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A statistical assessment of demographic bonus towards poverty alleviation

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Abstract

The shift of birth and death rates from high to low level in any population is referred as demographic transition. Mechanically, the transition of a society creates more working member of its own population commonly called demographic bonus. This article empirically explores the realistic soundness of demographic bonus in reducing the poverty level of the society. Three contrasting regions namely Eastern Asia, Central America and Oceania were selected for analytical purposes. The findings indicate that Eastern Asia and Oceania are currently facing the end of their transition whereas the Central America is lagged behind in transition. Central America due to last runner in transition race is the sustained recipient of its own demographic bonus by the year 2030. On the basis of three mechanisms namely: labour supply, savings and human capital, the Eastern Asian region is found to be successful beneficiary of its own demographic gift which concludes that many million people have escaped from poverty. Under the right policy environment on the above three mechanisms, Eastern Asia experience indicates the realistic contribution of demographic bonus to reduce poverty.

Keywords: Demographic bonus; demographic transition; human capital; labour supply; savings.

1. Introduction

For any population, the historical shift of birth and death rates from high to low level is referred as demographic transition. In any society, the size of working age populations mechanically increases through the standard stages of demographic transition. This feature of demographic transition for any country or region is called ‘demographic dividend’ or ‘demographic gift’ or ‘demographic bonus’ or ‘demographic window of opportunity’. Demographic bonus provides a time-based opportunity to faster economic growth in any country.

The relationship between population and economic growth has a long history (Malthus 1798). Recently, Malthus views on ever increasing population and starvation are critically termed as ‘pessimistic’ approach by Bloom *et al.* (2003). However, apart from the debate whether population growth discourages (‘pessimistic view’), encourages

('optimistic view') or in independent ('neutralist view') of economic growth, it would be better to focus on the empirical evidence towards the interplay of changing age structure in connection with economic growth. Globally, the realistic impacts of changing age structure in connection with economic growth, have also been empirically explored by many authors under different formulations (Bloom and Freeman 1986; Bloom and Williamson 1998; Bloom and Sachs 1998; Bloom and Canning 1999; Birdsall *et al.* 2001; Sachs 2002; Lee 2003; Jackson and Felmingham 2004; Mason 2003; Mason 2005; Durr-e-Nayab 2008; Bloom *et al.* 2007a, b).

This article aims to empirically investigate the originality of demographic dividend towards poverty reduction. More explicitly, a cross regional comparison for three distinct regions with the latest available data was employed to assess this originality of demographic dividend towards poverty.

2. Data sources and Demographic Variables

As an empirical evidence of demographic dividend three contrasting regions were selected: Eastern Asia including China, Hong Kong, Macao, Mongolia and Korea, Central America including Beliz, Costa Rica, EL Salvador, Guatemala, Honduras and México and Oceania including Australia and New Zealand. These three regions present contrasting social and economic situations and thus become the one possible reason for inclusion in the study. The Central America has been relatively neglected region in the literature on demographic dividend and thus becomes the other reason for inclusion in this study. The main data source used in this article was Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2009), World Population Prospects: The 2008 Revision, New York: United Nations (United Nations Population Division 2008). This database provides the estimates of different demographic variables under four variants namely: the low, medium, high, and constant-fertility. Under all these variants the estimates were available on the 21 non-overlapped demographic variables. However, the following variables under medium variant over the period of 1950-2050, were selected: crude birth rate (CBR), crude death rate (CDR), population growth rate, working and non-working age populations and dependency ratios. The second data source was the Millennium Development Goals database of Statistics Division, United Nations; from there the estimates of proportion of population below $1 a day (PPP) and poverty gap ratios were selected at country level for East Asia and Central America.

