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AGE STRUCTURAL TRANSITION AND ECONOMIC GROWTH: EVIDENCE FROM SOUTH AND SOUTHEAST ASIA

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ABSTRACT

Age structural transition is a process and a consequence of shifting age structure from a young aged population to old aged population. It is well known that economic growth in the East Asian countries was significantly contributed by demographic gift, that is decline in young aged population and increase in working aged population. However, little is known about the role of age structure changes on economic growth in the context of South and Southeast Asia. In this paper an attempt has been made to study the nature and process of age structural transition in the countries of South (Bangladesh, India and Sri Lanka) and Southeast Asia (Indonesia, Malaysia, Philippines, Singapore and Thailand). Further, this paper also attempts to study the influence of age structure changes on the economic growth in these countries. Time series analysis covering the period 1950-92 has been used for studying the relationship between age structure and economic growth, controlling macroeconomic variables such as investment share of GDP, net foreign balance, share of public consumption expenditure, inflation rate and openness.

The 'demographic bonus' or 'window of opportunity' had a positive impact on economic growth in all Southeast Asian countries except in the Philippines. The South Asian countries did not perform well in terms of economic growth at the onset of 'window of opportunity'. The results also indicate that countries that have had open economies and had excellent human capital benefited more from the "window of opportunity". In the next 20-25 years, the window of opportunity is likely to benefit most South Asian countries if favourable policies are pursued to take advantage of this with opening up their economy. The demographic bonus will be available for another 15-20 years followed by a period of demographic turbulence in the Southeast Asian countries.

There will be a faster growth in the old aged population after 15 years and stagnantion/decline in the working aged population.

As the gaps between demographic indicators are narrowing among the Asian countries, the question remains whether demographic convergence will lead to economic convergence in the future. The demographic transition has given the South Asian countries an opportunity for economic convergence. However, whether that opportunity is realised will depend on whether socio-economic policies are favourable to economic growth.

JEL Classification*:* F43, J11, J18, J21, J24

Key words*:* Age structure, window of opportunity, economic growth, open economy, South Asia, Southeast Asia.

1. Introduction

Age structural transition- a process and consequence of shifting age structure from a young aged population to old aged population- is an integral part of a demographic transition whose trajectories are determined by the timing and speed of fertility and mortality declines. Fertility and mortality are constant during the early stages of a demographic transition resulting in a constant age structure. However, when mortality declines and fertility is constant in the later stages of a demographic transition, a large share of a country's population is young, leading to a high dependency ratio[1] . Later, when fertility also starts declining, the cohorts of the high fertility regime in the previous stage of demographic transition move into the working ages contributing to a decline in the dependency ratio. During the final stage of the demographic transition, when both fertility and mortality reach the lowest level, the share of old aged population increases as cohorts of the high fertility regime age and are followed by a stable age distribution. Thus, the dependency ratio increases during the final stage of demographic transition due to an increase in the elderly population.

The nature of the changing age structure of the population during the demographic transition –from high fertility and mortality to low fertility and mortality- has various social and economic implications.

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1   The dependency ratio conventionally defined as the ratio of young age (ages 0-14) and old age (ages 65 and above) population to the working age population (ages 15-64).

Economic demographers observe that decline in the dependency ratio and increase in the working aged population during the age structural transition, is a "demographic bonus" or "window of opportunity" invoked by the demographic transition. During this period of window of opportunity, social sector expenditures are reduced due to less demand for health care services by the smaller young and old aged population as well as reduced demand for educational services due to declines in the growth of the school aged population. Therefore, the demographic bonus is likely to contribute partly to the growth of the national economy if favourable policies are pursued. The report of the Symposium on Population and Economic Development held in Italy characterises the window of opportunity as (a) more workers producing more total output, if they are productively employed; (b) greater accumulation of wealth, if savings occur and are productively invested and (c) a large supply of human capital, if appropriate investments are made in its formation (Birdsall & Sinding, 1998). After the "window of opportunity" there will be a period of "turbulence" to economic development due to an increase in the elderly population both in absolute and proportional terms. This period will have several challenges including provision of better medical care and a sustainable social security system.

Over the years, different views have come up regarding the consequences of population growth on development. Pessimists have argued that population has had negative impact on development (Echrlich, 1968; Coale and Hoover, 1958). However, optimists have contended that population pressure invokes technological changes leading to positive growth in the economy (Boserup, 1981; Simon, 1981). A study based on cross-country evidence concluded that there was no systematic evidence of either positive or a negative impact of population growth on economy (Kuznets, 1967). The revisionists during the 1980s have concluded that slower population growth would be

beneficial for development for most developing countries (National Research Council, 1986) and the relationship between population and development is contextual. The study by Kelly and Schmidt (1995) concluded that population size and density have a transitional impact on the economic growth. They argue that birth rate reductions have an immediate positive impact on growth due to reduction in the child-rearing expenses but will have negative impact in the long-run as fewer people will be entering into the labour force. The studies cited were mainly restricted to the impact of population size or density without considering the dynamics of its age structure.

Since the advent of the "miracle economies" in East Asia, the role of age structure on economic growth has attracted the attention of researchers. Among other factors, the demographic transition in the East Asian countries has played a favourable role for rapid per capita income growth (Asian Development Bank, 1997; Mason, 1988). Several studies have reported that shift in age structure has had significant impact on economic growth through savings and investment (Mason, 1988; Lee at al. 1997; Bloom and Williamson, 1997). This new approach of incorporating the age structure in growth models combines elements of the human capital approach and the life cycle saving theory. The evidence on the basis of estimated growth models has shown that age structure has significant transitional impact on the growth of the economy. These models assume that during the early stages of demographic transition where there is a large young aged population and small working aged population, the per capita income growth declines as there are relatively few workers and savers. As the demographic transition proceeds, the decline in the youth dependency burdens and increase in the working age population promotes per capita income growth, as there are more savers. When the transition completes, the old age dependency ratios raises and the income growth deteriorates (Bloom and Williamson, 1997).

It has been postulated that this "demographic gift" has contributed significantly to the economic growth of the East Asian countries (Mason, 1988; Lee et al., 1997). Bloom and Williamson (1997) have found that age structure has a transitional impact on the economy. They have concluded, based on the cross-sectional analysis of 78 Asian and non-Asian countries, that growth of the working aged population has had a powerful positive impact on GDP per capita growth, while growth of the total population has had a negative impact. It was also established in their study that growth of the dependent population (0-14 and 65+) slowed down the economic growth. However, the impact is not uniform between young and old aged populations. Although growth of the population under age 15 was negatively associated with the GDP per capita growth rate, there was no significant relationship found with the growth of elderly population. Behrman et al. (1999) studied the relationship between the average age of a population and several economic outcomes based on the panel data from 164 countries covering the period between 1950 and 1995. The economic outcomes used in their analysis are macroeconomic aggregates such as domestic savings, GDP per capita, capital per worker and tax revenue, governmental expenditure in education and health, and social indicators such as inequality, unemployment, homicide rates and schooling progression rates. It was concluded in their study that economic outcomes clearly follow the age patterns. Further, they have found that relationships between the mean population age and economic outcomes vary by regions as well as with different policy regimes such as openness, domestic financial markets and macroeconomic volatility. All these studies have used either dependency ratios, mean age of the population, differences in the growth rate of working age and total population, or the growth rate of young or old aged population as age variables. Broad age groups such as young, working and old ages were considered

as age variables. The limitation of this approach is that dynamics within the broad age groups are missed in the analysis.

