COST-BENEFIT ANALYSIS OF INTERVENTIONS IN THE INDUSTRIAL SECTOR OF GHANA

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Abstract

In this paper, we conduct a cost-benefit analysis of six important industrial sector interventions, purposely designed to increase firm profitability and growth. The interventions are as follows: (i) management training for large manufacturing enterprises, (ii) management training for medium-sized firms, (iii) a capital grant for micro-enterprises, (iv) increased general R&D spending, (v) establishment of a properly functioning credit reference bureau office and (vi) reduction in electricity tariff for industry. Where possible, we took advantage of recently completed context-specific randomized control trials from various studies to estimate the effects of the interventions. This was supplemented by wider literature reviews and non-experimental data.

The analysis indicates that providing management training to local (non-multinational) factories with large turnovers (large firms) generates a BCR of 5.9. The total cost of this intervention is estimated at GHS1.62M per year per factory, and it is expected to generate total profits of GHS 2.1M for the first year. In the case of management training for medium-sized firms, a much higher BCR of 9.6 was obtained; with a total cost of GHS6,876 per year per firm and an expected total profit of GHS 70,985 per year. In terms of the capital grant for microenterprises, a BCR of 7.0 was obtained. An in-kind payment worth GH683 is expected to accrue as profits to a typical microenterprise of GHS5,263 for three years. An increase in R&D spending by 0.4 percent of GDP is expected to generate a BCR between 1.5 and 1.75. The expansion of the activities of the current credit referencing system to include data from Fintechs, mining companies, wholesalers, court records and tax records, will generate a BCR of 11.7. Finally, for the last intervention that sought to provide subsidies or reduce the electricity tariffs payable by manufacturing firms and industry, a BCR of 1.8 is estimated. Our results provide important information to decision-makers.

The analysis suggests the key interventions needed for the different size of firms in order to ensure industrial transformation. Management training of medium and large firms while providing capital grants to microenterprises will stimulate industrial transformation. The headline recommendation is that these interventions can be successful at structurally transforming the industrial sector by increasing the profitability of local firms, creating avenues for employment generation and complimenting the efforts at increasing economic growth. These findings are much aligned with the Ten Point Industrialization Strategy of Government and therefore provide very useful analytical information and policy direction for programme

implementation. The recommendations should be in tandem with other strategies outlined in the ten-point industrialization strategy of Government.

Key Words: cost-benefit analysis, management training, capital grant, R&D, Credit Reference, Electricity Tariff, industrial sector.

Policy Brief

Key Takeaways

- Several interventions studied have higher benefit to cost ratios, between 6-12. The key takeaways are as follows:
    - Management training is critical in enhancing the profitability of enterprises in Ghana. Our estimations suggest that the large firms are likely to benefit much more from the management training relative to medium-sized firms, though the costs of assisting large firms are obviously much higher. BCR = 6-10
    - The provision of capital grants to microenterprises is another important way of increasing the profitability of microenterprises given the difficulty the face in raising funds at a reasonable cost. BCR = 7
    - Information asymmetry in credit delivery remains a challenge in Ghana's financial landscape and this is evidenced by the high non-performing loans ratio of about 20%. The inclusion of additional information into the credit referencing system will generate a consumer surplus estimated at GHS69m. BCR = 12
- Two interventions studied have low benefit-to-cost ratios but large net benefits:
    - An increase in research and development expenditure by 0.4 percent of GDP will generate an estimated rate of return between 0.5 – 0.7 per cent of GDP, underpinning economic growth. BCR = 1.5-1.7
    - Providing subsidies or reducing the electricity tariffs payable by manufacturing firms and industry will generate total welfare of about GHS987m. BCR = 1.8

The Problem

Although Ghana has witnessed some impressive growth in recent times, past experiences with industrialization have not been as expected. There are several reasons for this: informality, poor infrastructure, lack of skilled labour, poor management practices, financial constraints and inadequate technological innovation. Indeed, the industrial sector that is supposed to be an important source of employment and economic growth rather lags behind the services sector in terms of contribution to GDP and employment. It is widely known that industrial transformation has been the source of growth and employment creation for many advanced economies in the West and especially the Asian Tigers. Ghana, therefore, needs to structurally transform its industrial sector to enhance its growth and employment prospects as expected.

Intervention 1: Management Training for large manufacturing enterprises

Overview

Management practices in developing countries considerably lag behind those in advanced economies. There is, therefore, the need to improve such practices to enhance industrial growth. This intervention seeks to provide management training to local (non-multinational) factories that relatively have large turnovers (large firms).

Implementation Considerations

We estimate that this would require consulting services costing GHS 1.59m per factory. The cost of the consulting service could be paid by the government. This intervention could, therefore, be classified as government investment to boost private sector contribution to the manufacturing sector. Some additional costs would, however, be borne by the firms as investments to enable recommendations for a total cost of GHS1.62M per factory.

Costs and Benefits

Costs

The total cost of the intervention is estimated at GHS1.62M per factory. The intervention will be in the form of a consultancy service on various management practices: factory operations, quality control, inventory, human resources management and sale and order management.

Benefits

This intervention would increase the profits of the local (non-multinational) factories with relatively large turnovers. It is expected that the total profit for a period of 6 years will be GHS 10.5M. The benefits for this intervention are likely to be underestimated since we anticipate some spillover effects of this intervention for other firms, especially local firms.

Intervention 2: Management training for Medium-sized firms

Overview

This intervention seeks to provide management training for medium-sized firms. This intervention is conceptually the same as Intervention 1, except that the type of management training required by the medium-sized firms, to make them profitable, may not be the same for large firms.

Implementation Considerations

This intervention will require hiring a consultant to train the owners of medium-sized firms on some specific management modules. We estimate that this would require a cost of GHS 4,355 per factory. Some additional costs would, however, be borne by the firms as investments to enable the full realization of the training program.

Costs and Benefits

Costs

The total cost of the intervention is estimated at GHS6,876 per firm. Additional investment costs resulting from the training are estimated at GHS142.

Benefits

This intervention would increase the profits of medium-sized firms. It is expected that the total profit for the first year will be GHS 70,985. We anticipate some spillover effects of this intervention for other firms, especially local firms.

Intervention 3: Capital grant for microenterprises

Overview

This intervention seeks to provide a capital grant to some selected microenterprises within the manufacturing sector in Ghana. The capital grant could be in the form of an in-kind grant. The main target group for this intervention is micro-enterprises within the manufacturing sector.

Implementation Considerations

These firms shall receive an in-kind payment worth GH683 and will be distributed to some selected microenterprises in Accra and Tema in 2019. Hypothetically, identification and selection of firms will be in two levels. Beneficiary firms would first be selected by their tax compliance status, thus firms that do not comply with tax laws are not likely to be selected. The next level of selection would be based on randomization.

Costs and Benefits

Costs

The total cost for this intervention per each enterprise is GH752.

Benefits

The benefit is assumed to last for 3 years hence profit likely to accrue to the firm within a period of 3 years is GHS5,263 (at a discount rate of 8%).

Intervention 4: Increased General R&D Spending

Overview

Although poor countries have low returns to R&D because the supporting infrastructure to take advantage of such investments (good management practices, rule of law, financial market sophistication etc.) is absent, we argue that some productivity improvements are still envisaged. This intervention appraised the returns of doubling the current R&D spending of 0.4 percent.

Implementation Considerations

Costs and Benefits

Costs

Increase R&D spending by 0.4 percent of GDP per capita (double of the spending to 0.8%)

Benefits

An estimated rate of return of R&D spending between 0.5 – 0.7

Intervention 5: Credit Reference Bureau

Overview

The proposed intervention involves building the capacity of the regulator to ensure effective surveillance of the credit referencing system to improve on the quality of information in circulation while enforcing an appropriate rewards and sanctions regime per the CRB Act.

Implementation Considerations

The intervention facilitates the inclusion of additional information into the credit referencing system. These include data from Fintechs (some of which are aligned to Telecommunication companies), mining companies, wholesalers, court records and tax records.

Costs and Benefits

Costs

The overall undiscounted cost is approximately GHS5.9m

Benefits

A change in consumer surplus is estimated as GHS69m.

Intervention 6: Reduce Electricity Tariff for Industry

Overview

This intervention aims at providing subsidies or reducing the electricity tariffs payable by manufacturing firms and industry. While one approach is to raise costs on residential users, we

chose an intervention that provides subsidies since it is unlikely for the former to be politically feasible.

Implementation Considerations

There are four categories of consumers in Ghana. These are residential, non-residential (commercial), Special Load Tariff (SLTs) for industry and street lighting. We focus on SLTs.

Costs and Benefits

Costs

The total cost of the intervention is obtained by adding the value of transfer (that is subsidy paid by the government) to the value of additional electricity. This becomes GHS 534m.

Benefits

The total welfare estimate for the intervention is GHS 987m.

BCR Summary Table

Interventions	**Benefit per firm (GHS)**	**Cost per firm (GHS)**	**BCR**	**Quality of Evidence**
Management Training for large manufacturing enterprises	9,581,108	1,613,393	5.9	Limited
Management training for Medium-sized firms	65,726	6,876	9.6	Medium
Capital grant for micro enterprises	5,263	752	7.0	Medium
	Benefit per year (GHS, millions)	**Cost per year (GHS, millions)**		
Increase General R&D Spending	1800 (Rate of Return 0.5 – 0.7)	1200 (0.4% of GDP)	1.5 and 1.75	Limited
Credit Reference Bureau	69	5.9	11.7	Limited
Reduce Electricity Tariff for Industry	988	534	1.8	Limited

Notes: All figures assume an 8% discount rate.

1. Introduction

Although Ghana has witnessed some impressive growth in recent times, the experience with industrialization has not been as expected, with respect to employment generation and its contribution to economic growth. There are several reasons for this; namely, the large informal sector, poor infrastructure, lack of skilled labour, poor management practices, financial constraints and inadequate technological advancements. Indeed, the industrial sector that is supposed to be an important source of employment and economic growth rather lags behind the services sector both in terms of contribution to GDP and employment growth. It is widely known that industrial transformation has been the main source of growth and employment creation for many advanced economies and especially, the economies of the Asian Tigers. Ghana, therefore, needs to structurally transform its industrial sector to enhance its economic growth and employment prospects.

