Prolonging the Native Demographic Bonus: An Empirical Evidence

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Abstract

When the countries pass through the stages of demographic transition, the size of their working age population for economic development mechanically increases which is referred as demographic bonus. Presently, the developed world has reached at an advanced stage of transition and delivering the ageing societies. The prolonging of the current economy of the developed world seems to be largely dependent on working age people of its own. Alternatively, the advanced economies are gently threatened by demographic ageing. This study has empirically explored the contribution of non-native population in prolonging the demographic bonus of Australia: a developed nation which officially welcomes the non-native population. The study further fits the models on the age and sex schedules of non-native population. The findings suggest that immigration could not stop the demographic ageing but figuratively it re-opens the local demographic window of opportunity up to a sufficient time and keep it prolong until migratory flows balanced out with the earlier flows.

Keywords: Component projection method, demographic bonus, demographic transition, polynomial models

1. Introduction

The countries at individual level or regions at aggregative level moves through the standard stages of demographic transition, the size of working age populations mechanically increases. This one time feature of demographic transition for any country or region is called 'demographic bonus or gift'. The origin of the relationship between population growth and economic growth in literature was given by Malthus during 1790s (Malthus, 1798). Recently Malthus views on ever increasing population and starvation are critically termed as 'pessimistic' approach (D E Bloom, Canning, & Sevilla, 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 real 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 been empirically explored by many authors under different formulations (Birdsall, Kelley, & Sinding, 2001; D E Bloom & Canning, 1999; D. E. Bloom, Canning, D, Fink, G, Finlay, J E 2007; David E. Bloom & Freeman, 1986; D E Bloom & Sachs, 1998; D E Bloom & Williamson, 1998; Durr-e-Nayab, 2008; Jackson & Felmingham, 2004; Lee, 2003; Mason, 2003, 2005; Sachs, 2002).

However, at one side presently the developed world has almost reached at the advanced stage of transition and experiencing the fertility decline (below replacement level: TFR, below 2.1), and on the other side the developed world is also experiencing the low mortality. Both of these demographic events are transforming the modern societies into ageing societies. The developed world at one side has achieved a wide variety of economic development and on the other side it has a plenty of employment opportunities as well as investment. The further economic development or even the prolonging of the current economy may be gently threatened by the shortage of young skilled and unskilled labour force. Hence, keeping in mind the above documented views, this study aims to empirically investigate the contribution of International migration in extending the duration of demographic dividend for a developed economy. A population projection with the latest best available data can answer the issue well and was employed in this study to assess this original contribution of net International migration towards demographic dividend. The working age profile of the contributors is not only a dominant feature but also the pre-requisite for demographic gift. Therefore, this study is further aimed to model the age and sex-specific projected migration schedule, with their cumulative forward and backward distributions, of the non-native contributors.

2. Brief literature on the Issue

The balancing equation of population change theoretically determine the future size of population for any country or region provided that the fertility, mortality and migration statistics available. Fertility, mortality and net migration are the main components of balancing equation. Mortality happens once in life whereas the fertility is the matter of choice it can happen more than once in life. The policies regarding mortality can extend the longevity by the better provision of health care to enhance or maximize the potential contributions of individuals in the society. The mortality is the universal phenomenon. To cope up with the contribution of demographic gift, the developed world has reached at an advance stage of health care policies which results in low mortality indices. In terms of fertility, the current below replacement fertility levels in most of the developed world clearly pronounces that above replacement fertility is not achievable at least in short term based distant future for a variety of good reasons (United Nations 2000, 2008; Lutz 2000).

With these documented views on fertility and mortality, only the third component of population change namely International migration is left where the demographic as well as social policies are required to explicate the contribution of migration towards population productive age structure and this becomes substantial when the case under consideration deals with officially planned migrant receiving scheme. The impact of migration on the growth of population viewed enormously under different formulations and settings in the literature. However, this section is confined to the brief statements on the issue. As a potential policy tool for sustaining the demographic window of opportunity, contribution of International migration has been rigorously viewed in a landmark document called 'Replacement Migration: Is it a solution to Declining and Ageing Population?' published by United Nation (UN) (United Nations 2000). For the first half of the 21st century, population projections under five different scenarios on eight developed countries were made. Based on the empirical findings from these countries, International migration has been discussed in detail as a key potential policy tool.

