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Dynamic Demographics and Economic Growth

in Vietnam

Nguyen Thi Minh

Mathematical Economics Department,

National Economics University Hanoi, Vietnam

CENTRE FOR ECONOMIC AND POLICY RESEARCH
COLLEGE OF ECONOMICS, VIETNAM NATIONAL UNIVERSITY HANOI

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Dynamic Demographics and Economic Growth in Vietnam[1]

Nguyen Thi Minh

E-mail: minhkthn@gmail.com

Abstract

This paper is an empirical study of the effect of age-structure of population on economic growth in Vietnam. The statistics 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. Our estimated results from regression models also indicate that Vietnam has utilized this opportunity: the change in demographics has contributed up to 15 percent of economic growth during the last five years. Another finding is that while being categorized as dependent, the aged seem do not have negative impact on economic growth but young children do.

Vietnam's population will probably shift from a demographic dividend to demographic debt in about ten years. Therefore, 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 coming period of demographic debt. In addition, building up sound pension and health care systems in the medium term is also a must.

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

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[1] Forthcoming in *Journal of the Asia Pacific Economy* in 2009.

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A brief review of Vietnam's age-structure transition

In 2007, Vietnam ranks 13th in population but 57th in GDP (by the World Bank); and its population density is among the highest in the world. In addition, Vietnam has been experiencing a rapid change in the age-structure of its population. With these characteristics, Vietnam has to pay more attention on the issue of its demographics when shaping up the economic-related policy. Below we will examine more closely the dynamics of demographics in Vietnam.

Over the last 30 years, Vietnam has been experiencing a big change in its demographic picture. During this period, the fertility rate decreased dramatically from a very high rate of 6.7% in 1970-1975 to 2.14% in 2005-2010. This may be due to several important factors: the determination of the Government in implementing the Family Planning Program, which set a target at reducing the population growth rate. Another factor is the social- economic condition in Vietnam during this period: After 1975, the Vietnamese economy experienced a difficult time as there was no longer economic foreign assistance – a very importance source that supported Vietnam economy before the war ending in 1975. This difficulty lead to the abolishment of the ration scheme in which the Government provided rice and other essential products to all children under 18 whose parents worked for the Government. These two factors play a key role in reducing the fertility rate at a rate that is must faster than in many other countries. The dramatic reduction in the Vietnamese fertility rate 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
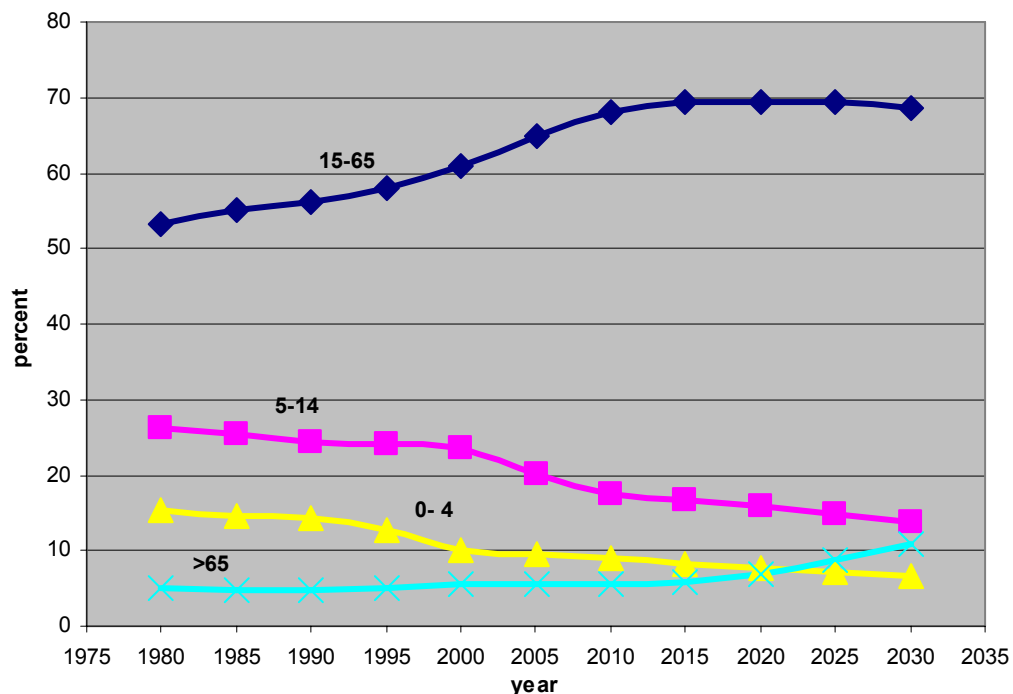
Table 1 shows that Vietnam had the highest fertility rate in 1970-1975 among country groups in the table, while today it enjoys a rate that is lower than the world average level as well as the level of Asian countries.

