The Demographic Dividend: Evidence from Districts of Rajasthan

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Abstract
The productive capacity of an economy is directly linked to the size of its working – age population relative to its total population, it is essential to distinguish between the two components when exploring the impact of demographic change on economic performance. Census 2011 data shows the overall percentage of children in 0-6 year's age group has declined by 3.54% in Rajasthan. They constituted 18.85% of total population in 2001 compared to 15.31% in 2011. This indicates lowering fertility rates- a negative growth in this segment. Thus, Rajasthan is transforming demographically, in which population growth slows down, life expectancy increases, per capita income increases and participation of women in labourforce increases, but it has its own issues like illiteracy, income disparity, status of women and lower level of health care facilities. Demographic dividend is defined as a rise in the rate of economic growth due to rising share of working age people in population. Using OLS and IV estimates in cross district data of Rajasthan for 2001, paper confirms that the working age population has had a powerful positive impact on per capita net district domestic product, supporting the optimist camp. The coefficient on the working –age population is positive, statistically significant, and big: a one percent increase in the working age population is associated with a 3.02 percent increase in the NDDP per capita. The coefficient on young and old dependent population is negative and statistically significant: a one percent decrease in young age population is associated with about a 2.62 percent increase in NDDP per capita, while IV estimate suggest that a one percent increase in the working age population is associated with a 3.69 percent increase in the NDDP per capita, when it instrumented on Log % young population. Thus the growth of dependent population slows down economic growth. However, elderly dependent population is fewer impediments in the process of economic growth in Rajasthan.

Keywords
Demographic Dividend, Economic Growth, Rajasthan, OLS.

I. Introduction
The productive capacity of an economy is directly linked to the size of its working – age population relative to its total population, it is essential to distinguish between the two components, when exploring the impact of demographic change on economic performance. The Census 2011 report, while indicating a decline in the growth rate of the state's population, has indicated a substantial youth segment here. The call came at a round –table discussion on "Trends and implications of Rajasthan Population Census, 2011,' organized by the Forum for Population Action in collaboration with Unicef, UNFPA and others. The rate of Population growth in the state was still about 1.96 % per annum. Devendra Kothari, Professor, Population Programme Management and Member, Rajiv Gandhi population Mission, Rajasthan said "What impact this will have on the state's fragile eco-system as well as the quality of its people can easily be imagined. The writing is on the wall. What we do in the next five years, specially during the Twelfth Five Year Plan (2012-17), will determine Rajasthan's future. Investment in education has to be increased to improve the quality especially at the government schools and colleges where most of the students are from poor and rural families."
Census 2011 data shows the overall percentage of children in 0-6 year's age group has declined by 3.54% in Rajasthan. They constituted 18.85% of total population in 2001 compared to 15.31% in 2011. This indicates lowering fertility rates- a negative growth in this segment (TNN Apr 16, 2011). Thus, Rajasthan is transforming demographically, in which population growth slows down, per capita income increases and participation of women in labour force increases, but it has its own issues like illiteracy, income disparity, and status of women and lower level of health care facilities.

II. Demographic Dividend
The debate over relationship between population growth and economic development is there since the much criticized theory of Malthus in 18th century. Economist focused on the size of population and the growth of nation, but the composition of population age structure was not considered until the study of Coale and Hoover (1958), but in recent years, demographers Bloom et al have studied the type of composition of age structure of population and its effect on economic growth and the concept of "demographic dividend" emerged.
Demographic dividend is defined as a rise in the rate of economic growth due to a rising share of working age people in a population. This phenomenon occurs with a falling birth rate and the consequent shift in the age structure of the population towards the adult working ages. It is also commonly known as the demographic gift or bonus or demographic window. With many developing countries particularly in the Asian continent experiencing a rapid decline in fertility, there has been overwhelming optimism that the demographic bonus will take these countries to greater economic heights [Bloom and Williamson 1998].
As generally defined, demographic dividend occurs when a falling birth rate changes the age distribution, so that fewer investments are needed to meet the needs of the youngest age groups and resources are released for investments in economic development and family welfare (John Ross, 2004).

III. Data and Methodology
Using OLS and IV estimates in cross district data of Rajasthan for 2001, paper is an attempt to find out relationship between demographic dividends and per capita net district domestic product. The study uses census data relating to age distribution of population and data on per capita net district domestic product have been collected from Human Development Report Rajasthan, (an update 2008) published by Institute of Development Studies Jaipur.