3. Demographic Transition

Figures 1 to 3 show the trend of CBR, CDR and natural increase in Eastern Asia, Central America and Oceania respectively. In Eastern Asia, the CBR peaked at about 41 in 1950s, and decreased to 13 births per 1000 population by the year 2009. The CDR has progressively declined from 18 deaths per 1000 population in 1950 to seven in the year 2009 (Figure 1). The largest natural increase for the three regions were: 24 per thousand populations during 1965-70 (Eastern Asia), 33 per thousand populations during 1960-70 (Central America) and 15 per thousand populations during 1955-60 (Oceania). This trend can be more clearly traced out using Figure 4, where the population growth rates for the three respective regions could be found at peaking during 1965-70, 1960-70 and 1955-60 (2.44, 3.13 and 2.26 percent increase per annum).

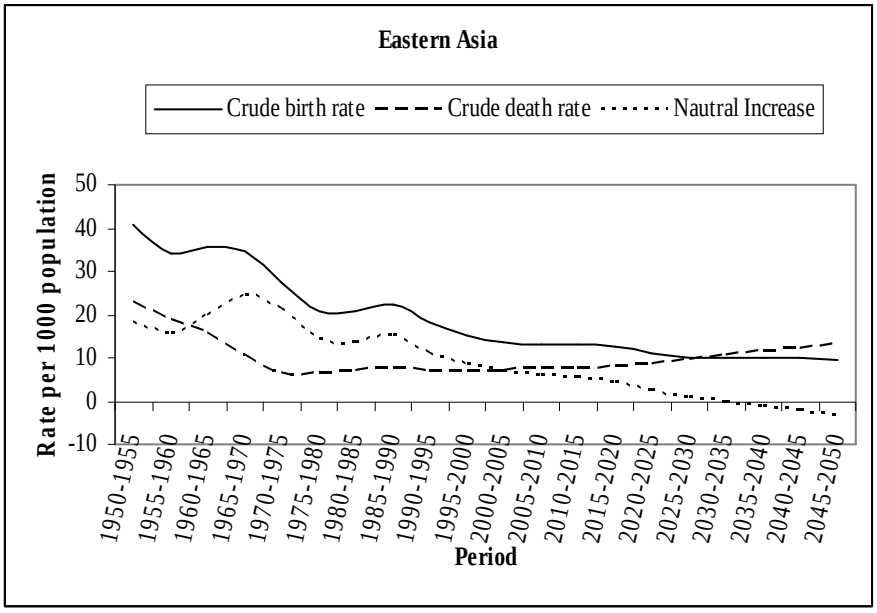

Figure 1: Demographic transition from 1950 to 2050 in Eastern Asia
Source: From United Nations data, World population prospects (2008)

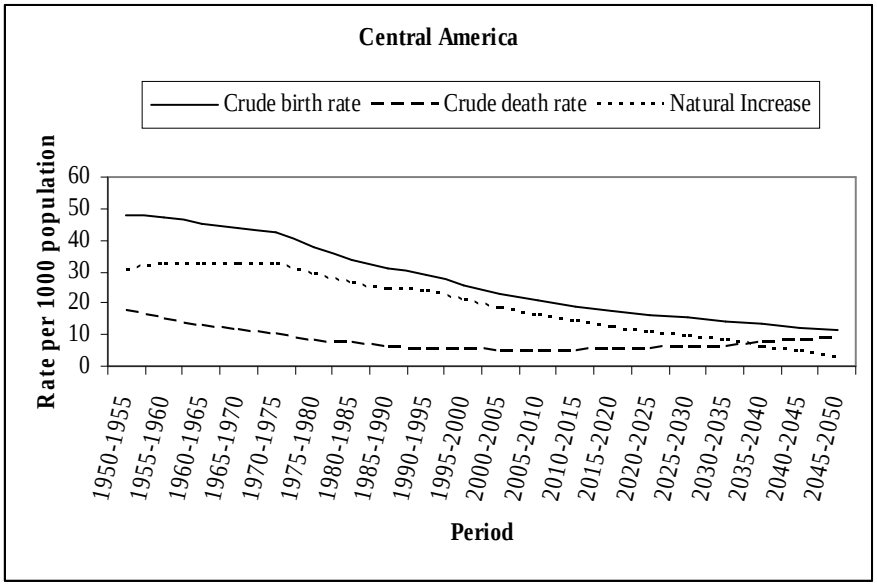

Figure 2: Demographic transition from 1950 to 2050 in Central America
Source: From United Nations data, World population prospects (2008)

