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Research Article

THE EFFECT OF FINANCIAL DEVELOPMENT ON LABOR PRODUCTIVITY: EVIDENCE FROM THE MIDDLE EAST AND NORTH AFRICA

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ABSTRACT
Labor productivity issue in economy has an increasing importance in effective stability that is affected by various financial and non-financial factors. In this study, the direct effect of financial development on labor productivity has been analyzed by using Dynamic Panel Data (DPD) techniques based on Generalized Method of Moments (GMM) in the Middle East and North Africa (MENA) countries from 1990 to 2012. The empirical results of this study confirmed that, domestic credit to private sector as a share of GDP positively affects on labor productivity in the first place. Secondly, the higher levels of education and health have a higher level of labor productivity. In addition, increasing trade openness through knowledge and technology transfer enhances labor productivity. Finally, the additional worth findings confirmed the transmission of GDP per person employed performance to the next period and labor productivity dynamics.

Keywords: *Labor Productivity, Financial Development, Dynamic Panel Data*

INTRODUCTION
The basic presumption of sustainable economic development of every branch of national economy is an efficient use of basic production factors, i.e. labor, land and capital. According to the economic theories, the role of labor in the process of production has had noticeable changes during the past. This change contains the concept of labor force, which only evaluates the physical abilities from one side and the productivity from the other side, which is the result of stored knowledge of skills and experience in labor. Furthermore, labor productivity issue in economy has an increasing importance in effective stability. This has been the only reason for many different countries to imply their economic capabilities and abilities to promote labor productivity. Thus, several studies have examined the effects of various factors such as human capital, capital accumulation, health, education, etc. on labor productivity.
The process of financial development of the last few decades dramatically changed the economic architecture worldwide. Early twentieth century witnessed the upsurge of theoretical and empirical studies that document the relative importance of financed to growth. The basic idea of financial development affecting economic growth is based on Schumpeter (1912) In addition; some other studies such as Pagano (1993), De Gregorio (1996), Outrivelle (1999), Evans *et al.*, (2002) and Papagni (2006) have found significant relationships between financial development and human capital in the literature. In other words, these efforts suggest a positive and significant relationship between financial development and economic growth or human capital. Generally, Empirical analyses, including firm-level studies, industry-level studies, individual country studies and broad cross-country comparison, demonstrate a strong positive link between the functioning of the financial system and long-run economic growth (Outreville,1999). According to the literature, both theoretical and empirical studies suggest a positive relationship between financial development and productivity growth, as the development of financial markets and institutions is a critical and inextricable part of the growth process (Levine, 1997). Undoubtedly, this relationship also can affect on labor productivity.
However, the studies have not reviewed the direct effect of financial development on labor productivity. In fact, most studies have examined the effect of financial development on economic growth or human capital. Generally, the role financial development in promoting labor productivity has been highly

neglected in literature. Therefore, there appears to be a strong positive correlation between financial development and the labor productivity. However, the central objective of this paper is to analysis the effect of financial development on labor productivity by using cross-country dynamic panel data (DPD) techniques based on generalized method of moments (GMM) in the Middle East and North Africa (MENA) over the period 1990-2012. These sample countries, based on the most current information, are the Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates and West Bank and Gaza, which has the same financial structure like banking system. The rest of this paper organized as follow; the next section provides a brief literature review on financial development and labor productivity. Data and empirical results presented in section 3. Finally, this paper concludes with section 4.

1. Financial Development and Labor Productivity: Literature Review

Generally, Productivity is commonly defined as a ratio of a volume measure of output to a measure of input use. Among other productivity measures such as multi-factor productivity or capital productivity, labor productivity is particularly important in the economic and statistical analysis of a country. Labor productivity is a revealing indicator of several economic indicators as it offers a dynamic measure of economic growth, competitiveness, and living standards within an economy. It is the measure of labor productivity (and all that this measure takes into account) which helps explain the principal economic foundations that are necessary for both economic growth and social development (OECD, 2001). On the other hand, financial development is defined as an improvement in the quality, quantity, or efficiency of the financial systems that are comprised of financial markets, banks and other financial intermediaries. The main intuition is that financial markets enhance productivity through efficient capital reallocation in the process of creative destruction, shifting capital from declining industries to those with good growth prospects (see, e.g., Hsieh and Klenow, 2007; Restuccia and Rogerson, 2007). In addition, the lower factor productivity of developing countries can explain by the misallocation of resources across productive units. An efficient financial system facilitates the adoption of modern technology to boost development of the knowledge-and technology- intensive industries through the provision of efficient credit facilities and other services (James, 2009).

