The Journal of Social Sciences Research
ISSN(e): 2411-9458, ISSN(p): 2413-6670
Vol. 6, Issue. 8, pp: 797-803, 2020
URL: https://arpgweb.com/journal/journal/7
DOI: https://doi.org/10.32861/jssr.68.797.803

Academic Research Publishing Group

Original Research Open Access

Determinants of Labor Productivity in Malian Firms

Traore Anna
Phd es Economics sciences; lecturer, teaching and research department in economic theory and analysis. Campus universitaire de Badalabougou, Bamako, Mali
University of Social Sciences and Management, Bamako, Mali

Sountoura Lansine (Corresponding Author)
Phd es Economics sciences; lecturer, Department of Quantitative Analysis and Development Policy. Campus universitaire de Badalabougou, Bamako, Mali
University of Social Sciences and Management, Bamako, Mali
Email: sountoural@gmail.com

Diallo Fadogoni
Phd es Economics sciences; lecturer, Department of Quantitative Analysis and Development Policy. Campus universitaire de Badalabougou, Bamako, Mali
University of Social Sciences and Management, Bamako, Mali

Traore Breïma
Phd es Economics sciences; lecturer, teaching and research department in economic theory and analysis. Campus universitaire de Badalabougou, Bamako, Mali
University of Social Sciences and Management, Bamako, Mali

Article History
Received: August 5, 2020
Revised: August 22, 2020
Accepted: August 28, 2020
Published: August 31, 2020

Abstract

This article identifies the determinants of labor productivity of Malian firms using 2007-2015 panel data. These data were collected by the World Bank in 2016 from industrial companies and services. The Hausman test made it possible to choose the composite error panel model for the estimation. The results indicate that there is a positive correlation between capital intensity, commodity imports and labor productivity. Labor productivity decreases with the number of years the manager has spent at the head of the company, the use of new information and communication technologies, and the purchase of fixed assets. We also find that formal firms seem to have higher productivity when confronted with stronger local informal competition. Overall, 79.5 percent of companies reported power outages. Power outages have a negative impact on labor productivity.

Keywords: Labor productivity; Determinants; Enterprises; Mali.

1. Introduction

This article enriches the empirical literature on labor productivity in Mali by using information from the World Bank's 2016 business survey in Mali. Such a survey provides rich data, directly from companies, with a detailed breakdown by sector that is not available in existing statistics. Using this data set, the evolution of the firm's labor productivity in relation to the determinants is examined in a multivariate empirical framework that takes into account the number of years of existence of the firm, i.e., since its creation, the number of years of the director at the head of the firm, the capital intensity, imports of raw materials, power cuts, the use of ICT, purchases of fixed assets and unfair competition following the presence of informal or unregistered firms.

The literature is quite extensive on the determinants of labor productivity. There are several country-specific case studies that explore the determinants of labor productivity growth in a particular country (Aslam, 1983; De Fuentes *et al.*, 2016; Dias, 1991; Fallahi *et al.*, 2010; Mahmood, 2015; Nto *et al.*, 2012; Velucchi and Viviani, 2011). Others have been interested in explaining the productivity differential between countries or regions (Belorgey *et al.*, 2006; Bourles and Cette, 2007; Choudhry, 2009; Gust and Marquez, 2004; Mefford, 1986). In this study, we focus not only on the role of ICT in labor productivity growth but also on other socio-economic indicators that are essential for labor productivity growth. The "power cuts" factor is largely ignored in the literature, but is fundamental in the case of the Mali study.

The objective of this article is to identify the potential determinants of labor productivity for the different companies in Mali belonging to different sectors (manufacturing and service). To our knowledge, this is the first study to empirically examine the determinants of labor productivity in Mali using survey data to fill gaps imposed by severe data limitations, both at the micro and macroeconomic levels.

We find that capitalistic intensity, imports of raw materials and unfair competition have a positive influence on labor productivity. On the other hand, we observe a negative correlation between the number of years of the director at the head of the company, power cuts, the use of NICT by the company, the purchase of fixed assets.

