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The Economic Effect of the Graying of the Population

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Important socio-economic trends are based on demographics. For instance, a number of scholars, such as Jackson and Howe (2008), are concerned about a current demographic trend that runs counter to past trends. Most notably, they are concerned that the great powers (in terms of wealth, military strategy, or population) are aging at remarkably divergent rates. For instance, the US is barely aging. It is one of the youngest developed countries, and the age gap between the US and other developed nations is projected to widen. The US will likely remain a great power and is indeed the only developed country with the capacity to remain a great country. The US was the third most populous country in the world in 1950 and is forecasted to remain so in 2050.

The idea of rapidly growing populations through the developing world is also an outdated trend. Only a few areas of the developing world, such as sub-Saharan Africa and some Muslim countries, such as Afghanistan, Iraq, Pakistan, Somalia, Sudan, and Yemen, have high fertility rates. Fertility has trended downward in most other developing countries.

The concern is that aging populations will not prosper. For instance, an individual's creativity in art peaks between the ages of 30 and 50, and Nobel achievements peak when people are in their 30s (see Jackson and Howe, 2008, p. 111). While immigration is setting new records in many countries, (e.g., the US has 13% immigrants), immigration does not seem to be a solution for the problems many aging countries will be facing. For instance, according to Jackson and Howe (2008, p. 122-126), Hispanic immigrants entering the US are more productive than the Muslims who are the primary immigrants in many European countries.

While scholars have developed many theories about how population graying may be a serious long-run problem, there has been little evidence testing this theory. An exception is Bloom et al. (2009), who show, in the long run, low rates of fertility are associated with diminished economic growth. A notable exception to the thesis

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that aging will be problem is Siegel (2005), who claims that since young countries will be the "producers" and the aging countries will be the "consumers" in the future, there will be no problems with the future aging of the world. We examine in this paper a bit of empirical evidence on this vital and challenging question: whether the age structure of a society affects its economic performance. To do this, we model the factors likely to influence economic growth in OECD countries (OECD Observer, 2008). Using the variables described in Table 1, we show the multivariate regression results for the OECD countries in Table 2, where the average per capita growth rate in GDP is the response variable.

Table 1. List of Variables

Variable	Definition
GDPGROWTH	Average per capita growth rate in GDP from 1997-2007
POPGROWTH	Growth in population from 2005-2006
GDPPERCAPITA	GDP divided by population using current exchange rates, USD
POPDENSITY	Population per Km
AGESTRUCTURE	% total population 65 years and older
TOBACCO	% of adults smoking daily
OBESITY	% of adults with BMI > kg/m^2
RESEARCH	Per capita expenditures on research and development, USD
EDUCATION	Public and private expenditures on education as % of GDP
TAXES	Total tax receipts as % of GDP

Notes: The nongrowth variables are usually for 2006. While 30 OECD countries are in the database, complete data were available for 21 countries.

Table 2. Regression Results (Response = GDPGROWTH)

Variable	Coefficient	T-value	P-value
CONSTANT	4.48275	2.22	0.048
GDPPERCAPITA	−0.00005	−2.88	0.015
POPGROWTH	0.36938	1.13	0.282
POPDENSITY	−0.00215	−1.57	0.145
AGESTRUCTURE	−0.20814	−3.83	0.003
TOBACCO	0.08457	2.53	0.028
OBESITY	0.03824	1.07	0.309
RESEARCH	0.43653	1.48	0.167
EDUCATION	−0.22092	−0.99	0.344
TAXES	0.38264	1.14	0.277

Notes: The OLS linear regression results based on robust standard errors. $R^2 = 0.82$.

The only three variables of interest that are statistically significant at the conventional 5% significance level are age structure (i.e., the percent of the population 65 years and older), tobacco use, and the level of per capita GDP. For this study, three variables are especially important. That population density and the population growth rate *are not* significantly associated with GDP growth but that old

age *is* significantly associated with GDP growth is crucial. The significance levels of these three variables support the graying theory that the age structure of the population, not the relative size or growth of the population, is important in attaining faster economic growth. It is not surprising that there is a significant negative relationship between the level of per capita GDP and the growth of per capita GDP. This means that the higher the starting level of per capita GDP, the slower the rate of growth of per capita GDP. This conforms to the usual dictum that big is bad in the sense that more opulent nations have a hard time sustaining economic growth and similarly bigger mutual funds find it more different to get high percent growth rates than do smaller or mutual funds.

It is probably not surprising that the predictor variable obesity was not significantly associated with GDP growth in these countries. This is not usually regarded as a crucial engine of economic growth, although some feel there is a relationship between the general health of an economy and its rate of economic growth. It is surprising that expenditures on research and development, education, and taxes had no significant associated with GDP growth. We usually postulate that these factors should positively influence economic growth. However, some of this is no doubt the result of the relatively short time frame for our analysis. The significant positive relationship between tobacco use and GDP growth, meaning that higher levels of tobacco use is associated with higher levels of economic growth, is also unexpected.

For the purposes of this study, the most interesting result, besides the insignificance of population density and the population growth rate, is that the age structure had the biggest impact of all the explanatory variables on GDP growth. Age has a decidedly negative impact on economic growth, being significant at the 0.3% level. This result suggests that those who are concerned about how an aging population will harm future growth may be correct. But this paper is only a step toward further research.

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