Dynamic Demographics and Economic Growth in Vietnam

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Abstract:

This paper is an empirical study of the effect of demographics on economic growth in Vietnam. Empirical results show that in recent years, Vietnam's demographics have been changing remarkably with an increase in the labor force as well as a decrease in the dependency ratio. This change offers a great opportunity for the economy to enhance its economic growth in the short and medium terms at least. The results show that this opportunity has contributed approximated 15 percent of economic growth during the last five year.

Vietnam's population will probably shift from a demographic dividend to demographic debt in about ten years. Hence it is very important for Vietnamese government to take advantage of this dividend period in order to improve human capital and technology and prepare a time of demographic debt. In addition, building up sound pension and health care systems in the medium term is also suggested.

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Key Words: Demographics, economic growth, dependence ratio, age structure, economic dividend

1. A brief review of Vietnam's demographic transition

Over the last 30 years, Vietnam has been experiencing a big change in its demographic picture. During this period, the rate of fertility decreased dramatically from a very high rate of 6.7% in 1970-1975 to 2.14% in 2000-2005. The same pattern is found with the rate of mortality. This is a result of the success of the family planning program and the improvement of the health care system of Vietnam as well as the innovations in medicine in the world. In addition, life expectancy also increased overtime. These demographic changes in Vietnam have taken place at a much quicker speed than many other Asian rates or even the world average rate. The dramatic reduction in the rate of fertility in Vietnam is illustrated in Table 1 below.

Table 1: A comparison of fertility rate

Period	World	Developed countries	Less developed countries	Asia	Vietnam
1970-1975	4.47	2.13	5.41	5.04	6.7
1975-1980	3.92	1.91	4.65	4.19	5.89
1980-1985	3.58	1.85	4.15	3.67	4.5

1985-1990	3.38	1.83	3.84	3.4	4.02
1990-1995	3.05	1.68	3.42	2.97	3.3
1995-2000	2.8	1.55	3.11	2.67	2.5
2000-2005	2.65	1.56	2.9	2.47	2.32
2005-2010	2.55	1.6	2.75	2.34	2.14

Source: Population Division of the Department of Economic and Social Affairs

of the United Nations Secretariat. World Population Prospects : The 2006 Revision.

