TRADE OFF BETWEEN PRODUCTIVITY AND EMPLOYMENT: AN INTERNATIONAL COMPARISON

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Abstract

This paper analyses the trade off between productivity and participation in different regions of the world for 1980-2005 with particular focus on developing economies. Patterns of employment productivity trade off have been analyzed across region and time period. We find these trade off vary across countries and depend on different income groups and regions. Results show that Africa is a victim of low productivity trap because of unproductive employment growth, whereas Southeast Asian region and to some extent South Asian region showed positive growth both in employment and productivity. Cross country empirical analysis shows that in developed high income economies this trade off fades away within 7 years, however, in case of developing and low income countries this tradeoff can last for even more than 10 years. These different trade-offs can be explained by differences in structural transformation phases and differences in labour market institutions between developed and emerging countries.

JEL Classifications: *F2, J24, J21, O5*

Keywords: *labour productivity growth, labour force participation, labour intensity*

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1. **Introduction**

In order to attain long term sustainable economic growth of an economy the creation of employment opportunities along with promotion of higher productivity is a basic essential. Developed and developing economies are emphasizing on improving workers productivity, but at the same time it is considered that labor productivity will be increased by the substitution of capital intensive methods for labor intensive methods in production process.

Although productivity gain can lead to job losses as technological progress lead to efficient utilization of resources i.e. more output can be produced with fewer workers, however, at the same time productivity gain can lead to employment creation due to expansion of new products markets. The new jobs may be created in different areas, sectors and industries. Shift of employment between different sectors has been taking place in all regions of the world and on balance an increase in employment is more prominent in services sector which accounts for the 42 percent of total employment in the world, however, with considerable variation among different regions of the world. Similarly, the employment status, human capital development, investment in physical capital goods, adoption of ICT is also changing with the time. But this transition process takes time and there may be trade offs between employment growth and productivity growth during this period.

This study focuses on the productivity and participation tradeoff in dynamically changing economies with particular focus on developing countries. The hypothesis is that there will be trade off in productivity growth and employment due to structural changes in short and medium run. But over the long run, the economy will be benefit from these changes with higher productivity as well as employment growth. The purpose of this study is to judge whether it is true for the all regions of the world or it is specific to countries belonging to some specic income groups. Study will make an international comparison of this tradeoff between the different regions as well as by different income groups of world. Study will analyze (i) the relationship between productivity and employment differences between low income and high income developed economies and (ii) the impact of structural

changes on the employment situation of current developing economies. Study will also explore the transformation of short term trade offs into long run positive influences for sustainable growth and the potential requirement for this in developing economies.

The paper is structured as follows. Section two will explore the overview of employment-productivity relationship. In section three, the patterns of employment productivity tradeoff have been analyzed across region and time periods at macro level. Empirical analysis of this trade off by applying cross sectional and panel analysis is done at regional level section four. Potential reasons which can explain the difference in productivity participation trade-off across different regions of the world are discussed in section five and section six summarizes the findings and suggests policy recommendations to reduce this trade off

2. The Relationship between Employment and Productivity

We start with a basic relation where output is considered as a multiplicative term of employment and productivity, in simplest terms. This means that a given level of output can be achieved either with high productivity and low employment (that's mean employment intensity of economic growth is low) or, on the contrary, with low productivity and high employment (a high-employment intensity). The important question is whether an increase in productivity necessarily imply a decline in employment. In fact, it's not always the case as there are other sources of increase in productivity as well, such as better capacity utilization, efficient use of inputs, and training of labor. In this case, the productivity can grow without reducing the employment. Similarly, there may be "displacement effects" that occur due to expansion of market share with increase in productivity level of particular firm. There can prompt employment decrease in other competing firms so displacement effect should be keep in mind while focusing on the net impact on employment. Moreover, whenever productivity increases with mechanization there may be less demand of labor (i.e agriculture sector) but at the same time there will be more labor demand due to expansion of output and related activities of mechanical developments. Thus although immediate impact may be

slight decline or displacement in labor demand but in longer[1] term market forces will compensate through output expansion and new products demand. For evaluating the productivity-employment tradeoff, both time framework and the response of markets, and institution, towards productivity increase are important. World Employment Report (2004-05), defines the "compensating mechanisms" through which productivity growth in particular sector/location in economy can effects out put and employment growth at aggregate level. The compensating mechanisms work through decline in product prices, increased wages, increase in investment and overall employment and new products through innovation (for detail see employment report). It is an interesting question to explore whether these compensating factors are playing their role in developing and emerging economies for positive effects in long run.

3. The Trade off between Productivity and Employment

To evaluate the productivity and participation trade off, we analyzed the cross section of 40 countries from all over the world for the period of 1980-2005. In our sample, we only selected countries with a population size of more than 10 million. In our final sample, more than 70 percent countries are developing economies and they belong to different income groups. The list of the countries by income groups/region is provided in appendix A.

We start our analysis with the identity of per capita income and labour productivity, labour intensity and participation

$$\left(\frac{Y}{P}\right)=\left(\frac{Y}{H}\right)\cdot\left(\frac{H}{E}\right)\cdot\left(\frac{E}{P}\right) \qquad \text{……..(1)}$$

where

$$\left(\frac{E}{P}\right)=\left(\frac{E}{L}\right)\cdot\left(\frac{L}{P1564}\right)\cdot\left(\frac{P1564}{P}\right)\text{……(2)}$$

[1] There is considerable variation is short, medium and long term variation. But most economist define short run(3-5 years0,medium.long term (5-20 years) and very long term 20+ years.

where *Y* is GDP, *P* is population, *H* is hours work , L is labour, P1564 is working age population and *E* is the number of employed persons. Notice that the participation rate is defined as the share of employed persons in the total population instead of the population between 15-64 years of age. This is done intentionally because employment rate is widely available and less subject to measurement differences across countries and working age population (15-64 years) measure is little bit arbitrary because people older than 64 years may still be working. Data for identity in equation one is drawn from the Groningen Growth and Development centre, key indicators of labour market (KILM) and world Development indicators for working age population share in total population.