Lindh and Malmberg (1999) have classified the age distribution as 0-14 (young), 15-24 (youth), 25-49 (prime working), 50-64 (middle) and 65+ (old age) for studying the impact on economic growth. This classification was done based on the life cycle theory and its behaviour in the general economy. As the young population (0-14) is dependent on the adults for their consumption, they incur health and education expenditures in the economy. The youth population (15-24) also consumes health and education, however, the pattern of consumption behaviour is likely to be different from young aged population due to differences in the needs and services. The prime working aged population (25-49) uses most of their earned income to buy a house and raise their children and therefore they save little. The population in the middle aged group 50-64 are likely to earn higher income because of their experience and also to have a higher saving rate than the 25-49 age group. As the old aged people (65+) are mostly retired, they depend on others for their consumption needs, particularly in health. Their study has shown based on cross-country analysis that age share of the variables have substantial effects on per-worker GDP growth rates. Using 5-year data in the OECD countries covering the period 1950 and 1990, their study found that there is a strong positive correlation between initial population shares of middle aged people (50-64 years) and growth in the following period. They also found a strong negative correlation between growth and the population share of the old aged population.

The studies cited thus far are limited to cross-sectional analysis at one point in time or cross-country panel data analysis. More recently, Andersson (2001) studied the impact of age structural transition on economic growth for Scandinavian countries using time series analysis.

The analysis in this study has been carried out in each Scandinavian country separately using the annual time series data from 1950 to 1992. This study observed a positive impact on economic growth by the share of middle aged adult population.

Thus far no attempt has been made to study how changes in age structure have influence on economic growth in the countries of South and Southeast Asia during their demographic transition using time series analysis. Due to varied demographic, institutional and environmental factors in South and Southeast Asia, the relationship between age structure and economic growth must be studied separately for each individual country.[2] Some of the differences in economic performance could be due to differences in these factors.

The speed and timing of demographic transition between South and Southeast Asian countries differ. Generally, the Southeast Asian countries experienced their demographic transition earlier. However, even among Southeast Asian countries, there were marked differences in the speed of fertility and mortality declines. These differences are presented in Table 1.

It is observed from table 1 that the lowest fertility rate was observed in Singapore followed by Thailand. The highest fertility rate was observed in Philippines. The total fertility rate was 1.8 per woman in Singapore, 1.9 in Thailand and 4.0 in Philippines during 1990-95. Barring Sri Lanka, India and Bangladesh have highest fertility among the South Asian countries. In the case of mortality, the life expectancy at birth was highest in Singapore (76 years) followed by Sri Lanka

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2   The South Asian countries Bangladesh, India and Sri Lanka and Southeast Asian countries Indonesia, Malaysia, Philippines, Singapore and Thailand were considered for the analysis. Other countries in the South and Southeast Asia were excluded from the analysis due to non-availability of certain data.

Table 1: Demographic, economic, environmental and institutional characteristics in South and Southeast Asia

Countries	Population size (000), 2000	GDP per capita 1995 (US $)	GDP per growth rate(%) 1990-95	Total fertility rate (per woman) 1990-95	Life expectancy at birth (years) 1990-95	Open to trade 1960-90	Tropics	Institutional quality index,1980
Indonesia	212107	2495	6.12	2.9	62.6	0.63	1	3.67
Malaysia	22243	7917	5.00	3.6	70.7	0.90	1	6.90
Philippines	75965	2518	2.96	4.0	66.3	0.06	1	2.97
Singapore	3565	19412	7.39	1.8	75.6	0.83	1	8.56
Thailand	61397	5005	9.26	1.9	68.8	1.00	1	6.26
Bangladesh	129154	754	2.62	3.4	55.6	0.00	0.1	2.74
India	1013660	1172	4.92	3.6	60.3	0.00	0.5	5.76
Sri Lanka	18829	1755	2.80	2.2	71.7	0.20	1	4.32

Source: World Bank (1998), United Nations (1999), Sachs & Warner (1995, 1997)

(72 years) during the year 1990-95. The lowest life expectancy at birth was observed in Bangladesh (56 years) followed by India (60 years). Tropic of the country is one of the important predictive factors for economic growth (Gallup et al. 1998). It has been argued that population located far from coast is also faced with large transport cost for international trade contributing to slower economic growth in the regions. With regard to this factor, only 10 per cent of the land in Bangladesh and 50 per cent of the land in India is subject to tropics, whereas in all other countries, the entire land is on tropics.

The quality of public institutions,[3] another important determinant of economic growth, also varies among the countries of South and Southeast Asia. Singapore ranks at the top in terms of institutional quality followed by Thailand. The lowest ranked countries were Bangladesh and the Philippines. Sachs and Warner (1995) have found that increased openness[4] to trade promotes economic growth. In regard to this indicator, the countries differed as to whether they were open or not during the period of analysis. India and Bangladesh were not open to trade during the period of analysis. Thailand was open to trade during the whole period from 1960 to 1990.

South Asian countries exhibited lower economic performance than Southeast Asian countries. The per capita GDP in Singapore is

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3   The quality of public institutions is based on an index created by Knack & Keefer (1995). This is based on five indicators of the quality of public institutions such as (i) the perceived efficiency of government bureaucracy, (ii) the extent of government corruption, (iii) efficacy of the rule of law, (iv) presence and absence of expropriation risk and (v) the perceived risk of repudiation of contracts by the government.

4   Sachs & Warner (1995) classified the country to be open if it meet the minimum criteria on four aspects of trade policy. These are (i) average tariffs must be lower than 40 percent, (ii) quotas and licensing must cover less than 40 percent of total imports, (iii) a black market premium must be less than 20 percent and (iv) export taxes should be moderate.

significantly higher than other Southeast and South Asian countries. In general, Southeast Asian countries are performing well in terms of economic growth with the exception of the Philippines. As regards per capita GDP growth rate in recent years, the highest GDP growth rate was observed in Thailand (9.26 percent) during the period 1990-95 followed by Singapore (7.39 percent). The lowest GDP per capita growth rate was observed in Bangladesh (2.62 percent) followed by Sri Lanka (2.80 percent).

Given the potentially significant contribution made by age shares on economic growth, this paper aims to understand this phenomenon and explore how the relationship between age structural transition and economic growth vary across different social, environmental, and policy regimes in the countries of South and Southeast Asia. Specifically, this paper aims to: (i) study the nature and process of age structural transition in the countries of South and Southeast Asia; (ii) analyse the extent of the relationship between age structural transition and economic growth in the context of South and Southeast Asian countries; and finally (iii) derive policy implications from the study. This study first describes the nature and process of age structural transition in the countries of South and Southeast Asia covering the period from 1950 to 2050 and its socio-economic implications. Next, the relationship between age structural transition and economic growth is analysed using regression models.

The paper is organised as follows: After presenting an introduction, section 2 discusses data and methodology used in this paper. Section 3 provides the brief account of the nature and process of age structural transition and its impact on economic growth. This section also studies the relationship between age structural transition and economic growth using regression models. And finally section 4 gives discussion and conclusion of the study.

2. Data and Methodology

This study uses data from various sources. The majority of the data comes from the United Nations (1999), Penn World Tables (Summer & Heston, 1995) and Sachs & Warner (1995, 1997). The age structure of the population from the year 1950 to 2050 has been taken from the United Nations (1999). The age distribution of the population from the year 2000 to 2050 is based on projections. The economic variables such as investment share of GDP, net foreign balance, share of public consumption expenditure, and inflation rate are obtained from Penn World Tables 5.6 (Summers & Heston, 1995). The variables such as openness, institutional quality and tropical condition are derived from Sachs and Warner (1995, 1997). In order to study the age structural transition and its impact on economic growth, the population has been categorised according to the Lindh and Malmberg classification described earlier.

We have used annual time series data covering the period from 1950 to 1992 to study the relationship between age structure and economic growth. A multiple regression analysis is used to study the relationship between age structure and economic growth. The economic growth is measured from growth rate of per capita Gross Domestic Product (GDP) and used as a dependent variable. As the focus of the paper is not on the econometric specification of the age share models on the economic growth, a simple Ordinary Least Squares (OLS) method has been used in the regression models to estimate the effect of age shares on the per capita GDP growth. The variables such as investment share of GDP, net foreign balance, share of public consumption expenditure, inflation rate and openness have been controlled in the model. In order to avoid perfect collinearity, the age group 0-14 has been excluded in the regression model. The study uses eight countries in the South and Southeast Asia chosen on the basis of data availability. These countries

are Indonesia, Malaysia, Philippines, Thailand, Singapore, Bangladesh, India and Sri Lanka.