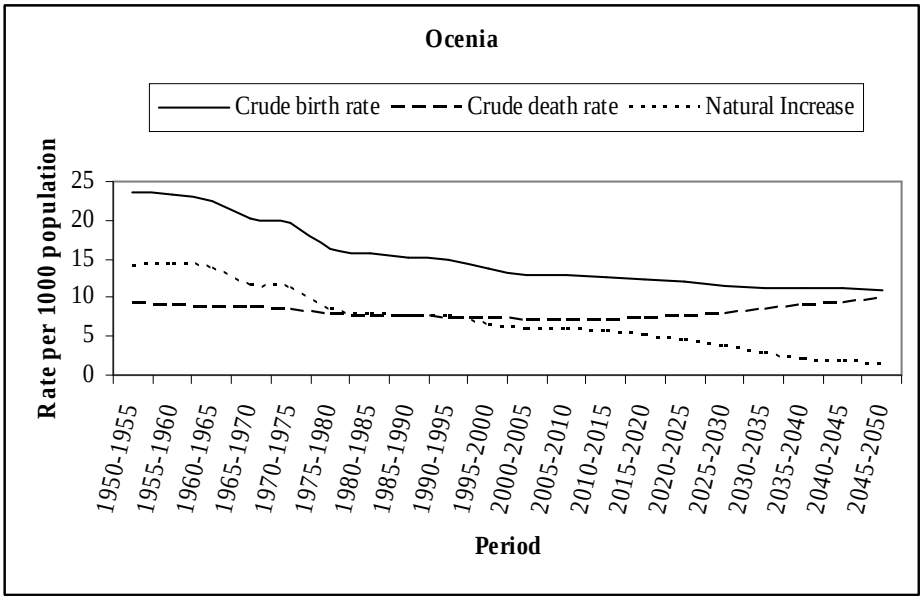

Figure 3: Demographic transition from 1950 to 2050 in Oceania
Source: From United Nations data, World population prospects (2008)

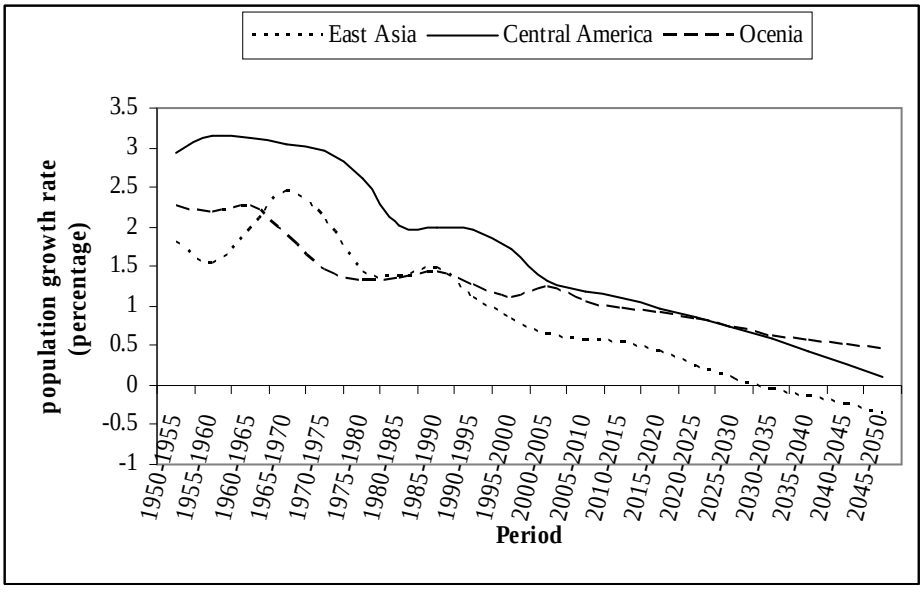

Figure 4: Population growth rates from 1950 to 2000
Source: From United Nations data, World population prospects (2008)