3.1. Descriptive Analysis

We consider the annual percentage growth rates of these series to be stationary and continue our analysis based on them. As in our sample most of economies are developing so there is no data available for annual hours worked. We will use the GDP per employed person as a measure of labour productivity. The data are represented graphically in a following way. First, we focus on the long term development taking account of each country's starting position. This shows whether there has been convergence among the 40 countries the past 25 years in terms of welfare (GDP per capita), productivity (GDP per person employed).As major part of sample countries consist of developing economies so apparently there is no convergence in sample. The negative annual growth of countries shows that these economies are prey of low level of income trap **see figure 1.** These economies are Zambia, Zimbabwe, Madagascar and Nigeria .All these four economies are from Africa and belong to lower income economies group. On the contrary, countries like China, Malaysia, South Korea and Thailand showed good performance despite the low initial level of income. All these economies belong to east and Southeast Asian region and explain some part of East Asian miracle growth.

Figure 1: Scatter plot of GDP per capita in 1980 and average annual per capita Income Growth between 1981-2005

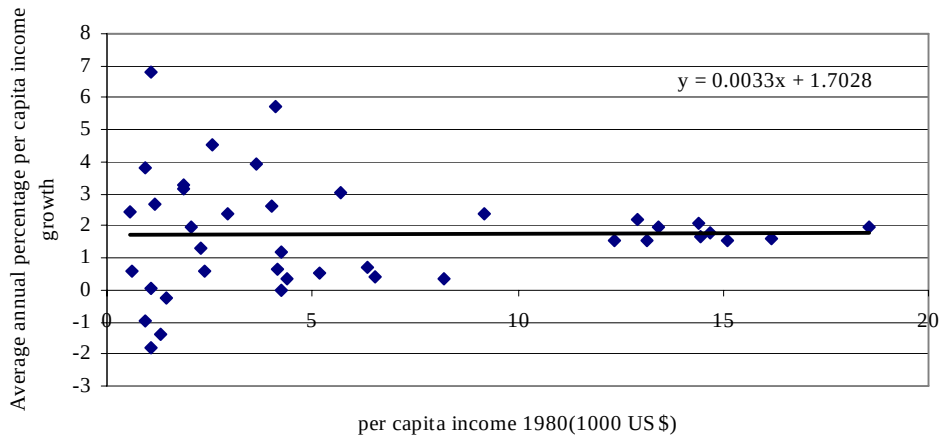

Figure 2: Scatter plot of Labor Productivity in 1980 and average annual Productivity Growth between 1981-2005

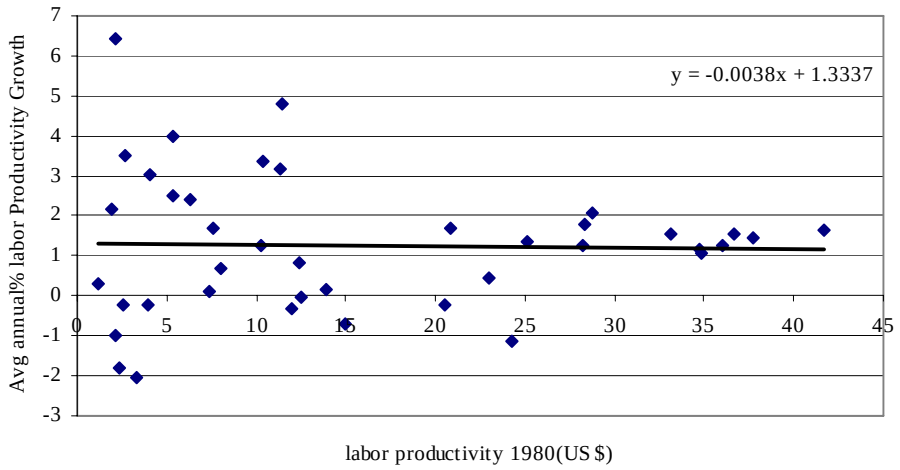

Figure 3: Relationship between rate of employment and labor productivity,1981-2005