Advances in the services provided by the financial system are believed to reduce information and transaction costs, which allow for increased innovation and productivity of a country. Generally, in the investigation concerning the influence of the progressive financial development, authors were mostly focusing on positive and negative growth effects. Most of the theoretical discussion on the growth effects coming from financial development suggests that, through an improved allocation of capital, economic growth should be higher (Agnieszka, 2012). The prevailing view in economics is that financial development contributes to growth and productivity in various ways. For example, financial institutions are better suited than individuals to identify potentially successful projects because these institutions are big enough to pay large fixed costs of collecting information about individual projects and to analyze this information more efficiently. In addition, once a project has started, they can better monitor its managers to ensure that savers' resources are used productively.

Another important function of financial system is to collect and process information on (productivity-enhancing) investment projects in a cost effective manner, which reduces cost of investment for individual investors (King and Levine, 1993). Financial markets can collect resources from many savers necessary to invest in large projects. In addition, they facilitate the pooling and hedging of risk inherent in individual projects and industries. Thus, well-developed financial markets and institutions can generate growth and so labor productivity by increasing the pool of funds and by reducing the risk and enhancing the productivity of fund transfers from savers to investment projects (Economic Letter, 2003). The combination of well-developed financial markets and institutions, as well as a diverse array of financial products and instruments, suits the needs of borrowers and lenders and therefore the overall economy. Financial markets (such as those that trade stocks or bonds), instruments (from bank CDs to futures and derivatives), and institutions (from banks to insurance companies to mutual funds and pension funds) provide opportunities for investors to specialize in particular markets or services, diversify risks, or both

(SFFED, 2005). It is obvious that all the above factors lead to an increase in GDP per worker and In other words, labor productivity can be improved.

Several studies have examined the effects of financial and nonfinancial factors on labor productivity, but the direct effect of financial development on labor productivity highly has been neglected. Generally, Financial development can contribute to the growth of total factor productivity by either raising the marginal productivity of capital (Goldsmith, 1969), or improving the efficiency of capital allocation to increase the aggregate saving rate and investment level (McKinnon, 1973; Shaw, 1973).

Buera *et al.,* (2008) develop a model with tradable and non-tradable sectors that differ in the size of the fixed costs needed to operate. They conclude that financial frictions disproportionally affect total factor productivity in the tradable sector where fixed costs are higher. In their model, lower financial development leads to inefficient capital allocation and is biased towards the lower-productivity activities. Arizala *et al.,* (2009) use a largely unexploited panel of 77 countries data spanning the years from 1963 to 2003 and covering 26 manufacturing industries and find evidence of a significant, positive relationship between financial development, measured by private credit over GDP, and industry-level total factor productivity growth. These findings were repeated in Jeanneney *et al.,* (2006), They investigated the impact of financial development on productivity growth in China by using panel data set covering 29 Chinese provinces over the period of 1993-2001 and applying the Generalized Method of Moment (GMM) system estimation, Empirical results showed that financial development-measured by indicator of Bank Competition and indicator of Public Credit- has significantly contributed to China's productivity growth, mainly through its favorable effect on efficiency. Other studies such as Roubini and Martin (1991) on a cross-section of up to 53 countries, Aghion *et al.,* (2005) on 71 countries obtained similar findings.