This paper undertakes a cost-benefit analysis of six interventions that are designed to improve the profitability of firms in the industrial sector as follows: management training for large manufacturing enterprises, management training for medium-sized firms, a capital grant for micro-enterprises, increased general R&D spending, establishment of a properly functioning credit referencing system and a reduction in electricity tariff for industry. The first intervention seeks to provide management training to local (non-multinational) factories with large turnovers (large firms). The second intervention is conceptually the same as the first, except that emphasis is on medium-sized firms. Generally, the type of management training required by medium-sized firm to be profitable may not be the same for large firms. The third intervention seeks to provide a capital grant to some selected micro-enterprises in the manufacturing sector. The capital grant could be in the form of cash or in-kind grant.

The fourth intervention seeks to appraise the returns of doubling the current R&D spending of 0.4%. The fifth intervention facilitates the inclusion of additional information into the current credit referencing system. These additions include data from Fintechs, mining companies, wholesalers, court records and tax records. The sixth intervention aims at providing subsidies or reducing the electricity tariffs payable by manufacturing firms and industry.

Cost-benefit analyses for three of the interventions draw upon evidence from randomized controlled trials, allowing us greater confidence in the causal effects of the interventions (Bloom et al. 2013; Mano, Iddrisu and Yoshino, 2011; Fafchamps et al., 2014). The results

from these analyses suggest that providing training (for large and medium firms) or capital (for microenterprises) can have significant benefits relative to costs with a range spanning 6-10. Specifically:

- management training to local (non-multinational) factories with large turnovers (large firms) generated a BCR of 5.9. The total cost of the intervention is estimated at GHS 1.62M per year per factory, which is expected to generate total profit for the first year of GHS 2.1M;
- management training for medium-sized firms, yielded a BCR of 9.6; with a total cost of GHS 6,876 and an expected total profit of GHS 70,985;
- In terms of the capital grant for micro-enterprises, a BCR of 7.0 was obtained. An in-kind payment worth GH 683 is expected to accrue profits to a typical microenterprise of GHS 5,263 over three years;

For the remaining three analyses, we were not able to draw from RCT or quasi-experimental studies and so we can be less confident of the potential results. These analyses indicate that:

- An increase in R&D spending by 0.4 percent of GDP is expected to generate a BCR between 1.5 and 1.75. This BCR was not obtained following a typical quantitative approach but approximated based on Ghana's likely rate of return based on its distance from the technological frontier.
- The expansion of the activities of the current credit referencing system to include data from Fintechs, mining companies, wholesalers, court records and tax records, generated a BCR of 11.7.
- Finally, for the last intervention that sought to provide subsidies or reduce the electricity tariffs payable by manufacturing firms and industry, its estimate BCR is 1.8.

It is important to emphasise that the BCRs presented in this paper are not estimated with a high degree of precision. While the first three interventions, focusing on large, medium and micro manufacturing enterprises, draw from randomized controlled-trials (the so-called 'gold standard' of evidence), there are still concerns about extrapolating these findings to a wider setting in Ghana. First, the study used for training large manufacturing firms is from India (Bloom et al. 2013). We have reasons to believe that the situation in Ghana is comparable to the Indian context in ways that would not affect the potential impact of the intervention greatly – in particular the sophistication of management is lower in Ghana than in India, and total factor

productivity of the manufacturing sector are similar. However, there may be differences in other factors (e.g. culture, sector composition, broad-based business environment) that may change the impact of the intervention when applied in Ghana that are hard to predict in advance. While the other two RCTs are from Ghana, the sample sizes are small, the focus of the interventions is relatively narrow and academic researchers led the implementation. It is possible that extrapolation to a larger, 'real-world' implementation setting, including government involvement, would lower the impact of the interventions (Muralidharan and Neihaus, 2017). Additionally, reviews of evidence on SME training broadly show that impacts are highly heterogeneous, likely due to variability in the training delivered and the actual uptake of practices that are taught (Woodruff, 2018). The remaining interventions draw from observational studies and analyses of panel data with associated uncertainty about the direction of causation and confounding.

Despite this uncertainty, the results of this study still provide important information to decision-makers, not least because cost-benefit analyses of this nature are rare in Ghana. The headline recommendation is that providing inputs to manufacturing firms in the form of training and capital appear to be quite beneficial, even within the bounds of uncertainty. Improving access to credit via enhancing credit reference bureaus might also be highly beneficial, though the evidence is significantly weaker. The other supporting investments (on R&D and electricity tariffs) have lower BCRs but large net benefits. Overall, these interventions may be able to transform the industrial sector by increasing the profitability of local firms, creating avenues for employment generation and complementing the efforts at increasing economic growth. They will require strong institutional support both at the national and local levels to ensure its sustainability and success.

2. Management Training for large manufacturing enterprises

2.1 Description of intervention

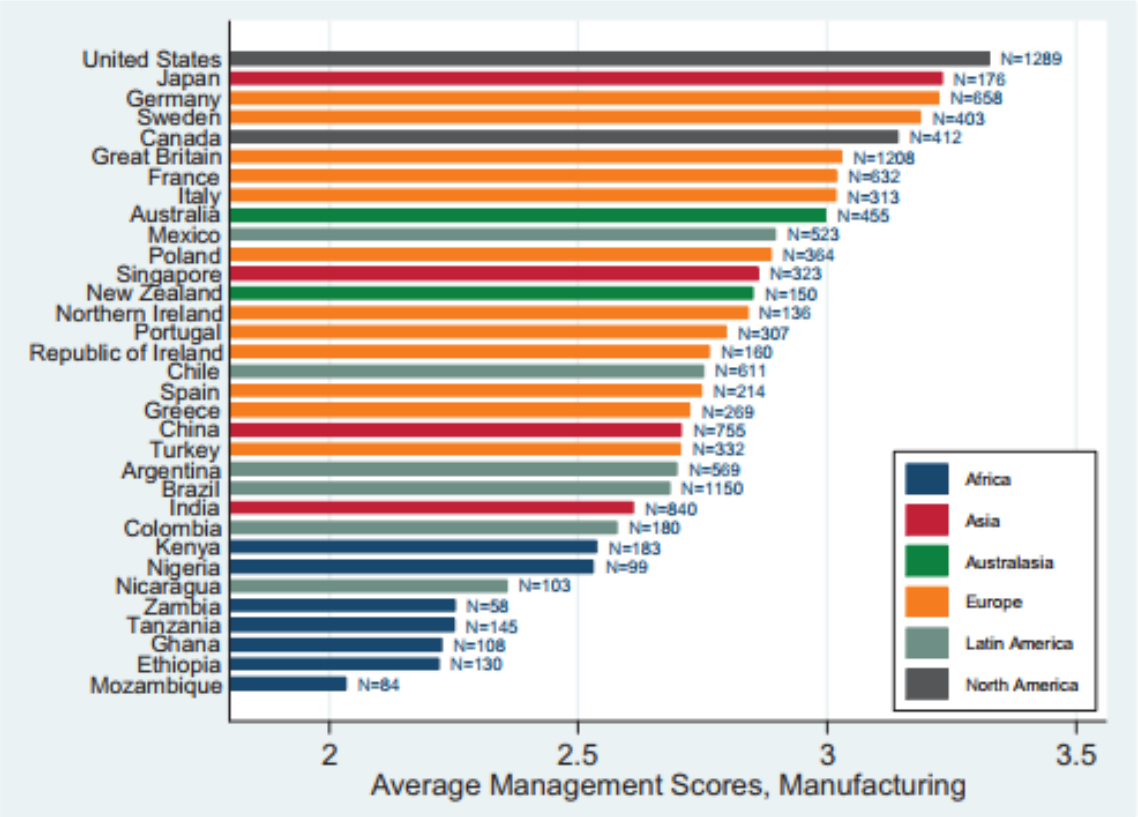
The contribution of manufacturing to GDP in Ghana has followed a downward trend from 2013 to 2017. Though there is evidence of a sharp increase from about 6% in 2012 to about 12% in 2013 (Figure 1), the decline in 2017 (11%) is worrying and needs to be addressed. It is therefore not surprising that Ghana's average managerial score is 108 – in the bottom three out of 33 countries surveyed – as shown in Figure 2.

Management training in developing countries is crucial especially within the manufacturing sectors since variations across management practices account for variations in firm productivity (Bloom & Van Reenen, 2010; Bloom *et al*., 2014; Essel, Adams, & Amankwah, 2019). In that light, providing consulting services to the management of firms (within the manufacturing sector) is one way to improve the management of factories (or firms) (Bloom, Eifert, Mahajan, McKenzie, & Roberts, 2013). Management training for large manufacturing enterprises is an effective approach to increase firms' productivity (Bruhn, Karlan, & Schoar, 2010).

Figure 1: Contribution of Manufacturing to GDP (%)

Source: World Bank Development Indicators

Figure 2: Average Management score by country



Source: Bloom, Sadun and Van Reenen (2013)

This intervention, therefore, aims at providing consulting services to top managers of manufacturing enterprises in the form of training. This intervention will target 20 large manufacturing firms within the private sector. Government-owned organizations usually have worse management practices (Bloom & Van Reenen, 2010). One weakness of government-owned manufacturing enterprises is the presence of weak incentives and poor governance structures. Workplace promotion is usually based on tenure instead of performance. Besides, low performers are less likely to be retrained or laid off. Multinational manufacturing will be excluded since they are more likely to have adopted the best international managerial practices (Bloom & Van Reenen, 2010).

2.2 Evidence on Management Training for large manufacturing enterprises in Ghana and around the world

When it comes to firm productivity and profitability, management matters greatly. Using data on 3,380 manufacturing firms, Bloom and Van Reenen, (2010) show that higher management

scores are strongly associated with better performance and education of both managers and workers. Additionally, firms with better management practices are relatively large, have higher output, higher growth rate, and higher survival rate. Management-related issues account for about a third to fourth in cross- country and within-country total factor of production gap (Bloom et al., 2014). Observational studies from around the world, note that training is correlated with firm performance (for example, Ng and Siu, 2004 for Chinese firms; Kintana, Alonso, & Olaverri, 2006 for Spanish firms; Horgan and Muhlau, 2006 for Irish and Dutch firms; Katou and Budwhar, 2007 for Greek firms).