From the foregoing discussion, presently it can be concluded that the two regions Eastern Asia and Oceania are characterized by post industrial stage of demographic transition, whereas the Central America is on the end of mature industrial stage of transition. In short, Eastern Asia and Oceania are currently facing the end of their demographic transition whereas the Central America is under the way of on going transition.

4. Non-working Populations

Dependency ratio under three different variants namely: total dependency ratio, child dependency ratio and old-age dependency ratio is used to assess non-working populations of the regions. Figures 5 show the trend of the total number of dependents, child dependents and old-age dependents in Eastern Asia by the year 2050. In Eastern Asia total dependency began to fall in 1970 till 2010, along with child dependency began to fall in 1970 till 2050. On the other hand the old-age dependency ratios show an increasing trend after 1995 (Figure 5). This increasing old-age dependency trend makes increase in the total dependency ratios again after 2015. In Central America, total dependency began to fall in 1970 till 2035; along with child dependency began to fall in 1970 till 2050. On the other hand the old-age dependency ratios show an increasing trend after 2005. This increasing old-age dependency trend makes increase in the total dependency ratios again after 2040. In Oceania, total dependency began to fall in 1965 till 2010; along with child dependency began to fall in 1970 till 2050. On the other hand the old-age dependency ratios show an increasing trend after 2015. This increasing old-age dependency trend makes increase in the total dependency ratios again after 2015.

From the foregoing discussion, it can be concluded that Eastern Asia and Oceania must prepare themselves for an ageing population which is going to take place in the next six years.

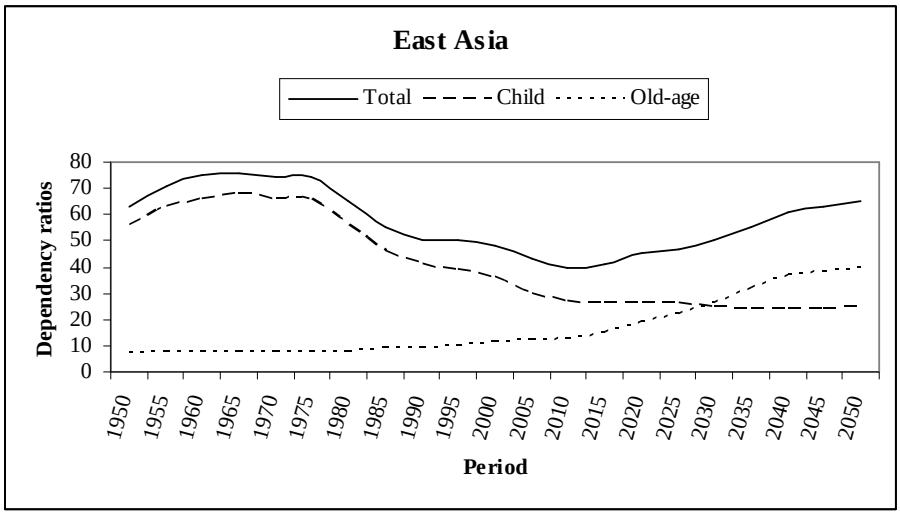

Figure 5: Dependency ratios from 1950 to 2000
Source: From United Nations data, World population prospects (2008)

