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The Role of Health in Labor Productivity: A Case Study of Member Countries of Organization of Islamic Cooperation

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Abstract

The present paper attempts to estimate the relationship between labor productivity and health, technological progress and education, using panel data observing 57-nation Orgamization of Islamic Coopeation, OIC over the period of 1995-2009. A two-step procedure was used with the first involving an estimate of labor productivity based on observations in the OPEC, GCC and ECO member countries and also African nations within the Islamic countries. The second step involved an estimate of the effect on labor productivity of health, technological progress and education. Our findings indicate that labor productivities in Islamic countries with some exceptions on an average are above 3 with the highest of 12 belonging to Azerbaijan. Exceptions are Somalia and Gabon with negative productivities and Brunei and Cameroun with productivities around one. The only variable influencing labor

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productivity in the Islamic countries is health with technology and education having no meaningful influence.

Keywords: Health; Labor Productivity; Islamic Countries; OIC.

1. Introduction

At one time or another various contries across the world witness their population moving from rural areas, normally with high rates of bith and death, to urban, industrial areas ordinarily with high rates of birth and death. Hence, the working age population (15-64 years) grows faster than the mere consuming population (65 years and above), leading to a reduction in the working age population and an increse in the dependent, consuming population (Lee, 2006). Countries experiencing a reduction in the working age population ratio will find it crucial to focuss on raising their labor productivity as a way of meeting the deficeit supply caused by a reduction in the ration of the working age to total population (Fisher and Hostland, 2002; Shaw, 2002 and Deiwert et al., 2009). Here, a system will be needed that develops the required conceptual and empirical basis for monitoring labor productivity, identifying its determinants and controlling for its impacts. The experience of most developd and some developing countries reveals that the economic grwoth is positively and substantially affected by productivity, particularly labor productivity. For example more than 50 percent of economic growth in both South Korea and Singapour has been accounted for by productivity increses (Chadha, 2008) with labor forming an important constituent. Labor productivity is under the influence of many vaiables

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and its improvement is affected by a variety of policies (see, for example Saari, 2006; Khazabi, 2008 and Deiwert et al., 2009). The three most prominent explanatory variables of the labor productivity are: education, health and technological progress. The education variable is ordinarly is measured by the avrage years in schooling of the labor force or public or private expenditures on education. An increse in either yesrs in schooling or expenditures on education is expected to improve the labor productivity indices (Yunhua et al., 2000: Duryea and Page, 2002 and Razzak and Timmins, 2007). Another variable that is expected to affect labor productivity is health, which is normally measured by life expectancy or by expenditures apprpriated to education. The explanatory power of technological progress as a determinant of labor productivity is aslo strong. This variable is usually proxied by the growth rate of total productivity or by growth rate of technological exports (Singh, 2004 and Jajri and Ismail, 2009). A question that has not been attempted and that we intend to take up in this paper is how these explanatory variables are likely to affect labor productivity in the particular cultural set up of Islamic countries. Finding an anwer to this question is particularly important because the problem of working age ratio and the concomitant rise in defeceit supply is especially acute in this group. Since the labor productivity in these countries is either unobserved or where observed is unavailable, we opted estimate this variable first and proceed to study how education, health and technological progress affect it second. Hence, more broadly speeking, our final goal is to see how human capitalas manifested in

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education and heath together with productivity affect labor in Islamic countries. This is expected to bring labour productivity studies in these countries up to date compared to the studies available from other countries and add further to empirical evidence already available on the issue. More formally, this paper aims at arriving at a quantitative picture of labor productivity in Islamic countries and how much it is influenced by human capital and technological progress.

2. Research Methodology

The empirical model estimatig labor productivity by country can be represented as:

$$Dq / q = da/a + b_1\, dk/k + b_2\, dn/n)$$

$$Dq / q - dn/n = da/a + b_1\, (dk/k - dn/n) \quad (2)$$

Where Dq/q masures GDP growth rate, da/a is the growth rate of total factor productivity, dk/k the growth rate of capita, and dn/n the growth rate of labor. The parameters b_1 and b_2 are elascticity of output with respect to kapital and elasticity of output with respect to labor respectively. The expressions $1- b_1 + b_2$ and $da/a + b_1\, (dk/k-dn/n)$ are indicative of constant returns to scale and labor productivity respectively. To measure the effect of education(x_1), health(x_2) and technological progress(x_3) on labor productivity(y), we use the following empirical model:

$$y = b_0 + b_1\, x_1 + b_2\, x_2 + b_3\, x3 + \mu \quad (3)$$

Where, with the exception of y all other variab les are observed. The variable y is determined via above equation (2).