To the best of our knowledge, only one experiment provides robust evidence on the impact of management training for large manufacturing firms (Bloom et al., 2013). That study provided free training in the form of managerial consulting services to 14 textile plants (treatment group) and compared their performance to 6 control plants in India. This training led to an improvement in managerial practices and an improvement in productivity by 17%, quality, efficiency and reduced inventory within the first year and in subsequent years, improvement in firm size. Expansion occurred as a result of increasing the number of plants and not through expanding existing plants Although these managerial practices proved beneficial to firms, most of them had not adopted them previously because of information constraints. They thought they were doing well with their usual practices and were skeptical about these new managerial practices. Most firms did not engage managerial consultants because they were not aware that they were poorly managed. Unlike other studies, (such as De Mel, McKenzie, & Woodruff, 2008), capital constraints were not a hindrance to the expansion of firms.

Bloom et al., (2013) also documented that better management lead to more delegation. Consultants and directors on the RCT confirmed that better management empowered directors to decentralize more decision making to the plant managers as well as increase firm size by lessening the constraint on male family members' management time (Bloom et al., 2013).

A subsequent follow up study showed that, despite the fact that half of the management practices were dropped, the firms exposed to training still outperformed control plants on important measures of productivity (Bloom et al. 2018). Additional evidence pointed towards large spill-over effects to non-treated plants within treated firms.

2.3 Cost-benefit analysis

As stated the only robust studies that document the effect of training on large firms are Bloom et al. (2013) and the follow-up study, Bloom et al. (2018). We therefore outline an indicative cost-benefit analysis that draws heavily on this experiment.

Cost

The main cost involved in this intervention is the cost of consulting services per factory. The market cost of providing consulting services in the form of management training was $250,000 in 2009 as documented by (Bloom et al., 2013). Using an exchange rate of 1.4 (exchange rate GHS per USD 2009) and adjusting for inflation of 4.56 between 2009 and 2018 based on GDP deflators, the cost of consulting services per factory is 2018 GHS 1,594,262. An additional investment of 2018 GH 19,131 required to enable recommendation is budgeted for. This makes the overall cost of this intervention, 2018 GHS 1,613,393 per factory. The underlying assumption is that providing consulting services to Indian firms in Bloom et al.'s (2013) study would cost the same for Ghanaian firms.

Benefit

Although such managerial consulting services are likely to bring about improvements in the overall performance of the firm such as an increase in productivity, expansion of the firm, increase in market share and increase employment, the overall aim of the firm is to maximize profit. Hence the benefits that accrue to the firm as a result of the providing consulting services in the form of management training are measured in terms of profit. Profit is estimated to increase to $325,000 (Bloom et al., 2013). Adjusting for inflation of 4.56 (between 2009 and 2018 based on GDP deflator) and using an exchange rate of 1.4 GH per USD 2009, the projected profit for the intervention in 2018 is GH 2,072,541.00. This benefit is expected to last for 6 years based on a follow up of the original Bloom et al. (2013) study (Bloom et al. 2018). The net present value of the profit of the benefit at a discount rate of 8% is GHS 9,581,108.

2.4 Summary and discussion

Table 1 presents a summary of the costs and benefits for the intervention and their proposed BCRs. The BCRs for this intervention are 6.5, 5.9, and 5.0 at a discount rate of 5%, 8%, and 14% respectively. The cost of this intervention may seem huge especially for the private sector. It is, therefore, possible to scale down the cost to meet the budget of the Ghanaian firm. This intervention is recommended for private large firms.

Table 1: Summary of costs and benefits

	5%	8%	14%
Cost			
Cost of the consulting firm per factory	1,594,262	1,594,262	1,594,262
Additional investment required to enable recommendations	19,131	19,131	19,131
Total cost	1,613,393	1,613,393	1,613,393
Benefits			
Profits in the first year	10,519,580	9,581,108	8,059,423
BCR	**6.5**	**5.9**	**5.0**

The BCRs show that high returns are possible when firms invest in managerial training. The essence of this training is to provide the managers of firms the knowledge and skills need to run the firm. This increases their competence. From the table, a firm, which invests about GHS 1,613.393 in training, will earn GHS 10,519,580 as profit in expectation, a 6x return on investment.

While the return is large, and the underlying study robust, there is uncertainty about whether the results from India will transfer to the Ghanaian setting. India and Ghana differ culturally and in the composition of their manufacturing sectors. Nevertheless, there are reasons to believe that the comparison is not so far-fetched. Besides being developing countries of similar GDP per capita, both countries have a similar total factor of productivity (Şeker & Saliola, 2018)[1] and Ghana has a lower management score than India (Bloom, Sadun and Van Reenan, 2013 - see Figure 2). The potential for improvement is similar in both settings. As stated above, the results of the BCR should not be considered estimate of high precision – rather an indicative estimate that supports upon the broader narrative of this paper that management training for manufacturing firms is likely to be cost-beneficial.

[1] Şeker & Saliola show that firms in India have a TFP of 1.16 while firms in Ghana have a TFP of 1.19.

3. Management training for Medium-sized firms

3.1 Description of intervention

Small and medium-sized enterprises have typically been the backbone of Ghana's manufacturing sector, yet they have been characterised as poorly managed and not very productive. Teal (1999) provides some compelling reasons for this characterization and this includes dysfunctional government policy, informality, poor infrastructure, lack of skilled labour, poor management practices, financial constraints and poor economic performances. Improving upon the poor management and low productivity of manufacturing firms in Ghana has, therefore, been one of the main objectives of the country's industrial policy. The objectives are set within the country's long-term strategic vision of achieving middle-income status through industrial transformation.

To improve upon the management of manufacturing firms, the country has formulated some policies to increase the supply and improve the quality of entrepreneurial and management skills in the manufacturing sector. For instance, the government, in its industrial policy, seeks to strengthen existing training institutions to deliver entrepreneurship and management training programs that meet the needs of the manufacturing sector. The government also seeks to encourage industry to provide the necessary training for its staff to meet its entrepreneurial and managerial skill requirements and promote investments in the development of entrepreneurship and management training institutes. Finally, the government intends to provide incentives for sector-specific training and skills development in entrepreneurship and management, especially in public and private sector training institutions as well as within industry associations and at the firm-level. Some other policies seek to ensure the availability of technical skills in specialised areas.

This intervention seeks to provide management training for medium-sized firms. This intervention is conceptually the same as Intervention 1, except that the type of management training required by the medium-sized firm to be profitable may not be the same for large firms. We envisage the training to include some elementary modules on modern entrepreneurship, business planning, marketing, production management, quality management, record keeping and costing.

3.2 Evidence on Management Training for medium-sized firms in Ghana and around the world

This cost-benefit analysis draws heavily from the work of Mano, Iddrisu and Yoshino (2011) in Ghana. Based on a randomized experiment in Ghana, they attempted to show whether basic-level management training improves business practices and performance. The study was conducted at Suame Magazine, located in Kumasi, the second-largest city in Ghana. Suame Magazine is known in West Africa as a large cluster of garage mechanics, but it is also a cluster of metalwork enterprises producing a variety of metal products, such as bolts and nuts, corn mill machines, threshing machines, and cash safes. The study randomly selected 167 metalwork entrepreneurs; the treatment group consists of 47 entrepreneurs and the control group consists of 66 entrepreneurs. The treatment group underwent approximately 14.1 days of training on entrepreneurship, business planning, marketing, production management, quality management, record keeping and costing. The results from the study generally demonstrate that entrepreneurs in a survival cluster are unfamiliar with business practices which are standard in developed countries and some other developing countries. The results also indicated that participation in a rudimentary management training program improves upon business practices, but with considerably varying degrees of success. Although the authors cautioned about the generalizability of their findings because of the relatively small sample, they compared their findings from some earlier studies in Latin America. With the findings being similar, the concluded that entrepreneurs in developing countries can improve the productivity of their SMEs by learning management techniques.

As indicated earlier, the work of Mano, Iddrisu and Yoshino (2011) is comparable to some papers in the literature (for instance, Karlan and Valdivia, 2011; Bruhn, Karlan and Schoar, 2010; Drexler, Fischer, and Schoar, 2010). Karlan and Valdivia (2011) report on a randomized control trial of an entrepreneurship training program in Peru. The training consisted of classroom-style interactive lectures for pre-existing clients of a group lending microcredit program for women. The lessons focused on basic business and recordkeeping skills and targeted micro and not small and medium enterprises. The study showed an increase in business knowledge, but no consistent improvements occurred for business revenue, profits, or employment; although there is some suggestive evidence of stronger impacts for those with less interest in receiving training as self-reported in a baseline survey, and some suggestive evidence of an increase in the revenues during bad months.

Bruhn, Karlan, and Schoar (2010) conducted a randomized control trial in Mexico to examine whether lack of managerial knowledge can be alleviated by providing consulting services to supplement the managerial skills of the business owners. The treated sample of small businesses was paired with a consultant from one of a number of local management consulting companies for a period of one year. The Consultants were asked to diagnose the problems that prevented the firms from growing, suggest solutions to solve the problems and assist the firms in implementing the solutions. The results showed that the consulting services had a positive effect on firms' productivity. Monthly firm sales and profits were also higher in the treatment group than in the control group. The estimated effects were economically large but are only significant at the 10 percent level, likely because the data is noisy, and the sample size is relatively small.

Drexler, Fischer, and Schoar (2010) tested different approaches to teaching record-keeping skills to micro-entrepreneurs. They find that a simple, rule-of-thumb based approach to teaching does better than a more intricate training program. The results suggest that an improvement in these skills increases sales, and in particular helps to reduce months of very poor sales outcomes.

Generally, the studies examining the impact of management training on medium-sized firms produce some positive outcomes, although there is some heterogeneity in the results (Woodruff, 2018). These heterogeneities arise from the variations among the training provided, and the uptake of recommendations from the training. Other sources of variation could include the participants' inherent abilities and education levels and their workers' abilities and motivation.

3.3 Cost-benefit analysis

We conduct a cost-benefit analysis of offering management training for medium-sized firms by relying on the work of Mano, Iddrisu and Yoshino (2011). As with the previous intervention, the result should be considered as an indicative BCR estimate, with a potentially wide error margin.

Costs

There are, at least, three cost items that can be associated with this intervention. The first is the training cost of the program. The second is the additional cost of investments to be incurred by

the entrepreneurs after the training to realize the training's benefits. The third is the time cost of participating in the training by the entrepreneur.

The training cost of the program includes the hiring cost of instructors, the cost of teaching material production, the cost of the instructors' travel, accommodation expenses, cost materials and the cost of renting the venue. There are some additional costs to be incurred: the cost of selecting the instructors and the researchers' travel cost for follow-up visits. Mano, Iddrisu and Yoshino (2011) used similar cost items in their study and estimated the cost of their training per entrepreneur to be US$ 742. Using the exchange rate for 2007, the average inflation rate between 2007 and 2018, we project the cost of the training to be GHS 4,355 per entrepreneur.