3. Age structural transition and economic growth

This section discusses the nature and process of age structural transition in the selected countries of South and Southeast Asia. An attempt is also made to look at how the shift in age structures influenced the trends in the per capita GDP growth rates in these countries. Age structural transition is a constituent of comprehensive demographic transition frameworks integrated with fertility and mortality transitions. During the transition, there could be a 'disordered cohort flows' due to combination of fertility and mortality declines (Pool, 2000). This cohort flows will have varying implications in social, economic and health as they progress from young age to old age. For example, when the baby boom cohort enter into the adult age and, if the institution is not observing them in the labour market, the unemployment might go up, which again resulting to possible increase in the crime rates. On the positive side, if the baby boom cohort is observed into labour market, there could be a faster economic growth. Further, the saving rate is also likely to increase as they pass through different ages. The purpose of the studying age structural transition is not only on quantifying the age structural shifts of the population over a period of time, but also to derive it's various implications.

As the age structural transition is a consequence of speed and timing of fertility and mortality decline, it is important to understand priori the fertility and mortality trends in these countries[5]. Figure 1a shows the fertility trends in South and Southeast Asian countries. The figure exhibits that fertility has universally declined in all the countries. However, the speed and onset of fertility decline differed. The fertility

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5.   The cause of fertility and mortality transition in these countries are not discussed as they are beyond the scope of this paper.

decline was most rapid in Singapore, followed by Thailand. Although both Singapore and Thailand had a similar level of fertility in the 1950s and 1990s, it is important to note that the nature of fertility decline was different during the transition period 1950-90. Specifically, Singapore's total fertility rate has declined from 6.4 children per woman to 1.8 children-around 72 percent of declines in the span of 40 years. Similarly, Thailand's fertility rate has declined from 6.6 children per woman in the 1950s to 1.9 children per woman in the 1990s-a decline of 71 percent. But, in the case of Singapore, fertility started declining from 1955-60 and it was rapid from 1960 and reached below replacement fertility in 1980, and thereafter remained constant. On the other hand, in Thailand fertility decline was rapid only during the period 1965-70 and reached below replacement level in the 1990s. Although the fertility rate for Bangladesh and Malaysia were close to the level of Singapore and Thailand in 1950s, the decline in these countries was very slow. Further, it is important to note that, although the level of fertility rate is almost same between Bangladesh and Malaysia for both initial (1950s) and end years (1990s), the pattern of fertility decline was quite different. The fertility rate in Malaysia declined from 1955-60 till 1975-80 and remained at the same level between 1975 and 1990; whereas in Bangladesh, fertility increased between the years 1950 and 1970 and the decline started only after the 1970s. However, rapid fertility decline was observed in Bangladesh starting in 1980. Also, note that the pace of decline varies between the years 1950 and 1990 among Sri Lanka and India. Philippines recorded the highest fertility in 1950-55 as well as in 1990-95 and the decline was slow.

Regarding mortality transition, the life expectancy at birth was highest in Singapore (76 years) followed by Sri Lanka (72 years) around the year 1990. The lowest life expectancy at birth was observed in Bangladesh (57 years) followed by India (60 years) in the same year.

Figure 1. Fertility and mortality trends in South and Southeast Asia

a. Trends in TFR in the South and Southeast Asian Countries

b. Trends in Life expectancy at birth in the South and Southeast Asian countries
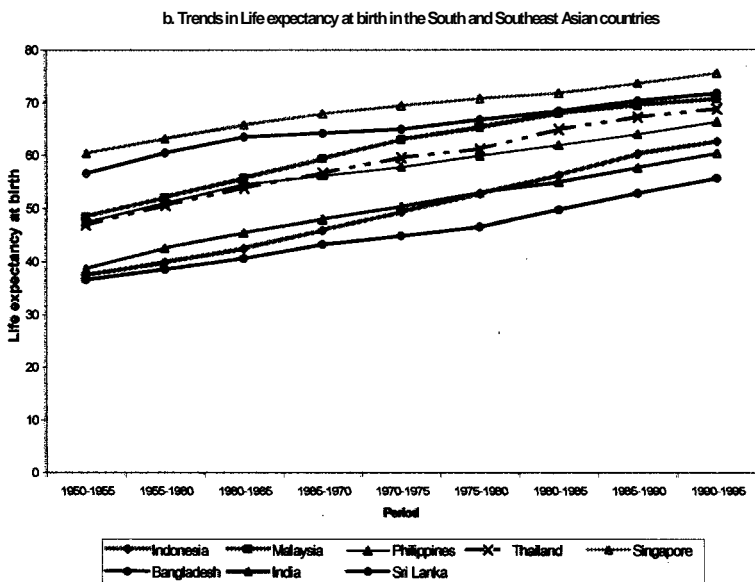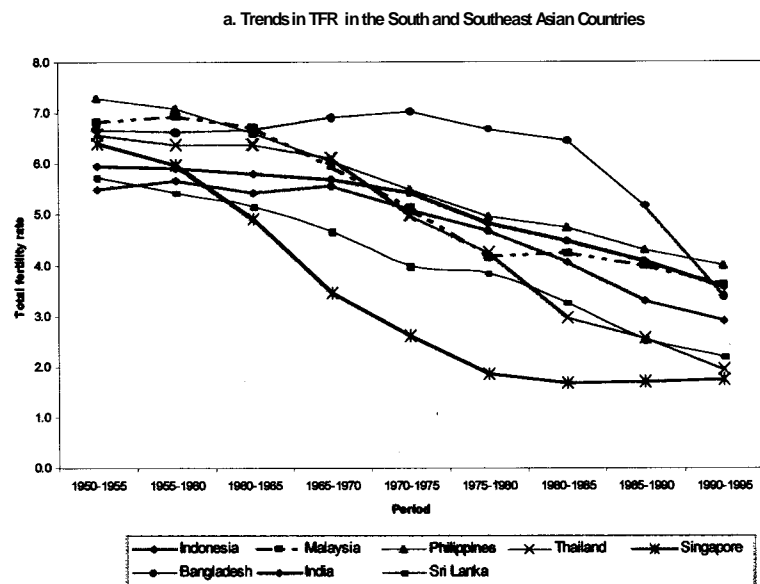
The life expectancy at birth has increased dramatically in all the countries between 1950 and 1995 (see figure 1b). The largest increases were observed in Indonesia (67 percent) and India (56 percent) as these countries had a very low life expectancy at birth during the initial year. The 8 years differences in life expectancy at birth between Malaysia and Sri Lanka in 1950-55 has been narrowed down in 1990-95 due to a faster increase in life expectancy at birth in Malaysia. In general, the gap in the life expectancy at birth has been narrowing down among all these countries.

The combination of differential rate of decline in mortality and fertility over the demographic transition among these countries would contribute to the varying disordered flows of age cohorts between these countries. Figure 2 illustrates this point with graphs of the age structural transition of each South and Southeast Asian country from 1950-2050. The age structural transition and its implications on the trends in per capita GDP growth rate are discussed in the following paragraphs.