5. Demographic Dividend

Theoretically, demographic dividend is the difference between the rate of growth of working age population and total population. The positive differences offered a one-time window of opportunity for any country to make use for economic growth. Table 1 shows the starting and ending timing which ultimately lead to the overall duration of demographic opportunity for the three regions. The second column of Table 1 shows that Eastern Asia 'window of opportunity' opened in 1970 and is looked to shut by year 2010. So, demographically, the forty year long opportunity is seemed to close in last year. On the other hand, Central America due to its late entry in demographic transition is looked to be the stayed recipient of demographic gift by the year 2030. The sixty year long 'offer' of opportunity in Central America is currently at its best time for the necessary input in terms of policies to fasten the more economic growth. Australia and New Zealand having availed the forty year opportunity (1965-2005) and currently enjoying the economic successes (Table 1 column 3).

Table 1: Timings and durations of demographic dividend in three regions

Period	Eastern Asia	Central America	Oceania
1960	-0.47	-0.55	-0.40
1965	-0.11	-0.42	0.16
1970	0.16	0.07	0.28
1975	0.04	0.18	0.33
1980	1.08	0.46	0.46
1985	1.29	0.72	0.36
1990	0.58	0.97	0.20
1995	0.07	0.72	-0.10
2000	0.25	0.63	0.09
2005	0.69	0.58	0.18
2010	0.33	0.62	-0.01
2015	-0.14	0.51	-0.32
2020	-0.51	0.28	-0.43
2025	-0.31	0.15	-0.45
2030	-0.41	0.00	-0.42
2035	-0.67	-0.19	-0.26
2040	-0.66	-0.35	-0.22
2045	-0.23	-0.29	-0.07
2050	-0.30	-0.24	-0.15

6. Mechanisms of Demographic Dividend and Policy Environment

The demographic dividend is delivered through three main mechanisms namely: labour supply, savings and human capital. *Labour supply* is delivered through the working age population of the country. Children born during the earlier stages of transition, later on mechanically enter in working age life which gives the potential workers and thus lowering the ratio of dependents to non dependents. Further, this boom generation can be more economically productive with best provision of education than their older counterparts irrespective of sex discrimination. *Savings* are characterized by monetary

outcomes of boom generation during prime working ages and thus improving the country or region's ability for investment and growth. More explicitly, working people tend to have a higher level of monetary output and also of higher level of savings between the ages of 40 and 65 which ultimately make an overall increase in the national savings for any country or region (Kelley and Schmidt 1996; Higgins and Williamson 1997; Higgins 1998; Lee *et al.* 2000). In one way these savings can be further risen up by having less number of children. *Human capital* is characterized by increased life expectancy and having fewer children in connection with the improved health of women. More explicitly, demographic transition affects human capital in three ways. First, increased longevity plays substantially in attitudes of people towards education, family formation, retirement, status of women and labour force participation. Secondly, more opportunities are available in terms of education for fewer children which make them more productive and effective workers of labour force. Lastly, having fewer children ultimately enhances the health of women as well as their participation in the labour force, which in turns economically improves the families and society.

However, these three mechanism documented above are heavily dependent on the policy environments of any country or region. The best usefulness of demographic dividend through these mechanisms is categorized in four groups of policy investment. The first group is characterized by *public health* which causes poverty. According to World Bank Group cited in (Bloom *et al*. 2003, p.71) has reported that illness, injury or deaths are the most common reason for poor households. However, the following two areas of public health for a region or country should be prioritized: effective medical care of infants and best health of women. The second group is characterized by population policy, which is mainly related to the provision of *family planning.* Outside the West, the East Asia has completed the fasted demographic transition (Bloom *et al*. 2003, p.44). The sharp transition is assumed to play a significant role to uplift an economy of the country or region. As a result of the above two groups, a country or regions sees a large, healthier and better-educated workforce leading towards the formation of third group which is characterized by *flexible labour market*. Openness to trade is a one possible determinant of economic growth to lower the poverty of a country or region. As a result of open trade, the East Asia per capita income was rose to US$4,000 during 1965-1990 (Bloom *et al*. 1999; Inter American Development Bank 2000). At advanced level, planning for the *elderly population* falls in the last group of policy environment which strongly required the policy input ranging from designing pension system to the provision of social services.

