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Effects of Number of Apprentices on Financial Performance of Firms in the Furniture and Wood Industry of Ghana.

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Abstract

This study examined the relationship between the number of apprentices in a firm and the financial performance of the firm, using the RPED/CSAE Ghana Manufacturing Enterprise Survey (GMES) covering the period of 1991 to 2002. The dynamic panel model estimation technique was employed to investigate the effect of the number of apprentice on gross profit per capital of firms in the furniture and wood processing industry of Ghana. The findings of the study indicate that the financial performances of firms deteriorate during the apprenticeship period, as they take up more apprentices but increase in wages of apprentices had direct significant effect on financial performance. Other dynamics of the apprentice and the master were discovered to be important variables in explaining firm's financial performance. The average age of an apprentice in the Furniture industry was about 24 years while that of the Wood industry was about 29 years which is clearly very high. It has been suggested that firms may need incentives other than the services of the apprentice to increase their demand for apprenticeship. The incentive may include tax exemption which should be proportional to the number of apprentices engaged and a proper contract must be signed that will allow apprentices to serve the firm for a specified period after training before being released. The youth must also be advised to begin the apprenticeship process early.

Keywords: Apprenticeship, Financial performance, Dynamic panel model, Gross profit, Contract

1. Introduction

Should we hire a 'lemon' and give him/her some small training or we should train an apprentice to take up the job in the near future? This is the kind of question that confronts organized firms who are after the worker with the right skills to work with. Apprenticeship provides a firm with the option to employ a tailor made worker who is in tune with the goals and aspiration of the firm that made the skill acquisition possible. However, apprenticeship comes with both monetary and opportunity cost that most firms would not want to bear. The monetary cost includes the financial commitment that is necessary to maintain and develop an apprentice. The real or opportunity cost includes the time and space that the master must allot to individual apprentice. But apprenticeship process can be very beneficial to the firm in the long run if the apprentice is retained as a form of internal recruitment. Kriechel et al. (2012) related the cost and benefits of training and apprentice in the theoretical framework which was adopted for this study.

Traditional/informal apprenticeship seems to be dominant in Ghana purely due to the fact that the kind of training received from such traditional firms are usually firm specific, which may not be generally applicable elsewhere (Monk, Sandefur & Teal, 2008; Sonnenberg, 2012). Activities in formal firms may be generally identical such that an apprentice from one firm may with little training work in another firm after the training process. Thus on the grounds of external diseconomies of scale, traditional/informal firms may demand more apprentice than formal firms. In other words, both firms may demand apprentice if the return to

apprenticeship to the firm exceed the cost of apprenticeship to the firm. Hence, though return to apprenticeship to individual apprentice can encourage the general public to supply more apprentice (Frazer, 2006): Monk et al., 2008), the demand for the apprentices depends on the firms perceived effects of apprenticeship to overall performance.

Earlier studies have paved the way for active research into the area of apprenticeship in Ghana. The gap exist in the area of the benefits of apprenticeship to the resident firm since return of apprenticeship to the apprentice have receive great deal attention in Ghana (Frazer, 2006).The focus of this study was to explore the effects of varying number of apprentices on the profitability of the participating firm

As stated earlier, very little work exist in Ghana on the return of apprenticeship to the participating firm. However, the area is well researched in other countries like Germany that have taken apprentiship business seriously and have even formalized it.

The study of Sonnenberg (2012) on apprenticeship in Ghana and Senegal confirms that apprenticeship is not a new concept in Ghana but rather formal apprenticeship is an up and coming phenomenon among firms in Ghana. Donkor (2006) also noted that the modalities regarding apprenticeship in the informal sector vary and depends on the ability to meet the minimum requirement which include entry cost and age in terms of maturity.

In an empirical work on net cost puzzle of apprenticeship training in Germany, Mohrenweiser and zwich (2008) observed that the proportion of apprentices in trade, commercial, craft and construction occupations has a direct positive impact on firms performance: the companies cover their training costs immediately. In contrast, the authors found that companies with apprentices in the manufacturing occupations face net training costs during the apprenticeship period but gain by the long-term employment of its graduate apprentices. These outcomes were one of the major motivations for this study. Fougère and Schwerdt (2002) examined the contribution of apprentices on firm performance in Germany. They found a positive effect of apprentices on value added only in medium-sized firms. Askilden and Nilsen (2005) asserted that apprentices are substitutes for skilled workers and are recruited primarily in boom phases.