Figure 2a shows the age structural transition in Indonesia. It has been observed that the share of the young aged population increased till 1975 and thereafter it declined. Also the share of prime working age population started increasing only from 1980. It is interesting to note that the per capita GDP growth rate was higher even before the decline in the dependency ratio (see table 2). The per capita GDP growth rate was 5.79 percent during 1970-75. It is important to mention that this country was under open to trade policy since 1971. There was a marginal increase in the per capita GDP growth rate (5.89 percent) during the period 1975-80 compared to earlier period. This period was also coincides with the decline in the share of young aged population. It was also observed that the growth rate of per capita GDP was over 5 percent during 1990s and the window of opportunity seems to continue till 2025 in Indonesia. Therefore, Indonesia has great potential for
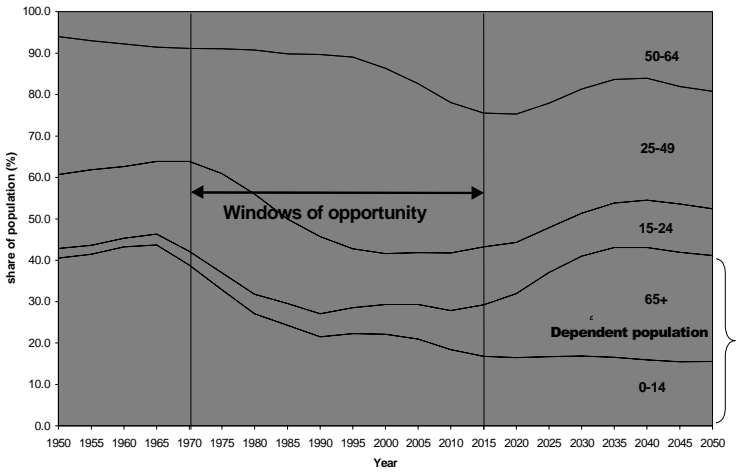
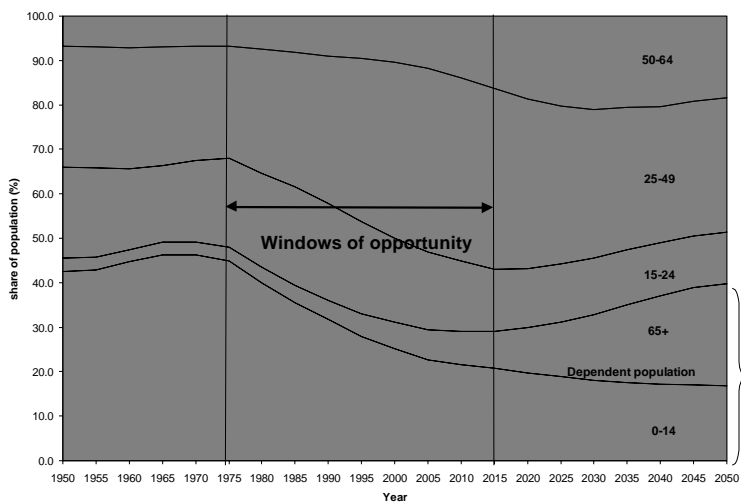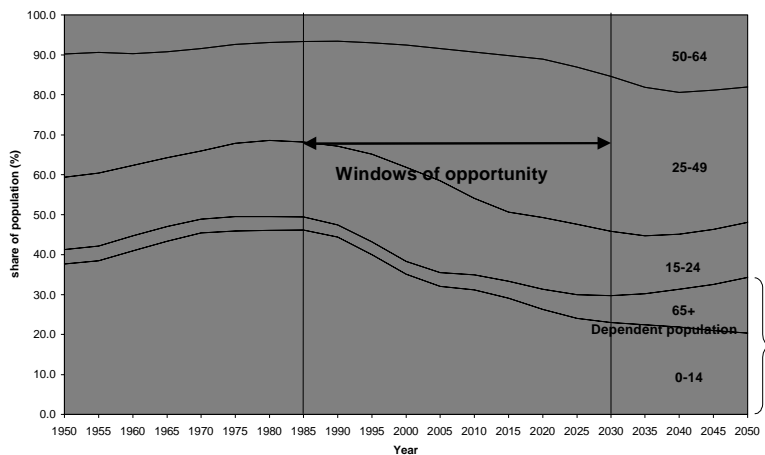# Figure 2: Age Structural Transition in South and Southeast Asian Countries

a. Indonesia
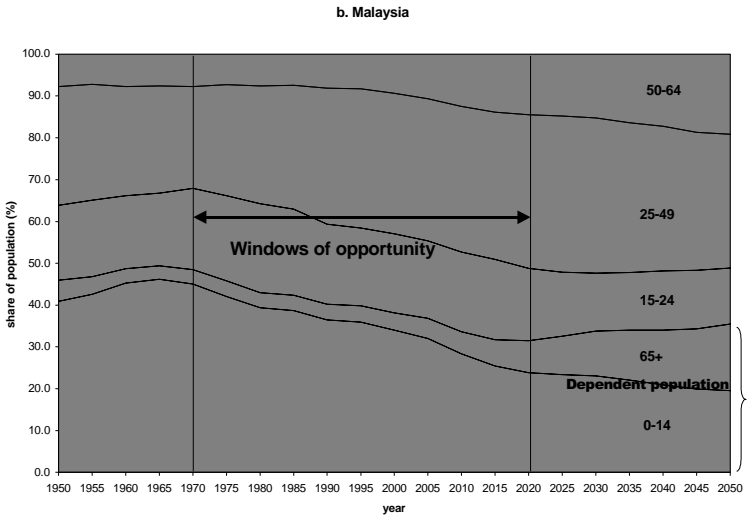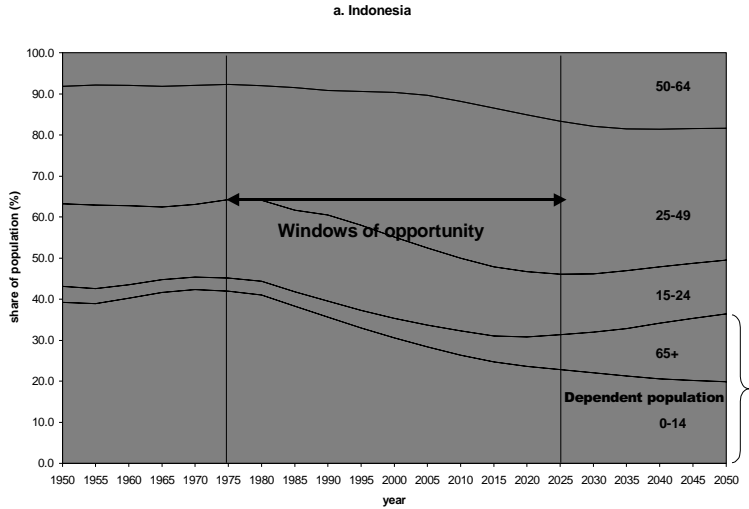
b. Malaysia
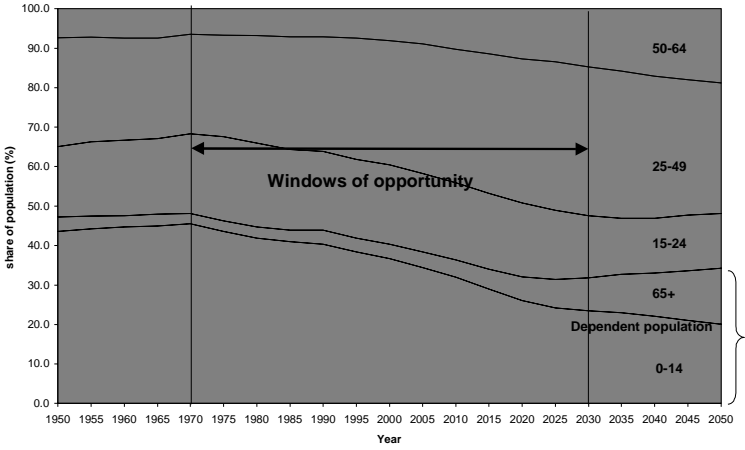
c. Philippines