The same pattern is found with the infant mortality rate, measured as the number of infant deaths over the number of live births, which reduces from a very high rate at 10. 67 percent during 1970-1975 to 2 percent today. To make a comparison, the figure for the world during the same period is around 9% and 5%, respectively. This thanks to the improvement in Vietnam's health care system as well as innovations in medicine in the world.

In addition, life expectancy in Vietnam increased over time, from 50 years in 1970-1975 to 75 now. This is a great improvement compared with the world as a whole: the figure for the world in the same periods is from 58 to 67, respectively.

The accumulation of the change in fertility rate, mortality rate and life expectancy has resulted in a big change in the age structure of Vietnam's population over time, which can be depicted in Figure 1.

Figure 1: Age structure of Vietnam population, history and projection

The figure shows three main features of the Vietnamese demographic dynamics:

1. The ratio of working age (from 15-65) to total population is expected to increase until it peaks at 70 percent in (around) 2018. This is likely to provide a potential source for labor force and hence for economic growth on the one hand, and pressure on new job creation on the other hand.

2. The ratio of older people (defined as above 65 years of age) 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 (0-4) and school –age children (5-14) keep decreasing; and this decline is likely to be enough to offset the increase in the rate of population, implying that the number of young children is expected to remain unchanged.

The demographics of a population impacts the economy of the nation. It may be supporting economic growth or impeding it, depending on the nature of the structure. In the literature on the impact of demographics on economic growth, "demographic dividend" and "demographic debt" are used to indicate the effects of the population on economic growth.

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-age people. A high ratio of working-age people normally implies not only a large labor supply but also a large rate of saving and thus investment. This would promote per capita economic growth. Conversely, a high ratio of dependent people would imply a large rate of consumption and less investment, therefore impeding economic growth. Figure 2 below depicts the dynamics of the support ratio and the dependency ratio.

Figure 2: Dynamics of the support ratio and dependency ratio for Vietnam
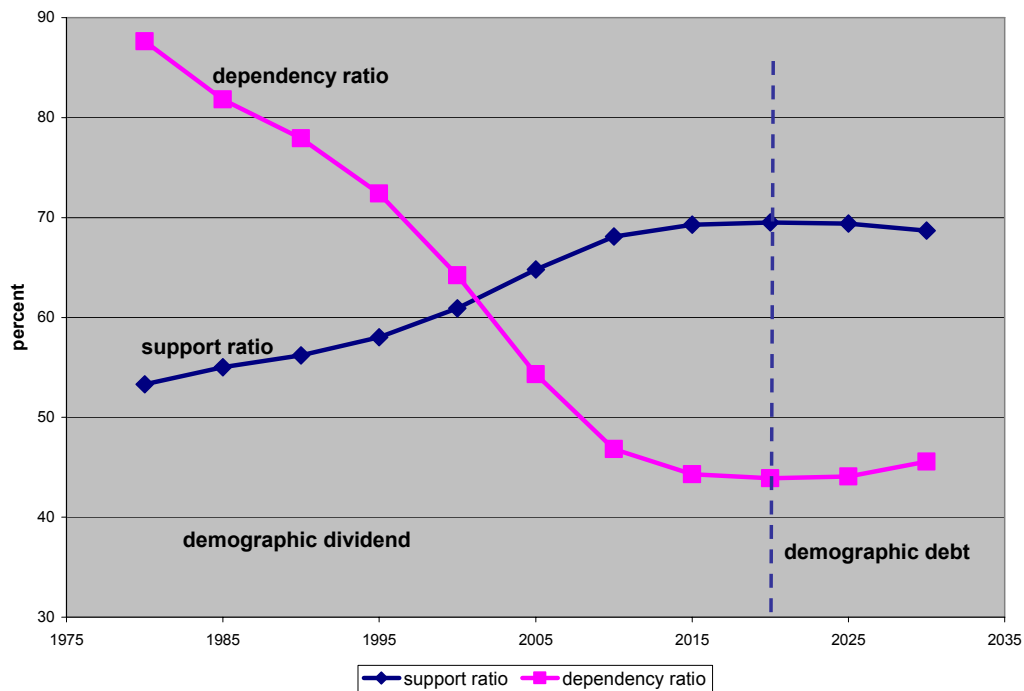
Figure 2 shows that the support ratio has increased steadily from 1980 to 2010 with a higher rate occurring between 2000 and 2010. After that it slows down and then stops rising. Year 2018 is expected to be the end of a demographic dividend period and the starting point for a period of demographic debt.