Hollenstein and Stucki (2008) investigated the determinants of the propensity of Swiss firms to provide apprenticeship training and the intensity of training. their analysis found that the skill composition of the workforce (including further training), ICT intensity and, to a lesser extent, workplace organisation are important drivers of apprenticeship based skill formation, with stronger effects on training propensity than on training intensity. The second objective was to analyse the relationship between apprenticeship training and firm performance. The outcome suggested that productivity and apprenticeships (training propensity orintensity) are negatively correlated.

Monk, Sandefur and Teal (2008) discovered that for currently employed people, who did apprenticeships but have no formal education, the training increases their earnings by 50% but declines as education levels rise. They argued that their results are consistent with those who enter apprenticeship with no education having higher ability than those who enter with more education.

Zwick (2008) estimated the contribution of changes in the proportion of apprentices on changes in firm performance in Germany. His findings revealed an insignificant and a negative effect of the share of apprentices on productivity which would be expected in a pure investment strategy and concluded that the investment and the substitution strategy may outweigh each other on average and that the cost-benefits study of Beicht et al. (2004) might underestimate the substitution strategy.

Earlier studies on apprenticeship in Ghana have concentrated on the return of apprenticeship to the individual apprentice with little or no attention paid to the returns to the involved firms as have been discovered in other parts of the world. The two most recent studies on apprenticeship in Ghana have both focused on the returns of apprenticeship to the apprentice leaving out the returns to the firms involved (Frazer, 2006; Monk, 2008). It is important, however, to understand what motivates and continues to encourage firms to demand the services of more apprentices. Such information shall help shape the argument on both supply and demand side of the apprentiship process in Ghana. The main objective of this study was, therefore, to examine the effects of number of apprentices on the financial performance of firms in the furniture and wood industry. To achieve the stated objective, the study tested the null hypothesis below:

> H_0: Changes in number of apprentices does not affect the profit of the engaged firm in the furniture and wood industry

The choice of the two industries was motivated by their active involvement in the apprenticeship business and to ensure homogeneity. Since there has not been much work in the scholarly literature on returns of apprenticeship to the firms in the local scene, the mixed nature of the review literature gives enough justification for the study. The outcome of the study shall shed light on the future of informal apprenticeship in Ghana and in turn motivate policy action into an area that provide alternative route to youth who dropout of the classroom. According to Anokye and Afrane (2014:1), "the system (apprenticeship) provides an alternative path for nearly 33 percent of students who drop out before completing Junior High School and nearly

42 per cent who drop out after completing Senior High School". Darvas and Palmer (2014) also noted that the majority of young Ghanaians acquire technical and vocational skills on the job through informal apprenticeships. Clearly, the importance of apprenticeship process to reducing the growing youth employment cannot be over emphasis.

2. Methodology

2.1 Theoretical framework

The study adopted the theoretical frame work proposed by Kriechel et al. (2012) as presented below. The costs and benefits of apprenticeship training within the firm can be summarized in the following framework. The firm aims to maximize the total benefits of training, which consist of benefits during training (Bt) and expected benefits after training ($E[Bt+1]$).Because training also involves costs (Ct) during the training period, the principal maximization problem can be formulated as:

$$\max Bt - Ct + E[Bt+1] \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

First, benefits during the training period (Bt) are the result of the apprentice performing unskilled work to which he devotes (hu) hours of his working time. Apprentices also perform "hs" hours of skilled work with a relative productivity of $\gamma < 1$ as apprentices are not yet as productive as skilled workers in the training occupation. The total time an apprentice spends with productive work is given by

$$hw = hu + hs \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The apprentice's involvement in skilled and unskilled tasks is valued at the within-firm wage rate of skilled (ws) and unskilled workers (wu). The benefit of an apprentice during the training period is, therefore, given by

$$Bt = hu.wu + hs.\gamma.ws \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The costs for the training firm (Ct) consist of the wage of the apprentice (wa), the wage of training personnel (wt) for the number of hours (ht) during which the training personnel was not able to pursue other productive tasks. Other expenses for an apprentice, such as materials, infrastructure, external training courses, recruitment and administrative costs are denoted by x:

$$Ct = wa + ht.wt + x \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Finally, there is a possibility that a firm generates returns in the period following the training program. Such post-training benefits ($Bt+1$) crucially depend on whether apprentices are retained and, if so, for how long these workers remain with the training firm. The retention rate of apprentices is denoted by K.The sources for post-training benefits are given by (i) reduced hiring costs H(K) and (ii) reduced firing costs F(K). Retaining former apprentices reduces the firm's need to hire skilled workers. A further channel for post-training benefits is (iii) a compressed wage structure.