d. Singapore

e. Thailand

f. Bangladesh

g. India
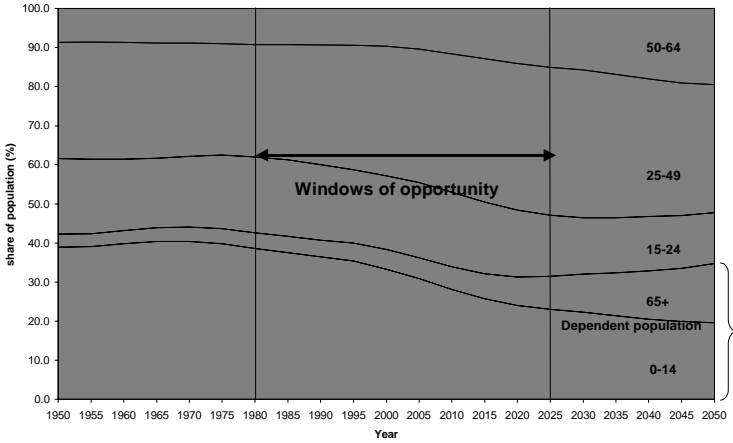
h. Sri Lanka
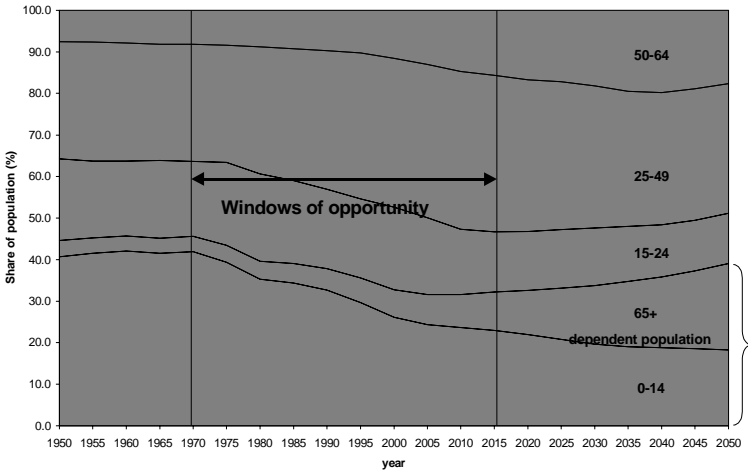
Table 2. Per capita GDP growth rate in South and Southeast Asian Countries, 1950-95 (%)

Period	Indonesia	Malaysia	Philippines	Singapore	Thailand	Bangladesh	India	Sri Lanka
1950-55	N.A.	N.A	5.07	N.A.	-3.86	N.A	2.82	1.66
1955-60	N.A.	2.05	2.50	N.A.	5.78	N.A.	2.76	2.24
1960-65	-1.22	3.34	1.85	2.53	3.75	4.04	-0.24	-1.23
1965-70	3.41	5.15	2.44	9.87	5.96	2.33	1.05	1.03
1970-75	5.79	4.28	2.92	11.47	1.97	-5.95	0.40	0.70
1975-80	5.89	7.10	2.94	5.51	5.14	2.47	1.53	4.83
1980-85	5.06	1.72	-3.99	3.98	2.44	2.28	3.49	4.48
1985-90	3.59	4.21	2.66	6.12	7.42	2.67	3.68	0.49

Source : Summer & Heston (1995)

improving its economic growth. To increase economic growth, employment should be created to accommodate the increasing workforce. However, the recent estimate on unemployment rate is disappointing. In particular, the average rate of unemployment has more than doubled during 1990s compared to 1980s (Asian Development Bank, 2001). It is important for Indonesia to promote favourable policies to create employment in order to keep pace of the economic growth.

In the case of Malaysia, the share of the young aged population started declining and prime working age population started increasing from 1970s (see figure 2b). However, the decline in the share of the young aged population was not rapid as that of Singapore (see figure 2d) and Thailand (see figure 2e). Further, the decline in the share of the young aged population and increase in the share of the prime working aged population (decline in the young dependency ratio) was also coincided with the increase in per capita GDP growth rate in Malaysia. To be specific, the per capita GDP growth rate has increased from 4.28 percent in 1970-75 to 7.10 percent in 1975-80. It is also important to note that after the initial rise in the per capita GDP growth rate, there was a sharp decline during the period 1980-85. The per capita GDP growth rate during this period was only 1.72 percent. After 1985, the per capita GDP growth rate increased significantly in the following periods 1985-90 and 1990-95 (see Table 2). As the share of the young aged population will be declining and the share of working age population will be increasing in the future, the per capita GDP growth rate is likely to go up if favourable policies for economic growth are pursued in Malaysia. The window of opportunity shall be available for Malaysia till 2020 and thereafter it starts receiving old age burden in the economy (see figure 2b).

The country Philippines is also experienced a decline in the young age dependency ratio since the 1970s (see figure 2c). The share of the

young aged population has declining and the share of the prime working population has increasing since 1970s. Although dependency ratio was declining, the per capita GDP growth rate was fluctuating around 3 percent since 1970s and was negative during the period 1980-85 (-3.99 percent). This indicates that Philippines did not use the 'window of opportunity' for promotional economic growth. Among the Southeast Asian countries, the economic growth for the Philippines was comparatively low during the window of opportunity'. Philippines opened up the economy in the year 1989. Even after opening up the economy, the per capita GDP growth rate was only 0.07 percent during the period 1990-95 (World Bank, 1998). This seems to indicate that the economic growth policies and institutional structure did not create the environment to use the 'window of opportunity' in Philippines. In order to promote economic growth, policies should create employment for the increasing labour force. It is worthwhile to mention that the unemployment rate in Philippines was fluctuating around 8-10 percent during 1990s, a rate significantly higher than other Southeast Asian countries (Asian Development Bank, 2001).

Among Southeast Asian countries, a unique age structural transition was observed in Singapore. The share of young aged population (0-14) increased between 1950 and 1965, then sharply declined through 1990, and thereafter fluctuated till 2005 before stabilizing at around 15 percent of the total population (see figure 2d). At the same time, the share of the prime working aged population increased from 1970, contributing to a decline in the dependency ratio from the 1970s. This is a 'window of opportunity' for development invoked by the demographic transition. Unlike other countries, decline in the young aged and increase in the working aged population was rapid in Singapore. Singapore used this potential to improve coverage and quality of education. When the dependency ratio started declining

sharply, the per capita GDP growth rate increased from 9.87 percent in 1965-70 to 11.47 percent in 1970-75. However, the improvement in the per capita GDP growth rate was not sustained in the later years and in fact declined. The per capita GDP growth rate was only 5.5 percent in 1975-80, and 4 percent in 1980-85 despite the decline in the young aged population and the increase in the prime working aged population during these periods. This shows that economic growth policies were not always synchronous with the speed of decline in the dependency ratios in the context of Singapore. In the later period, the per capita GDP growth rate went up from 3.98 percent in 1980-85 to 6.12 percent in 1985-90. It is important to note that the share of middle age working population (50-64) increased at a slower rate during this period.

The age structural transition shows that Singapore has bright prospects for economic growth till the year 2015. The share of the prime working aged population is likely to decline sharply from the year 2000. This will ease the unemployment situation. According to ADB (2001), the unemployment rate is around 4.5 percent in 2000, which is more than two and half times the unemployment rate in 1990. Also, the share of the middle aged working population will be increasing sharply from 2000 to 2015, a conducive factor for economic growth. Due to their work experience in the past and the higher saving rate, the productivity is likely to go up if suitable policies are pursued for savings and investment. As the share of old age population will also start increasing rapidly from 2010, it is a great opportunity for Singapore to pursue the policies which will encourage the middle age working population to save more. These savings could be invested for productive purposes, and the returns from the investment could be used for their consumption during their old age. Singapore will be approaching the period of "demographic turbulence" after the year 2020. The share of prime working aged population will stabilise at around 30 percent, the

share of the middle aged working population will decline, and consequently the old aged population will increase to about 25 percent - a value closer to prime working age population. As the shares of the prime working aged population and the old aged population are likely to be closer, this will have various social implications. In order to avoid demographic turbulence on the economy and society, it is important to prepare policies directed towards meeting this challenge.

