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Impacts of a Micro-Enterprise Clustering Program on Firm Performance in Ghana

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Jörg Peters, Maximiliane Sievert, and Christoph Strupat¹

Impacts of a Micro-Enterprise Clustering Program on Firm Performance in Ghana

Abstract

Widely considered as an important backbone of economies in developing countries, micro- and small enterprises face several constraints in doing business in Ghana. The creation of industrial zones (IZ) with improved access to infrastructure and secured land tenure is a potential remedy to promote local economic development. In this paper, we assess the effects of an intervention on business performance that establishes or upgrades IZs for micro- and small enterprises in Ghana based on firm-level data on 227 enterprises. Lacking reliable baseline data and an appropriate control group, we use retrospective questions to reconstruct the situation before the intervention. Furthermore, in order to account for general changes in the local economic environment, we examine regional agricultural market development over time. The results show that the establishment of IZs leads to the creation of new firms, but for existing firms that relocated to the IZs the effects on firm performance are negative.

JEL Classification: O14, O22, L69

Keywords: Project evaluation; firm clustering; micro-enterprises

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1. Introduction

Micro- and small enterprises are widely considered as an important backbone of economies in developing countries. In Ghana, however, they face several constraints in pursuing their business activities. They operate in a difficult business environment with insecure land property rights and credit constraints and unreliable electricity access being among the major problems. In urban areas, enterprises often work in informal and overcrowded business areas and frequently suffer from insufficient space for their operation. The creation of industrial zones (IZ) with improved access to infrastructure and secured land tenure is a potential remedy to promote local economic development. Yet, such IZ barely exist and the existing ones do not have access to reliable electricity and other services.

In order to improve this situation, the *Program for Sustainable Economic Development in Ghana* (PSED), jointly implemented by the Ghanaian Ministry of Trade and Industry (MoTi) and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Directorate-General for International Cooperation of the Dutch Ministry of Foreign Affairs (DGIS), assists selected districts in Ghana to establish or upgrade IZs for micro- and small enterprises. The Industrial Zone Development component is part of the Dutch-German energy partnership *Energizing Development*.¹

During the first phase of the PSED-IZ project eight industrial zones (IZ) were supported between 2007 and 2009. The supported IZs are located in five regions - Brong Ahafo, Western, Ashanti, Central and Eastern Region. The major objective of the intervention is to improve the local economic development and, eventually, the performance of the micro-enterprises in the IZs. To this end, the IZs offer affordable land for rent or purchase to both already existing and newly created firms in towns in which micro-enterprises face massive land scarcity and existing informal business areas are overcrowded.

¹ The project is jointly financed by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Directorate-General for International Cooperation of the Dutch Ministry of Foreign Affairs (DGIS).

Furthermore, the IZs provide a service package including business management trainings, improved electricity supply, road access, water supply, and sanitary facilities. In addition to these externally provided services, it is expected that the IZs form clusters that enable enterprises to benefit from cooperation with other enterprises and provide an integrated service for customers. On the implementation level, GIZ cooperates closely with district assemblies and local business associations. District assemblies and local business associations contribute by providing land and additional infrastructure like roads, water supply, and sanitary facilities to the IZs.

The present study evaluates the effect of this intervention on the treated enterprises based on quantitative firm-level data on 227 enterprises from the car repair and manufacturing sector. The sample consists both of firms that relocated from existing informal business areas to the new IZs and firms that have been created in the new IZs. We look at four business performance indicators, namely number of customers, monthly sales, wage payments and firm profits. In addition, we examine intermediate impact indicators that reveal changes in the firms' economic activity. In particular, we look at employment, electricity usage, loan and business training take-up, and cooperation activities.

The identification strategy we pursue in this evaluation has to respond to very specific challenges: The baseline information collected in 2007 has proven to be not usable in a simple before-after comparison, because only a small sub-sample of enterprises that were surveyed before the treatment has actually relocated from the existing informal business areas to the newly created IZ. The straightforward suspicion that those firms that in fact relocated to the IZ differ substantially from those that stayed in the informal business areas was confirmed during field trips. The second best option would be to include a control group in order to conduct a cross-sectional comparison. A comparable region with enterprises comparable to those operating in the IZ, though, does not exist.