The rest of the document is organized as follows. Section 2 provides a brief review of the literature on the main determinants of productivity. Section 3 deals with methodology. Section 4 presents the productivity results and their discussions. Section 5 concludes.

2. Literature Review

Studies on the productivity of factors of production are numerous and varied, using different measures of productivity as well as different measures of common determinants. Below, we focus on those that most closely resemble our study by their nature.

Kilby (1961), conducted an analysis of African labor productivity, focusing on the quality of the human capital factor. The problems related to African productivity are on the one hand the performance of the African worker and on the other hand the relationship between the worker's competence (quality) and his production (productivity). According to him, the main determinants of labor productivity are to be found in the management of companies. This includes reviewing the supervision and control of production, the organization of the work process, coordination and planning, the provision of labor incentives, how to maintain the plant and equipment, etc.

Choudhry (2009), examines the determinants of labor productivity growth using a data set of 45 countries for the period 1980-2005. He finds that education, investment in ICT, financial depth and FDI have a positive and significant impact on labor productivity. The high investment in ICT, the high financial depth and the level of education in the United States compared to Europe, according to him, constitute the difference in labor productivity between the United States and Europe. In 2005, for countries in Sub-Saharan Africa and South Asia, labor productivity was at a low level. Yean (1997), discusses the determinants of productivity growth in the Malaysian manufacturing sector between 1986 and 1991. He finds that the growth rates of production, exports and foreign direct investment have a positive and significant influence on the country's productivity growth. On the other hand, the increase in capital intensity has a negative effect on productivity growth.

Cieślik *et al.* (2017), used micro-level data for the years 2005 and 2013 to analyze the determinants of total factor productivity (TFP) of Ukrainian enterprises in the manufacturing and services sectors. They have shown that the company's productivity is positively related to intangible assets when other characteristics specific to the company, industry and time are taken into account. The capital-labor ratio, ownership status, foreign supply (imports) and exports also affect productivity. Firm size was positively related to productivity level in the case of manufacturing industry, but not in the case of services, where small firms are more productive.

Mefford (1986), studied the determinants of productivity differences in the international manufacturing sector from a model of the production function of a factory in a labor-intensive consumer goods industry. Data on about 30 factories from a dozen countries during the period 1975-1982 were used for the analysis. He demonstrated that, for this company, the most relevant determinants of differences in labor productivity between plants are management and worker factors.

Gasiorek (2007), worked on the determinants of productivity in Morocco with a particular focus on the role of international trade in influencing productivity levels. It uses a two-step methodology. In the first, it focuses on productivity and productivity change and its determinants at the firm level. At this level, cross-sectional and time series data are used. The second step was to understand and explain the differences in productivity between firms and sectors of the economy by highlighting the role of the economy. These results indicate that overall productivity varies considerably due to the relatively high degree of entry and exit of firms and changes in the share of incumbent firms. Understanding productivity changes requires changes in market share and industry entry and exit. It is also important to study the institutional, financial and regulatory framework for business development.

Velucchi and Viviani (2011), analyze the determinants of Italian labor productivity using an original panel recently developed by the Italian National Institute of Statistics at the enterprise level over the period 1998-2004. Using a non-linear Cobb-Douglas production function and a quantile regression approach, they find that labor productivity is very heterogeneous and that the relationships between labor productivity and firm characteristics are not constant between the quantiles. According to them, what is relevant for highly productive companies may not work for low-productivity companies. Innovation and human capital, in particular, have a greater impact on promoting labor productivity in low-productivity firms than in high-productivity firms. A similar result is detected for exporters and non-exporters: human capital and innovation have a greater impact for exporters than for non-exporters. The role of internationalization on labor productivity is more important for low-productivity firms than for high-productivity firms.

De Fuentes *et al.* (2016), in their analysis of the determinants of innovation and labor productivity in Mexico indicate that structural and behavioral factors of firms, such as size, openness strategy, use of public funds and export behavior, increase the propensity to invest in innovation.