In findings, the International migration was viewed as an unrealistic solution towards demographic ageing. A critical issue need to confront is that demographic ageing and demographic dividend or pre-conditions for economic sustainability are often correlated but conceptually entirely different. The growing literature largely deals with the impact of migration in connection with demographic ageing but the substantial contribution of migration in sustaining the demographic gift remained a relatively ignored area of research. Feld investigated the age-sex specific labour migrant participation of twelve Western European countries (Feld, 2000). The results of his forward twenty year projections confirmed the shortage of productive labour force in Italy which opens the way to consider the input of migration as a key strategy. Three main strategies had been suggested to obtain the maximum demographic gift (Wongboonsin, Guest, & Prachuabmoh, 2005). The first strategy was the strong establishment of a regional labour market. The second strategy was characterized by keeping older population to remain in the labour force. The third proposed strategy was characterized by reforming the financial system through effective macro-economic policies. Peng and her colleague Cheng have empirically investigated the impact of internal migration in prolonging the time span of demographic bonus in Chinese context (Peng & Cheng, 2005).

The authors reported the internal migration as a key contributory component in harvesting the local demographic bonus. The contribution of international migrants does not significantly affect the wages of native population; therefore this provides another good reason in sustaining the economy of the country. This assertion was empirically confirmed by Addison and Worswick (Addison & Worswick, 2002). In short, the international migration positively effects on the economy of native-born Australians. Similar remarks have been reported by Dustman et al (2005). The authors set their study in United Kingdom (UK) settings by exclusively focusing on 1992-2000 data on wages collected from Labour force surveys. The authors found no significant effect of immigration on native wages. Blanchflower et al (2007) presented the same above documented consistent evidence of migration from eight East European (A8) countries to UK. In sum, as an emerging theme from the growing literature, it can be argued that at one side the non-native population does not show any significant effect on the labour market of native population, which, ultimately fulfil the favourable age structure of developed economies as a proper pre-condition for the realization of the demographic bonus.

3. Data and methods

3.1 Data

As an empirical evidence of migration based contribution towards demographic bonus mainly the Australian case is considered. The main reason for selecting Australia was its official immigration programme which pronounced the Australian as a traditional receiving society. The two main data sources were used in this study.

The first was the 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. 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 and used in this study: crude birth rate (CBR), crude death rate (CDR), population growth rate, working and non-working age populations, age specific fertility rates[1] and dependency ratios. The second data source was the Australian Bureau of Statistics (ABS); from there, age specific death rates[2] (ASDR), the age-wise net overseas or International migrants (NOM) for the period of 2005-09 were selected.

3.2 Methods

The age distribution of a population plays a central role in observing the demographic dividend. Therefore, to best account for age distribution, the cohort component approach is used (for details see, Smith and Keyfits 1977, pp.193-4; Preston et al. 2001, pp.119-28). For demographic gift the working age ranges from 15-64 was focused in this study. The non-linear pattern of age specific migration schedule was approximately the reciprocal of the V-shape. In the literature, enormous linear and non-linear regression models come in all shape and size. Some well-known families of models are polynomial models, exponential family, power family and yield-density models. To initially and observationally capture the projected net migration pattern of working age schedules in Australia for 2005-10, polynomial models from the family of linear regression models were considered. The polynomial models have also been preferred in some instances (Brown & Newman, 2002; Marković & Sekulić, 2006; Newman, Brown, & Fraas, 2004).