As a way out, the identification strategy relies on retrospective questions that are used to reconstruct the situation before the intervention and that is then used for a

before-after comparison. In other words, we only surveyed treated firms (i.e. without a control group) and elicited not only information on the current situation, but also on the situation before the relocation treatment.

A potential source of bias in this approach obviously is the change in the underlying macroeconomic situation: If, for example, the performance of the surveyed enterprises changes because of general economic growth or changing prices, this would be falsely attributed to the intervention in such a before-after comparison. In order to reduce this risk, we assessed the regional economic development and the enterprises' business environment by interviewing officials of local business associations, the district assemblies, and the regional office of the Ministry of Food and Agriculture (MOFA). With the collected information, we estimate the regional economic growth, which we take into account when examining changes in firm performance.

The remainder of this paper is organized as follows: Section 2 provides an overview on the literature background, Section 3 presents the empirical approach, Section 4 the results and Section 5 concludes.

2. Theoretical background and empirical literature

2.1 Theoretical background

Micro- and small enterprises, often operating in the informal sector, account for an important share of production in many developing countries and in some countries they employ 80% of the overall workforce. Yet, they have to deal with various constraints like (very) limited access to capital, markets and productive infrastructure that affect their development (BOOMGARD ET AL. 1992). It is sometimes argued that a share of them could contribute substantially to economic growth – if they were not limited by these constraints (GRIMM ET AL. 2012). Industrial clusters, in turn, are considered as important growth promoters, since they might help to overcome the various constraints faced by micro- and small enterprises and foster

economic growth to a significant extent in developing countries (RUAN AND ZHANG 2009, SONOBE AND OTSUKA 2006).

According to the seminal work of MARSHALL (1920), an enterprise that is located in a cluster can benefit from external economies because of its close location to suppliers, customers, and competitors. An enterprise cluster is defined as the geographical concentration of enterprises producing similar or closely related goods in a small area (SONOBE AND OTSUKA 2006). The transmission channels of cluster benefits can be defined according to KRUGMAN (1991) by three types of external economies: intermediate input effects, labor market pooling, and technological spillovers. *Intermediate input effects* are externalities associated with the higher availability of spare parts, raw materials, or specific services within clusters. This, in turn, leads to a reduction of transportation costs, as either input suppliers from other places relocate to the cluster or enterprises already operating in the cluster turn to become new input traders. Both kinds of supplier arise as a result of the high concentration of enterprises with similar demand for such intermediary inputs, making it profitable to offer inputs within a cluster.

Enterprises in clusters where skilled labor is attracted from other places may benefit from *labor market pooling*. Such pools of specific skills allow enterprises to upgrade their own skills and reduce their search costs for qualified workers. These sub-externalities can contribute to a higher efficiency in work processes and new products or services. The geographical concentration of suppliers, producers and traders within clusters may enhance the circulation of technological know-how and ideas. Such *technological spillovers* can facilitate innovations in the work process and probably increase enterprise productivity. In addition, as clustering makes it easier for infrastructure providers to offer services needed to support higher level technologies (e.g. electricity), these spillover effects increase the diffusion and the adoption of new tools and machines.

Beside the three main types of external economies identified by KRUGMAN (1991), MCCORMICK (1999) identifies *market access* as another positive externality of firm clusters, which is of particularly importance in developing countries. Clustered

enterprises that produce similar or closely related goods may attract customers and traders from more distant places, as they offer special products and services or demand lower prices compared to dispersed enterprises. Furthermore, enterprises can pool their distribution channels and achieve lower transportation cost. As a consequence of the improved market access, clustered enterprises could increase production and benefit from higher sales.

2.2 Empirical Literature

Many studies from the U.S. and European countries provide evidence that clustering has been especially important for employment growth in industrialized countries (HENDERSON 1997, COMBES 2000, BLIEN ET AL. 2006). Di LUCIO ET AL. (2002) also find positive productivity effects in Spanish enterprise clusters. For less developed economies, little empirical evidence on these mechanisms exists. VISSER (1999) finds positive effects on sales comparing small clustered manufacturing enterprises with dispersed ones in Peru. FAFCHAMPS AND EL HAMINE (2004) analyse the effects of enterprise clustering in the Moroccan manufacturing sector and find positive effects on enterprise growth and employment, but a negative effect on wages.