The data consists of annual observations made across 56 membersa of the Organization of Islamic Cooperation observed over the period of 1995-2009. These countries are spread over four continents. Based on a type of

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official classification adopted, ther OIC represents Arab, African, and Asian countries. The Arab countries, especially the members of the Persian Gulf Cooperation Council hold a strong position the Organization. For the purpose of this paper, we take the Arab countries, to represent the strong representative of OIC, the OPEC members to represent major oil exporting countries and the ECO members to represent Central Asian countries. The data is commpiled from the World Bank, the World Health Organization and their afiilates.

The econometrics strategy is based on Panel Data analysis which appropriate tests estimates are unbiased and also dependable.

3. Results and Discussions

The estimates of the paper are presented and discussed in two parts. The part one reports the labor productivity growth estimates by membership in the OIC over the period of 1995-2209. The part two presents and discuesss parameter estimates for the effect of the growth of education, health and technological progress on labor prodcutivity growth by membership in the ECO, the African Union and the Persian Gulf Cooperation Council.

3.1. The Growth Rate of Labor Productivity

Our labor productivity growth estimates reveal that with the exception of a few, the avergae annual labor productivity growth figure for all Islamic countries is above 3 percent . Exceptions are Somalia, and Gabon with a negative productivitivity growth rate and Brunei and Cameroun with labor productivity growth rates in the neighbourhood of 1 percent (Tables 1- 3). The average annual labor

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productivity growth with average taken over the 1995-2009 period and also over the members of the ECO is about 6.29 percent The corresponding figure for members of the GCC, the OPEC and the AU is 4.92, 4.65 and 3.41 percent, respectively. Within the ECO membership, the annual average labor productivity growth rate of Azerbayejan, Tukmenistan and Tajikistan over the period of 1995-2009 are 11, 9.5 and 8.8 percent, respectively. These figures are the highest among the countries of the OIC shown the superior labor

productivity growth performance of these countries upon gaining independence from the Ex- Soviet Union. Within the OIC members, the AU members scored lowest in their labor productivity growth rate. Egypt and Borkina Faso with annual average labor productivity growth figures of around 6 percent are however exception to the rule.

Table 1 Labor Productivity over period of 1995-2009 in Persian Gulf Cooperation Council

Country	**abor Productivity Annual Average)**
Bahrain	5.58
United Arab Emirates	5.34
Kuwait	4.96
Oman	2.69
Qatar	7.72
Saudi Arabia	3.37
Average	4.92

Source: Research Findings

Table 2 Labor Productivity Growth Rate during 1995-2009 in ECO Countries

Country	**Labor roductivity (Annual Average)**
Afghanistan	4.02
Azerbaijan	11.22
Iran	4.50
Kazakhstan	4.31
KYRGYZ	5.36
Pakistan	5.93
Tajikistan	8.80
Turkey	4.38
Tukmenistan	9.50
Uzbekistan	4.83
Average	6.29

Source: Research Findings

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Table 3 Labor Productivity over the Period of 1995-2009 by OPEC members

Country	Labor Productivity (Annual Average)
Algeria	3.05
Equador	5.60
Iran	4.5
Iraq	4
KUWAIT	4.96
Libya	3.09
Saudi Arabia	3.37
QATAR	7.72
Nigeria	4.91
Average	4.65

Source: Research Findings

Table 4 Labor Productivity over 1995-2009 by Africamn Union Countries

Country	Labor Productivity (Annual average)
Algeria	3.05
Benin	4.92
Burkina-Faso	6.20
Cameroon	0.99
Chad	6.02
Congo	3.51
Democratic Republic of Congo	3.14
Eygpt	6.12
Erithrea	3.29
Guyana	-2.13
Kenya	4.91
Lybia	3.09
Niger	3.51
Nigeria	4.91
Senegal	4.01
Somalia	0.97
Sudan	4.77
Togo	4.12
Tunisia	3.05
Average	3.41

Source: Research Findings

3.2. Parameter Estimates

The question of how do education, health and technological progress affect labor productivities across the countries and overtime is addressed in this section. For that purpose we have meausred education by expenditues on education, health by life expectancy at birth and technological progress by exports of technology.