http://esa.un.org/unpp

Table 1 show that Vietnam had the highest fertility rate in 1970-1975 among country groups in the table, while today it enjoys a rate that is lower than the world average level as well as the level of Asian countries. The decline in fertility rate was quickest from 1980-1985. Together with the improvement in fertility and mortality rates, life expectancy has also seen a great improvement:
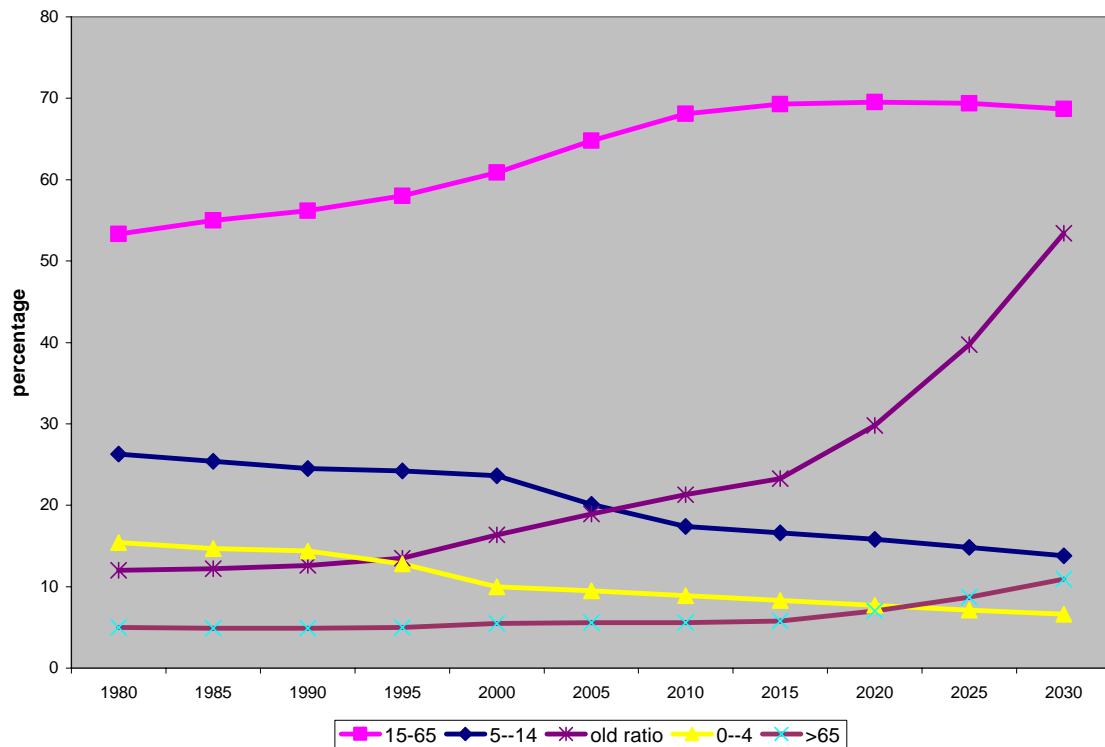
Figure 1: Life expectancy, history and projection
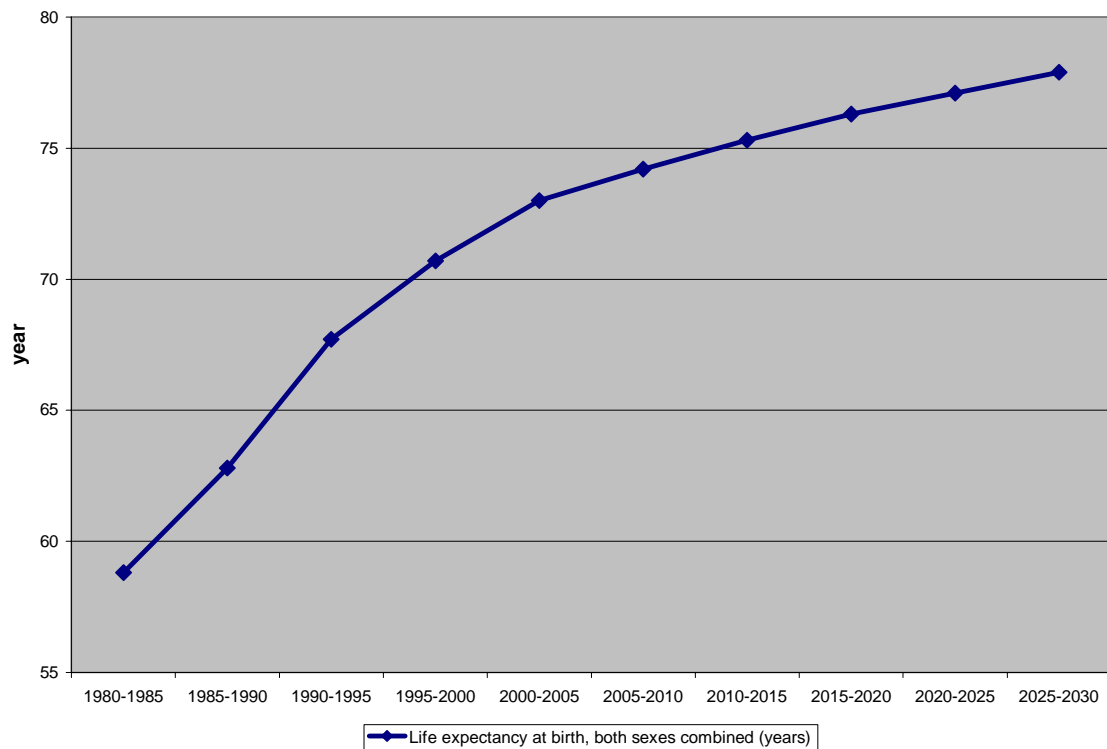
The cumulative change in demographics results in a big change in the age structure of Vietnam's population, which is depicted in Figure 2.

Figure 2: Age structure of Vietnam population, history and projection

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World Population Prospects: The 2006 Revision. http://esa.un.org/unpp and author's calculation

The picture reveals three main features of the Vietnamese demographic transition:

1. The ratio of working age (from 15-65) to total population will continue to increase until it reaches peak of 70 percent in 2018. This obviously brings about potential for economic growth on the one hand, and pressure on employment creation on the other.

2. The ratio of older people is also expected to increase from 5.6 percent in 2006 to around 11 percent in 2030. This sharp increase requires a well-built plan for the health care system as well as social   security.

3. The ratio of young children (0-14) is decreasing and this decline is   enough to offset the increase in the rate of population, meaning the number of young children will remain unchanged or decrease a bit.