Greenaway and Kneller (2004), analyze UK exports and productivity from a large sample of firms and find that the entry of large industries into the export market and their characteristics positively influence productivity.

Dias (1991), examines the factors affecting productivity in Sri Lanka's manufacturing sector and finds that the relationship between labor productivity and capital intensity, the level of urbanization, on the one hand, and the relationship between capital productivity and these variables, on the other, is positive and significant.

Söderbom and Teal (2001), in analyzing the determinants of productivity in Ghana's manufacturing sector over the period 1991-1997, finds that human capital is of minor importance in explaining productivity between firms of different sizes. It also leads to an absence of a relationship between productivity and wages.

Aslam (1983), in a system of simultaneous equations analyses the determinants of the level of real wages and productivity in all branches of activity in Punjab. He finds that there is a positive and significant correlation between wage growth and labor productivity.

Falcioğlu (2011), experimented with agricultural data on Turkey between 1980 and 2000 and finds that there is a significant influence between variety, proximity to central regions, high wages, capital intensity and regional productivity.

In Bangladesh, Islam (1990) analyses the determinants of labor productivity in two stages in the cotton textile industry. In the first step, aggregated, he finds that the size of the firm, the number of hours/persons lost compared to the actual number of hours worked and the man/capital ratio together explain 80.25 percent of the variation in labor productivity. The second step deals with labor productivity at the inter-company level. At this level, labor productivity change is associated with differential employment structures relative to work, capital equipment staffing, production management, preventive maintenance and capacity utilization.

For the year 2005-2006, Mahmood (2015) is working on 229 manufacturing industries in Pakistan. Using capital intensity as an independent variable and advertising expenditures as a mediator variable, he estimates the total direct and indirect effects on labor productivity and finds that about 18 percent of the total effects on labor productivity are attributable to advertising expenditures.

Fallahi *et al.* (2010), examines the determinants of labor productivity at the firm level in the Iranian manufacturing sector. The analysis is based on descriptive statistics and cross-sectional regression models on a sample of 12,299 industrial companies. The results show that labor productivity is positively related to wages, fixed capital per employee, export orientation, R&D activities and labor force training. Nto *et al.* (2012), study the productivity determinants of 120 Nigerian manufacturing firms using cross-sectional data. The results indicate that at the 1 percent threshold, unskilled labor, raw material costs and net productive assets have a positive impact on productivity.

Shinkai and Hossain (2011), analyze the productivity and performance of the IT sector in Bangladesh based on a survey of 202 companies of different sizes. They find that e-governance activities contribute to the total productivity of companies more than five years old. The presence of foreign executives in industries positively influences their productivity and performance.

Kim and Loayza (2017), construct indices representing each major determinant of productivity as a linear combination of representative indicators and assess the relative contribution of the indices to productivity change in 65 countries over the period 1985-2011. The results show that productivity change is more sensitive to physical infrastructure, education, market efficiency, innovation and institutional infrastructure. The overall determinants index has a positive relationship with productivity growth. Frijters (1999) on South Africa finds that education has a very small effect on productivity.

Ortega and Marchante (2010), study the impact of temporary contracts on labor productivity in Spain over the period 1987-2000. The results indicate a slowdown in labor productivity growth due to the use of temporary contracts in manufacturing and energy industries.

Giang *et al.* (2019), focused their study on total factor productivity and its determinants for 420 companies active in Vietnamese agriculture. They are broken down into very small, small, medium and large companies. Large companies have a positive productivity unlike small and very small companies. They find that foreign participation, export, access to bank loans and the Internet have a positive and significant influence on total factor productivity. The State's shareholding acts negatively.

Decker *et al.* (2009), examines the determinants of labor productivity in 48 states over the period 1989-2000.

Earle and Gehlbach (2014), demonstrated, based on panel data on 7,000 Ukrainian manufacturing companies, that political patronage in a context of weak institutions can have a significant redistributive impact on economic productivity. Innovation has a positive impact on the labor productivity of Ukrainian companies (Kostenko, 2014).