From figure 2e, it was noticed that the demographic bonus for Thailand was available from 1975. The share of the young aged population (0-14) declined rapidly and also a share of the prime working aged population increased at a faster rate after the year 1975. Thus, there was a decline in the dependency ratio, particularly the young dependency ratio from 1975. It is important to note that as the young aged population started declining since 1975, the expenditure per student in the secondary sector as percentage of GNP per capita also declined from 23.5 percent to 14.4 percent between 1970 and 1975 (World Bank, 1998). Thailand has used the potential of demographic bonus induced by the demographic transition to increase the economic growth in the country. For instance, the GDP per capita growth rate is increased during the period 1975-80 (5.14 percent) compared to the previous period 1970-75 (1.97 percent). However, it is interesting to note that the per capita GDP growth rate was not sustained in the later period despite continued decline in the dependency ratio. The estimated per capita GDP growth rate was only 2.44 percent during the period 1980-85. After a fall in the per capita GDP growth rate, a phenomenal increase of 7.42 percent was observed during 1985-90. The lower GDP growth rate during 1980-85 coincided with the increase in the share of the youth population. As the share of prime working age (15-49) is likely to increase in the future till 2015, Thailand could achieve a faster economic growth if the younger generation entering into the labour

force incorporated into the labour market. However, the increase in the unemployment rate in the recent period may impede positive growth in the economy. There was a slight increase in the unemployment rate from 0.9 percent in 1997 (lowest in 1990s) to 2.4 percent in 2000 (Asian Development Bank, 2001). Also, as the middle aged working population will be increasing, the savings rate is likely to go up in the future. Higher savings among these populations can be used for productive investment, which might again leading to faster economic growth. The challenge would be after the year 2025 when the share of the old aged population will rise steeply.

Among the South Asian countries, Bangladesh observed a unique age structural transition (see figure 2f). The share of the young aged population increased and the share of the prime working aged population decreased from 1950 until 1985. Consequently the dependency ratio increased till the year 1985. Excluding the period 1970-75, the per capita GDP growth rate was around 2-4 percent during 1960-85. The per capita GDP growth rate was negative (-6 percent) during the period 1970-75 due to political instability in the country. The disordered flow is visible among the youth population in Bangladesh. The share of youth population has increased consistently since 1970 and is likely to peak between the year 2000 and 2005. This will have serious implications for the youth population. The 'window of opportunity" will be available for Bangladesh for another two decades. Population aging would also be slower for the next two decades. If suitable policies are pursued, Bangladesh should able to achieve a higher per capita GDP growth rate in the future.

In the case of India, the share of the young aged population declined at a slower rate since 1970s. However, the share of the prime working aged population (15-49) increased only from the year 1980

(see figure 2g). Consequently, the decline in the dependency ratio started from the year 1980. The average per capita GDP growth rate was less than one percent during the period 1960-80. However, the growth rate has increased to more than 3 percent during the 1980s-the period in which the share of the working aged population also went up. However, the rate of growth was lower than that of many Southeast Asian countries at the time when the share of the working aged population increased. It is important to note that India was not open to trade during the 1980s. The decline in the dependency ratio is likely to continue in the future for another two decades and this gives greater opportunity for economic growth. As the country has opened up the economy in the 1990s, the prospects for economic growth are bright if the policies are directed towards increasing the productivity by providing employment for the large workforce entering into the labour market. Also, the share of the middle aged working population will be increasing from 2005, and therefore the savings rate would also go up after this year. This too is conducive to economic growth.

Regarding Sri Lanka, the share of the young aged population started declining in 1970 and the share of the prime working aged population increased since 1975. Therefore the dependency ratio declined from the year 1975. It was observed that economic growth was slower before 1975. However, the per capita GDP growth rate has gone up from 0.70 percent during 1970-75 to 4.83 percent during 1975-80 and maintained almost this same level of growth rate during 1980-85. Though the higher GDP growth rate coincided with the decline of the dependency ratio, it is also important to note that Sri Lanka was open to trade during 1978-83. Further, the per capita GDP growth rate was only 0.49 percent during the period 1985-90 when the economy was closed. Since the economy was not open to trade after 1983, other economic policies were not seems to be favourable to use the 'window of

opportunity' for productivity growth. The unemployment rate was about 15 percent during the period 1985-90, which is double the level of unemployment in the Philippines during the same period. The period of "window of opportunity" will be available up to the year 2015 (see figure 2h). It is high time for Sri Lanka to make use of this opportunity for growth. The period of turbulence will start from 2015 with a steep increase in the share of old aged population.

A statistical analysis

In the previous discussion, we have found that the growth of economy was faster during the initial period of "window of opportunity" in many countries. In this section, a statistical analysis has been carried out to see how the share of population in different age groups has influenced the economic growth over time, controlling for macroeconomic indicators. Table 3 gives the estimated regression coefficients of age share of the population on the growth rate of per capita GDP controlling for macroeconomic variables. The regression analysis is carried out from annual time series data covering the period 1950 to 1990 for most countries. For some countries, the analysis starts in 1960 due to unavailability of data. In order to avoid perfect collinearity of age shares, the age share 0-14 was excluded in the regression model.

The results revealed that the variable openness was positively associated with the GDP growth rate in some countries but was not statistically significant. In preliminary analysis that did not include age share variables the variable openness was highly significant and positively associated with the GDP growth rate in Singapore and Indonesia. With the age shares in the regression model, trade openness was not significant in these two countries but the sign of this coefficient was positive. The variable openness was excluded from the analysis in Malaysia, Philippines and Sri Lanka due to its lack of variability. To be

specific, the proportion of years the country was open in Malaysia was 0.90, in Philippines it was 0.06 and in Sri Lanka, it was 0.20 during the study period. Also, Thailand was an open economy the duration of the study period, whereas India and Bangladesh were closed to trade during the entire period and therefore the variable openness could not be included in the regression model for these countries.

The growth rate of investment has a positive effect on the GDP per capita growth rate in Malaysia, Indonesia, and Philippines. It did not have significant effect in other countries.

The growth rate of net foreign balance is not significantly related with GDP per capita growth rate in any country with the 5 percent level of significance. However, this variable was significant at the 10 percent level and showed a negative impact on the per capita GDP growth rate in India and Bangladesh.

It is expected that public consumption is likely to reduce growth. The growth rate of public consumption expenditure is negatively associated with the growth rate of per capita GDP in Singapore and Thailand. Contrary to our expectation, it was positive and significantly related to the per capita GDP growth rates in the Philippines, India and Bangladesh. There could be due to a non-linear relationship between public consumption expenditure and economic growth.

As expected, the inflation rate was negatively associated with the per capita growth rate of GDP in Thailand, Philippines and India. But it had a positive influence in Indonesia.

The growth rate of the total population had a negative influence on economic growth only in the Philippines. The relationship in the remaining countries was not significant. It seems that the pessimistic view regarding the impact of population growth rates on economic development is true in the case of Philippines.