Demographic dividend and demographic debt

The term 'demographic dividend' implies features of demographics that promote economic growth, while 'demographic debt' implies features that may impede economic growth. A common way to see if the economy is in a demographic dividend period or not is to look at the dynamics of the support ratio, defined as the ratio of working-age people to total population, and the dependency ratio, defined as the ratio of under 15 and above 65 to working people. A high ratio of working-age people normally implies not only a large labor supply but also a large rate of saving and hence investment. This would promote per capita economic growth. Vice versa, a high ratio of dependent people would imply a large rate of consumption and less investment, hence impeding economic growth. Figure 3 below depicts the dynamics of the support ratio, defined as the ratio of the number of working-age people to the number of dependent people, and the dependency ratio, measured as the ratio of the

number of people either younger than 15 or older than 65 to total population.

Figure 3: Dynamics of the support ratio and dependency ratio for Vietnam
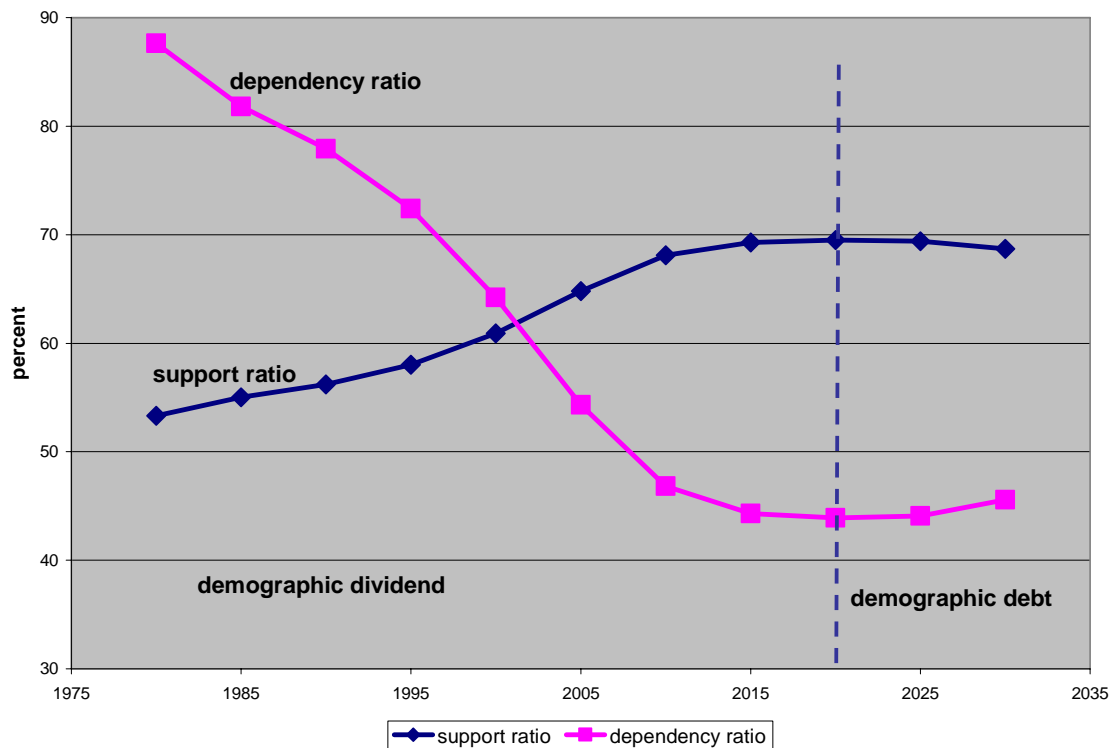
Figure 3 shows that Vietnam can enjoy a demographic dividend until 2018, after which will follow the period of demographic debt.

During the period of demographic dividend, the support ratio is increasing from 50 percent in 1980 to 70 percent in 2018. This is the time for Vietnam to take advantage of the increase in labor supply and

investment to accelerate economic growth and prepare for when the support starts declining after 2018.

In this paper we are going to evaluate the impact of these demographic changes on economic growth. The structure of the paper is as follows: the next section presents the theoretical foundation and sets up the model. Section 3 presents the econometric model and estimated results for the impact of age structure on economic growth using provincial data. Conclusions and policy recommendation are outlined in the final section

2. Theoretical framework, empirical evidence and model setup

The analysis of the effect of age structure on economic growth is based on the main idea that the role an individual plays as an economic agent in the economy varies over his or her life time. More particularly, a typical individual would be purely a consumer when he (or she) is at a young age, then a net saver and producer once joining the labor force, and in the final stage of his life, his behavior would be something in between (David Bloom and Canning, 2005). As such, besides having an impact on economic growth via labor supply, the age structure of a population also has an impact on economic growth through savings and investment (Bloom and Williamson, 1998).