The additional cost of investments to be incurred by the entrepreneurs after the training to realize the training's benefits can be varied. For instance, to improve record-keeping some stationery will be purchased; production management will require the upgrade of some machinery and business planning may require the hiring of some additional workers. Once again, based on the estimates by Mano, Iddrisu and Yoshino (2011), we project their cost of US$ 404, using the exchange rate for 2007 and the average inflation rate between 2007 and 2018 as GHS 2,379.

Obtaining a time cost was based on the assumption that the training would require 17.5 days. In addition, the training will be in the evening when most of the entrepreneurs may not be at work. The time cost is therefore estimated at a modest cost of GHS 142. Overall costs of the intervention are therefore GHS 6,876 per firm, at 8% discount rate.

Benefits

There are several benefits from the intervention: increase in profits, productivity, competitiveness and market share. Based on the availability of data and following closely the work of Mano, Iddrisu and Yoshino (2011), we estimated the gross profits of the training as GHS 70,985 after one year. Mano, Iddrisu and Yoshino (2011) obtained an estimate of GHS 13,400 to be the private benefit of the training in the first year of about 18 times the training cost. Using an average inflation rate of 5.3 between 2008 and 2018, we arrived at our projection of GHS 70,985 after one year. The preceding literature review indicates large heterogeneity in results, with some studies showing large persistent gains, and others with little gains. Therefore, we adopt one year of improved profit as a reasonable median impact.

3.4 Summary and discussion

The results of the cost-benefit analysis are summarized in Table 2. The results indicate that at an 8% discount rate the BCR is 9.6. The associated benefit for this BCR is GHS 65,726 of gross profits. The associated cost is GHS 6,876; 63 percent of which are training cost.

Table 2: Summary of costs and benefits

	5%	**8%**	**14%**
Gross profit after one year	67,604	65,726	62,267
TOTAL BENEFITS (2018 GHS)	**67,604**	**65,726**	**62,267**
Training cost per entreprenuer	4,355	4,355	4,355
Additional investments made after training	2,379	2,379	2,379
Time cost	142	142	142
TOTAL COSTS (2018 GHS)	**6,876**	**6,876**	**6,876**
BCR	**9.8**	**9.6**	**9.1**

The expected BCR for this intervention is quite high. This is perhaps unsurprising given the characteristics of medium-sized firms in Ghana. As indicated earlier, Teal (1999) provided some characterization to include informality, poor infrastructure, lack of skilled labour and poor management practices. Aside from the specific benefits of the training in enhancing managerial work in the form of business planning, marketing, production management, quality management, record keeping and costing, the training is expected to have some positive effects of managerial attitudes such as enhancing discipline.

As with the first intervention, limitations need to be noted with this analysis. The sample used by Mano, Iddrisu and Yoshino (2011), while from Ghana is relatively small and the study concentrated only on metalwork enterprises. As discussed, there are wide heterogeneities existing in the literature for such impact studies. The actual impact could be much lower (e.g. if superior management practices are not actually implemented) or much larger (e.g. if profits were to persist for more than one year). Despite these uncertainties, this study appears to be the best available evidence from the country.

4. Capital grant for micro-enterprises

4.1 Description of intervention

The role of microenterprise in economic development cannot be overemphasized. Most nations that have great economic developmental success stories emphasized the role of microenterprises. It is therefore not surprising that 'The Development of Small and Medium Scale Enterprises' is fifth on the ten-point pillars of the government of Ghana's Industrial Transformational Agenda. Recent studies on poverty reduction also suggest that it is more effective to tackle extreme poverty through facilitating household investment in microenterprises, smallholder agriculture and rural non-farm economy compared to large-scale formal sector programs and investments (Shepherd & Diwakar, 2019).

The main constraint in the expansion of microenterprises to increase its yield and contribution to GDP has been with finance (Masakure, Henson, & Cranfield, 2009; McKenzie & Woodruff, 2008). A capital constraint can cause firms to operate below their capacity. As in the case of Mexico, returns from capital grants among constrained enterprises were much higher than enterprises, which were not financially constrained (McKenzie & Woodruff, 2008). Besides, unlike the formally registered firms, informal firms that form the majority are less likely to receive a loan (McKenzie & Woodruff, 2008).

This intervention seeks to provide capital grants to some selected microenterprises within the manufacturing sector in Ghana. The capital grant could be in the form of in-kind grant. The main target group for this intervention is micro-enterprises within the manufacturing sector. These firms shall receive in-kind payment worth approximately GHS 700. This amount is drawn from the 2009 GHS 150 (Fafchamps, McKenzie, Quinn, & Woodruff, 2014) which was distributed to some selected microenterprises in Accra and Tema in 2009.

4.2 Evidence on Capital grant for micro-enterprises in Ghana and around the world

There are a handful of high quality studies that examine the impact of cash grants on microenterprises. Using data from the Mexican National Survey of Microenterprises, Mckenzie and Woodruff (2006), analysed the returns to capital based on a cross-section conducted every two years from 1992 to 1998. They found that, for the smallest firms (those with a capital stock of less than $500 a month), the returns to capital ranged from 10 to 15 percent a month especially among firms that were financially constrained. Any additional investment of $100

in the enterprise yielded $10-$15 a month. This was a randomized experiment that gave cash and in-kind grants to small retail firms.

In a similar study in Sri Lanka, De Mel et al. (2008), employing randomized grants to generate shocks to capital in some selected microenterprises revealed an average real return to capital of 4.6 to 5.3 percent. Their results predict that returns to capital vary with entrepreneurial abilities and the level of wealth of the household. This, therefore, implies that aside from financial constraints there are other factors likely to influence the profitability of a microenterprise. Another striking revelation of the Sri Lanka study is that although female-owned enterprises were more credit constrained, returns on capital grants were much higher for male-owned enterprises than female-owned enterprises.

Unlike the study in Sri Lanka (De Mel, McKenzie, & Woodruff, 2008) and Mexico (McKenzie & Woodruff, 2008), Fafchamps et al (2013) found strong evidence that the manner through which capital grants are delivered affects returns. Fafchamps et al (2013), using a randomised control trial set up delivered both cash and in-kind grants to microenterprises in Accra and Tema, and found that improvements to business profits were significant for in-kind grants and marginally significant for cash under some specifications. A grant of GHS 150 (equivalent to about $120 at the time of the study) yielded a return of 15% (a monthly profit of GH25). With respect to gender differences, Fafchamps et al (2014) show that in-kind grants generated significant impacts for females, but not cash grants. The effects were strongest for women with more mature businesses as measured by initial profits.

An explanation for this ‘fly-paper effect’ (i.e. where the mode of capital matters), is that the diversion of capital grants to other uses are minimized when capital grants are provided in-kind. Giving out grants in-kind to owners of microenterprises is a way of helping firm owners who lack the self-control to keep their capital grants within the confines of their business and not spend on other personal needs. Banerjee and Mullainathan (2010) and Duflo, Kremer, & Robinson (2010) have shown that individuals with self-control issues may not be disciplined enough to embark on high productive ventures today which yield high returns tomorrow. Such individuals may also divert credit grants or loans for other purposes other than the purposes for which they received it (Banerjee & Mullainathan, 2010; Duflo, Kremer, & Robinson, 2010).

4.3 Cost-benefit analysis

Cost

The main costs associated with this intervention is the cost of capital grants to some selected microenterprises in Ghana. This is a one-time direct payment made to these microenterprises. This cost also comes with an assumed administrative cost of 10% of the total grant given out. A capital grant of GHS 683 is calculated based on the calculations from GH 150 in 2009 (Fafchamps et al., 2014) and an inflation rate of 4.56 from inflation between 2009 and 2018 based on GDP deflators. Thus, the total cost for this intervention per each enterprise is GH 752.

Benefit

Following Fafchamps et al., (2014), capital grants given out to entrepreneurs are expected to increase monthly profits by 15% for three years. The benefit is assumed to last for 3 years (Fafchamps et al., 2014). This equals GHS 5,263 (at a discount rate of 8%).

4.4 Summary and discussion

The results of the cost-benefit analysis are summarized in Table 3. The results indicate that at a 5%, 8%, and a 14% discount rate, the BCRs are 7.4, 7.0 and 6.3 respectively.

Table 3: Summary of Cost and Benefit

	5%	**8%**	**14%**
Benefits			
Increase in monthly profit.	5562	5263	4741
Cost			
Capital Grant	683	683	683
Administrative Cost (10%)	68	68	68
Total Cost	752	752	752
BCR	**7.4**	**7.0**	**6.3**

The results of this analysis are based on a high-quality randomized control trial in Ghana (Fafchamps et al. 2014). While this is only one study, the importance of capital grants is backed up by the aforementioned studies from Sri Lanka and Mexico, which are consistent in impacts both directionally and in terms of magnitude. The high returns are also consistent with non-experimental studies from Ghana. For example, Udry et al (2006) found an average rate of return of 250% to 300% per annum in the new technology of pineapple cultivation, while in well-established food crop cultivation, the rate of returns to capital is 30-50%. As before, the BCR is indicative but the available evidence suggests relatively large returns from providing

capital grants in Ghana. Any future implementation would need to carefully consider the impacts of providing grants to a wide cross-section of the population including the potential for leakage. The provision of in-kind grants, as opposed to cash, might ameliorate some of this challenge.

5. Increase General R&D Spending

5.1 Description of intervention

It has been shown in the literature that investment in R&D has been one of the most important sources of the economic growth witnessed by many developed countries in recent times (Bloom, Schankerman and Van Reenen, 2013). For many developing countries and especially those in Africa, this has not been the case. These countries have generally been described as being below the technology frontier in many perspectives and less inclined to absorb productivity spillovers from advanced economies. It has been suggested that such countries should increase their R&D spending to grow faster to catch up with the developed economies. This is irrespective of the evidence in some other papers that most poor countries have low returns to R&D because the supporting infrastructure to take advantage of such investments (good management practices, rule of law, financial market sophistication etc.) is absent. It is acknowledged that some productivity improvements are still envisaged if some activities that enhance the potency of R&D spending are improved; for instance, education, quality of scientific infrastructure, the overall functioning of the national innovation system as well as the quality of the private sector.