IV. Results
The scatter plot with a trend line is exhibited in figure 1 for per capita NDDP and % of working age population by the districts of Rajasthan. It is amply evident that there is a positive association between per capita NDDP and % of working age population.

It shows that districts like Ganganagar, Kota and Ajmer have higher the % of working age population with higher level of per Capita NDDP.

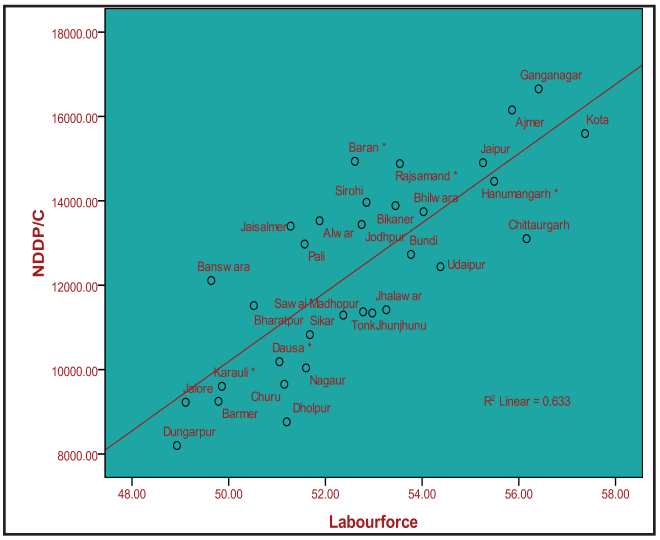

Fig. 1: Per Capita NDDP and % of Working Age Population

The association between per capita NDDP and % of young age population is shown in fig. 2, which indicates negative association between these two variables, while per capita NDDP has slight positive association with % of old age population (fig. 3).

Fig. 2: Per Capita NDDP and % of Young Age Population

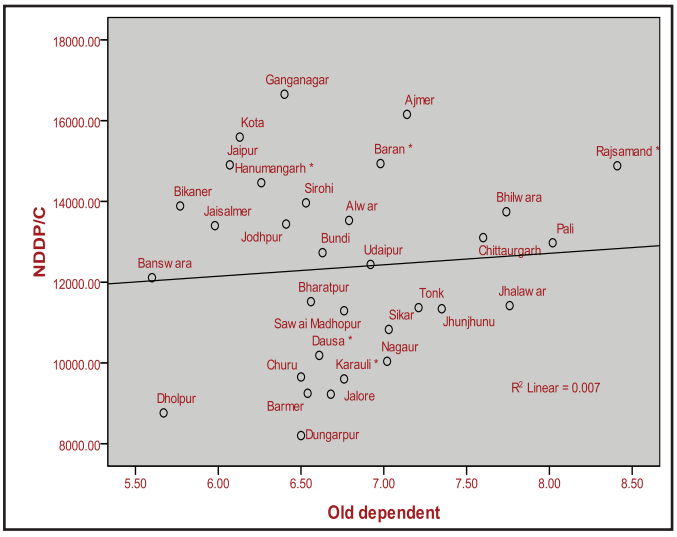

Fig. 3: Per Capita NDDP and % of Old Age Population

The econometric analysis is based on 32 districts of Rajasthan for census year 2001. We start by asking whether the level of population growth affects economic growth, since that's the way the population debate has been couched. The results appear in Table 1, shows significant at .05 percent level positive association between Log per Capita NDDP and Log % of Working Age Population. Supporting the optimist camp it confirms that the working age population has had a powerful positive impact on per capita NDDP.

The coefficient on the working –age population is positive, statistically significant, and big: a one percent increase in the working age population is associated with 3.02 percent increase in the NDDP per capita. Note, how sensitive this result is to the specification 2. As soon as Log % of Young Population and Log % of Old Population is subtracted, coefficient of Log % of Working Age Population has increased from 3.02 to 3.60. The coefficient on young and old dependent population is negative and statistically significant: a one percent decrease in young population is associated with about a 2.62 percent increase in NDDP per capita, while one percentage decrease in old dependent would increase NDDP per capita by half percentage in the districts of Rajasthan.

Table 1: OLS Regression of Economic Growth on Population Growth, 2001.

Dependent Variable: Log per Capita Net District Domestic Product, 2001.