Another channel through which demography can affect economic growth is human capital (Bloom and Canning, 2001a), which evidently depends on age structure of the population.

Empirical evidence regarding the important role of demography as a determinant of economic growth is rich and can be found in developed as well as developing countries. For example, (Bloom and Williamson, 1998) studied the effect of demography on economic growth for EU countries during the period from 1965 to 1990 and found that almost 20 percent of economic growth is attributed to population dynamics.

For developing countries, where population is assumed to be young and the countries have chance to take advantage of demographic dividend, demography is also shown to have great impact on economic growth. Bloom et al. (2000), among others, show that around one-third of economic growth in Asian 'miracle countries' is assigned to age structure. China has also gained from its demographic dividend over the recent years where its age structure accounts for 15-20 percent of its economic growth (Cai Fang and Wang Dewen, 2006).

However, demographics dividend only provides an opportunity for an economy to grow more quickly, it is not sufficient in and of itself. Appropriate policies in investment (both in physical and human capital) and job creation are necessary in order to realize the opportunity. The success of the Asian miracles is a good example.

In the growth accounting approach, a simple mathematical manipulation is applied in order to include the age structure into the model as follow (Bloom, 2005)

$$(Y/N) = (Y/L)\ (L/WA)\ (WA/N) \tag{1}$$

Where N denotes the total population, L is the labor force and WA is the working age population. Assuming that the working participant rate (L/WA) is constant, equation (1) can be rewritten as:

$$g_{(y1)} = g_{(y2)} + g_{(WA/N)} \tag{2}$$

Where the letter g denotes the growth rate, *y1* denotes per capita income and *y2* means per worker income.

Equation (2) implies that the growth rate of income per capita can be physically decomposed into two components: the growth rate of income per worker and the growth rate of the ratio of working age group to total population. If income per worker (or in other words, labor productivity) were to remain the same, income per capita would grow at the rate at which the working age ratio grows. It would imply that for aging nations, where the working ratio tends to decline, income per capita would be declining as well. By the same token, many developing countries, which are experiencing a period of demographic dividend, see a rising income per capita.

The growth regression approach is based on the neoclassical growth model, which states that the growth rate of income per worker at the steady state depends on the value of income per worker at the steady state and some initial level of income per worker (Bloom, 2005)

$$g_{y2} = a \ (y2^* - y2_0) \qquad (3)$$

Where the steady state $y2^*$ depends on factors that affect labor productivity such as human capital or capital stock per worker.

Using the same manipulation as above, we arrive at the following equation:

$$g_{y1} = b \ (X\beta + log \ (L/WA)_0 + log \ (WA/N)_0 - y1_0) + g_{(WA/N)} \quad (4)$$

Where X is a set of variables that determine income per worker at the steady state.

Equation (4) is the basis for an econometric model that takes into account the age structure as a determinant of economic growth.

In the following section, we will present the estimated results obtained from an empirical model for equation (4) and compare it with the result obtained from growth accounting method shown in equation (2)

3. Data, the econometrics model and estimated results

Data used in this work come mainly from the Vietnam Household Living Standard Survey (VHLSS) for the years 2002, 2004 and 2006, conducted by the General Statistical Office (GSO), which provides data on demography for sixty-one provinces.

Other macro-economic and social data are also collected from the GSO.

A description of the data is presented in Table A in the Appendix.

Variables used in the analysis:

1. GDP per capita 2001: represents initial GDP per capita

2. Working ratio: the percentage of people between ages 15 and 65

3. Youth ratio: the percentage of people under 15 years of age

4. Old ratio: the percentage of people above 65 years of age

5. Invest ratio: investment over GDP

All variables are measured as the average over the period 2002-2006, due to the fact that investment is often very lumpy

We follow Cai and Wang (2005) in choosing variables in the X set to include: initial per capita GDP (in the logarithm term), investment ratio and the number of midwives per thousand people in the initial year.

Table 2: OLS Estimated result for the determinants of the growth rate of income per capita. *Dependent variable: growth rate of gdp per capita*

explanatory variables	*Coef.*	*Std. Err (hetero-corrected)*	*P>|t|*

working ratio 2002	0.276	0.085	0.002
working ratio growth	0.934	0.347	0.009
gdp per capita 2001	0.142	0.288	0.623
invest ratio	0.024	0.019	0.196
_cons	-0.096	0.055	0.089
R^2	0.25		
N0 of panels	56(*)		

(*) Five provinces are excluded from the set of 61 provinces due to lack of data

The R^2 is not high, implying that there are some other factors that affect economic growth not included in the model. However, the model is well specified by the Ramsey test and the obtained residuals are well behaved. Further more, our goal is not to forecast the growth rate but to evaluate the impact of demography on economic growth, and hence the relatively low R^2 is not of great concern.