Currently, the countries with the highest R&D expenditure (as a % of GDP) within Sub-Saharan Africa are South Africa (0.82% in 2016) and Kenya (0.79% in 2010). The rest of the countries spend less than 0.5%. Ghana's estimate is 0.4% with more than 90 percent being undertaken by the government. Therefore, attempts at increasing R&D spending is becoming critical if the continent wants to catch-up with leading countries in the region.

This intervention, therefore, seeks to appraise the effects of the doubling of Ghana's current R&D expenditure of 0.4 (% of GDP). The computations are not entirely quantitative, as the estimates for the benefit are based on projections from the work of Goñi and Maloney (2017) who estimated the rate of return to R&D for different countries based on distance from the technological frontier

5.2 Evidence on General R&D Spending in Ghana and around the world

Generally, the empirical evidence on R&D spending is dominated by the case of advanced countries, with the bulk of these studies concentrating on the United States. This is because the United States is a technological leader in most industries. There have been some studies from the rising Asian Tigers because of the recent evidence of R&D efficiency.

For this analysis, however, we rely mostly on the empirical work of Goñi and Maloney (2017) who used a global panel of R&D expenditures and exploited more recent advances in an instrumental variable in a varying coefficient context, to calculate the rate of return for R&D spending. More specifically, they found that the rate of return for R&D spending takes the shape of an inverted-U suggesting that the returns rise with distance to the frontier and then fall thereafter, potentially turning negative for the poorest countries. The findings do not only confirm the view that poor countries do far less R&D as a share of GDP than the rich countries but also suggests that poor countries cannot exploit technological transfer for convergence. However, middle-income countries are expected to be able to can converge rapidly to the frontier. They, however, interpreted the low returns to R&D with caution. They indicated that the low returns found for poor countries do not diminish the centrality of technological transfer for development, but rather suggests the importance of some complementary factors; education, the quality of scientific infrastructure, the overall functioning of the national innovation system, and the quality of the private sector, which become increasingly weak with distance from the frontier and offset the catch-up effect.

Griffith, Harrison and Van Reenen (2006) studied firms in the OECD and obtained some rather interesting results with respect to R&D spending. Using a random sample of the firms, they showed that the estimated returns to R&D rise with distance from the technological frontier and increasingly reflect the greater gains from catch-up afforded to follower countries. Extrapolating their estimates to middle-income countries, the implied returns were found to be large and suggest a much larger effort in R&D in developing countries than in advanced countries. The results presented evidence for the existence of knowledge spillovers associated with technology sourcing.

Apart from the work of Goñi and Maloney (2017) and Griffith, Harrison and Van Reenen (2006), they have been some other works exploring individual country effects of R&D spending. For instance, Bloom, Schankerman and Van Reenen (2013) studied firms in the

United States to test the effects of two countervailing R&D spillovers - a positive effect from technology (knowledge) spillovers and a negative business stealing effects from product market rivals. Relying on a framework that incorporates these two measures as well as measures of a firm's position in technology space and product market space, they showed that technology spillovers quantitatively dominate, so that the gross social returns to R&D are at least twice as high as the private returns.

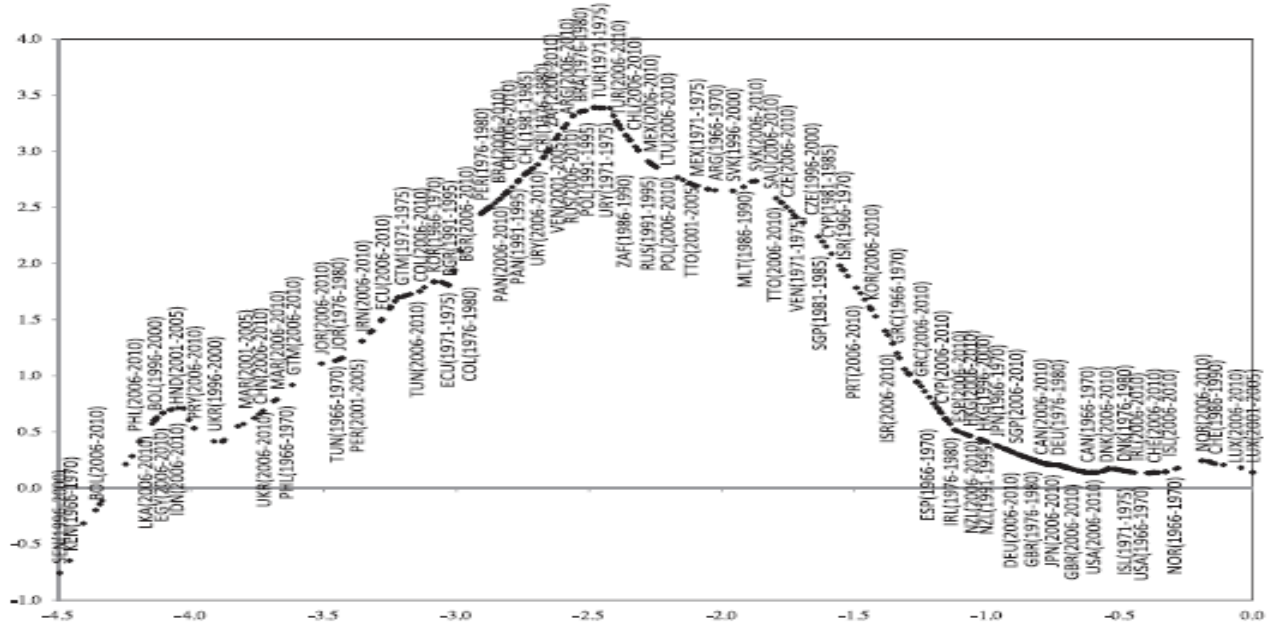
Madden and Savage (2000) examined the role research and development (R&D) plays in technology progress for a sample of OECD and Asian economies from 1980 to 1995. An empirical model is estimated which relates total factor productivity to domestic and foreign R&D activity, trade, and information technology and telecommunications (ITT). The results confirmed a positive relationship between national productivity and R&D activity in the long run.

Although it is difficult to obtain empirical evidence for Ghana, one implication of the above evidence is that some positive spillover effects are possible for Ghana, if general R&D spending is doubled. Relating it with the estimated rate of return for R&D relative to the technological frontier as provided Goñi & Maloney (2017), countries that had per capita income closest to that of Ghana included Bolivia with a GDP per capita PPP of Int$4900 (2006 – 2010). By extrapolating their R&D rate for Ghana, we expect Ghana to obtain rates of returns between 50 and 75 percent.

5.3 Cost-benefit analysis

As indicated earlier, the computations in this intervention are not entirely quantitative but based on reliable projections from the work of Goñi and Maloney (2017) who mapped out the rate of return to R&D for different countries based on distance from the technological frontier. Based on this mapping, we used the rate of return for countries that had per capita income closest to that of Ghana for the period (1996 and 2000). One such country is Bolivia with a GDP per capita PPP of Int$4900 (2006 – 2010). We then use Bolivia's estimated rate of return for R&D as a reasonable projection for the case of Ghana (0.5 – 0.7). The two countries may differ structurally.

Figure 3: Rate of return to R&D relative to the technological frontier



Source: Goñi & Maloney (2017)

But we do not expect Ghana's distance from the technological frontier to exceed a country like Egypt and Indonesia and slightly above that of Kenya between 1966 and 1970. By dividing the R&D rate of return (0.5 – 0.7) by the expected R&D spending of as a percentage of GDP (0.4), we expect the BCR from doubling R&D spending to be between the ranges of 1.5 and 1.75.

5.4 Summary and discussion

This intervention appraised the effects of Ghana doubling its R&D expenditure (% of GDP) of 0.4% percent to 0.8%. The computations are not entirely quantitative, as the estimates for the benefit are based on projections from the work of Goñi and Maloney (2017) who was able to estimate the rate of return to R&D for different countries based on distance from the technological frontier. We used the R&D rate of return for Bolivia between 2006 and 2010 (0.5 – 0.7) since its per capita income within the period was similar to that of Ghana. We again did not expect this rate of return to be lower than that of Kenya between 1966 and 1977 that appears to be quite distant from the frontier. With the expect cost of 0.4% GDP, we obtain a BCR between 1.5 and 1.75.

This estimate is reasonably in line with the literature discussed in section 5.2, and particularly for developing countries, that some positive returns are expected from an increase in R&D spending. The BCR is quite low because Ghana may likely to quite distant from the

technological frontier. The implication of this finding is that some complementary investments are needed to move the country closer to the technology frontier to realize much higher effects of R&D expenditure. We accept the recommendation from Goñi and Maloney (2017); i.e. an increase in the proportion of the population that is educated, the quality of scientific infrastructure, the overall functioning of the national innovation system and the quality of the private sector.

More importantly, it appears the private sector's contribution to R&D in Ghana is only marginal. The current estimates are approximately 10 percent of the 0.4 (% of GDP). This is not surprising as the services sector appears to be outpacing the manufacturing sector (% of GDP). An increase in the share of the private will, therefore, be critical to maximizing the efficiency of R&D as well as narrowing the country's distance from the technological frontier.

Lastly, an important point needs to be made about the size of the impact. While the BCR is low, the absolute net benefit is large. Assuming Ghana's GDP is around GHS 300 billion, an investment of GHS 1.2 billion (0.4% of GDP) would yield a benefit of GHS 1.8bn for net benefit of GHS 0.6 billion. This would be significantly larger than scaled-up programs of the previous interventions noted in this paper. For example the net benefit of GHS 0.6billion would be larger than equivalent training or capital programs targeting 20 large firms, 10,000 medium firms and 100,000 microenterprises.

6. Credit Reference Bureau

6.1 Introduction

There is a vast literature on the relationship between financial development and economic development. Overwhelming evidence points to the fact that the development of inclusive financial systems promote investment, spurs growth and reduces poverty and inequality (Allen, Carletta, Qianc and Valenzuela, 2013; Ayyagari, Demirgüç-Kunt, and Maksimovic, 2013; Beck, Demirgüç-Kunt, and Levine, 2007; Aghion, Howitt and Mayer-Foulkes, 2005). Households without credit constraints not only have the opportunity to access credit but also, secure their savings.

Recent studies on poverty reduction suggest that it is more effective to tackle extreme poverty through facilitating household investment in microenterprises, smallholder agriculture and rural non-farm economy compared to large-scale formal sector programmes and investments

(Shepherd and Diwakar, 2019). Financial inclusion offers the opportunity for households to invest in education, health, nutrition and productive assets. It enhances what Amartya Sen describes as the capabilities and functioning of poorer households including greater participation in society as they are placed in a better position to take advantage of opportunities around them.