In this case, the firm is able to extract a rent $\Delta(\tau)$ from paying a wage below productivity. The size of that rent must be positively affected by employing former apprentices as skilled workers. One could imagine that the retained apprentices have superior abilities compared with skilled workers from the external labor market ("lemons"). Due to information asymmetries, even the most talented apprentices are willing to stay with the training firm despite the below market-value wage. Post-training benefits $Bt+1$can thus be summarized as

$$Bt + 1 = H(K) + F(K) + \Delta(\tau) \ldots\ldots\ldots\ldots (5)$$

Total training benefits consist of net benefits (costs) during the training period t as well as a potential post-training benefit in period $t+1$. The maximization problem in Equation (1) thus extends to: max $Bt[\mathrm{wu}, \mathrm{ws}, \gamma, \mathrm{hu}, \mathrm{hs}] - Ct[\mathrm{wa}, \mathrm{ht}, \mathrm{wt}, \mathrm{x}] + \mathrm{I}[\mathrm{Bt}+1(\mathrm{H}(K) + \mathrm{F}(K) + \Delta(\tau))] \ldots\ldots\ldots\ldots.(6)$

The maximization problem in Equation (6) suggests that characteristics of apprentices and their master are important variables in explaining firm performance. The size of apprentices in a firm can affect variables in both the benefit and cost aspect of the maximization problem. The overall effect can therefore be empirically established over some time periods of which this study intends to do by employing panel data on firms and workers to analyze the relationship between number of apprentice and firm performance.

2.2 Data source

The main data source was the RPED/CSAE[1] data set which contains a panel survey of firms operating within the Ghanaian manufacturing sector. It covers 12 years (waves) of data, collected in seven rounds over the period 1991 to 2002. Rounds I–III was annual surveys collected under the Regional Program on Enterprise Development (RPED) organized by the World Bank. Rounds IV-VI covers two years each and round VII covers three years. The data was collected by a joint effort of the following organizations: the Centre for the Study of African Economies (CSAE), the University of Oxford, the University of Ghana, Legon and the Ghana Statistical Office.

The original sample of 200 firms which were first surveyed in 1991, was drawn on a random basis from firms contained in the 1987 Census of Manufacturing Activities. The firms constituted a panel which was intended to be broadly representative of the size distribution of firms across the major sectors of Ghana's manufacturing industry. These sectors include food processing, textiles and garments, wood products and furniture, metal products and machinery. Firms in ten three-digit manufacturing sectors were interviewed. This study focused on the data set on the wood product and furniture industries. The data covers the four major

urban areas of Ghana; namely Greater Accra, Kumasi, Takoradi and Cape Coast.

This data set was employed purposely because it has complete information on firm and workers characteristics than any other survey data on Ghana manufacturing industries (Teal, 2011).

2.3 Measurement of variables, model specification and estimation techniques.

The dependent variable is financial performance which is proxied in this study by gross returns on capital invested (ROCI). Gross profit was estimated as real manufacturing value added minus wages and later divided by total capital to arrive at ROCI. Number of apprentices is the main explanatory variable of interest and is measured by the number of apprentices engaged by a firm (i) at a given time period (t).

Other dynamics of the apprentice such as age (apprage), potential experience (apprpex) and wage(apprm) were introduce alongside some firm dynamics like size (emp) measured in terms of number of employees excluding apprentice, potential experience (firmpex) and age of the firm in years (firmage) were introduced as control variables. The RPED/CSAE data set is well dressed and all the aforementioned variables are clearly defined in the data set (Teal, 2011). Size of the firm is defined to include firm of even one employee as Micro(less than 5 workers), Small (5 to 19 workers), Medium (20 to 99 workers) and large enterprise (more than 100 workers) (see Teal, 2011).

Since the lag values of $ROCI$ can affect current value of $ROCI$, we specify and estimate a dynamic panel model as in Equation (7).

$$ROCI_{it} = \alpha_i + \emptyset ROCI_{it-1} + \beta_i X_{it} + \varepsilon_{it} \ldots\ldots (7)$$

Where β_i is the vector of slope coefficients

X_{it} is the vector variable as defined above

ε_{it} is the error term which is normal distributed

$t = 1,2,3, \ldots 12$

$i = 1,2,3, \ldots,$

The model in Equation (7) follows the AR (1) dynamic model specification which can best be estimated by an instrumental based estimation. That is, the introduction of the first lag of the dependent variable in the right-hand-side of the model creates an inherent endogeneity since the lag variable is proven to be correlated with the error term. For a relatively small time period, the static estimator shall be biased. The available alternative options are the GMM instrumental variable (IV) estimator and direct bias corrected estimators (Behr, 2003). In the case of endogenous predetermined regressors, the system-estimator proposed by Blundell and Bond (1998) is unbiased and most efficient, while the direct biased corrected estimators perform similar to the GMM-estimator proposed by Arellano and Bond in 1991 (Behr, 2003). The difference and system GMM estimators are the opposite sides of the same coin and hence both estimators were employed and the most consistent results adopted for the study. The selection of the appropriate model was based on the two proposed post estimation tests after GMM dynamic model estimation. The first is the Arrelano and Bond test of autocorrelation and the Sargan test of valid over-identifying restrictions both of which are available in STATA 12 which is adopted for the estimations (Stata Corperation ,1985-2009).