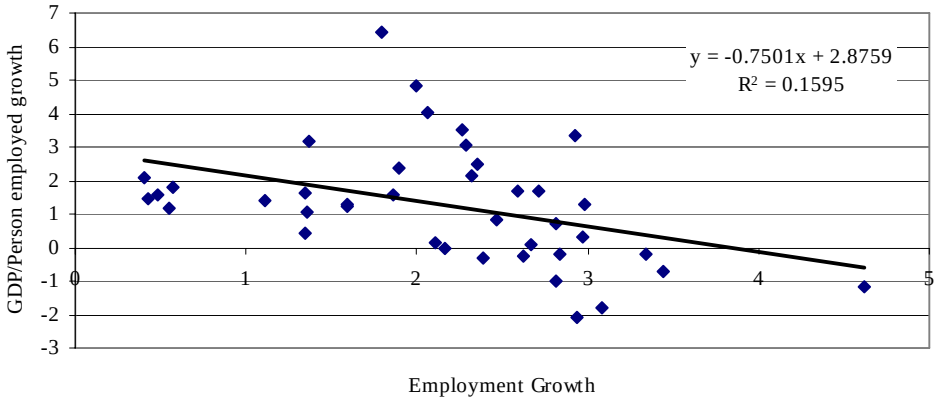

Figure 2 is scatter plot of initial level of labour productivity and its annual average growth during the same period. This scatter plot is pretty much coincides with the per capita income scatter plot, indicating that labor productivity growth is a major explanatory factor for income growth. A slightly negative line can be drawn. There are some countries which had the low initial productivity level but then high annul growth in productivity i.e. Malaysia, South Korea, China, Thailand and Turkey. At the same time there are some economies in the sample that are prey of low productivity trap i.e. Zambia, Zimbabwe and Madagascar ,Peru, Syria, South Africa, Brazil, Ecuador, and Kenya. In forthcoming section we will discuss the possible reason for poor productivity performance of these economies.

Figure 3 provides an assessment of long term interaction between employment growth and productivity growth for the cross section of countries from all over the world. Although a negative relationship can be seen between employment and productivity growth but there is quite variation within countries. At one peak there is China, South Korea and Malaysia which show evidence of both productivity and employment growth and on the other hand there are economies mostly from Africa ,Latin America and Middle East .These economies showed high employment growth mainly due to high population growth but slow growth in productivity showing high rate of underemployment.

Moreover decomposition of output by employment and productivity on regional basis is presented in **table 1**.In most of cases we can observe the negative relationship between employment and productivity growth in decade-wise analysis of different regions of the world i.e. Europe, Africa and Middle East and North Africa. One can also notice that in Africa except 1960-70 decade output growth is mainly due to employment growth with very low productivity. In Europe, productivity growth is responsible for the output growth during the last four decades however the situation is reversed in the recent past (2000-2005). The Southeast Asian region performed quite well as employment and productivity growth move positively together however during the last decade productivity growth dominated the employment growth but employment growth is still quite

reasonable. Similarly in South Asia both employment and productivity growth are moving together positively since 1980s.

Output growth in developed economies during 1960-2005 shows that employment elasticity of output is low contrary to developing economies. Similarly Output decomposition by different income groups shows that in high income economies the output growth is mainly due to productivity growth however in low income economies the low output is due to unproductive employment growth see table A & B in appendix B.

Table 1 : Output Decomposition by Employment and Productivity during 1960-2005 by Regions

	Africa			**Southeast Asia**			**Europe**		
	output growth	Emp growth	produc growth	output growth	emp growth	produc growth	output growth	emp growth	produc growth
1960-70	5.00	2.46	2.53	6.21	2.52	3.69	5.29	0.64	4.65
1970-80	3.11	2.71	0.39	6.35	2.68	3.66	3.27	0.35	2.92
1980-90	2.11	3.36	-1.25	5.66	2.85	2.8	2.38	0.59	1.79
1990-00	1.48	2.77	-1.29	4.78	1.53	3.25	2.32	0.85	1.47
2000-05	2.95	2.1	0.85	5.04	1.44	3.6	1.76	1.23	0.53
	Middle East & North Africa			**North America**			**Oceania**		
	output growth	Emp growth	produc growth	output growth	emp growth	produc growth	output growth	emp growth	produc growth
1960-70	4.89	1.65	3.24	5.22	2.49	2.72	4.28	2.48	1.81
1970-80	6.87	2.76	4.11	5.38	3.59	1.79	2.69	1.52	1.16
1980-90	3.92	3.1	0.81	2.3	2.52	-0.22	2.51	1.09	1.41
1990-00	3.89	2.88	1.01	3.03	1.58	1.45	3.16	1.43	1.72
2000-05	3.63	2.51	1.12	2.33	1.67	0.66	3.31	2.4	0.91
	South America			**South Asia**					
	output growth	Emp growth	produc growth	output growth	emp growth	produc growth			
1960-70	4.81	2.03	2.77	4.38	1.86	2.52			
1970-80	4.21	2.47	1.73	3.17	2.38	0.78			
1980-90	1.23	3.19	-1.96	4.88	2.21	2.67			
1990-00	3.81	1.52	2.27	4.86	2.02	2.84			
2000-05	3.75	2.72	1.03	5.24	2.76	2.47			

Productivity growth can lead to poverty reduction and better standard of living as productivity growth is main determinant of income growth .Gain in productivity means that there is more real income in economy which can be distributed among workers in form of high wages. There will be increase in per capita income which can further boost the productivity through better standard of living and increased human capital investment. An empirical study conducted by ILO (2004-05) shows that productivity growth and poverty change are strongly negatively associated. To look at the impact of

productivity and labor participation on per capita income we provide the breakdown of relationship determined in equation 2 above.

The table 2 below provides the breakdown of labor productivity growth into effects of labor force participation and GDP per capita for the periods (1980-95 and 1995-2005) by region and by income group. We find some interesting details from this table.

- It appears that relationship between labor force participation and labor productivity tends to be negative in most of cases. When particularly focusing on the developing economies, the effects of increased labor force participation are much smaller. However share of active population to total population has turned strongly positive in most of developing economies during 1990s.But their poor performance with regard to productivity shows that demographic transition is not materialized into demographic benefits i.e. Kenya, Madagascar, Mexico, Syria, Zambia and Zimbabwe.

- Analysis with regard to time period shows that in all regions except east and south East Asian economies per capita income growth has increased during 1995-2005 as compared to 1980-95, which indicates the per capita income in improving in the world. Same Analysis by income group shows that except high income economies, growth in per capita income growth is high during 1995-2005.