7. Poverty

The assessment of poverty is based on the calculations of the certain standard measures. Two such measures are: proportion of population below $1 a day (PPP) and poverty gap ratio. These measures were used to assess the poverty trend in Eastern Asia and Central America particularly during the demographic opportunity period. Table 2 show the poverty trends during 1990-2006 at the country level in the Eastern Asia and Central America. China in Eastern Asia has made a spectacular improvement in reducing extreme poverty during the sixteen year time (1990-2006). The percentage decrease in extreme poverty of China was estimated to be 72%. Overall in Eastern Asia, between 1990 and 2006, the proportion of population living on less than $1.25 a day declined from almost 60 to 16 per cent. The only exception is for Mongolia in Eastern Asia, where extreme poverty increased. On the other hand, the countries in Central America showed less

improvement in poverty reduction in comparison with Eastern Asia. At country level and overall, Central America retained the same decline trend of poverty with slow pace. Poverty gap ratios are given in the parenthesis of Table 2. Poverty gap ratios indicate how far the extreme poor fall below the poverty line. The highest poverty gap ratio in China during 1990-94 (19.2) has looked to be narrow during 2002-06 (4.0) (Table 2). Among the countries in Central America, during 2002-06, the lowest gap ratio was in Mexico (1.0) and the highest gap ratio was in Honduras (8.0). Altogether, the decreasing trend in poverty is almost visible in two regions during the transition period.

Table 2: Percentage of people below $1 and poverty gap ratios by selected countries of East Asia and Central America

		Period			
Region	**Country**	**1990-94**	**1994-98**	**1998-2002**	**2002-06**
Eastern Asia	China	56.9* (19.2)	36.4 (10.7)	32.0 (9.9)	15.9 (4.0)
	Korea	-	-	2.0 (0.5)	-
	Mongolia	-	26.5 (4.6)	15.5 (7.2)	22.4 (6.2)
Central America	Costa Rica	8.6 (3.1)	7.1 (1.7)	3.9 (1.2)	4.0 (1.5)
	El Salvador	-	14.2 (5.2)	13.8 (5.5)	12.7 (5.8)
	Guatemala	-	15.7 (6.0)	15.0 (5.6)	11.7 (3.5)
	Honduras	35.0 (15.4)	15.6 (5.9)	14.4 (5.4)	19.5 (8.0)
	Mexico	3.9 (0.6)	7.5 (1.8)	4.3 (1.0)	2.4 (1.0)
	Nicaragua	32.5 (14.9)	21.8 (8.7)	19.4 (6.7)	15.8 (5.2)
	Panama	16.9 (7.8)	10.4 (5.7)	11.2 (3.9)	9.4 (2.9)

*****Values represent the average percentage of PPP below $1
Note: Values inside the parenthesis ( ) are percentage poverty gap ratios at $1 a day

8. Concluding remarks and future directions

This article was started with the speculation of demographic dividend as a realistic approach to reduce poverty. In this article, an attempt has been made to assess the interplay between population growth and economic growth (poverty reduction) in connection with the three contrasting regions. The best realization of demographic dividend is based on the three mechanisms: labour supply, savings and human capital. These mechanisms are largely dependent on the policy environment. On the results of policy investment on these mechanisms, the East Asian looked to be more successful

beneficiary of its own demographic gift. This success in literature is documented as 'economic miracle' for East Asia. As shown in section 4 and 5 that the working age population grew more than non-working population between 1960 and 2000. This population change under the cover of policy environment increased the income growth in the region. More explicitly, on the economic side, in Eastern Asia, the per capita income rose annually more than 6 percent between 1965 and 1990. The average life expectancy of seven East Asian countries raised by 13 years the second half of the twentieth century. The average annual gain in life expectancy for Eastern Asia was 1.84 years. This net gain in the life expectancy not only indicates a consistent health policy in the region but also become a substantial basis for human capital. The second main provision of the health policy was the coherent implementation of family planning services. As reduced fertility is the key out come of the effective family planning implementation in any society. In view of poverty reduction, Mason and Lee (2004) have reported an inverse relationship between poverty and fertility. Therefore, the strict policies of family planning at country level including one child population policy of China in East Asia dropped the fertility rates which ultimately improved the health of women and become the basis for increased female labour force participation contributing towards poverty reduction.

