise, CPF interest rates will be lower on retained funds.

Health Care Financing

The 3M's (Medisave, Medishield and Medifund) are designed to be the pillars of health care financing, especially for old age, but in a lifetime, considerable portions may be spent. Topping-up through children's Medisave makes up deficits in parents' Medisave accounts. Also, periodic government top-ups from past budget surpluses ensure that older persons' Medisave is not empty. The Medifund is a safety-net subject to a means test involving the entire family. There seems to be no other safety net, unless a national social insurance scheme is introduced catering to long-term care(An Eldershield for long-term care as an optional scheme is to be introduced in September 2002). Of course, the absolute needy are still able to get some financial help from the government through the public assistance scheme for the less privileged, who are declining, besides the Medifund.

Up to the early 1990s, health care financing was left to employers with minimum share from employees. The government (and generally the public sector) virtually financed the entire health care needs of employees. The government set up a health care reform committee to reduce government expenditure through co-insurance and self-financing. Government hospitals are now re- structured as privatised bodies, with overall supervision of the Ministry of Health . Cost-recovery is the main criteria for efficiency.

Emphasis is now on health sector reforms for sustainable health development, at least to contain perceived high costs of health care financing for the ageing population. The government is prepared to expand provisions for infrastructure, medical technology, supply of doctors and paramedics, measures that are cost-effective in social spending. Reforms since 1994 have included caps on company health expenses for taxation, now below 2 per cent. Co-payments and group insurance have been encouraged to pass the costs to the consumer, who is expected to use his Medisave, with very little employee benefits except through group insurance.

The presently-constituted health care financing system is based on three principles (Lim, 1997): payment at consumption to discourage excessive usage, individual responsibility to maintain health status, and to save through the Medisave, as well as a guarantee to provide access to health care for the needy.

Social insurance, at least for the elderly, can be introduced from age 45 (say) ensuring long-term care, which is not yet an acute problem among the elderly. Mandated private and public health insurance, sometime called “sickness funds”, require universal adoption with provision for consumer choice. An assessment of the ”opt out” system for Medishield has been attempted. Despite its universal coverage, equal access and mildly progressive equity financing(labelled as “equity”) ,cost control through the demand side might not work due to excessive Medisave usage. The proposed long-term care insurance scheme (announced by the government) should be universal, without opt-out caveats. A society’s cohesiveness is best expressed through a compulsory scheme for ages past 45, and any non-usage(cross subsidization) could be passed on to other older members or families.

6. Policies for Consideration

__Fertility Policy__

The replacement rate is of serious concern. Especially disconcerting is the rapidity of decline in the TFR during the 1995-2000 period, plummeting from 1.7 to 1.5, an unprecedented experience in Singapore's demographic transition. If current nuptiality and fertility trends continued, then further declines in TFR may be expected, as already visualised by the government.

It is time to listen to women . Though an expert government committee of senior officials is vested with recommending policies to encourage pro-natalism(or selective pro-natalism) ,women are pivotal as listening posts. More women and allied groups must be invited to discuss and put forward alternative policies and incentives to encourage marriages, higher family size, and to procreate beyond the "affordability" criteria.

Among measures that may be devised by women groups and disseminated to official policy makers would be pro-nuptiality incentives to entice early marriages without disrupting women's careers. Easier said than done, but if sufficient financial incentives were in place, there is such a likelihood. For example, a controversial proposition would be to award extra entry points to young married women or couples to pursue higher education. Women should be able to take leave without disrupting family life, and return to their courses of study or work after raising a minimum family size.

Apart from ethnic or class considerations, all maternity expenses should become a state responsibility in that the first three confinements at government hospitals can be "written off" or heavily subsidised. If the government is serious about falling fertility and to reassure future economic growth, such a revolutionary measure must be considered. Any married woman should qualify for this privilege. It is our contention that positive results may come about even in the short or medium term.

Generous leave privileges, including no-pay perks, should also be considered. Women must be able to re-enter the labour market at the end of such leave, as is done for national servicemen. Increments for leave periods may have to be encouraged through qualified criteria. Also, national conscription for women on a short-term basis is not a far-fetched idea. It provides room for more socialisation and enables women to be equal to men in national building. Insufficient socialisation at younger fecund ages may be a caveat to future family formation. With national service confined to men, the age differential may be less conducive to building up of social relationships. It is necessary for the government to play "Cupid" so as to promote pro-natalism through marriage.

Though legal abortion is a woman's right of choice, there need to be some restraint among young persons. Counselling and encouragement to forge family ties and to accept responsibility for conceptions are difficult exercises and may be wrought with danger. Incentives must be offered to encourage the saving of such conceptions instead of abortion. This universal development may have to be closely monitored and even social–engineered so as to promote pro-natalism. Adoptions are a better alternative to foetal abortion.

Family allowances, as in Europe and Australia, need to be given to families to bring up children, especially those below the middle-income level. With higher birth orders, increasing allowances may be worthwhile. No doubt, the recently announced "baby bonus" is in this direction, but it is specific for younger mothers contemplating more than two children. Nordic and Western European countries have successfully implemented work arrangements and childcare facilities to promote a pro-natalist and pro-nuptial environment, of course at some cost ,but as being necessary for national survival. This requires *political will* and a willingness to increase public expenditure. What about existing family sizes with three or more young children? It is probable to increase the fertility level of low-income families, and not rely on educated mothers to procreate larger families, when in fact they do not do so. A *laissez faire* approach is a partial solution.