Table 2 shows that age structure is a significant determinant of economic growth: the estimated coefficients on both the ratio of working people and its growth rate are significantly positive. The coefficient 0.934 implies that each percent increase in the working ratio is followed by nearly one percent increase in per capita income. During the period of study, on average, the working ratio increase by 1.7 percent, leading to an increase of 1.6 percent. With the annual per capita income growth at 11

percent, it means that the total effect of age structure on per capita income growth is approximately 14.5 percentage point.

Equivalently, the working ratio in the above model can be replaced by the dependency ratio, which is defined as the ratio of people either younger than 15 or older than 65, which has been done by many authors (Cai and Wang, 2006, for example). Instead of simply using the dependency ratio as in Cai and Wang (2006), we deconstruct it into two: the youth ratio and the old ratio. The former is defined as the ratio of people who are under 15 years of age and the latter are older than 65. The reason for this is because the effect of old people and the young people on economic growth maybe different from each other: while many old people are financially independent and have not much effect on the behavior of working people, the young people do. And we want to test this hypothesis.

The model then is:

$$g_{y1} = a_0 + a_1 workingr\,ratio_0 + a_2 youth\,rati\,growth + a_3\,old\,ratio\,growth + a_4 gdp_0$$
$$+ a_5 invest\,ratio + u$$

Table 3: OLS Estimated result for the determinants of the growth rate of income per capita. *Dependent variable: growth rate of GDP per capita (*)*

Explanatory	Coef.	Std. Err (hetero-	P>|t|

variables		corrected).	
working ratio2002	0.143	0.069	0.044
youth ratio growth	-0.470	0.166	0.007
old ratio growth	0.015	0.067	0.820
gdp per capita 2001	0.000	0.000	0.289
invest ratio	0.026	0.019	0.168
_cons	-0.020	0.043	0.637
R^2	0.25		
No of panel	57		

Table 3 shows that although both young and old people are categorized as dependent in the literature on demographics, the impact they have on economic growth differs: while the youth ratio shows a clear impact on economic growth, the old does not. A possible explanation is that: the hypothesis that the old consume more and save less may be true in countries with a good social security system, where old people can be granted a reasonable income to live, but it may not be true of Vietnam. In addition, they may not be as much of a burden for other working members in their families as the youth.

4. Concluding remarks:

During the last 30 years, Vietnam has had a demographic advantage in terms of age structure. The results show that Vietnam had

been returning this advantage into reality during the studied period. This is consistent with the fact that during this period of time, Vietnam has been opening up the economy, thus integrating more deeply into the global economy. As a result, more flow of foreign investment comes in and economic conditions and institutions have improved. All of these help utilize any potential source of growth, including the demographic dividend

The prediction from the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat shows that Vietnam will continue to enjoy the period of a demographic dividend for another decade. On the one hand, it implies more pressure on job creation. Recent increased processes of urbanization, in which many farmers lose their cultivating land and are not yet prepared for shifting jobs, may create more concerns. On the other hand, this means that Vietnam is able to enjoy the advantage of low labor costs for a while. To fully take advantage of this, the labor market should be improved in terms of information and mobilization.

In about 10 years, Vietnam's economy will depend strongly on the improvement in human capital and technological progress as there will no longer be a demographic dividend. As such, investment in education and R&D is of much importance.

In addition, the percentage and absolute numbers of old people is going to rise sharply after 2015. The government needs to establish a sound pension system in order to smooth the transition of the economy when moving from demographic dividend to demographic debt period.

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A**PPENDIX**

Table A: Sample statistics of variables in the data set

. Variables	Mean	Standard Error	Standard Deviation	Minimum	Maximum
gdp	7212.231	1439.754	11244.838	657.294	80491.520
population	1343.807	111.599	871.615	294.667	5771.833
invest/gdp	0.328	0.020	0.149	0.057	0.761
youth ratio 2002	0.330	0.006	0.044	0.233	0.440

old ratio 2002	0.065	0.002	0.015	0.032	0.101
working ratio 2002	0.605	0.005	0.038	0.525	0.696
working ratio growth	0.019	0.001	0.010	-0.008	0.039
youth ratio growth	-0.047	0.002	0.018	-0.087	-0.008
midwives/pop	0.716	0.040	0.304	0.202	1.594