A negative association between clustering and output prices is shown by BIGSTEN ET AL. (2011) for manufacturing enterprises in Ethiopia, suggesting that new entry leads to higher competitive pressure in the cluster. In addition, they find a positive effect on productivity, but also show that there is no effect on firm's profitability, as the productivity and the price effects cancel each other out. Overall, they conclude that customers benefit most from clustering in Ethiopia. ALI AND PEERLINGS (2011) explore differences in profits between clustered and dispersed enterprises in both urban and rural areas in Ethiopia. Their findings indicate that in both areas average monthly profits are significantly larger for clustered than non-clustered enterprises, whereas urban clusters are more profitable than rural ones.

Beside the few empirical studies on enterprise clustering in developing countries, several case studies exist that try to explain qualitatively why enterprises that are

part of clusters tend to perform better than isolated ones (SCHMITZ 1999), or comparing cluster with different characteristics (MCCORMICK 1999, VAN DIJK AND SVERRISSON 2003). The most extensive qualitative analysis for Africa was conducted by MCCORMICK (1999). Using six case studies from Kenya, Ghana and South Africa, the study shows that small enterprises did not benefit from improved market access, labor market pooling and technological spillovers, only intermediate input effects in terms of the higher availability of spare parts and raw materials could be generated. From these findings she concludes that the small size markets, oversupply of labor and weak institutions prevent clustered enterprises from Africa to benefit from external economies.

3. Methods and Data

3.1. Identification Strategy

Most approaches in the usual portfolio of methods to approximate the counterfactual situation rely on the inclusion of a non-treated control group to which the treated firms are compared. Such a control group needs to fulfill certain requirements to make the underlying identification assumption hold: the control group basically is supposed to mimic the behavior of the treated firms in the absence of the intervention. In the present case, no group of firms could be found that meets this comparability requirement. We inspected the project areas and other potential study regions by field trips to contemplate two alternative control group options.

First, in all of the surveyed IZs a number of enterprises of similar sectors still operate in informal business areas. These firms might qualify as a control group. Yet, as moving to the IZ or not does not happen by chance, but rather reflects an active decision of the enterprise, these enterprises are suspected to be systematically different from those that moved to the IZ. In qualitative interviews we found that the motivation for staying in informal business areas was mostly based on what one might subsume as risk-aversion. These enterprises fear that they would lose customers if they move and do not believe that potential positive effects compensate

for this. Among those enterprises that moved to the new IZ, many had conflicts about land usage with the owner of the compound they were operating on and were, hence, virtually forced to relocate. Therefore, enterprises that have already relocated to the IZ can indeed be expected to systematically differ from those who stayed in the town center.

Second, we made an attempt to find informal business areas as control groups in other places of the Brong Ahafo region and examined two other towns (Dormaa and Kenyasi). Here, PSED-IZ was about to establish new IZs within a new phase of the project, which raised confidence that the informal business areas are comparable to the informal business areas in our treatment group regions. Yet, after visiting the two sites we had to abandon this idea. In Kenyasi, the process of relocating enterprises to a new IZ was already in an advanced stage and only few enterprises could still be found in the informal business areas. Dormaa, located in direct proximity to the Ivorian border, turned out to be strongly affected by the conflict in Cote D'Ivoire² because the vast majority of customers are vehicles on cross-border-transit. This customer flow had slowed down substantially and business activities of the visited enterprises were exceptionally low.

As an alternative to a control group, we apply a before-after comparison to estimate the impacts on enterprise performance and compare outcome indicators of treated enterprises at the time of the survey to the value of outcome indicators before the respective enterprise has moved to the IZ. The next challenge was that the baseline data collected in the informal business areas in 2007 (see PETERS, SIEVERT, AND VANCE 2011) could not be used, since most of the enterprises interviewed for this baseline have not relocated to the new IZs.³ Therefore, we approximate the situation before

² The presidential elections in 2010 with former president Gbagbo not accepting his electoral defeat resulted after month of negotiations in the outbreak of an armed conflict between followers of Gbagbo and his challenger Ouattara. The crisis was only solved by April 2011 when pro-Ouattara forces backed by the UN and French forces captured and arrested Gbagbo. To support the transition process, UN peacekeepers and French military are still present in Cote D'Ivoire (CIA 2012).