Table 3. Results of regression analysis on the determinants of economic growth in South and Southeast Asia (dependent variable = growth rate of per capita GDP)

Independent variables	Indonesia	Malaysia	Philippines	Thailand	Singapore	Bangladesh	India	Sri Lanka
Constant	0.03	2.31	-1.07	1.64	3.72*	2.81	1.99	1.20
GR of investment	0.19**	0.25**	0.16**	0.10	0.07	-0.05	-0.00	-0.08
GR of net foreign balance	0.06	0.00	0.00	-0.00	0.00	-0.01*	-3.46*	-0.00
GR of pub. Cons. expen.	0.03	-0.11	0.20*	-0.22**	-0.23*	0.50**	0.28**	-0.04
Inflation rate	0.08**	-0.00	-0.08**	-0.21**	0.04	-0.02	-0.18**	-0.12
Openness	0.07	n.i	n.i.	0.09	0.09	n.i	n.i	n.i
GR of population	-0.03	-0.24	-0.58**	0.13	-0.14	0.29	0.58	0.16
Log age share 0-14	n.i	n.i	n.i	n.i	n.i	n.i	n.i	n.i
Log age share 15-24	-0.06	0.09	-0.09	-0.18	0.74*	0.45	0.30	0.08
Log age share 25-49	-1.75*	-0.22	-0.87**	-0.83**	0.36	0.58	0.06	-0.39
Log age share 50-64	1.00	0.95**	0.13	0.96**	2.41*	-0.19	-0.17	0.32
Log age share 65+	-0.07	0.18	0.30*	0.03	-0.99**	0.29	0.09	0.09
R square	0.79	0.67	0.71	0.48	0.57	0.69	0.46	0.28
D.W statistic	2.37	2.26	1.80	2.34	2.45	2.40	2.21	2.79
F Value	7.65	6.00	5.50	3.02	3.41	8.41	4.71	1.58

** $p < 0.05$; * $p < 0.1$; n.i - not included.

Further, the results of regression analysis show that the effect of age shares on the GDP per capita growth rate is not uniform among the countries of South and Southeast Asia. The analysis found that none of the age shares were significant in the three South Asian countries studied. In contrast, age shares had a significant influence on the economic growth in all five Southeast Asian countries studied. However, the magnitude and direction of the effect of the population age shares varied among these countries. For instance, the youth population age share 15-24 was positively associated with the per capita GDP growth rate in Singapore, but had no significant relationship in the other countries. The productive age share 25-49 contributed negatively to the per capita GDP growth rate in Indonesia, Philippines and Thailand, but had no significant effect in Malaysia and Singapore. In accordance with the life cycle theory, the earnings of this age group are mostly consumed in bearing and rearing children, and therefore the effect on the economic growth by this population would be minimal.

As expected, the age share of the population 50-64 is positively associated with the economic growth in the countries of Singapore, Malaysia and Thailand. Similar findings were also observed in other studies of OECD and Scandinavian countries (see Lindh and Malmberg, 1999 and Andersson, 2001). It is expected that this population is more experienced and likely to earn more than the prime working age population. Also, the people in this age group are likely to save more since consumption on bearing and raising their children would have been largely completed. The increase in the saving rates is likely to contribute to higher economic growth in the country. As expected, the age share for 65 and above negatively affected economic growth in Singapore. However, it is interesting to note that the age share 65+ contributed positively to the GDP per capita growth rate in the Philippines. The study by Bloom and Williamson (1997) based on panel

data cross sectional analysis also found a similar positive association. It is possible that the old aged population made a significant economic contribution in the Philippines.

4. Discussion and Conclusions

This paper explored the process of age structural transition in the countries of South and Southeast Asia and its relation with economic growth. It was found that the age structural transition is not uniform among the countries of South and Southeast Asia. The differences in age structural transition are due to differences in the nature of fertility and mortality decline among these countries. It was also hypothesized that each country would undergo a period of "window of opportunity" or "demographic bonus" during the age structural transition. However, the timing and duration of this opportunity is determined by the timing and speed of the product of fertility and mortality decline. The demographic bonus was available for Southeast Asian countries and Sri Lanka since 1970s whereas for the other two South Asian countries, it started only in the 1980s. The period of window of opportunity is likely to end around the year 2015 in Singapore, Thailand and Sri Lanaka; 2020 in Malaysia; 2025 in Indonesia and India; and will continue till the year 2030 in the Philippines and Bangladesh.

The 'window of opportunity' had a positive impact on economic growth in all Southeast Asian countries except for the Philippines. The per capita GDP growth rate increased sharply at the onset of the shift in the age share of the population in Southeast Asian countries of Singapore, Thailand and Malaysia. However, the per capita GDP growth rate was not sustained at the same level in later years even though the decline in the dependent population and increase in the working aged population continued. While the Philippines had similar human capital in terms of education and health as the other Southeast Asian countries, the

economic growth rate during the period of analysis deteriorated. The Philippines differs from other Southeast Asian countries with respect to total fertility rate, trade openness and public institutional quality. These factors such as higher population growth, economic policy and institutional structure could have inhibited for the favourable outcome on economic growth during the period of 'window of opportunity'. This is also confirmed in the regression analysis that the rate of population growth negatively influenced the economic growth rate in the Philippines.

The South Asian countries benefited little from the age structural transition. The South Asian countries did not perform well in terms of economic growth relative to Southeast Asian countries at the onset of their age structural transition. The reason could be that at the onset of age structural transition, all of the Southeast Asian countries, excluding the Philippines were open to trade. However, in the case of South Asian countries, India and Bangladesh were not open to trade during the period of analysis and Sri Lanka was open only for 5 years between 1978 and 1983.

It can be argued that countries which have had open economies and had excellent human capital benefited more from the "window of opportunity" invoked by the demographic transition. Further support of this argument was found in regression analysis not shown in this paper. When the age share variable was not included in the equation there was a positive association between trade openness and economic growth in Indonesia and Singapore. When the age share variable was included in the equation, the effect of openness disappeared. Again this shows that the 'window of opportunity" is likely to have a positive impact on economic growth only if the country followed open economic policies.

Accumulation of human capital is an important element for the development process. There were significant differences observed in human capital between South and Southeast Asian countries. Around the year 1985, the illiteracy rate was above 60-70 percent in South Asia (excluding Sri Lanka), whereas it was only 10-28 percent in Southeast Asian countries (World Bank, 1998). The life expectancy was also much lower for India and Bangladesh compared to Southeast Asian countries. Hence, the onset of age structural transition started with low human capital in South Asian countries and therefore did not have a significant effect on economic growth. Lutz and Sanderson (2000) have argued that age structural transition combined with educational transition determines the level of economic growth. The joint effect of these would be much stronger on economic growth than the independent effects.

This study also found that macro economic growth follows the life cycle theory in the Southeast Asian economies. We have found that age share 25-49 had a significant negative impact on economic growth. As discussed earlier, this age group of population consumes most of their earning for consumption and are therefore likely to save little. This was true in Indonesia, Philippines and Thailand. The age group 50-64 had a positive effect on the economic growth due to their higher rate of saving and lower consumption. This was true in Singapore and Malaysia as age share 50-64 had positive influence on economic growth. However, in the case of age share 65+, a differential impact was observed. As this age group population is dependent for their consumption, it is expected that it will have negative impact on the economic growth. As expected, the effect was negative in Singapore. However, age share 65+ positively influenced the economic growth in Philippines. The analysis also revealed that age shares did not affect economic growth in the South Asian countries.

Regarding the future prospects for growth in South and Southeast Asian economies, the window of opportunity is likely to benefit most South Asian countries. The demographic bonus will be available for the next 20-30 years in the South Asian countries. If favourable policies are pursued to take advantage of this opportunity, India, Bangladesh and Sri Lanka could see phenomenal growth in the economy during this period. The good news is that these countries have opened up their economies in the 1990s. We have seen earlier that openness seemed to be instrumental for rapid growth during the period of window of opportunity in the Southeast Asian countries. As the human capital is low in South Asian countries (excluding Sri Lanka), there is an opportunity to improve it. It has been argued that human capital is an important element to acquire skills and facilitates adoption of superior technology imported from developed countries in the regime of open economy. As regards the South Asian countries, especially Bangladesh and India, the quality and coverage of primary education could be improved during the window of opportunity, which will have long-term effect on economic growth. Moreover the quality of education varies between South and Southeast Asian countries. The South Asian countries of India and Bangladesh have higher pupil-teachers ratios- an indirect measure of the quality of education - than Southeast Asian countries. In 1990, the pupil-teacher ratio in Bangladesh and India was 63 and 47 respectively, whereas this ratio ranges only between 20-33 in the Southeast Asian countries (Asian Development Bank, 2001). Also, secondary enrolment in Bangladesh was only 21 percent in 1991- a rate achieved in the 1960s by many Southeast Asian countries. But, India ranks closer to some of the Southeast Asian countries in terms of secondary enrolment (World Bank, 1998).