However, so far, no attempt has been made to study the systematic relationship between labor productivity and a relatively broad set of characteristics of Malian firms. Therefore, we aim to fill at least part of this gap in the literature. Our study is based on data at the level of Malian companies for the period 2007-2015. This allows us to assess the determinants of productivity in the manufacturing and service sectors.

3. Methodology and Methodology

To examine the determinants of productivity of Malian firms over the period, we use the Cobb-Douglas production function:

$$Y = AK^{\alpha}L^{\beta}; \frac{\partial y}{\partial L} \succ 0 \qquad (1)$$

Where *Y*, *K*, *L* are respectively production, capital and labor, α and β are elasticity parameters expressing the substitutability of inputs with each other.

Referring to studies by Nelson and Phelps (1966), Lucas (1988), (Corvers, 1997) and Niringiye *et al.* (2010), which extend and modify equation (1) to integrate individual effects *i* and longitudinal effects *t*, we have the following:

$$Y_{it} = AK_{it}^{\alpha}L_{it}^{*\beta} \qquad (2)$$

Where *Y*, *K* are defined as previously in (1) and *L** represents effective units of effective work. We can then write an equation for the efficiency of the work units as follows:

$$L_{it}^{*} = L_{it}L_{1,it}^{\theta 1}L_{2,it}^{\theta 2}L_{3,it}^{\theta 3} \qquad (3)$$

Where $_{Li}$ is the number of employees of company *i* and $L_r^{\theta r}$ is the number of employees whose level of education r = 1, 2 and 3 is respectively lower, intermediate and upper. The parameter θ_r reflects the contribution of the respective levels of education to the units of work efficiency.

By substituting L_{it}^{*} of equation (3) for its expression in equation (2) and dividing by the work performance (L), we have:

$$\frac{Y_{it}}{L_{it}} = A(\frac{K}{L})_{it}^{\alpha} L_{it}^{\alpha+\beta-1}(1\text{-}L_2\text{-}L_3)^{\beta(1-\theta 2-\theta 3)} L_{2,it}^{\beta\theta 2} L_{3,it}^{\beta\theta 3} \quad (4)$$

According to equation (4), the level of labor productivity depends on the relative shares of the three levels of education in the firm's labor force.

Equation (4) can be used to calculate the dynamic effects of human capital on labor productivity. We modify and extend Corvers (1997) model by adding other human capital variables to it in order to minimize overestimation of the relative importance of the components of human capital that were originally specified in the original model. We therefore include the weighted average intensity of education and skills. So we have the following model:

$$\frac{Y_{it}}{L_{it}} = A(\frac{K}{L})_{it}^{\alpha} L_{it}^{\alpha+\beta-1} L_{1,it}^{\beta\theta 1} L_{2,it}^{\beta\theta 2} L_{3,it}^{\beta\theta 3} L_{4,it}^{\beta\theta 4} \quad (5)$$

Applying the logarithm to equation 5, we have:

$$\ln\frac{Y_{it}}{L_{it}} = \ln A + \alpha \ln(\frac{K_{it}}{L_{it}}) + (\alpha+\beta-1)\ln L_{it} + \ln \beta\theta_1 L_{1,it} + ... + \ln \beta\theta_4 L_{4,it} + u_i + \varepsilon_{it} \quad (6)$$

L_1, L_2, L_3 and L_4 are the weighted average educational level and the proportion of skilled workers.

To extend this model to conform to panel data, we incorporate the longitudinal dimension. The empirical model, in accordance with our variables, can therefore be written as follows:

$$\begin{aligned}\ln LP_{it} = {} & \beta_0 + \beta_1 \ln Comp\_ext\_yr_{it} + \beta_2 \ln Mang\_yr_{it} + \beta_3 \ln Cap_{it} \\ & + \beta_4 \ln Foreign\_inp_{it} + \beta_5 Power\_out_i + \beta_6 NTIC_i \\ & + \beta_7 Fix\_asset_i + \beta_8 Del\_comp_i + u_i + \varepsilon_{it} \end{aligned} \quad (7)$$

3.1. Data and Definition of Variables

The data used in this study are those of the World Bank-Mali. They are obtained from a survey of Malian companies in 2016. The survey covered companies located in the Bamako District, the Segou region, the Mopti region in the center of the country and the Sikasso region in the south. We use non-cylindrical panel data for the period 2007-2015. This choice is dictated by the fact that we want to have recent and original data. Mali is a weakly industrialized country. There are 25 companies that meet our objective.