³ We find 14 enterprises that were interviewed in 2007 and also relocated to the new IZs, but most of these enterprises already operated in the new IZs during the time of the baseline survey, making it impossible to assess the situation before the relocation.

the enterprises had moved to the IZs by retrospective questions. While this, of course, raises suspicions about potential biases and inaccuracies in the retrospectively elicited information (which we discuss in the following), the trivial advantage of a before-after approach is that classical selection-into-treatment biases do not occur.

The principal underlying identification assumption is that, in absence of the IZ treatment, the enterprises would perform today as they had done before moving to the IZ. If this assumption holds true, all changes in enterprise performance over the time can be attributed to the relocation to the IZs. However, this assumption is easily violated, for example, if the general economic situation has changed since the relocation and if this change also has affected the outcome indicators. If we do not account for these general economic changes, we would falsely attribute the increase or decrease of enterprise performance to the intervention. In order to deal with this threat, we elicited information on the development of local production and prices of the most important crops. The agricultural sector is the most important income source in the surveyed areas and, therefore, also drives demand for products and services offered by enterprises in the IZ. This enables us to estimate the direction of the general local economic development. In order to investigate the extent and the direction to which our before-after impact can be suspected to be biased, we consider this development when examining the observed changes in firm performance triggered by the intervention.

With respect to the retrospective nature of our before-information, a potential source of bias is a systematic misreporting of respondents (see also DEATON AND GROSH 2000). If, for example, all enterprises systematically understate the before-situation or overstate the after-situation to express their gratitude for the GIZ intervention, this would lead to an overestimation of the impact. Respondents might even not misreport on purpose, but be biased in their retrospective perception and provide information on the before-situation that is better or worse than it actually was. While

misreporting is always a threat to surveys that rely on self-reported indicators, these psychological effects pose a higher risk to our retrospective approach.

In order to detect systematic misreporting we use different cross-checks. For starters, we do not only ask for exact numbers in indicators, but also for tendencies. For example, the number of customers is first elicited directly: “How many customers did this enterprise have each week today and before moving to the industrial zone?” Second, we ask for a qualitative judgment: “Compared to the actual situation has this enterprise had more/less/the same number of customers than before moving to the industrial zone?” The answer to this second question can either be used directly as a categorical outcome variable, but also to verify the accuracy of the exact first question.

In addition, the structure of our questionnaire reduces the risk of systematic misreporting by separating the block of retrospective questions on the before-situation from those on the current situation. The block of questions on the actual situation is placed at the beginning of the questionnaire, while all retrospective questions can be found at the end. Altogether, we find a high level of accuracy in our data with, for example, most answers on exact numbers (e.g. number of customers) are confirmed by the discrete ones (e.g. more/less/same number of customers). Furthermore, qualitative focus group discussions and feed-back received from the enumerators do not hint at any systematic intentional misreporting out of gratitude or other reasons. Since the general attitude towards GIZ is good (but neither euphoric), we neither have reason to believe that respondents understate today’s performance nor overstate the before performance in order to “harm” the GIZ project. Therefore, we do not expect systematic misreporting to bias our results to a substantial extent.

Although we are quite confident that respondents do not systematically misreport, we expect the retrospective data to be less accurate. This does not bias the results, but the data becomes noisier leading to high standard errors, which might make it more difficult to detect effects by obtaining significant results – if there are any effects.

3.2. Survey Design

The present evaluation includes three IZs in which GIZ had terminated its activities before the survey. The three IZs are located in district capitals; Techiman, Berekum, and Goaso in the Brong Ahafo Region in mid-western Ghana (see Figure 1).

Figure 1: PSED intervention areas



Source: Own illustration based on EIU 2008

In addition, enterprises in these three IZs had already been operating for a sufficient time. Firms had relocated between 2007 and 2011. Next to these relocated firms (which had already existed before in informal business areas), a number of enterprises had been newly created in the new IZ. Therefore, we use the terms *start-up firms* and *relocated firms* in the following. According to the monitoring list provided by GIZ, in July 2011 around one third of the enterprises in the IZs are start-ups with the rest being relocated firms.

In total, the IZs host 456 enterprises. Between September and October 2011, we interviewed 250 firms using a structured questionnaire covering all important aspects of their economic activities. We excluded 23 firms that live on the same compound where they operate their business, as business and household expenditures could not be clearly distinguished by the business owners. Thus, our sample consists of 227 firms. We focus on car repair services and manufacturing firms that, together, represent almost 80 percent of all enterprises in the IZs. The excluded enterprises are small restaurants and shops selling spare parts and raw materials that are quite different in terms of their working process from the surveyed sectors.