Apart from education, South Asian countries like India and Bangladesh should improve the level of nutrition. Although the over all

level of mortality is declining in these countries, the level of malnutrition among children in South Asian countries is significantly higher than that of Southeast Asian countries. The percentage of malnourished children (age less than 5) was 56 percent in Bangladesh and 45 percent in India during 1993-99. In contrast, it was only 19 percent in Thailand, 20 percent in Malaysia and an insignificant proportion in Singapore (Asian Development Bank, 2001). Studies have shown that malnutrition at the younger ages is likely to have long-term effects on morbidity and mortality in later ages and consequently affect the quality of life (Elo & Preston, 1992; Navaneetham, 1993). The health status among adults is an important determinant for labour productivity.

The Southeast Asian countries will face a different kind of challenge in the future. The demographic bonus will be available only for another 15-20 years followed by a period of demographic turbulence. There will be faster growth in the old aged population after 15 years and stagnantion/decline in the working aged population in the Southeast Asian countries. Nevertheless, a good opportunity for Southeast Asian countries will be an increasing share of the middle aged (50-64) population. We have found that this age group has a positive impact on the growth rate of the economy. The Southeast Asian countries could use this opportunity to increase or sustain their economic growth with favourable economic growth policies focused on saving and investment. The level of economic growth in the next 10-15 years will be a determining factor for sustaining growth during the period of demographic turbulence. The Southeast Asian countries could concentrate on improving the quality of technical education, thereby creating opportunities for technological development.

As the gaps between demographic indicators are narrowing among the Asian countries, the question remains whether demographic

convergence will lead to economic convergence in the future. The demographic transition will give the South Asian countries an opportunity for economic convergence. However, whether that opportunity is realised will depend on whether socio-economic policies are favourable to economic growth. To conclude, age structural dynamics is one of the important factors for economic growth, but the magnitude and direction of the effect seems to be conditioned by socio-economic policies and institutional factors. Nevertheless, age structural dynamics may have to be incorporated into the macroeconomic policy framework to achieve successful economic growth.

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References

Andersson, B. 2001. Scandinavian Evidence on Growth and Age Structure, *Regional Studies*, Vol. 35, No.5.

Asian Development Bank, 1997. *Emerging Asia: Changes and Challenges*, Asian Development Bank, Manila.

Asian Development Bank. 2001. *Key indicators of Developing Asian and Pacific Countries*, Oxford University Press, New York.

Behrman J.R., Duryea, S. & M.Szekey. 1999. Aging and Economic Opportunities: Major World Regions Around the Turn of the Century, *Working Paper no. 405*. Inter-American Development Bank.

Birdsall, N & S. Sinding. 1998. *Report on Symposium on Population and Economic Development,* November 2-6, Bellagio, Italy.

Bloom, D.E. & Williamson, J.G. 1997. Demographic Transitions and Economic Miracles in Emerging Asia, *Working Paper 6268*. Cambridge, M.A. NBER.

Boserup, E. 1981. *Population and Technological Change: A study of Long Term Trends*, University of Chicago Press, Chicago.

Coale, A.C. & Hoover, E.M.1958. *Population Growth and Economic Development in Low Income Countries: A Case Study of India*, Princeton University Press, Princeton.

Deaton, A.S. & C.H. Paxson. 1997. The Effects of Economic and Population Growth on National Saving and Inequality, *Demography*, 34(1), pp. 97-114.

Ehrlich, P.R. 1968. *The Population Bomb*, Ballentine, New York.

Elo, I.T., & Preston. 1992. Effects of Early-life Condition on Adult Mortality: A Review, *Population Index*, 58(2), pp.186-222.

Gallup, J.L., Sachs, J.D. & Mellinger. 1998. Geography and Economic Development, *NBER Working Paper No. 6849*, National Bureau of Economic Research, Cambridge, MA, 02138.

Higgins, M. & J.M. Williamson. 1999. Explaining Inequality the World Round: Cohort size, Kuznets curves and Openness, *NBER working paper no. 7224*, National Bureau of Economic Research, Cambridge.

Higgins, M. & Williamson, J.G. 1997. Asian Demography and Foreign Capital Dependence, *Population and Development Review*, 20: 553-559.

Jones, G.W. 2000. Human Capital Aspects of Economic Development: A Comparative Perspective in Asia, *Paper presented at the IUSSP/ APN Meeting on Age Structural Transitions and Policy Implications*, Phuket, Thailand, November 8-10.

Kelly, A.C. 1988. Economic Consequences of Population Change in the Third World, *Journal of Economic Literature* 26: 1685-1728.

Kelly, A. & Schmidt, R. 1995. Aggregate Population and Economic Growth Correlation: The Role of the Components of Demographic Change, *Demography*, 32, 543-555.

Knack, S. & Keefer, P. 1995. Institutions and Economic Performance: Cross country tests using Alternative Industrial Measures, *Economics and Politics*, 7(3). 207-27.

Kuznets, S, 1967. Population and Economic Growth, *Proceedings of the American Philosophical Society*, 111.

Lee, R., A. Mason and T. Miller. 1997. Savings, Wealth, and Demographic Transition in East Asia, *East West Center Working Papers*: Population and Series. Hawaii.

Lindh, T and Malmberg, B. 1999. Age Structure Effects and Growth in the OECD, 1950-1990, *Journal of Population Economics*, Vol.12.

Lindh, T. 1999. Age Structure and Economic Policy: The case of Saving and Growth, *Population Research and Policy Review*, Vol. 18.

Lutz, W. & Sanderson, W. 2000. Toward a Concept of Population Balance: Considering Age Structure, Human Capital, and Intergenerational Equity, *Paper presented at the IUSSP/APN Meeting on Age Structural Transitions and Policy Implications*, Phuket, Thailand, November 8-10.

Mankiw, N.G. Romer, D. & Weil, D.N. 1992. A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics*, Vol.57.

Mason, A. 1988. Savings, Economic Growth, and Demographic Change, *Population and Development Review*, 14.

National Research Council. 1986. *Population Growth and Economic Development: Policy Questions*, National Academy Press, Washington, DC.

Navaneetham, K. 1993. The Influence of Cohort Effects on Mortality Trends in India: Role of Economic Factors, *Population Research and Policy Review*, Vol.12.

Pool, Ian. 2000. Age Structural Transitions and Policy: Frameworks, *Paper Presented at the IUSSP/APN Meeting on Age Structural Transitions and Policy Implications*, Phuket, Thailand, November 8-10.

Sachs, J.D. & A. Warner. 1997. Fundamental Source of Long run Growth, *American Economic Review*, Papers and Proceedings.

Sachs, J.D. & Warner, A.M. 1995. Economic Reform and the Process of Global Integration, *Brookings Papers on Economic Activity*, 1-118.

Sachs, J.D. and A. Warner. 1995. Natural Resource Abundance and Economic Growth, *NBER Working paper no. 5398*, National Bureau of Economic Research, Cambridge.

Shantakumar, G. 2000. Population and Labour Force: Changing Dynamics and Policy Implications, National University of Singapore, Singapore.

Simon, J. 1981. *The Ultimate Resource*, Princeton University Press, Princeton.

Summer, R & Heston. A. 1995. *The Penn World Table (Mark 5.6),* Centre for International Comparisons, University of Pennsylvania, Philadelphia, P. A.

Tuljapurkar, S. 2000. Structural and Policy Consequences of Mortality and Fertility Decline, *Paper presented at the IUSSP/APN Meeting on Age Structural Transitions and Policy Implications*, Phuket, Thailand, November 8-10.

United Nations. 1999. *World Population Prospects: The 1998 Revision,* Vol. I & Vol.II, Department of Economic and Social Affairs, Populaiton Division, New York.

World Bank. 1998. *World Development Indicators on CD –ROM*, The World Bank, Washington D. C.

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