These data provide a lot of information on manufacturing industries and service companies. They include the firm's output that has been related to the number of its employees to obtain the labor productivity that is the model-dependent variable.

The Director, through his experience or the number of years at the head of the company, must be able to better understand the workers and encourage them to work more. Capitalistic intensity is a factor that favors the company's production. We also assume that the number of years of existence of the company, i.e. from its creation to the date of the survey, should allow for a better integration into the sector. Imports of quality raw materials are also a factor that stimulates labor productivity. To date, Mali remains a country whose population as well as entrepreneurs suffer enormously from power cuts. While in most studies on the determinants of productivity, the absence of this variable seems obvious, this is far from being the case in Mali. For the study period, 79.5 percent of companies experienced power outages. The practice of the Internet is, in principle, observed throughout the production chain. The company buys fixed assets (cars, land, etc.) that are intended to support its production even if it is competing with informal companies.

Table-1. Definition of variables

Variables	Definition
Ln(LP)	The logarithm of labor productivity
Ln(Comp_ext_yr)	The logarithm of the number of years the company has been in existence
Ln(Mang_yr)	The logarithm of the number of years the director has been at the head of the company
Ln(Cap)	The logarithm of capitalistic intensity
Ln(Foreign_inp)	The logarithm of the amount of imports of raw materials
Power_out	=1 if the company has experienced power outages and 2 if not
NICTS	=1 if the company uses the Internet and 2 if not
Fix_asset	=1 if the company has paid for fixed assets and 2 if not
Del_comp	=1 if the company faces informal competitors at national level and 2 if not

Source: Authors based on World Bank data - Mali, 2016

Table-2. Descriptive statistics of variables

Variables	N	Min	Max	Mean	Std. Dev.
Ln(LP)	72	12.02	18.94	14.5079	1.46387
Ln(Comp_ext_yr)	78	1.79	4.19	2.8183	.47516
Ln(Mang_yr)	76	.00	3.91	2.4689	.79415
Ln(Cap)	30	12.87	24.14	18.0253	3.10320
Ln(Foreign_inp)	29	.69	4.50	3.1045	1.06377
Power_out	78	1	2	1.21	.406
NICTS	78	1	2	1.64	.483
Fix_asset	77	1	2	1.52	.503
Del_comp	71	1	2	1.18	.390

Source: Authors based on data from the World Bank Mali 2016

Table 3 shows the gross correlation coefficients. The values of the correlation coefficients (r2) show that the firm's labor productivity is negatively associated with the age of the firm (r2 = -0.27), the power outage experienced by firms (r2 = -0.36), the use of NICTs (r2 = -0.39), and the purchases of fixed assets by firms (r2 = -0.14). On the other hand, the firm's labor productivity is positively associated with capital (r2 = 0.23) and the value of raw material imports (we have r2 = 0.23).

Table-3. Variance and covariance matrix of variables

	Ln(LP)	Ln (Comp_ext_yr)	Ln (Mang_yr)	Ln (Cap)	Ln (Foreign_inp)	Power_ out	NICTS	Del_comp	Fix_asset
Ln(LP)	1.0000								
Ln(Comp_ext_yr)	0.1242	1.0000							
Ln(Mang_yr)	-0.2657	0.2561	1.0000						
Ln(Cap)	0.2278	0.0572	-0.0934	1.0000					
Ln(Foreign_inp)	0.2278	0.1114	-0.0147	-0.0095	1.0000				
Power_out	-0.3606	-0.2733	-0.0939	0.0541	0.0541	1.0000			
NICTS	-0.3781	-0.2794	-0.0885	-0.2970	-0.2970	0.0458	1.0000		
Fix_asset	-0.1403	-0.1127	0.0363	0.5782	0.1406	-0.2425	0.1442	1.0000	
Del_comp	0.0317	0.0088	0.1946	-0.1884	-0.1957	0.1354	-0.1370	-0.1981	1.0000