3. Results and Discussion

3.1 Descriptive Statistics

Table 1
Descriptive statistics of number of apprentices and their age

Industry	Number of apprentices	Mean	Standard Deviation	Mean age of apprentice	Standard Deviation
Furniture	452	10	12	24 years	7
Wood	258	3	10	29	10

Source: Author calculation based on RPED/CSAE data sets

Table 1 presents the descriptive statistics of the number of apprentice and their age. From the table, it can be observed that apprenticeships are more popular in the furniture industry than the wood industry (mean of 10 against 3 apprentices respectively). Also, apprentices are generally older in the wood industry than in the furniture industry (the mean age of 24 years against 29 years respectively). The relatively high average age contrasts the point made by Boehm (1995) that apprenticeship training starts at adolescence especially pre-teens but supports the finding of Anokye and Afrane (2016) that most of these apprentices do not enter apprenticeship training at much an early age in recent times as they probably did in the past.

Table 2
Descriptive statistics according to size categories (number of employees)

Size	Furniture			Wood		
	No. of Apprentices	Mean	Age of Apprentice	No. of Apprentices	Mean	No. of apprentices
Micro	47	1	21	20	1	21
Small	173	5	23	43	4	23
Medium	164	16	26	86	3	36
Large	68	12	32	109	4	34
Total	452	-		258	-	

Source: Author calculation based on RPED/CSAE data sets

The results suggest that small and medium enterprises dominate the apprenticeship process in the furniture industry while medium and large enterprises dominate in the wood industry. Medium and large enterprises employ older apprentice than micro and small enterprises. The firm-size categories already exist in the data set. A recent paper by Teal (2011) which used the RPED data noted that the firm size in the dataset was categorized based on the number of employees in the firm as; Micro businesses (0–4 employees; includes self-employed persons); small businesses (5–19 employees); medium enterprises (20-99 employees); large firms (100 or more employees).

3.2 Dynamic panel regression analysis

Both the difference GMM estimator by Arrelano and Bond and the system GMM estimator by Blundell and Bond were employed and the results indicated that the two-step system GMM estimator is more consistent with the model. The two-step system GMM estimation passed both the autocorrelation test and sargan tests which are the two major post estimation tests after dynamic GMM estimation. Failure to reject the sargan test of valid over-identifying restrictions suggests that the use of GMM estimator was appropriate. The wald test further suggests that together the variables in the model are appropriate in explaining the financial performance of firms in the furniture and wood industry of Ghana. Since the R-square is the good mean of fitness in instrumental based estimators, it is concluded that the model is fit to be interpreted and used for policy recommendations. The results are presented in Table 3 and it is followed by interpretations and discussions.

The outcome of Table 3 suggests that the first lag value of returns on capital invested (ROCI) significantly explain current value of ROCI. That is, a cedi increase in the ROCI in current period can increase the value of ROCI of the next period by about 7.81 pesewas in the furniture and wood industry of Ghana.

Table 3
Two-step system GMM estimation of ROCI on explanatory variables

Dependent variable: Return on Capital Invested (ROCI)			
Variables	Coefficients	t-value	P-value
First lag of ROCI	0.0781	14.78	0.000
Number of apprentices	-0.1135	-3.26	0.001
Apprentice wage	0.0059	6.03	0.000
Apprentice age	0.0701	3.51	0.000
Apprpex	-0.1108	-6.14	0.000
Apprm	0.1216	3.87	0.000
Number of masters	-0.0147	-2.38	0.018
Mastage	-0.1083	-8.16	0.000
Mastpex	0.0785	5.66	0.000
Firmpex	0.0647	3.57	0.000
Firmage	-0.0714	-3.21	0.001
Size	0.0054	3.88	0.000
Iexport_1	0.4718	5.66	0.000
Ianyfor_1	2.3305	1.54	0.124
Wald test	Wald chi2(15)= 1941.56	Prob > chi2 = 0.0000	
Autocorrelation test	Order 1: t=-2.7201 P-value0.0065	Order 2: t -.05265 P-value=0.9580	
Sargan test	chi2(33) = 39.23165	Prob > chi2 = 0.2106	