The question of why access to finance is limited especially in many countries in the developing world is one that has gained much attention among scholars. Demirgüç-Kunt, Beck, and Honohan (2008) point to geography – lack of physical access, eligibility requirements and affordability. One of the most cited evidence is the work by Stiglitz and Weiss (1981) on credit rationing within the context of imperfect information. Imperfect information introduces principal-agent problems which are manifested in the form of adverse selection and moral hazard. Credit institutions care about default risks as well as returns on their loans. These concerns are reflected in how they price credit which then introduces a dynamic in the principal-agent relationship. Limited information within the credit market means that financial institutions run the risk of attracting risk-lovers, and to that extent, engage clients with a high default risk (i.e. a case of adverse selection). Relatedly, clients who benefit from loans may act in a manner that does not take into account the interest of the lender (a case of moral hazard). These challenges undercut what should be the effective functioning of credit markets, triggering credit rationing and thereby excluding large segments of individuals and firms who would otherwise use credit effectively. Access to credit in the developing world is even more challenged. The potential of many Small and Medium Scale Enterprises (SMEs), which constitute more than three-quarters of the total number of firms in Sub-Saharan Africa and other developing regions are undermined by their inability to access credit (Goswani, Medvedev and Olafsen, 2019; Quartey et al. 2017; Berg and Fuchs, 2013; Bigstein et al., 2003; Quartey, 2002; Aryeetey, 1998).

Demirgüç-Kunt and Maksimovic (1998) find that, compared to firms that depend only on private funds, those that explore external finance grow faster. Access to credit reduces barriers to new entry of firms (Klapper, Laeven, and Rajan, 2006), increases sales (Banerjee and Duflo, 2004), promotes firm growth or expands firm size (Sandefur, 2010; del Mel, Mckenzie and Woodruff, 2006; Ayaggari, Demirgüç-Kunt and Maksimovic, 2006), facilitates product diversification and promotes innovation (Ayaggari, Demirgüç-Kunt and Maksimovic, 2007). More recent evidence suggests that access to credit has important implications for firm

productivity (Cusolito and Maloney, 2018). Individually and compositely, these outcomes have implications for overall economic performance.

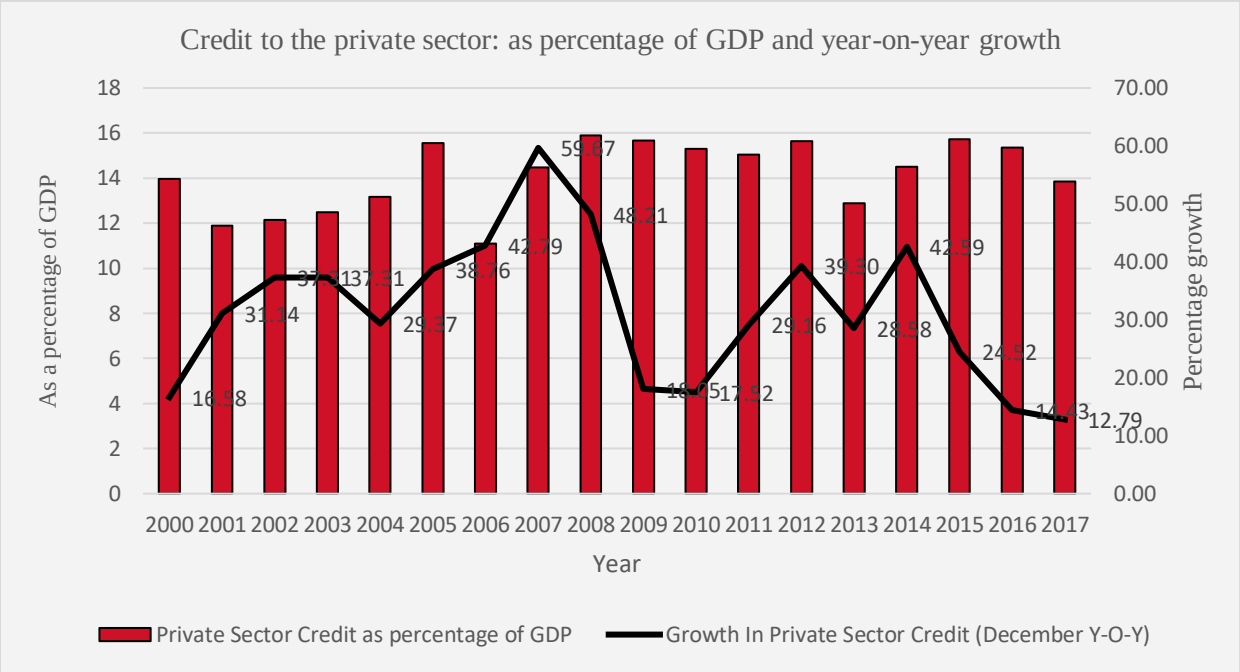
Access to credit also means individuals and firms subjecting themselves to various levels of scrutiny. This includes producing a form of national identification, sharing the location of residence, providing details on economic activity, to mention a few. These data become important ingredients for formalizing the informal economy.

6.2 Credit Access and Financial Sector Performance in Ghana: An overview

In a study on firm survival in Ghana, based on a survey of 1000 firms in 2013, Davies and Kerr (2018), show that the challenges firms face with regards to debt and credit increases with firm size. Using panel data on manufacturing firms in Ghana over the period 1991 to 2002, Szabo (2018) finds that firms with access to formal credit are more likely to be closer to their efficient capital stock level frontier and less likely to be inefficient in capital stock utilization compared to those who lack formal credit. In a randomized control trial conducted for firms in Accra and Tema, Fafchamps, McKenzie, Quinn, and Woodruff (2014) find that returns to capital for owners of firms increase by about 15 percent per month when the owners receive capital support equivalent to about $120.

In close to two decades, credit to the private sector as a percentage of GDP has hovered around an average of 14 percent with a standard deviation of just about 1.5 percentage points. The level peaked just at the start of the global financial crisis at approximately 16 percent. Meanwhile, year-on-year private sector credit growth has been relatively volatile, peaking just before the global financial crisis to about 60 percent in 2008. Ghana's performance on growth in private sector credit lags behind the Sub-Saharan African average (excluding high-income countries), for the period under review. Since about 2014, there has been a declining trend of both private sector credit as a percentage of GDP as well as its year on year growth, culminating in the banking sector crisis experienced in 2018. We explore the origins of the crisis.

Figure 4: Private sector credit performance: 2000 to 2017



Source: World Development Indicators and Bank of Ghana database (Accessed on 24th June 2019)

In the early 2000s, a set of reforms aimed at financial liberalization sparked competition in Ghana's banking sector. The period saw the entry of new banks and other financial institutions as well as a diversification of products on offer. Figure 4 shows the positive effect of these reforms on private sector credit growth as well as its share of GDP. By 2012, a confluence of factors including adverse macroeconomic outcomes, poor corporate governance and deficiency in financial sector regulation and supervision began to erode the earlier gains. By the end of 2016, one of the ominous signals of a deteriorating financial system was laid bare by the results of an Asset Quality Review exercise, carried out by the Bank of Ghana (BoG). The central bank had to intervene to safeguard the stability of the financial sector. A direct consequence was the reduction in the number of licensed banks from 36 in 2017 to 30 at the end of 2018. The challenges with the banking sector were passed on to Micro-Finance Institutions and Rural Community Banks where almost two-fifths were declared as distressed or folded up.

Measures introduced by the central bank to address the financial sector challenges included the introduction of new minimum capital requirements, the roll-out of new regulatory reforms, improvements in financial sector risk assessment and strengthening of financial sector supervision. Other interventions included the introduction of a deposit insurance scheme,

improvement in collaborations among regulatory authorities and the introduction of guidelines for information sharing and cybersecurity. The current slew of reforms also saw the introduction of the Ghana Reference Rate. The latter is the product of a collaboration between the Bank of Ghana and the Ghana Banking Association to review the determination of the base rate in a bid to eliminate unregulated discretionary practices by individual banks that led to permanently 'over-priced' interest rates. Following the determination of the Ghana Reference Rate, banks add or subtract their risk premium to arrive at a rate for lending. Its implementation began in April 2018 and the rate is published monthly.

In 2007, a Credit Reporting Act: Act 726 was passed by the Parliament of Ghana to regulate credit reporting in the financial sector. About three years later, in 2010, the first credit reporting bureau – XDS Credit Reference Bureau- started operations. Since then, two more private CRBs have joined. They are part of a credit referencing system made up of key players, including a regulator, Bank of Ghana, financial and non-financial institutions, and in recent times, Fintechs. Available evidence suggests that Credit Reference Bureaus have the potential for contributing to easing credit risks among banks in Ghana (for example Kusi, Fiador and Agbloyor, 2016). The credit reporting system is also complemented by a collateral registry, hosted by the central bank. The latter holds information on collateral submitted by borrowers to the various financial institutions. While these interventions wield potential to further reduce the risks involved in lending, several concerns have been raised. These include the quality of data available to and supplied by the Credit Reference Bureaus (CBRs). Industry players raise issues of trust among financial institutions. The implication is that data submitted to the bureaus might not be comprehensive or entirely accurate. Some banks may do so to 'protect' a certain class of customers. Furthermore, there is scope for expanding the data available to the CRBs to include court rulings, utility payment records, tax payment profile, among others. The importance of completing the National Identity and Digital Addressing systems have also been highlighted.

6.3 Description of intervention

The proposed intervention involves building the capacity of the regulator to ensure effective surveillance of the credit referencing system. The purpose would be to improve upon the quality of the information in circulation while enforcing an appropriate rewards and sanctions regime per the CRB ACT. The intervention also facilitates the inclusion of additional information into the credit referencing system. These include data from Fintechs, mining companies, wholesalers, court records and tax records. The improvement in data sources is

relevant to better assess the creditworthiness of individuals and institutions. Besides improving the quality of information available to the CRBs, the intervention also facilitates effective linkages with other existing data sources such as those with the collateral registry.

At the core of this intervention is strengthening the capacity of the Credit Reporting Office of the Bank of Ghana. The intervention would seek to address the capacity constraints faced by the office in carrying out its mandate. The Box below presents key tasks the office would need to give attention to in order to enhance the credit referencing system and consequently improve access to credit.