Source: Authors based on World Bank data - Mali, 2016

4. Results and Discussions

The Hausman test refutes the hypothesis that there is no correlation between the random term *ui* and the explanatory variables of the model. (P-value= 28.07 percent greater than 5 percent) with the Chi-2 test at 8 degrees of freedom. This means that the estimators of the fixed-error model are biased. It is preferable to retain those in the compound effects model that are unbiased.

We estimate the equation using the composite error panel model. The results are recorded in the table below.

Table-4. Determinants of productivity from the composite error panel

	Robust	
Variables	**Std. Err.**	**Coef.**
Ln(Comp_ext_yr)	.5705566	-.5807137
Ln(Mang_yr)	.1840157	-.5490538***
Ln(Cap)	.1286745	.2758179**
Ln(Foreign_inp)	.2212584	.6359257***
Power_out	.5876079	-1.898239***
NICT	.5030581	-.9332888*
Fix_asset	.7377339	-1.742467**
Del_comp	.0514009	.1223266**
_cons	2.72928	16.41925
sigma_u	.44249076	
sigma_e	.92856077	
rho	.18506029	
Number of obs	25	
Number of groups	15	
R2	0,68	

***, **, **, * indicate the significance thresholds, respectively at 1 percent, 5 percent and 10 percent

Source: Authors based on data from the World Bank Mali 2016

The number of years of the director at the head of the company or the director's experience has a negative influence on labor productivity. The 1 percent increase in the number of years of the director at the head of the company leads to a 0.55 percent decrease in labor productivity. This is explained by the fact that if the director lasts in his position, he becomes animated by a lack of spirit of innovation for having used all his know-how and a rupture of understanding between him and the workers.

There is a positive and significant correlation between capital and labor productivity. If the company's capital increases by 1 percent, labor productivity increases by 0.28 percent. These results confirm those of Dias (1991) on Sri Lanka Papadogonas and Voulgaris (2005), on Greece and Fallahi *et al.* (2010) on Iran and Cieślik *et al.* (2017) on Ukraine. Capital accumulation is seen as a means of increasing business productivity when combined with an appropriate mix of effective labor force. Macroeconomic theory therefore attaches great importance to investment demand, i.e. the demand for plants and equipment.

Imports of raw materials have a positive and significant impact on labor productivity at the 1 percent threshold. The 1 percent increase in the amount of imports of raw materials leads to an increase in labor productivity of 0.64 percent. This is due to the fact that raw materials are essential and fundamental in the production system. The positive labor productivity can also be explained by the quality of imported raw materials. These results confirm those of Ding *et al.* (2016) for China and Cieślik *et al.* (2017) for Ukraine.

Power cuts have a negative and significant impact on labor productivity at the reasonable threshold of 1 percent. In other words, 1.90 percent is the decrease in labor productivity induced by the increase in power outages of a unit. The power outage has negative effects on the company's production activity and prevents it from honoring its commitments (with suppliers, customers, etc.). It extinguishes the motivation to work among the workers by making them lose the beginning of a momentum. These effects are immeasurable. Electricity is a major concern for companies. 81.5 percent of them located in the Bamako District reported being victims of untimely power cuts that caused a temporary shutdown of production activity. 78.4 percent of those located in the Ségou, Mopti and Sikasso regions reported experiencing power cuts during the study period. Power outages resulted in an average loss as a percentage of sales of 11.08.

There is a negative correlation between NICT and labor productivity. The 1 percent increase in the use of NICT would lead to a 0.93 percent decrease in the company's labor productivity. Malian companies are not sufficiently connected to NICT. This is corroborated by the statistics, 64.1 percent of them are not connected. The use of NICT increases business productivity by increasing labor productivity. These results refute this assertion by Steffen and Stephan (2008) and Kılıçaslan *et al.* (2017).