In relation to non-financial factors affecting productivity, some studies such as Griffith *et al.,* (2000), Wang and Tsai (2003), Hua (2005), Sarquis and Arbache (2005), Laplagne *et al.,* (2007) conclude that R&D and education has a positive and significant on total factor productivity. Theoretically, education allows worker to use existing physical capital more efficiently, to drive the development and diffusion of new technologies and improve the capacity of imitation and adoption of the techniques previously developed by more advanced countries. Generally, Human capital theory supports the view that people with higher levels of education and lower incidences of chronic illness (Higher health level) should have higher labor productivity. Also, Studies such as Coe and Helpman (1995) on 22 OECD countries, Coe *et al.,* (1997) on a sample of both highly industrialized countries and developing countries (77 countries in total), Connolly (1997) on a cross-section of up to 32 countries, Keller (1998), Cameron *et al.,* (1999) on the industrial productivity level in the U.K, Miller and Upadhyay (2000) covering 83 countries and Isaksson (2001) on 73 countries have found that trade as a significant carrier of knowledge or technology enhances TFP and human capital. Therefore, according to the theoretical and empirical evidence all financial and non-financial factors affecting labor productivity can be summarized in the following figure.

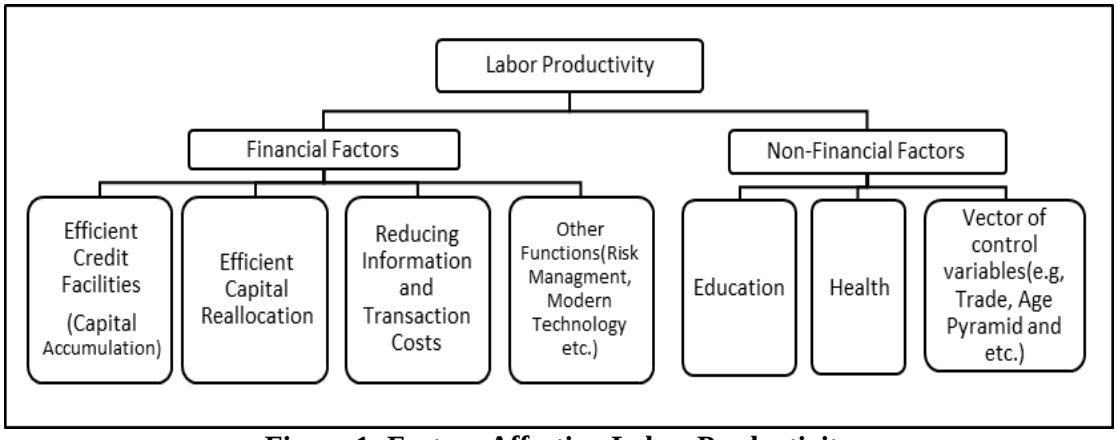

Figure 1: Factors Affecting Labor Productivity

Data and Empirical Results

The model used to evaluate the effects of financial development on labor productivity is based on empirical findings, theoretical issues by focusing on the Forbes, Barker and Turner, 2010 specification. More specifically, for econometric estimations, the regression model can describe as follows:

$$LP_{it}^{*} = \beta_0 + \beta_1 FD_{it} + \beta_2 Z_{it} + U_{it} \quad (1)$$

Where, i denotes the number countries, t is the time, LP_{it}^{*} denotes the desired and long run labor productivity, FD_{it} is a financial development, Z_{it} is a vector of control variables (education, health, trade etc.), and U_{it} is the error term. It is clear, labor productivity gradually adjust to its optimal and expected level. In other words, the labor productivity model can represent by using partial adjustment mechanism as most popular adjusted mechanisms by following equation:

$$LP_{it} - LP_{i,t-1} = \gamma (LP_{it}^{*} - LP_{i,t-1}) \quad (2)$$

Where, LP_{it} is actual level of labor productivity at the end of period t, γ is adjustment parameter (measures the speed of adjustment) and will take on values between zero and one. The above equation implies that in each period the percentage of the difference between the desired and actual level of labor productivity is decreased. By replacing equation (1) in the second equation and simple algebra, the equation (2) can be rewrite as follow:

$$LP_{it} = \beta_0 \gamma + \beta_1 \gamma FD_{it} + \beta_2 \gamma Z_{it} + (1-\gamma) LP_{i,t-1} + \gamma U_{it} \quad (3)$$

Therefore, to assess how financial development affects labor productivity, the final model can be represented in the following equation:

$$LP_{it} = \delta_0 + \delta_1 FD_{it} + \delta_2 TO_{it} + \delta_3 EDU_{it} + \delta_4 Hper_{it} + \delta_5 LP_{i,t-1} + e_{it} \quad (4)$$