4. Results and discussion

4.1 Demographic transition

Figure 1 shows the trend of CBR, CDR and natural increase in Australia since 1950. In Australia, the CBR peaked at about 23 births per 1000 population during 1950s, and decreased to 13 births per 1000 population by the year 2009. The CDR has progressively declined from 10 deaths per 1000 population in 1950 to seven in the year 2009. The largest natural increase was observed during 1955-60 (15 per thousand populations). This trend can be more clearly traced out by focusing on the population growth rate which could be found at peaking during 1955-60 (2.26 percent increase per annum). Form the foregoing discussion, presently it can be concluded that the Australian society is currently facing the end of their demographic transition.
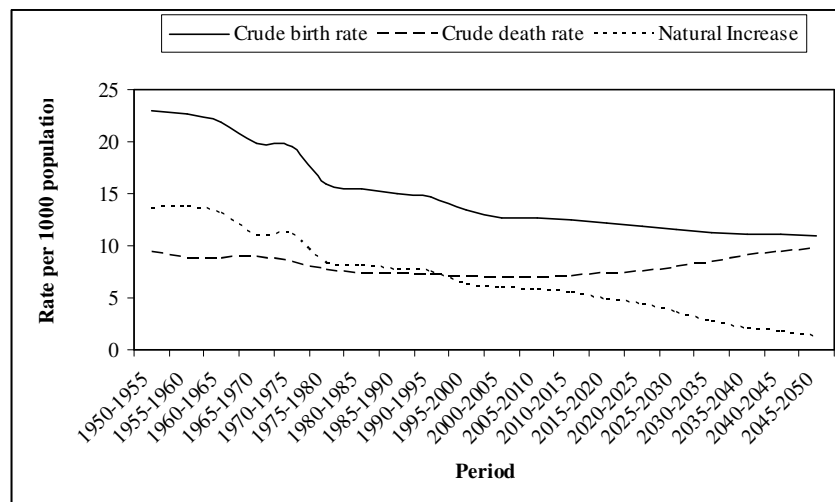

Figure 1: Demographic transition from 1950 to 2050 in Australia

4.2 Non working population

The assessment of non-working populations is based on certain measures. One such measure is dependency ratio, which has been used in this paper under three different variants namely: total dependency ratio, child dependency ratio and old-age dependency ratio. Figure 2 shows the trend of the total number of dependents, child dependents and old-age dependents in Australia till the year 2050. In Australia, total dependency began to fall in 1965 till 2010; along with child dependency began to fall in 1965 till 2050. On the other hand the old-age dependency ratios show an increasing trend after 2010.

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[1] The fertility rates were selected only for the period 2005-10.

[2] The averages of the age specific death rates over 2005-08 were used in this study and selected from ABS document under catalogue no.3302 released on 25 Nov, 2009.

This increasing old-age dependency trend makes increase in the total dependency ratios again after 2010. From the foregoing discussion, it can be concluded that Australian society must prepare themselves for an ageing population which is going to take place in the current year.
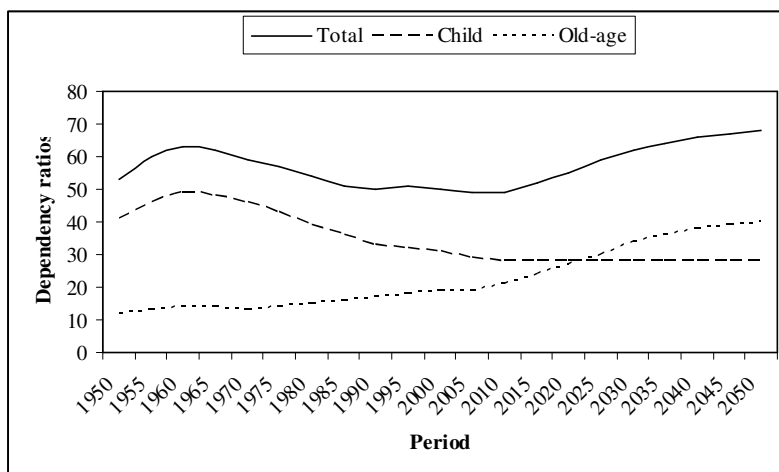

Figure 2: Dependency ratios from 1950 to 2000

4.3 Demographic bonus

Theoretically, demographic bonus 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 or region to make use for economic growth. Table 1 shows the starting and ending timing which shows the overall duration of demographic opportunity under three categories namely: total population, male population and female population. The second column of Table 1 shows that Australian 'window of opportunity' opened in 1965 and is looked to be shut by year 2005. So, demographically, the forty year-long opportunity is seemed to close in recent previous years (2005-09). Third and fourth column of Table 1 gives the sex-specific duration of demographic bonus in Australia and concluded that for the whole as well as male and female populations have availed the forty year opportunity (1965-2005) and currently enjoying the economic successes. Economic demography theoretically states that the potential economic benefits with the closure of demographic window soon disappear in the society.