The purchase of new or used fixed assets has a negative and significant impact on labor productivity. The 1.74 percent drop in labor productivity is due to a 1 percent increase in the purchase of fixed assets. Malian companies do not pay for good quality fixed assets or that they are certainly diverted from their functions.

The presence of informal or unregistered competitors in the country has a positive and significant impact on labor productivity. Formal enterprises seem to have higher productivity when confronted with stronger local informal competition. Formal enterprises facing low competition from the informal sector are certainly protected by regulations (labor regulations or state interventions). Also, due to the importance of the presence of informal competitors in the country, formal firms may not distinguish between sources of competition. In both situations, companies, in order to increase their competitiveness, strive to be more efficient and productive. These results confirm those of Ali and Najman (2016).

5. Conclusion

The study makes it possible to lay the foundations of the empirical and economic literature on labor productivity in the case of companies in Mali. Our results show that capital investment and the purchase of raw materials induce labor productivity growth. The use of NICT leads to a decrease in labor productivity. The study indicates that 64.1 percent of companies do not use NICT. Companies must train themselves by developing the use of ICT and make the information system a tool for employees' work. The purchase of fixed assets has a negative impact on productivity. Also, power cuts are a real brake on production. They have a negative impact on firms' labor productivity and cause an average loss, as a percentage of sales, of 11.8. Minimizing productivity losses caused by power outages requires improving the quality of electricity service.

References

Ali, N. and Najman, B. (2016). Informal competition and productivity in Sub-Saharan Africa. Available: https://www.researchgate.net/publication/312220294

Aslam, N. (1983). Level of real wages and labour productivity in the manufacturing sector of the punjab. *The Pakistan Development Review*, 22(4): 283-99.

Belorgey, N., Lecat, R. and Maury, T. (2006). Determinants of productivity per employee: An empirical estimation using panel data. *Economics Letters, Elsevier*, 91(2): 153-57.

Bourles, R. and Cette, G. (2007). Trends in "structural" productivity levels in the major industrialized countries. *Economics Letters, Elsevier*, 95(1): 151-56.

Choudhry, M. T. (2009). Determinants of labor productivity: An empirical investigation of productivity divergence. Available: https://www.researchgate.net/publication/253129398

Cieślik, A., Gauger, I. and Michalek, J. J. (2017). Determinants of productivity of ukrainian firms. *Comparative Economic Research, Sciendo*, 20(1): 5-19.

Corvers, F. (1997). The impact of human capital on labour productivity in manufacturing sectors of the European Union. *Applied Economics*, 29(8): 975-87.

De Fuentes, C., Dutrenit, G., Gras, N. and Santiago, F. (2016). Determinants of innovation and productivity in Mexican firms: An analysis under the synthesis approach, Sobey School of Business Working Papers Series No. 2016-02.

Decker, C. S., Thompson, E. C. and Wohar, M. E. (2009). Determinants of state labor productivity: The changing role of density. *J. R. A. P.*, 39(1): 1-10.

Dias, S. (1991). Factors affecting the productivity of manufacturing sector in Sri Lanka: A spatial analysis. *Geo Journal*, 23(2): 113-20.

Ding, S., Guariglia, A. and Harris, R. (2016). The determinants of productivity in Chinese large and medium-sized industrial firms, 1998-2007. *J. Prod Anal.*, 45: 131-55.

Earle, J. and Gehlbach, S. (2014). The productivity consequences of political turnover: Firm-level evidence from ukraine's orange revolution, IZA Discussion Paper, No. 8510, September.

Falcioğlu, P. (2011). Location and determinants of productivity: The case of the manufacturing industry in Turkey. *Emerging Markets Finance and Trade*, 47: 86-96.

Fallahi, F., S., S. and M., A. N. (2010). Determinants of labor productivity in manufacturing firms of Iran: Emphasizing on labor education and training, MPRA Paper No. 27699.