Altogether, from the foregoing analysis throughout the article, the demographic dividend in connection with substantial policy investment looked to be realistic route towards poverty reduction particularly in Eastern Asia. More explicitly, the falling rates of poverty during demographic opportunity period mean that many millions of people are escaping from poverty. These results with the most recent data set are consistent with the other studies seen in literature for Eastern Asia (Bloom and Sachs 1998; Bloom and Williamson 1998; Bloom *et al.* 2000; Mason 2001; Bauer 2001; Mason and Lee 2005; Phang 2005; McNicoll 2006; Silipo 2009). As far as Australia and New Zealand are concerned, these are the part of developed world and have reached at an advanced stage of demographic transition. Therefore, the remarks are confined to situation of other two regions. In short, the demographic dividend in Oceania is currently looked to expire as well as expecting an elderly society in near future. Central America in demographic transition and demographic dividend clearly looked lagged behind Eastern Asia. However, to get the substantial benefit from the demographic gift in Central America, a strong prompt policy investment is utmost need of time, as 39 years of opportunity have already gone. In sum, on the comparison of three regions, Eastern Asia experience indicated some realistic contribution of demographic gift to reduce the poverty.

However still more insights are required. Like inequalities and disparities in terms of timing and durations of demographic dividend for each country exist and become an area of demographic research which needs a statistical treatment. On the other hand, in this article, little is said about the developed world where an aging society is going to emerge which strongly needs the timely investigation of some what called 'second demographic dividend'. Critically, for the developed world, the application of second or third demographic dividend to prolong their current economic growth requires a significant believe on the first demographic dividend as a realistic route towards poverty reduction.

References

Bauer, J. (2001). Economic Growth and Policy in East Asia. In *Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized*, (eds) A. Mason, Stanford University Press, Stanford.

Bloom, D.E. and Canning, D. (1999). From Demographic Lift to Economic Liftoff: The Case of Egypt. Paper presented at the conference for Growth beyond Stabilisation: *Prospects for Egypt, Egypt Centre for Economic Studies*, Cairo, 3–4 February.

Bloom, D.E., Canning, D., Fink, G. and Finlay, J.E. (2007a). Does age structure forecast economic growth? *International Journal of Forecasting,* 23 (4), 69-585.

Bloom, D.E., Canning, D., Fink, G. and Finlay, J.E. (2007b). Realizing the Demographic Dividend: Is Africa any different? Working Papers of Program on the Global Demography of aging PGDA. http://econpapers.repec.org/RePEc:gdm:wpaper:2307.

Bloom, D.E., Canning, D. and Malaney, P.N. (2000). Population dynamics and economic growth in Asia, *Population and Development Review*- supplement: Population and economic change in East Asia, vol. 26, pp. 257-290.

Bloom, D.E., Canning, D., Evans, D.K., Graham, B.S., Lynch, P. and Murphy, E.E. (1999). Population change and human development in Latin America. Working paper for IPES, Harvard Institute for International development.

Bloom, D.E., Canning, D. and Sevilla, J. (2003). *The Demographic Dividend: a New Perspective on the Economic Consequences of Population Change'*, Rand Corporation, Santa Monica, Arlington.

Bloom, D.E. and Freeman, R.B. (1986). The Effects of Rapid Population Growth on Labour Supply and Employment in Developing Countries. *Population and Development Review,* 12 (3), 381-414.