Where, as mentioned earlier, LP_{it} denotes labor productivity (GDP per person employed) (Hourly wages can be used as an indicator of labor productivity. While wages are likely to be a reasonable indicator of the effects of education on labor productivity, statistical issues and the way that labor markets function in practice mean that using wages as an), FD_{it} is a financial development index (measured by domestic credit to private sector (% of GDP)) (The main measure for financial development is the ratio of private credit to GDP; this measure captures the development of financial intermediaries (Beck *et al.*, 2000). Following Levine *et al.*, (2000) and Beck *et al.*, (2000), Private Credit (PRIVATE) is measured by the value of credit by financial intermediaries to private sector as a share of GDP), TO_{it} is the trade openness (measured by trade volume percentage of GDP), EDU_{it} is the education expenditures (Education expenditure refers to the current operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment) (percentage of GNI), $Hper_{it}$ is the health expenditures per capita (adjusted for purchasing power parity, in $), $LP_{i,t-1}$ is the lagged labor productivity and $\gamma U_{it} = e_{it}$ is the error term and often assumes that has two separate components ($e_{it} = \mu_i + \varepsilon_{it}$) (For the sake of exposition we are considering only the individual effects case here. There may also be time effects, which is a symmetric case, or both of them, so that the error has three components: $e_{it} = \mu_i + \lambda_t + \varepsilon_{it}$). Data cover the 1990-2012 period, taken from the World Bank Database (World Development Indicators, 2014).

Before we proceed with model estimation, we should examine the stationary properties of the model variables using conventional unit root test. In this section, we use the Fisher-ADF test because it is much more flexible test and is applicable to unbalanced panel data, also use individual fixed effects as regressors and compute automatically lag difference term and bandwidth selection (using the Schwarz

criterion for the lag differences, and the Newey-West method and the Bartlett kernel for the bandwidth) the result summarized in Table 1.

Table 1: Result of Unit Root Test (Fisher-ADF Test)

Variables	Situation	Fisher-ADF Test Statistics		
		Level	First Difference	Result
Labor Productivity	Individual Intercept and Trend	133.4 (0.00)*	-	I(0)
Financial Development	Individual Intercept and Trend	53.96 (0.11)	232.0 (0.00)*	I(1)
Education	Individual Intercept and Trend	193.6 (0.00)*	-	I(0)
Health	Individual Intercept and Trend	60.54 (0.031)*	-	I(0)
Trade Openness	Individual Intercept and Trend	67.29 (0.01)*	-	I(0)

Note: Probability of rejection of null hypothesis of unit root is given in parentheses.
** indicates significance at the 0.1 level.*

Table 1 results show that all variables except of financial development are stationary in level. In other words, the financial development variable has a unit root. Hence, the variables of the model should be examined for their co-integration. If the model variables are co-integration, there is a long-run relation between the dependent and independent variables. For this test, we use pedroni's (1999) panel co-integration test, Engle-Granger based, that the results are presented in table 2. The results show that we cannot reject the alternative hypotheses of co-integration strongly by all pedroni's seven test statistics (Pedroni describes various methods of constructing statistics for testing for null hypothesis of no co-integration. There are two alternative hypotheses: the homogenous alternative, which Pedroni terms the within-dimension test or panel statistics test, and the heterogeneous alternative, which also referred to as the between-dimension or group statistics test).

Table 2: Pedroni Panel Co-integration Test Results

Panel v- Statistic	-13.72 (0.00)*		
Panel rho- Statistic	12.09 (0.00)*	Group rho- Statistic	15.42 (0.00)*
Panel PP- Statistic	-15.61 (0.00)*	Group PP- Statistic	23.08 (0.00)*
Panel ADF- Statistic	-8.34 (0.00)*	Group ADF- Statistic	-3.67 (0.00)*

Note: Probability of rejection of null hypothesis of no co-integration is given in parentheses.
**indicates significance at the 0.1 level.*