(Current Prices) Sample Includes 32 Districts

Independent Variables	Ordinary Least Square Estimates			
	1	2	3	4
Log % of Working Age Population	**3.0181** (1.1)**	**3.6005** (0.5)***		**2.9296** (2.5)**
Log % of Young Population	-0.520 (0.923)		**-2.616** (0.44)***	-0.776 (-0.85)
Log % of Old Population	-0.150 (0.283)		**-0.498** (0.2)*	0.1934 (0.57)
Log Average Annual Pop. Growth Rate				**0.3318** (1.75)*
Constant	-0.346 (8.23)	-4.862 (2.0)**	**20.00** (1.9)***	-0.008 -0.001
Adjusted R^2	0.5909	0.61305	0.514	0.6193

Standard errors are reported in parentheses below coefficient estimates.

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Surprisingly but not unexpected, there is significant positive association between log per capita NDDP and Log Average Annual Population Growth Rate in districts of Rajasthan, when Jaisalmer district is excluded.

In transition, when the age distribution changes, population growth does matter. The coefficient here is big, positive and significant. Thus, where the growth rate of economically active exceeds that of the population, in our sample, higher NDDP per capita have appeared (ceteris paribus). Equivalently, where the middle of the age distribution (ages 15-64) grows faster than the tails (ages 15 and below and 65 and above), NDDP per capita growth is faster. The

opposite is true if the growth rate of the total population exceeds that economically active. If the dependent population is growing faster the workforce, our model predicts slower growth.

As we mentioned earlier, previous contributions to the population debate have, typically, failed to explore the possibility of reverse causality between population growth and economic growth, this despite a literature which suggests that economic events clearly induce demographic responses. Table 1 used ordinary least squares (OLS), while Table 2 reports the results when instrumental variables (IV) are used to account for possible reverse causality.

Table 2: Instrumental Variable Estimates of the Effects of Economic Growth on Population Growth, 2001. Dependent Variable: Log per Capita NDDP, 2001 (Current Prices). Instrumental Variable: Log % of Young Population.

Independent Variables	OLS	IV
Log % of Working Age Population	3.60059 (0.508)***	3.69332 (0.588123)***
Constant	-4.86262 (2.015)**	-5.23005 (2.33064)**
Adjusted R^2	0.613053	0.613053

Standard errors are reported in parentheses below coefficient estimates.

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level.

In column 2 of Table 2, the coefficients on the Log % of Working Age Population is similar to the OLS estimates: a one percentage point increase in the working age population is associated with an increase of 3.69 percentage point in per capita net district domestic product, , when it instrumented on Log % young population.

V. Conclusions

Using OLS and IV estimates in cross district data of Rajasthan for 2001, paper confirms that the working age population has had a powerful positive impact on per capita net district domestic product, supporting the optimist camp. The coefficient on the working –age population is positive, statistically significant, and big: a one percent increase in the working age population is associated with 3.02 percent increase in the NDDP per capita.

The study shows that districts like Ganganagar, Kota and Ajmer have higher the % of working age population with higher level of per Capita NDDP. The coefficient on young and old dependent population is negative and statistically significant: a one percent decrease in young population is associated with about a 2.62 percent increase in NDDP per capita, while IV estimate suggest that a one percent increase in the working age population is associated with a 3.69 percent increase in the NDDP per capita, when it instrumented on Log % young population.

Thus the growth of dependent population slows down economic growth. However, elderly dependent population is fewer impediments in the process of economic growth in Rajasthan.

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Dr. M.R.Singariya received his M.A. degree in Economics from S.D. Govt. P.G. College Beawar, Rajasthan, in 1996 and awarded UGC NET in Economics. He has obtained his Ph.D. under title of "A Study of Population Growth and Economic Development in Rajasthan" from M.D.S. University Ajmer in 2012. Dr. Singariya has worked as lecturer in Economics in various government colleges of Rajasthan. He is associated with various academic and professional bodies (Indian Economic Association, The Indian Econometric Society, Indian Association for the Study of Population and Rajasthan Economic Association etc.). His research interests include economy of Rajasthan, Population Studies, Economic Development and Econometrics. He has to his credit a good number of research articles and seminar papers on varied subjects and most particularly in population studies, regional inequalities, gender issues and human development etc. published in local, national and international journals. His research article is also published in International Journals of repute like Journal of Economics and Sustainable Development (International Institute for Science, Technology & Education, USA) and International Journal of Research in Commerce, Economics and Management. Besides, he has presented papers in annual seminars under IASP, IIPS, IEA and TIES. At present he is working as secretary cum treasurer of Rajasthan Economic Association and convener of youth development centre in his college.