- Table 2 also indicates that impact of participation whether it is measured as employment rate or labor force participation rate on productivity is negative or very low. Although this relationship is not perfect other factors can impact this relationship but it shows the trade off between labor participation and employment and it is true for all regions.

Table 2: Decomposition of labor Productivity into effects of labor Force participation and GDP per capita,1980-2005 Annual average % Growth

Region/Area	GDP per Person Employed (%)	Effect of Employment as a percent of labor force (age 15-64)(in % points)	Effect of labor force s a percent of working age population (age 15-64)(in % points)	Effect of Active population(age 15-64) as a percent of total population	GDP per Capita (%)
Africa					
1980-95	-1.77	0.028	0.03	0.29	-1.42
1995-05	0.38	-0.09	-0.15	0.39	0.53
Southeast Asia					
1980-95	3.47	0.13	0.11	0.64	4.36
1995-05	3.03	-0.33	0.19	0.31	3.21
Europe					
1980-95	1.78	-0.37	0.15	0.24	1.8
1995-05	0.9	0.54	0.55	-0.04	1.96
Middle East and North Africa					
1980-95	0.812	0.044	0.54	0.63	1.54
1995-05	1.21	-0.14	0.158	0.932	2.154
North America					
1980-95	0.26	-0.35	0.5	0.37	0.79
1995-05	1.07	0.16	0.06	0.41	1.71
Oceania					
1980-95	1.53	-0.46	0.21	0.18	1.46
1995-05	1.175	0.585	0.3	0.14	2.2
South America					
1980-95	-0.042	-0.8	1.1	0.43	0.7
1995-05	1.19	-0.58	0.69	0.44	1.74
South Asia					
1980-95	2.87	-0.23	-0.26	0.26	2.64
1995-05	2.61	0.32	-0.17	0.65	3.42
By Development					
Developed					
1980-95	1.81	-0.27	0.27	0.25	2.06
1995-2005	1.26	0.38	0.35	0.06	2.06
Developing					
1980-95	0.68	-0.18	0.2	0.48	1.17
1995-2005	1.55	-0.19	0.12	0.57	2.04
By Income Group					
High income					
1980-95	2.02	-0.23	22	0.23	2.22
1995-05	1.31	0.41	0.38	0.01	2.13
Upper middle					
1980-95	0.64	-0.25	0.28	0.53	1.21
1995-05	1.69	-0.14	-0.15	0.47	2.01
Lower Middle					
1980-95	1.33	-0.23	0.388	0.64	2.13
1995-05	1.7	-0.21	0.386	0.68	2.56
Low income					
1980-95	-0.27	-0.12	-0.02	0.21	-0.242
1995-05	1.15	-0.19	-0.12	0.48	1.27

Source: TCB/GGDC Database with GDP converted to US $ at 1990 GK PPP

4. Empirical Analysis:

The empirical strategy focuses on the relationship between productivity and participation. We will follow the methodology adopted by Ark and MuGuckin 2005. As discussed above in equation 1 that they are part of simple accounting identity that includes per capita income. So we can rewrite the identity in equation 1

$$\left(\frac{Y}{H}\right) = \frac{\left(\frac{Y}{P}\right)}{\left(\frac{H}{E}\right)\cdot\left(\frac{E}{P}\right)} \qquad \text{…….. (3)}$$

Rewriting equation (3) in terms of growth as

$$\Delta\log\left(\frac{Y}{H}\right) = \Delta\log\left(\frac{Y}{P}\right) - \Delta\log\left(\frac{H}{E}\right) - \Delta\log\left(\frac{E}{P}\right) \qquad \text{……(4)}$$

Since this is an identity, it cannot be estimated in order to assess the effect of a change in either right hand side variable to labour productivity growth. At least one variable has to be omitted to estimate this effect. We will skip GDP per capita but hours worked are also highly correlated with per capita income which will result in problem of endogeniety. To avoid this we will send both per capita income and H/E to residual term. So our equation for estimation in restricted form will become

$$\Delta\log\left(\frac{Y}{H}\right) = \beta_0 + \beta_1\Delta\log\left(\frac{E}{P}\right) + \varepsilon \text{ ……..(5)}$$

For estimating this model we will use the overlapping[2] and non overlapping economic specification as done by MuGuckin and van Ark, 2005.Each regression will be run with control and without control. In controlled model there will be initial productivity levels

[2] Overlapping time spans, are e.g. years 1-3, 2-4, 3-5, 4-6, to define growth periods for participation in the regression. Corresponding non-overlapping time spans would be years 1-3, 4-6, 7-9 etc.

(taken at the beginning of time span) and country specific fixed effects. Our final equation for estimation will become like this

$$\Delta \log\left(\frac{Y}{H}\right) = \beta_0 + \beta\Delta 1og\left(\frac{E}{P}\right) + c * D_j + d * \left(\frac{Y}{H_{j,t0}}\right)\} + \varepsilon \qquad \ldots\ldots\ldots\ldots(6)$$

Where j stands for the country and t stands for time span over which the growth is measured. As mentioned above time span will consist of 1,3,5,7 and 10 years. The initial productivity control is at the start of each time span.

As mentioned in previous section that employment to population ratio is used to measure the labor force participation and will be referred as employment rate from now onward. As data for the annual hours worked is not available for most of the developing economies in our sample, so we used the GDP per employed person as labor productivity indicator.