During the period of demographic dividend, the support ratio is expected to increase from 50 percent in 1980 to 70 percent in 2018. Taking this projection into account will improve the accuracy of growth accounting, therefore improve policy designs. During this period, Vietnam has opportunities to take advantage of the increase in labor supply and investment in order to accelerate economic growth and prepare for an expected decline in support ratio from 2018.

The structure of the paper is as follows: the next section presents the theoretical foundation for the relationship between age-structure and economic growth. Section 3 presents the econometric models and estimated results for the impact of age structure on economic growth using provincial data. In this section, we take into account a fact that most aged people in Vietnam do not receive a retirement benefit as in developed countries, therefore many of them still work and contribute to economic growth. As such in this section

we run two regression models: the first one considers the effect of the age- structure on economic growth in general. The second decomposes the dependents into two groups: young children and the aged, and examines the impact of these two groups on economic growth. Conclusions and policy recommendations are outlined in the final section.

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 lifetime. A typical individual would be purely a consumer when he (or she) is at young ages, then becomes a net saver cum 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 depends on the 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. In this paper, they 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, a 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.

Vietnam is an emerging country whose economy is in the transition period from planned to a market economy. Research on the supply side often pay attention on investors but not labor. Because of that, very little study exits on the relationship between demographics and economic growth for Vietnam. In this paper, we aim to shedding some light on this issue.

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)

$$(Y/N) = (Y/L)(L/WA)(WA/N) \qquad (1)$$

Where Y denotes total output, N is 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:

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

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

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-age ratio tends to decline, income per capita would decline as well. 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:

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

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

Equation (4) is the basis for econometric models that take into account the age structure of a population as a determinant of economic growth.

In the following section, we will present the estimated results obtained from econometric models based on equation (4).

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 General Statistic Office of Vietnam.

The data are then calculated for each of 61 provinces and for each year from 2002 to 2006.

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

Variables used in the analysis:

1. GDP per capita 2002: represents initial GDP per capita, as to present the heterogeneity in the economic condition between provinces ,which may include endowment, human capital or other geographic-socio-economic condition

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

Working ratio 2002: the ratio measured in 2002, used as the initial level. The inclusion of this variable is to account for the difference in endowment between provinces.

Working ratio growth: the average growth rate of the variable during period 2002-2006

3. Youth ratio: the ratio of people under 15 years of age to total population

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

5. Invest ratio: the ratio of investment to GDP

All variables are measured as the average over the period 2002-2006, due to the fact that investment is often very lumpy. The lumpiness of investment is found in Minh (2006) and others.

The method used in this paper is the ordinary least squares method (OLS) and the result is reported in table 2.