As the right-hand side of equation (4) includes the lagged dependent variable ($LP_{i,t-1}$), the estimated model is an AR(1) or Dynamic Panel Data (DPD) model. In the error term ($e_{it} = \mu_i + \varepsilon_{it}$), the idiosyncratic error component (ε_{it}) is usually assumed well behaved (white noise errors) and independent of both the regressors and the unobserved country-specific effects (μ_i). Since LP_{it} is a function of μ_i, so $LP_{i,t-1}$ is function of μ_i. Therefore, $LP_{i,t-1}$, a right-hand side regressor in equation (4), is correlated

with the error term (e_{it}). Even if $LP_{i,t-1}$ is not correlated with e_{it}, the estimates are not consistent, given the finite time span. Moreover, consistency may be undermined by the endogeneity of other explanatory variables, as in the cross-sectional estimates. In order to eliminate the unobservable country-specific effects (μ_i), following Anderson and Hsiao (1981), we difference equation (4) and then it can be rewritten as:

$$LP_{it} - LP_{i,t-1} = \delta_1(FD_{it} - FD_{i,t-1}) + \delta_2(TO_{it} - TO_{i,t-1}) + \delta_3(EDU_{it} - EDU_{i,t-1}) + \delta_4(Hper_{it} - Hper_{i,t-1}) + \delta_5(LP_{i,t-1} - LP_{i,t-2}) + (\varepsilon_{it} - \varepsilon_{i,t-1}) \quad (5)$$

Anderson and Hsiao (1981) suggest that the above first difference (FD) equation can be estimated using instrument variables. They consider $LP_{i,t-2}$ as instrument variable to $(LP_{i,t-1} - LP_{i,t-2})$. If ε_{it} has no serial correlation, $LP_{i,t-2}$ the will be a valid, but weak instrument. Although $LP_{i,t-2}$ is correlated with $(LP_{i,t-1} - LP_{i,t-2})$, it is not correlated with the error term $(\varepsilon_{it} - \varepsilon_{i,t-1})$.

Arellano and Bond (1991) suggest a similar procedure to eliminate the Country-specific effects. They show that using the first difference equation approach leads to a new bias and the efficiency of this instrumental approach may be relatively weak, because the new disturbance error term $(\varepsilon_{it} - \varepsilon_{i,t-1})$ is correlated with $(LP_{i,t-1} - LP_{i,t-2})$. Arellano and Bond (1991), Blundell and Bond (1998) propose the System-GMM approach, in which for the first-differenced equation (5), the instruments are the same as that discussed above and for the levels equation (4), Predetermined and endogenous variables in levels are instrumented with appropriate lags of their own first differences as following moment conditions:

$$E\left[LP_{i,t-s}(\varepsilon_{it} - \varepsilon_{i,t-1})\right] = 0 \quad For \quad s \geq 2, \quad t = 3,4,....,T$$
$$E\left[X_{i,t-s}(\varepsilon_{it} - \varepsilon_{i,t-1})\right] = 0 \quad For \quad s \geq 2, \quad t = 3,4,....,T \quad (6)$$

Where $X_{i,t-s}$ are explanatory variables vector. While the strictly exogenous regressors can directly enter the instrument matrix for use in the levels equation.

Table 4: Results of Model Estimation (Dependent Variable: Labor Productivity)

Variables	Panel Least Squares	Fixed Effect	A-B one-step GMM	A-B two-step GMM
Constant	-38.30	141.1	-	-
	(-0.31)	(0.270)		
Financial Development	1.482	3.891	8.306	9.70
(PRIVATE)	(1.66)**	(2.72)*	(0.982)	(4.606)*
Education expenditures	5.617	2.282	5.153	3.70
(% of GNI)	(1.39)	(2.19)*	(3.89)*	(5.238)*
Health expenditures	0.305	0.697	0.699	0.6709
per capita	(4.64)*	(1.28)	(1.86)**	(5.307)*
Trade Openness	1.184	12.29	13.787	12.05
	(0.910)	(2.64)*	(2.05)*	(5.515)*
Lagged Labor Productivity	1.013	0.979	0.963	0.947
	(174.1)*	(39.15)*	(37.58)*	(58.65)*
Adjusted R^2	0.994	0.995	-	-
J-Statistics	-	-	184.01	158.03
(PVAL)			(0.047)°	(0.856)°°

*Notes: The t-statistics are shown in parentheses. *, ** indicate statistical significance at the 0.05 and 0.1 levels respectively.*

°, °° Indicate rejection and not rejection of the null hypothesis on the 0.1 level of significance respectively.