We applied the cross section as well as panel approach to measure the relationship between the employment and productivity growth. First we estimated equation directly in levels. Cross section or point in time estimates typically isolate the long term or structural relationship. We estimate the cross section regressions for a number of different years. Results are presented in table 3. in cross section analysis productivity level is the dependent variable and employment population ratio is independent variable.. The coefficient on employment rate is positive and significant in all cases (see top of table 3). Similarly we estimate the impact of employment on GDP per capita.

Table 3: Effect of employment on Labor Productivity and per capita income

	1980	1990	2000	2005
Ratio of Employment/ population	44.19	48.1	64.28	67.18
t stat	(2.06)**	(2.05)**	(2.33)**	(2.37)**
Observations	40	40	40	40
Effect of Employment on per capita Income (1980-2005)				
Ratio of Employment/ population	25.58	48.1	36.18	38.35
t stat	(2.89)***	(2.06)**	(2.92)***	(2.94)**
Observations	40	40	40	40

The impact of employment rate is positive and significant in all cases (see the bottom part of table 3).

Table 4 provides the basic panel results with growth in productivity as dependent variable and employment rate as independent variable for sample of 40 countries for the period of 1980-2005.We estimate the trade off between participation and productivity with and without control variables. First and third column in table 4 shows the results of simple regressions without control variable. Where as second and fourth columns show the regression result with control. Here we used the initial productivity level and country fixed effects as control variables. Top panel of table provides the results for the impact of participation on labor productivity (GDP per employed growth).There is strong trade off between participation and productivity and it remains significant even after 10 years both in controlled and uncontrolled estimation and in overlapping and non overlapping panels. However in case of developed economies panel this trade off is of short term and fades away in less than 5 years (van Ark and MuGuckin, 2005, Belorgey et al 2004 and Broersma,2005).As in our sample of 40 countries ,majority countries(70 percent) are developing countries so in our sample trade off persist even after 10 years. In developing economies as underemployment rate is very high and that enhances this tradeoff. Moreover agriculture is major contributor in employment generation where underemployment is very high due to large share of unpaid family helpers. The elasticity estimates for employment productivity tradeoff ranges -0.6 to -0.8 in all cases. This means that increase in productivity is not necessarily translate in increase in per capita income in case of developing and low income economies.

The bottom of table 4 presents the result of impact of increased participation on per capita income growth. Impact of employment rate (employment to population ratio) is positive and significant in all time spans (measurement intervals) in uncontrolled regressions in overlapping panel indicating that even though there is loss of productivity with increase in employment but it is offset by positive gain in per capita income. With control variables, its impact is positive and significant only for annual and 3-year measurement interval. After that it becomes insignificant. However in case of no-overlapping panel it is significant only for annual and three years panel, after that it becomes insignificant.

Table 4: Effect of Change in Employment/Population Ratio on Value added per Employed Growth (1980-2005)				
	Overlapping		**No Overlapping**	
	Uncontrolled	controlled	Uncontrolled	Controlled
Annual Growth in employment to population ratio	-0.663 (10.28)**	-0.670 (11.09)**		
3-years Growth in employment to population ratio	-0.612 (8.18)**	-0.641 (9.97)**	-0.691 (5.49)**	-0.862 (3.65)**
5-years Growth in employment to population ratio	-0.598 (7.23)**	-0.685 (10.35)**	-0.735 (4.19)**	-0.789 (5.08)**
7-years Growth in employment to population ratio	-0.550 (6.02)**	-0.6888 (10.24)**	-0.469 (1.92)	-0.505 (2.39)*
10-years Growth in employment to population ratio	-0.474 (4.27)**	-0.710 (9.31)**	-0.852 (2.53)*	-0.78 (5.60)**
Effect of Change in Employment/Population Ratio on Value added per capita (1980-2005)				
Annual Growth in employment to population ratio	0.346 (5.33)**	0.330 (5.45)**		
3-years Growth in employment to population ratio	0.402 (5.34)**	0.250 (2.19)*	0.321 (2.54)*	0.25 (2.28)*
5-years Growth in employment to population ratio	0.419 (5.04)**	0.179 (1.14)	0.283 (1.60)	0.196 (1.26)
7-years Growth in employment to population ratio	0.468 (5.09)**	0.402 (1.86)	0.547 (2.22)*	0.42 (1.99)
10-years Growth in employment to population ratio	0.552 (4.93)**	-0.422 (1.47)	0.168 (0.50)	-0.50 (1.87)
**** significant at 1 percent,* significant at 1 percent**				

To confirm the impact of participation on productivity growth we evaluate the impact of various participation indicators (raw employment growth, employment/ labor force, employment/ working age population, labor force/ working age population and labor force to total population ratio).Table C in appendix C shows the results of impact of various participation indicators on productivity .These results reconfirm the existence of strong trade off between participation and productivity.

To evaluate the difference in this trade off for the economies belonging to different income groups, we evaluated the relationship between productivity and participation by different income group's economies. Table 5 shows the results by income groups. We can notice that

- In high income economies, trade off between productivity and participation becomes insignificant after 7 years. However in upper middle, lower middle and low income economies, participation coefficient remains negative and significant in all measurement intervals.

- Second thing to note is that as we move from high income economies towards low income economies, the trade off become large. In other words the negative impact of increased participation is high in low income economies compared to high income group's economies.

- When we focus on the impact of participation on per capita income growth, we noticed that for high income economies its impact is positive and significant for all measurement intervals. For upper middle income economies increased employment rate impact on per capita income growth is positive and significant for annual and 3 years panel after that it becomes insignificant. For lower middle income economies its impact is positive but insignificant however in case of low income economies its coefficient becomes negative and significant.

Above analysis shows that trade-off between productivity and participation in low income economies is large and for long duration as compared to advanced and developed economies.