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	P>|t|
working ratio2002	0.276	0.085	0.001
working ratio growth	0.934	0.347	0.029
gdp per capita 2002	-0.142	0.736	0.847
invest ratio	0.024	0.018	0.184
_cons	-0.096	0.051	0.066
R^2		0.25	
N0 of panels		57(*)	

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

The model passes the Breusch-Pagan test for heteroscedasticity and the Ramsey regression specification error test (tests results are reported in Appendix).

The R^2 of the model is 25% , 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 access the ability of independent variables in explaining the variation of the dependent variable 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-age 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 in growth rate. With the annual per capita income growth at 11[2] percent, it means that the total effect of age structure on per capita income growth is approximately 14.5 percentage point.

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[2] Data on growth were calculted by province, taken from the General Statistics Office of Vietnam, and it was greater than the data at the aggregate level due to the double counting problem.

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 that is this: 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 as their parents have to take responsibility for their children. And we want to test this hypothesis.

The model then is:

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

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 variables	Coef.	Std. Error	P>|t|
working ratio$_0$	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 $_0$	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 retirement benefit system, where old people can be granted a reasonable income to live on, but it may not be true for Vietnam where most old people do not get a retirement benefit. In addition, they may not be as much of a burden for other working members in their families as the youth do.

Concluding remarks and policy recommendation

During the last 30 years, Vietnam has gone through a period of demographic advantage in terms of the age structure. The estimated results show that Vietnam had been turning this advantage into reality during the studied period. This is consistent with the fact that during this period, 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 been improved. All of these help utilize any potential source of growth, including the demographic dividend. This regression result is in line with Cai and Fang (2006), showing that Vietnam has achieved the same level as China in realizing the advantage of having been in demographic dividend period.

However, in the short term when the economy is expected to be decline as a result of the globally economic crisis, it is possible that Vietnam may lose its advantage of having been in a dividend period, thus further reduction in economic growth is expected. At present, the unemployment rate in Vietnam is on the rise, and there is no sign of it changing the course. In addition, there is the added difficulty of 1.7 million people entering the labor force in 2009. With the growth rate in 2008 at 6.2 percent (as confirmed by the General Statistics Office of Vietnam recently), the effect of losing the advantage of being in dividend period alone could pull down the growth rate to five percent in 2009 as predicted by the International Monetary Fund.

It is recommended that Vietnam now provides more education and training to its labor force. As there is more incentive for people to do the training in an economically harsh period then in an easy period, given that the training is provided for free or with a suitable financial package, this would be the best time for this. Another reason for that is this: in about 10 years, there will no longer be a demographic dividend in Vietnam, thus hence economic growth will instead rely on human capital and technological progress. Therefore, the financial package for stimulating the economy should include the education and training sector.

The regression result shows that the ratio of the aged does not affect economic growth. It could be changed, however, when Vietnam applies the retirement system as an indispensable tendency. At that time the aged then may work less then they do now, thus the ratio of the aged in Vietnam may affect economic growth as in industrial economies. As the percentage of the aged is expected to rise sharply after 2015, the Vietnamese authority should take this conclusion into account when making plans for the economy in the future.

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Appendix

1. 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 ratiogrowth	-0.047	0.002	0.018	-0.087	-0.008

2. Test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of gdp_per_rate

chi2(1)   =   1.30

Prob > chi2 = 0.2543

Conclusion: the error terms of the model have a constant variance

3. Test for model specification error

Ramsey RESET test using powers of the fitted values of gdp_per_rate

Ho: model has no omitted variables

$F(3, 49) =$ 1.38

Prob > F =   0.2589

Conclusion: the model does not commit a model specification error

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CENTRE FOR ECONOMIC AND POLICY RESEARCH

CONTACT INFORMATION:

Centre for Economic and Policy Research (CEPR)
College of Economics, Vietnam National University-Hanoi

Address:

Room 704, Building E4,
144 Xuan-Thuy Road, Cau-Giay District
Ha Noi, Viet Nam

Tel: (84) 4 3754 7506/ext 704-714
Fax: (84) 4 3704 9921
Email: Info@cepr.org.vn
Website: www.cepr.org.vn