Source: Author calculation based on RPED/CSAE data sets

Number of apprentices depicts a negative relationship with ROCI which suggests that increasing number of apprentices have the tendency of lowering a firm's financial performance. That is, a unit increase in the number of apprentices in a firm can reduce the ROCI by about 11.35 percentage points in a year. The result is significant at the five percent level of significance. From the theoretical model adopted for the study, this outcome can be interpreted to mean that masters receive less return on the time devoted to train apprentice than the returns the apprentices generate by doing both skilled and on skill jobs in the firm. In order words, firms spend more in financing master to train apprentices than what the joint activities of both master and apprentices generate for the firm. The relationship can better be understood by observing the coefficients of the other dynamics of both the apprentices and the masters in the model.

It was expected in the framework that apprentice experience shall increase with time and this shall increase the apprentice involvement in skilled task and hence impact positively on profitability. The coefficient of the potential experience of apprentice (apprpex), however indicates that increase in the potential experience of apprentice have negative effects on financial performance. One possible explanation to this paradox is that as the experience of an apprentices increase, the apprentices begin to assume the role of the master by training other junior apprentices and hence rather devote less time to productive work than they used to do. Thus the effects of the potential experience of the apprentices can reflect on the joint effects of the potential experience of both the master and the apprentice. The interaction term in Table 3 suggests that the effects of the potential experience of an apprentice passes through the master's experience to affect financial performance positively. It could be inferred that the potential experience of the master can impact positively on profitability through increasing number of apprentice since the traditional supply of apprentice to a firm in creative industries like furniture and wood shall depend on the perceived experience of the master. Thus more experienced masters can engage more apprentices over time with the more experienced senior apprentices training junior apprentices so that the master's experience becomes an asset to the firm.

The observation that increase in the share of apprentices have negative effects on profit is in line with the findings of Mohrenweiser and zwich (2008) about the manufacturing sector of Germany. The negative relationship can also be explained by the finding of Hollenstein and Stucki (2008) that productivity and apprenticeships (training propensity orintensity) are negatively correlated. The result, however, contrast the observation of Zwick (2008) on German firms that increase in the share of apprentices has no effect on profits. Zwick interpreted his finding to mean that most establishments in Germany do not invest more in apprentices than their productivity effects during the apprenticeship period. This suggest that if firms do not make conscious move to maintain a balance investment into apprenticeship and the productivity of the apprentices, then the process shall have negative effects

Also, the wage of the apprentice had direct significant effect on financial performance. This result is consistent with both theory and empirical findings. Theoretically, wage serves as motivation to the apprentice who may feel appreciated. Thus increase in wage may not only motivate the apprentices to give off their best but shall also reduce the amount of time they give to personal jobs outside the firm as they become more experienced (Monk et al., 2008). Number of male apprentices also depict direct significant effects on financial performance.

Other control variables such as potential experience of the firm, size of the firm, age of the firm, export decision of the firm and presence of foreign ownership were introduced to reduce the effects of omitted variable bias and creates a more stable dynamic model. The outcome confirm the literature since all the variables had the appropriate sign with the exception of the presence of foreign ownership (anyfor) which although had the appropriate sign was not significant. The insignificant coefficient can be explained from the descriptive statistics which suggests that medium and small enterprises are the major actors in the apprenticeship business in the furniture industry but most foreign investment in Ghana are made into large enterprise.

4. Conclusion

The main conclusion from the discussion of the results above is that the dynamics of apprentices and their masters are important variables in explaining the financial performance of manufacturing firms in the furniture and wood industry. The main variable of the study, which is the number of apprentices in a firm have negative effects on the financial performance of a firm during the training period such that firms may not want to engage more apprentices at a time. However, the results further suggest that increasing the number of apprentices have both direct and indirect consequences for the firm during the training period. Most of the indirect consequences such as peer training among apprentices have positive impacts on profitability. A final apprentice gives off their best when they are well motivated.

The main recommendation is that stakeholders must support firms that are willing to take up more apprentices during the training period to ensure the success of apprenticeship as an alternative means to skill acquisition. Also, firms must strive to maximize after training benefits by engaging the services of apprentices after the training process.

The main limitation of the study is the inability to effectively measure the after training benefit to obtain the net benefit of apprenticeship contained in the theoretical framework. This was as a result of data limitation which can be addressed in future studies by using primary data or a data source with such details.

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