To decide on wheter the standard OLS estimation procedure is effiecnt for our purpose or not, we have used the most appropriate available test, namely: the “constrained F test”. In the case of panel data, the OLS estimation procedure gives efficient estimates provided all intercepts have an equal value. Hence, the constrained F test is used to see whether intercepts are the same of not. It happens that the calculated F is larger than the value obtainable from the F table (Table 5).

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Table 5 Contrained F Test

Test Statistice	Percent Error(Prob)
19.28	.08

Source: Research Findings

The constrained F test reveals that the null hypothesis of intercepts having an equal value is rejeted.The next stage is to use the Hausman test to determine whether a fixed coefficient model is more apprpriate or a random one.

Table 6 Hausman Test

Test Statistics	Percent Error(Prob)
13.87	.0003

Source: Research Findings

Clearly, the Hausman test reveals that the fixed effect model is a more appropriate model than the random effect (Table 6).

The stationarity problem is handled by an auto-regressive model of order 3 (AR 3) that removes auto colinearity in variables and resolves the stationarity problem in model choice.

After safeguarding for robutness of econometric model, we proceeded to estimate the parameters that determine how the growth in variables expenditures on education, life expectancy at birth and exports of technology affect labor productivity in the case of Islamic countries (Table 7).

Based on the DW test statistics in Table7, we can see that our AR (3) component of the model has corrected for autocorrelation. Furthermore, only health has statistically signifant effect on labor productivity so that an incerese in life expectancy of one year leads to a 6.2 increase in the labor productivity.None of the other variables, namely education and technological progress do have any meaningful effect on labor

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productivity in the case of Islamic countries. However, this result might be sensitive to the type of expenditures on education considered with expenditures at the secondary level education versus college level making a difference. The health factor as important as this paper shows determines the future course of labor productiivity growth in the Islamic countries. So, economic policy standpoint investments in the helath secotr will pay off much better than investments in the education or export sector.

Table 7 Parameter Estimates of Labor Productivity Model

Variables	**Coefficients**	**Prob.**
C	-424.7804	0.0285
LIF?	6.200851	0.0227
RES?	-15.88842	0.2636
ED?	1.231986	0.4482
AR(3)	).433058	0.0971
0.683195 R-squared		
0.502164 Adjusted R-squared		
3.773907 F-statistic		
0.003829 Prob(F-statistic)		
2.12 Durbin-Watson Stat		

Source: Research Findings

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نقش سلامت بر بهره وری نیروی کار در کشورهای عضو سازمان کنفرانس اسلامی

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مقاله حاضر به بررسی رابطه‌ی میان بهره وری نیروی کار با متغیر سلامت، پیشرفت‌های تکنولوژیکی و آموزش در۵۷ کشور عضو سازمان کنفرانس اسلامی در دوره زمانی ۲۰۰۹- ۱۹۹۵ با استفاده از داده های پانل دیتا، می پردازد. به منظور بررسی بهره وری سازمانی در کشورهای مذکور، بهره وری نیروی کار کشورهای عضو سازمان کنفرانس اسلامی،مورد بررسی قرار گرفته است و نهایتاً به تخمین مدل مستخرج در مقاله پرداختیم. یافته ها نشان می دهد که به جز کشورهای سومالی و گابن که بهره وری منفی دارند و کشورهای برونئی و کامرون که بهره وری نزدیک به یک دارند، بقیه کشورهای اسلامی به صورت میانگین، بهره وری بالای ۳ را تجربه کرده اند و کشور آذربایجان با بهره وری حدود ۱۲ بیشترین بهره وری را در این گروه دارند از طرفی تنها متغیر سلامت روی بهره وری نیروی کار این گروه از کشورها تأثیر مثبت و معنی داری دارد و سایر متغرهای دیگر مانند آموزش و پیشرفتهای تکنولوژیکی روی بهره وری نیروی کار تأثیر معنی داری ندارند.

واژگان کلیدی: بهره وری نیروی کار، سلامت، کشورهای عضو سازمان کنفرانس اسلامی.

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