Table 1: Timings, durations and status of demographic dividend in Australia without migration

Period	Total	Male	Female
1960	-0.39	-0.33	-0.45
1965	0.14	0.16	0.13
1970	0.31	0.31	0.29
1975	0.29	0.26	0.33
1980	0.44	0.44	0.43
1985	0.29	0.33	0.25
1990	0.21	0.19	0.22
1995	-0.10	-0.12	-0.07
2000	0.10	0.05	0.16
2005	0.17	0.12	0.20
2010	**-0.04**	**-0.06**	**-0.01**
2015	-0.39	-0.38	-0.40
2020	-0.45	-0.41	-0.48
2025	-0.45	-0.40	-0.50
2030	-0.41	-0.36	-0.47
2035	-0.25	-0.20	-0.32
2040	-0.24	-0.18	-0.29
2045	-0.08	-0.06	-0.10
2050	-0.15	-0.13	-0.16

4.4 Prolonging the demographic bonus

To best and realistically deal with the assumptions of mortality, fertility and immigration, the three five years based projections covering the short period of time for accuracy purposes (2010-2020) were made. However, only the two periods (2010, 2015) are shown in Table 2. The sex-specific calculated values of demographic dividends based on projected estimates in this paper are seemed to be consistent with the UN estimates for the same period. More explicitly, for year 2010 the second column of Table 2 gives the demographic dividend for Australian males (-0.07) which looks to be quite consistent with the corresponding calculated demographic dividend based on UN estimates (-0.06, Table 1 column 3).

Both estimates confirmed that the demographic bonus of native Australian males shut after 2005. The same is true for demographic opportunity of window in case of females (see Table 2 & 3). Overall, demographic window of opportunity confirmed to be shut in the absence of net migration after 2005 in Australia. On the other side, column four and five of Table 2 demonstrated that economic window of opportunity remained opened and realized only by the presence and contribution of immigration. The positive values of Table 2 indicate that migration not only extend the timing of Australian demographic bonus but also providing the substantial basis to explicate the additional but largely ignored mechanism of demographic bonus called migration.

Table 2: Projected timing and status of demographic dividend in Australia with and without migration

Period	Without migration			with migration	
	Male	Female		Male	Female
2010	-0.07	-0.03		0.48	0.43
2015	-0.41	-0.43		0.18	0.09

4.5 Modelling age specific migration schedules

To model the pattern of immigration, the data have been presented in graph paper shown in Figures 3 and 4. From these Figures, it is found that the migration schedules show the almost reciprocal of V- shape. Further, it is observed that the highest age specific net migration rates (ASNMRs) in the age groups (25-34) years for the respective two sexes. These figures also show the lowest migration rates in the last working age group: 60-64 year. From these presentations, it is observed that the age- interval 25-34 years is the most fertile period in the migratory span of working age Australian Immigrant irrespective of sex.
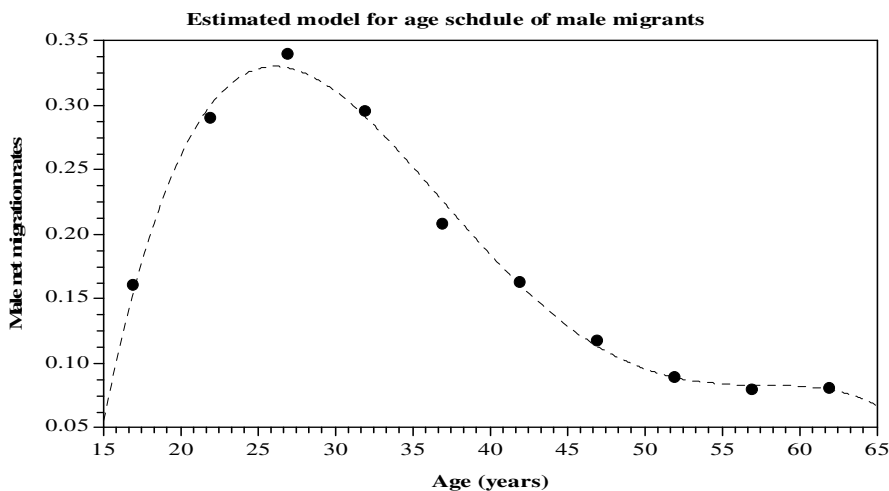