Key tasks for the Credit Reporting Office of the Bank of Ghana.

Policy Area: Access to Credit

Intervention: Improving capacity and expanding data sources for credit referencing system in Ghana.

Key tasks for Credit Reporting Office of Bank of Ghana:

- Facilitate demand for data from collateral registry and support its linkage with data from CRBs
- Facilitate and test for the inclusion of other data: court judgements, tax data, insurance data and other relevant additions to the extent feasible and with progressive realization.
- Assess and recommend the inclusion of additional data over time.
- Facilitate publicity of work/role of CRBs
- Monitor quality of data provided by banks (Avoid the phenomenon of "data

6.4 Evidence on Credit Reference Bureau in Ghana and around the world

Evidence on the determinants of private credit to firms and individuals is underpinned by two theories: the power of creditors and credit information (see, for example, Djankov, McLeish & Shleifer, 2007). The first theory suggests that when creditors have the power to enforce contracts, including recovering loans and taking custody of collateral, they are more willing to lend. The second theory, which is the focus of this paper, submits that creditors are more willing to lend when they have more information on the lender. The work of Stiglitz & Weiss (1981) and Jaffee & Russell (1976) fall into the latter category. While both theories are not mutually exclusive to improving private credit, Dzankov et al. (2007) tests and finds the information theory to be more important in poorer countries.

In assessing the impact of public and private credit registries on different measures of financial development, Asongu, Nwachukwu & Tchamyou, (2016) find mixed results. However, they find a positive effect of private credit reference bureaus on financial size (defined as deposit bank assets on central bank assets plus deposit bank assets). We use their effect size of about 5 percent as one of our key parameters. Further evidence suggests a marginal effect of CRBs on access to finance of up to 24 percent in some econometric specifications, depending on the type of CRB and the type of information gathered (Triki and Gajigo, 2014). The latter suggests that better information impacts positively on credit availability.

6.5 Cost-benefit analysis

We conduct a cost-benefit analysis based on the best and most recent evidence available. While drawing from similar work by Kusi, Agbloyor, Ansah-Adu & Gyekye Dako, (2017), our parameter estimates for benefits are informed by Asongu et al. (2016) and Triki & Gajigo (2014). Primarily, we consider the first-order effects of reduced information asymmetry. We anticipate increased credit and reduced interest rates.

Costs

The analysis considers three main types of costs associated with the intervention:

- Expansion of the Credit Reporting Office into a department
- Additional operational costs to be incurred by the three private credit reference bureaus due to expansion in data sources
- Costs to be incurred by three telecommunication companies and two Fintechs in complying with the submission of data under the Credit Reporting Act.

Cost estimates on the first item are based on field data, including interactions with the staff of the Credit Reporting Office and Collateral Registry of the Bank of Ghana. It covers overhead costs, human resources and operational cost. Based on interviews with the Bank, we consider an increase in the current staff strength at the Credit Reporting Office from 3 to 15. This would essentially entail upgrading the office to a department status. The second and third items are based on original implementation costs of XDS Data Ltd, the first credit reporting bureau in Ghana. The company provided a report of its implementations costs for 2011. We uprated these figures based on the GDP deflator for the period until 2018. Overall undiscounted costs came to about GHS 5.9m per year.

Benefits

The estimate of benefits is premised on the reduction in information asymmetry due to improvement in the amount and quality of credit information. This should lead to a reduction in the cost of lending, expansion in credit and reduction in the cost of borrowing for borrowers. Benefits are valued as total welfare, which is generated using standard consumer surplus equations. The consumer surplus accounts for both the reduction in the costs of borrowing (i.e. interest rate) for existing or counterfactual borrowers as well as the gain from expanding access to credit to individuals that would not have been given credit.

The current lending rate in Ghana is about 30 percent. According to the Banking Sector Report for 2018, total outstanding loans to the private sector was GHS 37.6 billion (Bank of Ghana, 2018). The share of non-performing loans to total loan value stood at about 0.182. This translates to a total value of non-performing loans (NPLs) of GHS 6.8 billion during this period. We assume the effect of expanding credit information will reduce NPLs by 1%. This is just about a tenth of the magnitude of the effect of CRBs on bank credit (Ibrahim & Alagidede, 2017). The cedi equivalent of this reduced effect is GHS 68 million. Thus, the reduction in interest rates is 0.2%, which is obtained by dividing 68million by 37.6 billion.

Based on the empirical evidence from Asongu et al. (2014) and Triki & Gajigo (2014), we calculate the effect of credit reference bureaus on private credit availability as 2.1%. Thus new credit made available due to the intervention would be GHS 788 million. The reduction in the interest rate due to the reduction in NPLs is calculated as a ratio of reduction in NPLs due to intervention to the total credit outstanding to the private sector. This is approximately 0.2%. Change in consumer surplus is therefore estimated as 0.2% * 37.6bn + 0.5 * 790m * 0.2% = GHS 69m.

6.6 Summary of Analysis and Discussion

The results in Table 4 indicate a total welfare estimate of GHS 69 million per year using consumer surplus equations. Total direct costs for the intervention is GHS 5.9 million per year. This brings the BCR to 12.

Table 4: Summary of costs and benefits

	Estimate
Direct benefits (Total welfare)	69
TOTAL BENEFITS (2018 GHS millions)	**69**
Cost of expansion of Credit Reporting Office	3.4
Total operation costs for CRBs and Telcos	2.4
TOTAL COSTS (direct) (2018 GHS millions)	5.9
BCR	**12**

The order of the magnitude of the BCR is sensitive to two key parameters: the level of reduction of NPL due to the intervention, as well as, the operational cost estimates for CRBs and the Telcos. As explained earlier, the latter is based on cost projections from actual implementation costs in 2011 of one of the three CRBs in Ghana. We rely on these estimates given that we could not obtain 2018 information. Beside the cost information, the results are most sensitive to the effect size of the reduction in NPLs. These effects are based on correlative studies with relationships estimated using ordinary-least squares regression. As with all such types of studies, caution is required when interpreting relationships since the direction of causality is uncertain and the potential for confounding is high. Robust evidence on this parameter should help improve the reliability of the estimates.

7. Reduce Electricity Tariff for Industry

7.1 Introduction

Electricity access rate in Ghana today stands at about 84 percent (World Bank, 2018). There are however significant differences in these rates for urban areas compared to rural areas. On average, urban areas have complete coverage (100 percent) whereas rural areas have a coverage of about 67 percent (Energy Commission, 2019). Per-capita electricity consumption rate in Ghana is higher than the SSA average. By the end of 2018, the total installed capacity for electricity supply stood at 4888.6 megawatts as against a dependable capacity of 4472.1 megawatts (Energy Commission, 2019). The peak demand for electricity supply is estimated at about 2,500 megawatts. This is expected to increase by about 140.68 megawatts or approximately 6 percent for the year 2019 (Energy Commission, 2019b). Over the medium term (2020 -2024), an additional 130 megawatts of electricity is projected to be needed to augment the national generating capacity in order to meet demand (under high growth scenario)

as well as the 18 percent reserve requirement. Projected peak demand is expected to climb to 4394 megawatts with dependable generating capacity increasing to about 5058 megawatts.

7.2 Recent Developments in Ghana's energy sector

In July 2018, the parliament of Ghana approved a concession agreement between the government of Ghana and the Manila Electricity Company, Meralco, for private sector participation in electricity distribution in Ghana. The agreement was part of a collaborative programme between the government of Ghana and the United States of America under the Millennium Challenge Compact II. Under the concession agreement, a new entity called the Power Distribution Services Ghana Limited, made up of a consortium of investors, was constituted. The consortium was supposed to take over the running of the Electricity Company of Ghana for a period of 20 years, starting from 1 February 2019. However, following the discovery of breaches related to demand guarantees issued by the consortium, the government of Ghana terminated the contract in October 2019. Despite excess capacity in the supply of electricity, firms face an uphill task in paying tariffs. The concerns about electricity stability and difficulties firms have with meeting tariff obligations are features in various rounds of business and industrial surveys in Ghana. These difficulties have been found to undermine firm productivity (see, for example, Abebrese, 2017). Jewell (2006) suggests that electricity tariffs could take up about 30 percent of the operational costs of an average firm. In some contexts, it leads to the closure of manufacturing firms (Akuru & Okoro, 2014).

7.3 Description of intervention

The intervention aims at providing subsidies or reducing the electricity tariffs payable by manufacturing firms and industry. While one approach is to raise costs on residential users, this is unlikely to be politically feasible. There are four categories of consumers in Ghana. These are residential, non-residential (commercial), Special Load Tariff (SLT) for industry and street lighting. We focus on SLTs.

7.4 Evidence on Electricity Supply and Industrialization

A number of studies examine the effect of electricity supply on economic development, at the macro and micro levels. In a study of 15 West African countries, Ouadrago (2013), finds a causal relationship between GDP and electricity consumption. In the short-run, the direction of causation is from GDP to electricity consumption. In the long-run, causality runs from

electricity consumption to GDP. In the case of Ghana, Adom (2011) however finds the direction of causality moving from long-run growth to electricity consumption.

The role of sustainable electricity supply in Ghana's industrialization efforts cannot be overemphasized. Equally important is the recognition that the performance of firms is sensitive to the level of prevailing electricity tariffs (Eifert, Gelb & Ramachandran, 2008). Data from the 2007 World Bank Enterprise Survey indicates that electricity ranks highest on the top ten constraints facing firms wanting to invest in Ghana. Using data from the Ghana Manufacturing Enterprise Survey covering the period 1991 to 2002, Abeberese (2020) finds that stable electrical supply (achieved through reducing the incidence of electricity rationing) increases firm investment. The author estimates decline in firm investment of up to about 50% (upper bound magnitude) following the electricity crisis that resulted in power rationing in 1998. Arlet, (2017) notes that electricity tariffs exert an adverse impact on small and medium scale enterprises compared to large firms.