Therefore, generalized method of moments (GMM) is mainly used in panel data econometrics to estimate dynamic models (Arellano and Bond 1991; Holtz-Eakin, Newey, and Rosen 1988). We use the Arellano and Bond (1991) one-step and two-step GMM estimators with mentioned moment conditions. The result of model estimation by GMM is presented in Table 4 and is compared with pooled data and fixed effects estimation. As regression results show, the coefficient on financial development remains correctly signed in all the regressions, and is statistically significant in the three cases. In other words, domestic credit to private sector as a share of GDP (reflecting the extent of financial intermediation and financial system development) positively affects on labor productivity in Middle East and North Africa (MENA) countries. In panel least squares estimation coefficient of education and trade openness and in the fixed effects model the coefficient of health index were not statistically significant but mentioned variables have the expected signs. This could be because of the correlation between lagged labor productivity and error term. In Dynamic Panel Data (DPD) Models, J-statistic is simply the Sargan statistic (value of the GMM objective function at estimated parameters) that used to construct the Sargan test of over-identifying restrictions. Under the null hypothesis that the over-identifying restrictions are valid, the Sargan statistic is distributed as a χ^2_{p-k}, where k is the number of estimated coefficients and p is the instrument rank. The p-value of this test in one-step estimator is 0.04; this means that the null hypothesis can reject on the 0.1 level of significance. In other words, the validity and consistency of instrument variables cannot be verified. However, the p-value of Sargan test in the two-step estimator is 0.85, which indicates no rejection of the over-identifying restrictions validity. Therefore, the two-step estimator is selected for analysis.

In the A-B two-step estimation model, all variables have the expected signs and are statistically significant. The results show that, if domestic credit to private sector as a share of GDP increases by one percent, GDP per employed person increases by $9.7 and so dose improve labor productivity. Increasing education expenditures and per capita health expenditures by one percent and $10 respectively, GDP per employed person goes up by $3.7 and $6.7, respectively. Therefore, According to the human capital theoretical evidence, the higher levels of education and health have a higher level of labor productivity in MENA countries.

Two additional findings are worth noting, first, the coefficient of trade openness is significantly positive. As if, trade volume increase by one percent, GDP per employed person increases by $12. In fact, trade through knowledge and technology transfer enhances labor productivity. Second, the result of estimation indicates the dynamics of labor productivity levels in Middle East and North Africa countries. Indeed, the empirical results of this study confirmed the transmission of GDP per person employed performance to the next period and labor productivity dynamics. Thus, increasing the level of labor productivity in current period by $100 enhances significantly GDP per person employed by $94.7 in next period. Hence, according to the equations (3) and (4), $\delta_5 = 0.947 = 1-\gamma$, adjustment parameter (γ) is equal 0.053 and implies that in each period 5.3 percentage of the difference between the desired and actual level of labor productivity is decreased. Generally, this analysis shows that the A-B two-step GMM procedure leads to results that are closest to expectations.

Conclusion and Policy Implications

Labor productivity issue in economy has an increasing importance in effective stability. This has been the only reason for many different countries to imply their economic capabilities and abilities to promote labor productivity. According to the theoretical and empirical evidence, various financial and non-financial factors affect on labor productivity. This paper, uses data on 22 countries of Middle East and North Africa region from 1990- 2012, and applies a Dynamic Panel Data (DPD) approach to examine the effect of financial development on labor productivity. In estimation process, the A-B two-step GMM estimator results were shown to be preferred to other estimation methods.

The results of regression show that financial development has positive and significant effects on labor productivity. So that, increasing the domestic credit to private sector as a share of GDP increase by one percent, GDP per employed person increases by $9.7 assuming other variables stay constant. The

additional findings show that, per capita health expenditures, education expenditures, trade openness and lagged labor productivity have positive and significant effects on labor productivity in current period. In addition, the result of estimation confirmed the transmission of GDP per person employed performance to the next period and labor productivity dynamics. The findings of this research suggest that governments should consider removing barriers of financial flows, investment and financial development barriers in general to promote labor productivity. Strengthening the fundamental structure of the Education and health services is also recommended. Finally, Policy makers should consider reducing of tariff and non-tariff barriers and the overall elimination of trade barriers to increase labor productivity.

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