Figure 3: The graph of observed and fitted model (----) of distribution of male age-specific net migration rates (ASNMFR) of Australia in 2010.
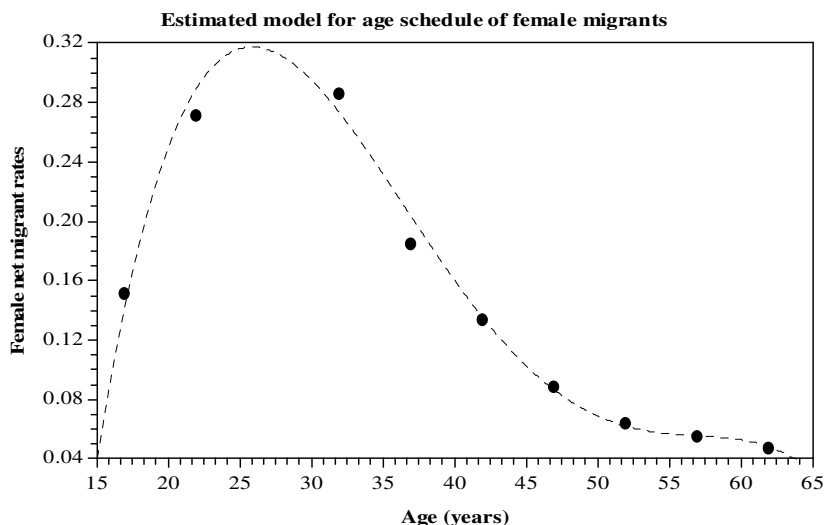

Figure 4: The graph of observed and fitted model (----) of distribution of female age-specific net migration rates (ASNMFR) of Australia in 2010.

From these figures, it is observed that these migration rates can be fitted by polynomial model with respect to different working ages. The estimated models for males and females are shown in equations 1 and 2 respectively.

$$y^M = -2.105002 + 0.2550595\ Z - 0.0093170\ Z^2 + 0.0001387\ Z^3 \tag{1}$$
$$- 0.0000007\ Z^4$$

$$y^F = -2.224072 + 0.2268589\ Z - 0.0098993\ Z^2 + 0.0001487\ Z^3 \tag{2}$$
$$- 0.0000008\ Z^4$$

In equations 1 and 2, 'Z' is the mid value of age group, y is the ASNMR. The validity of these models was assessed via cross validity prediction power technique (for computational details and applications of cross validity prediction power technique, see, Herzberg, 1969; Stevens, 1996; Islam and Ali, 2004; Nasir et al. 2009). The estimated cross validations for equation 1 and 2 are: 0.97 and 0.95. This shows that both models are highly cross validated over the population under study and their shrinkage are 0.03 and 0.05, these imply that the fitted model for ASMR for males will be stable more than 97%, the fitted model for ASMR for females will be stable more than 95% over the projected age schedules of Australia for 2010-15.

5. Conclusion

This article was started with the speculation of migrant contribution towards prolonging the demographic bonus in the developed world. Demographic bonus is completely distinct theme from demographic ageing. But often the migration contribution is counter-argued in the literature just by overlapping concept of demographic ageing on demographic dividend. However, to make the remarks more clear and directional, apart from this distinction, it would be better to focus on the traditional mechanisms of demographic dividend. The demographic dividend is delivered through three main mechanisms namely: labour supply, savings[3] and human capital. Labour supply is characterized by the high fertility outcome of pre-modern and industrializing stage of demographic transition for any country or region. More explicitly, children born during the earlier stages of transition, later, they 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. 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. 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. 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. In this study, figuratively from the foregoing analysis, it is observed that how a relatively ignored component of population change called migration substantially contributed towards the re-openings of economic window of opportunity? Has this investigation indicated a way for the possible inclusion or at least consideration in terms of theory somewhat called a fourth mechanism of demographic bonus, other than the three mechanisms documented above? Critically, the answer is left for optimistic, pessimistic and neutralist readers with pros and cons.

Further, the immigration is perhaps not the proper answer of inevitable demographic ageing for any country or region, but at least empirically relatively ignored migration reserves the plausible answer in extending or prolonging the native demographic dividend. More explicitly, it might be asserted in my part from concluding these statements and findings that immigration cannot stop the demographic ageing but figuratively immigration re-opens up to a sufficient time the local demographic window of opportunity and keeps re-opens until migratory flows balanced out with the earlier flows for and over the long term. As a one consequence, if there is no provision on the balanced out policy on migratory flows, then the cumulative migration would it self not only be prominent in demographic ageing as a key argument found in literature, but also put more pressure on the new migratory flows.

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[3] People during their working ages tend to have a higher level of savings than non-working people (for details see Kelley and Schmidt 1996; Higgins and Williamson 1997; Higgins 1998; Lee et al. 2000).

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