Table 5:Effect of Employment/Pop Growth on Labor Productivity (GDP/Employed) Growth

	High Income Economies		**Upper Middle Income Economies**		**Lower Middle Income Economies**		**Low Income Economies**	
	Uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled
Annual E/ P Growth	-0.143 (2.32)*	-0.164 (3.17)**	-0.509 (3.34)**	-0.503 (3.31)**	-0.913 (8.41)**	-0.870 (8.64)**	-1.751 (6.00)**	-0.690 (5.95)**
3- years E/ P Growth	-0.106 (1.64)	-0.165 (3.98)**	-0.418 (2.33)*	-0.423 (2.26)*	-1.08 (8.07)**	-0.998 (8.66)**	-1.790 (4.95)**	-1.635 (4.55)**
5-years E/ P Growth	-0.014 (0.19)	-0.146 (3.49)**	-0.575 (3.01)**	-0.95 (4.78)**	-1.07 (7.30)**	-0.908 (7.87)**	-2.094 (5.27)**	-1.88 (4.37)**
7-years E/ P Growth	0.104 (1.13)	-0.118 (2.39)*	-0.555 (2.73)**	-1.14 (6.02)**	-1.067 (6.66)**	-0.799 (7.30)**	-2.111 (5.14)**	-1.693 (4.03)**
10-years E/ P Growth	0.337 (2.79)**	-0.087 (1.39)	-0.340 (1.44)	-1.15 (5.67)**	-1.143 (6.01)	-0.833 (6.86)**	-2.11 (4.75)**	-1.66 (3.70)**

Effect of Employment/Population Growth on GDP per capita Growth

	High Income Economies		**Upper Middle Income Economies**		**Lower Middle Income Economies**		**Low Income Economies**	
	Uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled
Annual E/ P Growth	0.872 (14.02)**	0.842 (16.50)**	0.492 (3.22)**	0.502 (3.27)**	0.095 (0.87)	0.121 (1.20)	-0.72 (2.46)*	-0.63 (2.27)*
3- years E/ P Growth	0.910 (13.96)**	0.837 (20.64)**	0.586 (3.26)**	0.627 (3.32)**	-0.063 (0.47)	0.007 (0.06)	0.761 (2.10)*	-0.56 (1.64)
5-years E/ P Growth	1.002 (13.00)**	0.823 (19.87)**	0.433 (2.26)*	0.105 (0.50)	-0.052 (0.35)	0.044 (0.38)	-1.05 (2.66)**	-0.72 (1.82)
7-years E/ P Growth	1.121 (11.94)**	0.820 (16.31)**	0.0461 (2.26)*	-0.157 (0.75)	-0.041 (0.25)	0.0735 (0.66)	-1.07 (2.61)*	-0.54 (1.45)
10-years E/ P Growth	1.35 (11.03)**	0.811 (12.43)**	0.693 (2.91)**	-0.235 (1.01)	-0.104 (0.55)	-0.030 (0.25)	-1.068 (2.40)*	-0.47 (1.25)

High Income Economies: Australia, Belgium, Canada ,France ,Italy ,Japan, Netherlands, New Zealand ,South Korea ,Spain ,UK and USA
Upper Middle Economies: Argentina, Brazil ,Chile ,Malaysia ,Mexico ,South Africa and Turkey
Lower middle Income Economies: China ,Colombia, Ecuador, Egypt ,Indonesia, Morocco, Peru ,Philippines ,Sri Lanka ,Syria ,Thailand and Tunisia
Low Income Economies: Bangladesh ,India ,Kenya, Madagascar ,Nigeria ,Pakistan ,Tanzania ,Zambia and Zimbabwe

5. Factors affecting productivity participation trade off

During last decade there was a hot debate about the opposite development in the growth rates of labour productivity in Europe and USA. Focus of most studies was to find out the explanation of difference of productivity employment trade off between two developed regions of the world. There are various studies which describes the following possible sources of divergent growth of USA and Europe. The possible reasons for this differences mentioned by studies are difference in physical and human capital investment particularly on ICT role and increased skill of workers (Jorgenson et al 2002, van Ark et al. 2002, Krusell et al., 2000), difference in time and pace of structural transition and labor markets reforms (Nicoletti and Scarpetta 2003, Gust and Marquez 2004, Broersma 2005) ,difference in innovation and workplace changes (Besnahan, Brynjolfsson and Hitt, 2002) and difference in the employment pattern in two regions.i.e. Part time work and entry of low skilled workers in job market in Europe. Low skilled workers hold relatively simple jobs with a low output per hour worked, i.e. a low productivity (Beaudry and Collard 2003, Cavelaars 2004, Cette 2004, Belorgey et al. 2004, McGuckin and van Ark 2005).

In this study particular focus is on the low income and developing economies, here it will be explored whether above mentioned reasons also explain the productivity –employment trade-off variation in different regions of the world with low profile productivity economies. Here the possible factors affecting productivity participation trade off in different regions of the world are explained briefly.

- *Structural Transition:* structural change which represents the shift of resources from low to high productivity activities often results in short term and medium term loss of jobs often called as "creative destruction" in literature (Ark, Frankema and Duteweerd, 2004). Let's look at the distribution of employment in various sectors which will help us to understand the difference in tradeoff of various regions. We can see from table that services sector accounts for the major share of employment in the world. Employment productivity trade off is worse for most of the African countries and we can see that in Africa agriculture sector still accounts for two third employment. Productivity in agriculture sector is low due to high underemployment rate in this sector. Structural transformation can explain

to some extent the productivity participation tradeoff difference among regions see table 6.