Bloom, D.E. and Sachs, J.D. (1998). Geography, Demography and Economic growth in Africa. *Brooking papers on Economic Activity*, 29(2), 207-296.

Bloom, D.E. and Williamson, J.G. (1998). Demographic Transitions and Economic Miracles in Emerging Asia, *World Bank Economic Review,* 12 (3) 419-455.

Birdsall, N., Kelley, A.C. and Sinding, S.W. (eds.) (2001), *Population Matters - Demographic Change, Economic Growth, and Poverty in the Developing World,* Oxford University Press, New York.

Durr-e-Nayab (2008). Demographic Dividend or Demographic Threat in Pakistan? *Pakistan Development Review,* 47(1), 1-26.

Higgins, M. (1998). Demography, National Savings and International Capital Flows. *International Economic Review,* 39(2), 343-369.

Higgins, M. and Williamson, J.G. (1997). Age dynamics in Asia and dependence of foreign capital. *Population and Development Review,* 23(2), 261-293.

Inter-American Development Bank (2000). D*evelopment beyond Economics: 2000 Report, Economic and Social Progress in Latin America.* Washington, D. C.

Jackson, N. and Felmingham, B. (2004). The Demographic Gift in Australia. *Agenda,* 11(1), 21-37.

Kelley, A. and Schmidt, R. (1996). Savings, Dependency and Development. *Journal of Population Economics*, 9 (4), 365-386.

Lee, R. (2003). The Demographic Transition: Three Centuries of Fundamental Change. *The Journal of Economic Perspectives*, 17 (4), 167–190.

Lee, R., Mason, A. and Miller, T. (20000. Life cycle saving and demographic transition: The case of Taiwan. *Population and Development Review,* vol. 26, supplement: population and economic change in Asia, pp. 194-122.

Malthus, T.R. (1798). *An essay on the principle of population:* Chapter 1 in Oxford World's Classics reprint, Oxford, New York.

MacNicoll, G. (2006). Policy Lessons of East Asian Demographic Transition. *Population and Development Review,* 32 (1), 1-25.

Mason, A. (2003). Capitalizing on the demographic dividend, in *Population and Poverty-Achieving Equity, Equality and Sustainability'*, Population and Development Strategies Series No. 8, UNFPA, New York.

Mason, A. (2005). Demographic Dividends: The Past, the Present and the Future. Paper presented at Joint International Conference of The 21st Century, Center of Excellence, Program of Kobe University and the Japan Economic Policy Association, Kobe, Japan, 17-18 December.

Mason, A. (2001) (eds.). *Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized.* Stanford University Press, California.

Mason, A. and Lee, R. (2004). Reform and support systems for the elderly in developing countries: Capturing the second demographic dividend, Paper presented at International Seminar on the Demographic Window and Healthy Aging: Socioeconomic Challenges and Opportunities, China Centre for Economic Research, Peking University, Beijing.

Mason, A. and Lee, S.H. (2005). The demographic dividend and poverty reduction, *Proceedings of the United Nations Seminar on the Relevance of Population Aspects for the Achievement of the Millennium Development Goals*, New York, pp. 17-19.

Phang, H.S. (2005). Demographic Dividend and Labor Force Transformations in Asia: The Case of Korea, *United Nations Expert Group Meeting on Social and Economic Implications of Changing Population Age Structures*, Population Division, Department of Economic and Social Affairs. Mexico City, Mexico.

Sachs, J. (2002). Rapid Population Growth Saps Development. *Science*, 297, p. 341.

Silipo, L. (2009). The truth about demographic dividend in Asia. *Economic Research Flash,* pp. 1-12, viewed 10 December, 2009.
Available at : http://www.cib.natixis.com/flushdoc.aspx?id=49917

United Nations Population Division (2008). *World Population Prospects: The 2008 Revision.* United Nations, New York.