Frijters, P. (1999). Hiring on the basis of expected productivity in a South African clothing firm. *Oxford Economic Papers*, 51(2): 345-54.

Gasiorek, M. (2007). Determinants of productivity in Morocco: The role of trade? Working Paper 0716.

Giang, M. H., Xuan, T. D., Trung, B. H. and Que, M. T. (2019). Total factor productivity of agricultural firms in vietnam and its relevant determinants. *Economies, MDPI, Open Access Journal*, 7(1): 1-12.

Greenaway, D. and Kneller, R. (2004). Exporting and productivity in the United Kingdom. *Oxford Review of Economic Policy*, 20(3): 358-71.

Gust, C. and Marquez, J. (2004). International comparisons of productivity growth: The role of information technology and regulatory practices. *Labour Economics*, 11: 33-58.

Islam, A. F. M. M. (1990). Measurement and analysis of labour productivity: The case of cotton textile industry in Bangladesh. *Indian Journal of Industrial Relations*, 26(1): 89-99.

Kilby, P. (1961). African labour productivity reconsidered. *The Economic Journal*, 71(282): 273-91.

Kılıçaslan, Y., Sickles, R. C., A., K. A. and Gürel, Y. Ü. (2017). Impact of ICT on the productivity of the firm: evidence from Turkish manufacturing. *Journal of Productivity Analysis*, 47(3): 277-89.

Kim, Y. E. and Loayza, N. V. (2017). *Productivity and its Determinants: Innovation, Education, Efficiency, Infrastructure, and Institutions.* World Bank. https://www.worldbank.org

Kostenko, T. (2014). Assessment of the impact of innovations on labour productivity in domestic enterprises. *The Advanced Science Journal*, 4: 24-30.

Lucas, R. E. (1988). Mechanisms of economic growth. *Journal for Monetary Economics*, 22(3): 42.

Mahmood, T. (2015). Mediating effect of advertising expenditure on labour productivity: A case of manufacturing industries in Pakistan. *The Pakistan Development Review*, 54(1): 1-15.

Mefford, R. N. (1986). Determinants of productivity differences in international manufacturing. *Journal of International Business Studies*, 17(1): 63-82.

Nelson, R. R. and Phelps, E. S. (1966). Investment in Humans, Technological Diffusion and Economic Growth. *The American Economic Review Papers and Proceedings*, 56: 69-75.

Niringiye, A., Luvanda, E. and Shitundu, J. (2010). Human capital and labour productivity in East African manufacturing firms. *Current Research Journal of Economic Theory*, 2(2): 48-54.

Nto, P. O. O., Mbanasor, J. A. and Igberi, C. O. (2012). Determinants of productivity among manufacturing firms in South-Eastern Nigeria: Cobb-douglas stochastic frontier production function approach. *China-USA Business Review*, 11(10): 1385-93.

Ortega, B. and Marchante, A. J. (2010). Temporary contracts and labour productivity in Spain: a sectoral analysis. *Journal of Productivity Analysis*, 34(3): 199-212.

Papadogonas, T. and Voulgaris, F. (2005). Labour productivity growth in greek manufacturing firms. *Operational Research*, 5(3): 459-72.

Shinkai, N. and Hossain, M. (2011). Productivity and performance of it sector in Bangladesh: Evidence from the firm level data. *Bangladesh Development Studies*, 34(2): 1-22.

Söderbom, M. and Teal, F. (2001). Firm size and human capital as determinants of productivity and earnings, WPS 2001-09. Available: https://www.researchgate.net/publication/41660739

Steffen, W. and Stephan, J. (2008). The role of human capital and managerial skills in explaining productivity gaps between East and West. *Eastern European Economics*, 46(6): 5-24.

Velucchi, M. and Viviani, A. (2011). Determinants of the Italian labor productivity: A quantile regression approach. *STATISTICA*, 71(2): 213-38.

Yean, T. S. (1997). Determinants of productivity growth in the Malaysian manufacturing. *ASEAN Economic Bulletin*, 13(3): 333-43.