Table 6 :Employment by sector (as share of total Employment) 1997-2007

	Agriculture		Industry		Services	
Year	1997	2005	1997	2005	1997	2005
World	41.4	37.1	21.1	21.4	37.5	41.5
Developed Economies and European Union	6.1	4.2	28.3	25	65.6	70.8
Central and South-Eastern Europe (non-EU) & CIS	27	21.1	28.3	25.6	44.7	53.3
East-Asia	47.9	42.9	24.3	24.3	27.8	32.7
South-East Asia and the Pacific	48.8	45.5	17.1	18.2	34.1	36.3
South Asia	59.4	50.9	15.3	20.2	25.2	28.9
Latin America and the Caribbean	23.5	19.6	20.7	21.7	55.8	58.7
Middle East	21.4	18.7	25.6	25.5	52.9	55.9
North Africa	35.4	33.6	19.9	20	44.7	46.4
Sub-Saharan Africa	72.1	67.1	8.5	9	19.4	23.9

Source: Global Employment Trends 2008

- *Informal Sector*: structural transformation is time intensive and occurs in unequally manner in developing countries. With the shift from agriculture there is huge migration towards cities as developing an emerging economies are unable to produce new employment opportunities. So these workers mostly find their earning in informal employment mainly in services sector. Informal sector promote employment growth at expense of productivity growth as a result informal sector has reasonable economic activity but also substantial underemployment. During 1990s, 60 percent of new jobs were created in urban informal sector in Latin America and in Africa it created 90 percent of all new jobs and in Asia informal economy absorbed 40-50 percent of urban labor force.

- *Employment status:* also helps to understand the difference in trade off in various regions. In 2007 out of every 10 person employed 5 are working as family workers and own account worker. Family workers are mainly in agriculture sector and often prey of disguise unemployment with low productivity. Self employed workers are mainly working in informal sector which is also low productivity sector. During 1990s own account and family workers represented nearly two

third of total non farm employment in Africa, half in south Asia, 1/3rd the Middle East and 1/4th in East Asia and Latin America.

- *Employment by gender* and by skill level is also responsible for the productivity and participation trade off difference among regions. The female economic participation is linked negatively with the productivity and this trade off is not fade away in short run not even in highly developed economies (van Ark and Muckun 2005).This is mainly because female workers mostly work part time, lack of experience due to entry and exit from market and low education level in case of developing economis. Moreover services sector is major employer of the females. The poorer the region, the greater the likelihood that female workers are among the rank of family helper and own account worker. In comparison with for every 100 economically active men there are 67 active women in world, 82 in developed economies, 80 in East Asia, 41 in South Asia and 75 in Africa. Female employment to population ratio is send highest in the world after the east Asia but wide spread poverty persist implying the low productive, in decent job opportunities are available for them.

Other factors include the physical and human capital investment, development of ICT in country and strong macroeconomic conditions, which are necessary to allow the compensatory mechanism to transform the short run trade off in employment productivity tradeoff to long run realization of sustainable growth with high productive employment generation.

6. Summary and Policy Conclusions

This paper has established the existence of a trade-off between productivity and participation for the period of 1980-2005 across different regions of the world. We find that trade off exists in most parts of world but duration of this trade off varies across countries with different income groups. In developed or high income economies this trade off fades away with 7 years however in case of developing economies or upper middle ,middle and low income economies this employment productivity trade off exists even after 10 years. This implies that in developing economies along with the emphasis on labour productivity growth there should be some short term and medium term arrangement for the productive absorption of the existing and new entrants of workers. Regional analysis shows that Africa is trapped in low productivity trap because of unproductive employment growth whereas Southeast Asian region and to some extent South Asian region performed well with positive employment and productivity growth.

We find that the difference in human capital and physical capital investment, employment to population ratios, labour force participation by gender, employment in informal sector and dominating agriculture sector in developing economies and increasing share of services sector in employment generation, political and macroeconomic instability explains the difference in productivity –participation trade off across different regions of world.

To break or reduce the productivity employment trade off in short- medium run and to realize the long term growth potential we will recommend that along with strong macroeconomic polices there is need of sensible working of market forces which allocate resources more productive and efficiently. As compensating mechanism is not working automatically in developing economies there is need of creating such environment which can alleviate/ reduce the negative short /medium term effects without affecting long run growth potential. This can be done by creating jobs in infrastructure or by identifying special national strategy for creating productive employment. But focus should be on productivity enhancement along with employment growth in long run as it's the only way to achieve sustainable economic growth and better standard of living in long run.

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Appendix A:

List of Countries in sample by region

East and Southeast Asia	South America	Middle East and North Africa	Africa	Europe
China	Brazil	Egypt	Nigeria	France
Indonesia	Colombia	Turkey	South Africa	UK
Japan	Argentina	Syria	Tanzania	Italy
Phillipines	Peru	Morocco	Kenya	Spain
Thailand	Chile	Tunisia	Madagascar	Netherlands
South Korea	Ecuador		Zimbabwe	Belgium
Malaysia			Zambia	

South Asia	North America	Oceania
Pakistan	USA	Australia
India	CANADA	Newzealand
Srilanka	MEXICO	
Bangladesh		