Immigration Policy

The 1990s have witnessed unprecedented influx of workers and professionals .The better skilled and able professionals are offered residence status. In Europe, declines in fertility have prompted analyses on the necessity of skills immigration to ensure economic growth and state welfarism, also on account of ageing societies. Singapore has joined this league to increasingly rely upon immigration alongside pro-natalist policies to increase the replacement rate. Officially, the avowed policy is to keep the ethnic ratio constant even with respect to the incoming population. Whether this is feasible in the long run is a moot issue, but increasing globalisation and competition in attracting talents may dictate otherwise. Government planners must be prepared to accept the "political" risk of changing ethnic ratio. As long as immigrants contribute to the economy, the source of supply becomes immaterial. In the long run, we expect the ethnic quota policy to be revised, as it may not be sustainable.

Liberal policies must entice influx of skills and provide long term incentives to take up residence or citizenship. Housing policies, especially in the public sector, are exclusively designed for permanent residents and citizens. Once a permanent resident, an immigrant family is allowed to purchase flats in the resale market. How about opening the market for new flats? In fact, new flat owners have more incentives to stay and live here to contribute to Singapore's welfare. In light of the new immigration policies, other enhancing measures must be in place . Areas of enhancement include schools and other services. Familial immigration is a quicker solution, with incentives in housing, education and other subsidies ,including citizenship enhancements.

It is also important that Singapore employers treat foreign employees at *par* with locals, thereby removing any bias that may encourage foreigners to leave the country. The market place must be seen to be perfect in offering similar wages or salaries as locals obtain. Otherwise, foreign talent may seek opportunities elsewhere, and the search costs will be higher, nullifying any cost advantage.

Of course, immigration has to be phased in gradually despite any cultural fall-outs. Through selective immigration compatible immigrants are best recruited. It is more than certain that no amount of enhanced pro-natalist measures may be sufficient for fertility increases. At the least, pro-natalist measures can be extended to the incoming families as further incentives to procreate, but it can be difficult. Incentives offered to increase family size are implicit in government policies but some marketing will be needed to attract attention. Again, familial immigration has some advantages.

Social Security and Safety Nets

There is yet no social security system that may be considered as foolproof or comprehensive. Even the PAYG or welfare-oriented systems have their loopholes or deficiencies. Singapore's evolution to the mandatory contributing comprehensive savings scheme seems sound, provided there is full employment and accountability, not to mention low operating costs. It is thus fully-funded, withdrawable at a specified age, and even payable for housing mortgages, approved investments, health care and annuities. Its singular drawback is the parallelism between the distributions of CPF balances and the income distribution for the working population, thereby perpetuating income inequalities and progressive taxation. Interest on savings from the CPF are considerably low, as the funds are long term investments of the CPF Board. Its ameliorating feature is the non-taxability of savings even at withdrawal age. Only after this point, any interest will be taxable. However, life time withdrawals for housing provides some asset value, but considerable savings are used to purchase housing, public flats or otherwise. Only when such assets are realisable, the enhanced values (if any) become apparent, but “downgrading” through sales or repurchases or even reverse-mortgaging may yet be unpopular. After all, the public apartments and some land are 99-year leases, and may not qualify for reverse mortgages.

Surveys seem to indicate that the CPF is not sufficient for low-income earners, certainly for women who have had shorter working histories. Despite government top-ups to CPF in the Medisave, or even the ordinary accounts, there is some need for a *minimum* pension guarantee to persons in the lower income brackets. How this can be implemented is a practical question. A minimum pension guarantees some equity, reducing income inequalities experienced so far, and also provides moral support of society to the underprivileged or needy, and certainly the disabled and frail elderly with no support mechanisms. Over the years, this aspect has to be studied further and instituted to thwart any notion of inadequate social security nets. Only this reform will address the financial needs of the deprived older population.

Health Care Financing

A national health insurance scheme has its merits, especially for long term care. Whatever the risks involved, it should be introduced at least from age 45 to meet long-term care needs. No doubt, those who may not need it may want to opt out but this is to be discouraged. After all, health status checks will establish the amount of premium payable, and the healthy ones may pay less. A society’s compassion can be expressed towards the group of people who are deprived economically or needing long-term care when other avenues no longer exist. This will reduce government expenditure to an extent.

An initial seed-money or endowment by government surpluses would help with long-term insurance. Eventually, national health insurance is an inevitable necessity for all persons, from the beginning of the work cycle. Safeguards can be in-built and the insurance industry can be roped-in. No doubt, the Medishield is such a quasischeme, but the opt-out clause and pre-existing conditions make it a risk-selective scheme, and is not universal enough. The elements of the Medishield, long-term care financing and group insurance must be combined into national health insurance, which will work in a regime of a regulatory framework. What is needed is the *political will* to carry forward the proposal, however unpalatable it may sound. There is no private insurance that is equitable enough to see through the needs of the ordinary citizen. The US example is a case in point.

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Endnotes

1. This work arose from a study group of 24 academicians from the (then) Department of Economics and Statistics, National University of Singapore, deliberating on various policy issues throughout a full calendar year.

2. The Princeton Indices are a decomposition procedure, where the maximum observed *natural* fertility by women's age (Hutterite fertility) is taken as a *numeraire* against the Singapore fertility experience.

   The Indices are:

   $I_f = \dfrac{\sum w_x \bullet f_x}{\sum w_x \bullet F_x}$ = overall fertility change

$$I_g = \frac{\sum w_x \bullet f_x}{\sum M_x \bullet F_x}$$ = change from marital fertility pattern

$$I_m = \frac{\sum M_x \bullet F_x}{\sum w_x \bullet F_x}$$ = change from nuptiality pattern

$$I_f = I_g \bullet I_m$$

and w_x = women aged x
f_x = age-specific fertility rate
M_x = married women aged x
F_x = Hutterite age-specific fertility (Reference group)

Decline/Increase = $(1 - I_f)$, $(1 - I_m)$, $(1 - I_g)$

3. Research assistance was provided by Aamir Hashmi.