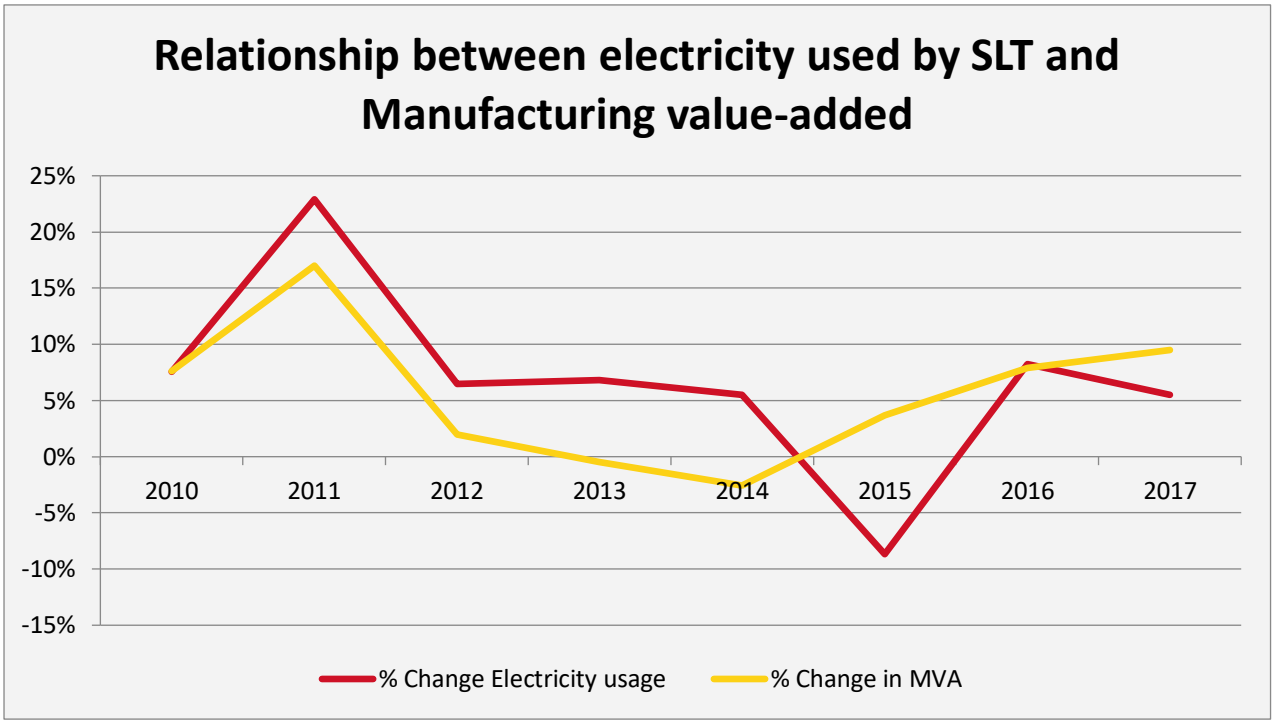
7.5 Cost-benefit analysis

In estimating BCRs, we assume a 10 percent reduction in average price of electricity for manufacturers and industry (SLT), excluding mines. Other key assumptions including the following:

- The elasticity of demand with respect to price for industry is -0.26 (based on historical data from the Ministry of Energy)
- The elasticity of output with respect to electricity in industry is 0.79 (excluding crisis years of 2014 and 2015 – see Figure 5)

Therefore, a 10 percent reduction in price is expected to increase the amount of electricity used by 2.6 percent. As a result, manufacturing value-added output is expected to rise by about 2 percent. Figure 5 shows a co-movement between change in electricity usage and change in manufacturing value-added.

Figure 5: Relationship between electricity used by SLT and manufacturing value-added



Costs

According to the July 2019 cost schedule from the Public Utilities Regulatory Commission (PURC), SLT rates for different kinds of consumers range from GHp 75 – 98 per kWh. Over the same period, the cost of generation and distribution was given as follows:

- Transmission: GHp 7.5 per kWh
- Distribution: GHp 31.0 per kWh
- Generation: GHp 45.2 per kWh

This brings the total cost of generation and distribution to about GHp 83.7 per kWh. The total cost for the intervention is then the subsidy value plus the value of additional electricity used. Total usage of electricity by SLT is 5046 gWh. Meanwhile, we assume a reduction in price of about 10 percent. According to PURC, 2019, average tariff paid by SLTs is 84.2 GHp/KWh (that is, average for low, medium and high voltage, excluding mines). The subsidy value then is given as:

= 10% * 5046 gWh * 84.2 GHp per kWh

= GHS 425m

To obtain the total cost of the intervention, we add the value of transfer (that is subsidy paid by the government) to the value of additional electricity used. This becomes:

= 425m + 109 GWh * 83.5 GHp

= 534m

Benefits

Total benefit from the intervention is calculated by adding the subsidy paid by the government to the estimated manufacturing value-added due to the reduction in tariffs. The subsidy value is same as estimated under 5.5.1. The estimated manufacturing value added is estimated using three key parameters calculated using data from the Ministry of Energy. The parameters include the elasticity of demand for electricity with respect to the price of SLT, the effect of electricity used by SLT on manufacturing value-added and the rate of reduction in price. Manufacturing value-added data for 2018 is obtained from the World Bank's World Development Indicators database. The value for 2018 is approximately GHS 29 billion.

Thus, the total welfare estimates for the intervention

= Value of transfer + Value addition

= 425m + 2.0% * 28bn

= GHS 987m

7.6 Summary and discussion

The total cost of reducing tariffs paid by manufacturing firms and industry (excluding mines) is estimated at GHS 534 million. The total welfare derived from the intervention sums up to GHS 987 million. This brings the estimated BCR to 1.8.

Table 5: Summary of costs and benefits

	Estimate
Subsidy received by firms	425
Manufacturing value add due to price reduction	562
TOTAL BENEFITS (2018 GHS millions)	**987**
The subsidy paid by the government	425
Cost of extra electricity used	109
TOTAL COSTS (2018 GHS millions)	**534**
BCR	1.8

A key limitation of the BCR estimate is the use of simple averages to obtain tariffs paid by SLT. The use of weighted averages will be ideal. We can only consider the latter alternative if we obtain accurate data on the different categories of SLT. Furthermore, verifying elasticity estimates from other sources would be an important value addition to the estimates.

8. Conclusion

This paper undertakes a cost-benefit analysis of six interventions that are designed to improve the productivity and profitability of firms in the industrial sector. The first intervention seeks to provide management training to local (non-multinational) factories with large turnovers (large firms). The second intervention is conceptually the same as the first, except that emphasis is on medium-sized firms. Generally, the type of management training required by a medium-sized firm to be profitable is not the same for large firms. The third intervention seeks to provide a capital grant to some selected microenterprises within the manufacturing sector in Ghana. The capital grant could be in the form of cash or in-kind grant. This is followed by the fourth intervention which seeks to appraise the return on doubling the current R&D spending of 0.4% while the fifth intervention facilitates the inclusion of additional information into the current credit referencing system. These additions include data from Fintechs, mining companies, wholesalers, court records and tax records. The sixth intervention aims at providing subsidies or reducing the electricity tariffs payable by manufacturing firms and industry.

Where possible our cost-benefit analyses draw on randomized controlled trials, allowing us greater confidence in the causal effects of the interventions. The results suggest that providing management training to local (non-multinational) factories with large turnovers (large firms) generated a BCR of 5.9. The total cost of the intervention is estimated at GHS 1.62M per year,

which is expected to generate total profit of GHS 2.1M for the first year. In the case of management training for medium-sized firms, a much higher BCR of 9.6 was obtained; with a total cost per firm of GHS 6,876 per year and expected total profits of GHS 70,985 per year. In terms of the capital grant for microenterprises, a BCR of 7.0 was obtained. An in-kind payment worth GHS 683 per firm is expected to accrue GHS 5,263 as profits to a typical microenterprise for three years.

An increase in R&D spending by 0.4 percent of GDP is expected to generate an average BCR of 0.7. This BCR was not obtained through a typical quantitative approach but approximated based on Ghana's likely rate of return and its distance from the technological frontier. It is interesting to note that expanding the activities of the current credit referencing system to include data from Fintechs, mining companies, wholesalers, court records and tax records, will generate a BCR of 11.7. This is intuitively obvious given the asymmetry information faced between lenders and borrowers and especially the high default rate. Finally, for the last intervention that sought to provide subsidies or reduce the electricity tariffs payable by manufacturing firms and industry, its estimate BCR is 1.8.

As discussed at length throughout this report, these BCRs are not estimated with precision. The use of RCTs ameliorates uncertainty to some degree, but even then there are some challenges in applying the studies to the current Ghanaian context. More research is needed.

Our results provide important information to decision-makers; first, the analysis suggests that specific interventions – management training and capital grants – targeting individual firms (at all sizes) are likely to have large benefits relative to costs. These interventions can be successful at increasing the profitability of local firms, and might create avenues for employment generation, complementing efforts at increasing economic growth. These findings are much aligned with the Ten Point Industrialization Strategy of Government and therefore provide very useful analytical information and policy direction for programme implementation. Second, expanding the information provided by credit reference bureaus may also be an effective use of funds. There is no doubt that credit constraints are a large impediment on growth. However, there is significant uncertainty around whether the intervention would have the impact suggested by this analysis, due to the lack of robust studies from which to draw from. That said, the central BCR is high and given the relatively low cost, it appears worth investigating further. The Bank of Ghana should speed up its proposed investment in CRB and educate the players within the financial sector as well as firms on the need to patronize the services of

Credit Reference Bureaus in the country. This may drive down lending rates and consequently increase access to credit at affordable cost.

Third, investing in R&D can yield positive returns of significant size. The investment required is large and so the BCR is modest at 1.5 to 1.75. Finally, and equally related to the need to reduce the cost of doing business is our findings that an electricity tariff reduction for firms yield high BCR. Access to stable power at reasonable cost will lead to increased output and employment. We therefore recommend that the government reduces some of the tariffs on electricity to firms, particularly if the costs need to be incurred anyway under the previously negotiated take-or-pay contracts. Supporting investments in reducing transmission losses and improving revenue collection would support this intervention.

9. Summary Table

Interventions	**Benefit per firm (GHS)**	**Cost per firm (GHS)**	**BCR**	**Quality of Evidence**
Management Training for large manufacturing enterprises	9,581,108	1,613,393	5.9	Limited
Management training for Medium-sized firms	65,726	6,876	9.6	Medium
Capital grant for micro enterprises	5,263	752	7.0	Medium
	Benefit per year (GHS, millions)	**Cost per year (GHS, millions)**		
Increase General R&D Spending	1800 (Rate of Return 0.5 – 0.7)	1200 (0.4% of GDP)	1.5 and 1.75	Limited
Credit Reference Bureau	69	5.9	11.7	Limited
Reduce Electricity Tariff for Industry	988	534	1.8	Limited

Notes: All figures assume an 8% discount rate.

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