List of Countries in sample by income Groups				Development			
High Income Economies	**Upper Middle Income Economies**	**lower middle income economies**	**lower income Economies**	**Developed Economies**	**Developing Economies**		
Australia	Argentina	China	Bangladesh	Australia	Argentina	China	Bangladesh
Belgium	Brazil	Colombia	India	Belgium	Brazil	Colombia	India
Canada	Chile	Ecuador	Kenya	Canada	Chile	Ecuador	Kenya
France	Malaysia	Egypt	Madagascar	France	Malaysia	Egypt	Madagascar
Italy	Mexico	Indonesia	Nigeria	Italy	Mexico	Indonesia	
Japan	South Africa	Morocco	Pakistan	Japan	South Africa	Morocco	
Netherlands	Turkey	Peru	Tanzania	Netherlands	Turkey	Peru	
New zealand		Phillipines	Zambia	New zealand	Phillipines	Nigeria	
South korea		Sri Lanka	Zimbabwe	South korea	Sri Lanka	Pakistan	
Spain		Syria		Spain	Syria	Tanzania	
UK		Thailand		UK	Thailand	Zambia	
USA		Tunisia		USA	Tunisia	Zimbabwe	

Appendix B:

Table A: Output decomposition by employment and productivity 1960-2005 by region

	output growth	emp growth	produc growth
Africa	2.93	2.68	0.25
East and Southeast Asia	5.61	2.21	3.4
Europe	3.01	0.73	2.27
Middle East and North Africa	4.64	2.58	2.06
North America	3.65	2.37	1.28
Oceania	3.19	1.79	1.4
South America	3.56	2.39	1.17
South Asia	4.51	2.25	2.26
By Income Group			
	output growth	emp growth	produc growth
High income economies	3.52	1.24	2.28
upper middle income economies	4.01	2.23	1.78
Lower Middle income economies	4.69	2.62	2.07
Low income economies	3.47	2.62	0.85
By Development Level			
	output growth	emp growth	produc growth
Developed	3.56	1.35	2.21
Developing	4.13	2.51	1.61

Countries list in these sub groups is presented in appendix

Table B: Output decomposition by employment and productivity 1960-2005 by income groups

	High Income economies			**Upper Middle Income Economies**		
	output growth	emp growth	produc growth	output growth	emp growth	produc growth
1960-70	5.64	1.51	4.13	5.27	2.01	3.26
1970-80	3.73	1.24	2.49	5.12	2.63	2.48
1980-90	3.15	1.1	2.05	2.52	2.86	-0.34
1990-00	2.79	1.03	1.76	4.12	1.98	2.14
2000-05	2.31	1.33	0.98	3.04	1.68	1.35
	lower middle income economies			**lower income Economies**		
	output growth	emp growth	produc growth	output growth	emp growth	produc growth
1960-70	4.83	2.25	2.58	4.79	2.25	2.54
1970-80	6.07	2.84	3.23	3.04	2.84	0.2
1980-90	3.67	3.2	0.47	3.19	3.11	0.08
1990-00	4.07	2.13	1.93	2.54	2.52	0.02
2000-05	4.78	2.65	2.12	3.77	2.37	1.4

Appendix C:

Table C: Effect of Participation on Labor Productivity Growth (Overlapping Panel)

	Employment		Employment/Labor force		Employment/Working Age		Employment/Population		Labor force/Working age		Labor force to population	
	uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled	uncontrolled	Controlled
Annual												
Labor Productivity Growth	-0.699 (12.49)**	-0.683 (11.84)	-0.439 (6.10)**	-0.498 (7.36)**	-0.690 (10.76)**	-0.675 (11.23)**	-0.663 (10.28)**	-0.670 (11.09)**	-0.930 (8.22)**	-0.823 (7.31)**	-0.803 (7.29)**	-0.777 (6.99)**
Constant	2. 80 (16.56)**	4.63 (6.99)	1. 23 (9.95)**	2.89 (4.20)**	1. 37 (11.54)**	2.63 (3.97)**	1. 67 (13.16)**	3.32 (4.89)**	1.509 (12.08)**	3.47 (5.09)**	1.83 (12.08)**	4.29 (6.02)
Observation	1000	1000	1000	1000	1000	1000	975	975	1000	1000	975	975
5-years												
Labor Productivity Growth	-0.712 (12.19)**	-0.668 (11.27)**	-0.291 (3.12)**	-0.599 (7.75)**	-0.666 (7.95)**	-0.714 (10.75)**	-0.598 (7.23)**	-0.685 (10.35)**	-0.964 (7.52)**	-0.791 (6.26)**	-0.711 (6.10)**	-0.621 (5.26)**
Constant	2.85 (19.10)**	5.37 (13.19)**	1.27 (15.04)**	3.37 (8.27)**	1.39 (16.97)**	3.46 (8.84)**	1.65 (17.47)**	4.16 (10.47)**	1.54 (17.56)**	4.14 (10.15)**	1.79 (15.76)**	4.74 (10.79)**
Observation	840	840	840	840	840	840	819	819	840	840	819	819
10-years												
Labor Productivity Growth	-0.69 (10.68)**	-0.888 (5.92)	0.104 (0.81)	-0.70 (7.25)**	-0.566 (4.79)**	-0.79 (9.94)**	-0.474 (4.27)**	-0.710 (9.31)**	-1.01 (7.03)**	-0.777 (5.47)**	-0.754 (5.99)**	-0.60 (4.74)**
Constant	2.88 (18.32)**	4.60 (3.97)	1.40 (17.5)**	3.81 (11.67)**	1.46 (18.57)**	3.94 (12.76)**	1.67 (17.11)**	4.72 (15.17)**	1.64** (19.60)	4.65 (14.41)**	1.91 (16.98)**	5.26 (14.62)**
Observation	640	640	640	640	640	640	624	624	640	640	624	624

All independent variables are growth rate
** significance at 1 percent
* significance at 5 percent