During a preparation mission in September 2011 the methodology including the questionnaires was finalized and four enumerators were trained. The enumerators had already been involved in other monitoring activities of the GIZ intervention. After two days of in-class training, pre-tests were conducted in order to familiarize enumerators with the application of the questionnaire as well as to check the feasibility and the completeness of the questionnaire. One of the authors stayed on the ground to supervise the implementation of the survey and to conduct qualitative interviews.

The retrospective before-after comparison, obviously, can only be applied for the relocated firms. The performance of start-up firms is crucial to assess the overall volume of activities in the IZs. Since the first part is more prone to inaccuracies due to the retrospective approximation of the before-situation, we oversampled relocated firms in order to obtain more information and, hence, increase the precision of estimates. We oversampled relocated firms in a way that we end up with 35 percent of start-up firms and 65 percent of relocated firms. The oversampling is compensated during data analysis by weighing all start-up enterprises by the factor 1.44.⁴

⁴ After correcting for business closure between the last monitoring in July 2011 and the survey in September 2011, the shares of relocated and start-up enterprises turn out to be 52 percent and 48 percent.

4. Findings

4.1 Regional Macroeconomic development

One critical assumption of a simple before-after identification approach is that the investigated indicators are not systematically affected by changes in the general economic situation in the surveyed regions. Therefore, in this section we assess the macroeconomic development of the surveyed districts. More than 90 percent of relocated firms have moved to the IZ within the last four years. Hence, we focus the macro-economic analysis on this period of time.

The business performance of the surveyed enterprises in all of the three intervention areas are clearly influenced by the agriculture-based economy and its seasonality. Most firms indicate the harvest season of cocoa, maize, cassava and plantain from September to December as high demand months. During the planting season from May to August most enterprises experience less demand and many apprentices leave for working in the agriculture sector. We assess the regional development for the districts of Techiman and Berekum, where 95 percent of the surveyed enterprises are located. In order to quantify the development of the agriculture-based economies for the last four years, we use the annual production of some major cash crops (maize, yam, cassava, and plantain) multiplied with the inflation adjusted local prices to approximate economic growth, disaggregated for both districts.⁵ For cocoa, figures are not available on the town level, but only aggregated for the Brong Ahafo region.⁶

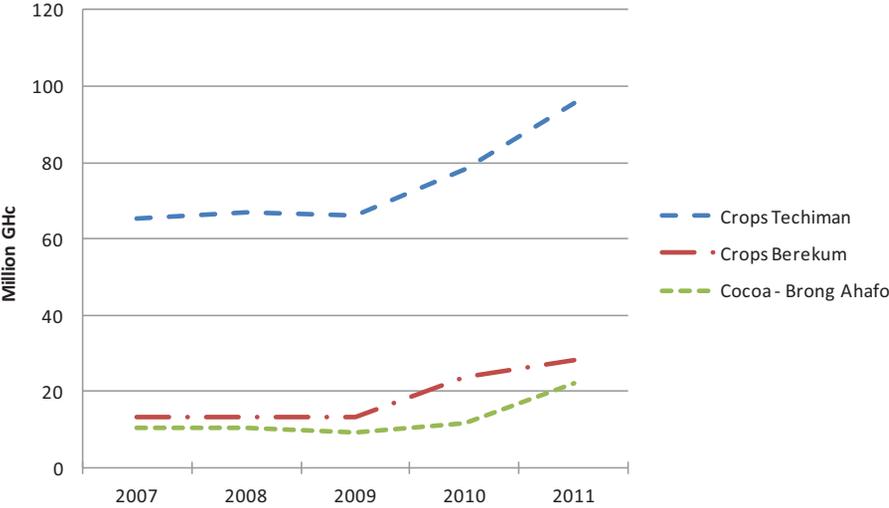
As depicted in Figure 2, since 2009 we can observe an upward trend for the agricultural economies of both towns. The difference in the two lines shown in Figure 1 do not reflect a difference in agricultural activity, but the fact that Techiman has five times as much arable land than Berekum. Based on these calculations, the agricultural economy of Techiman grew on average by 11 percent between 2007 and

⁵ We received Crop production data from the Statistics, research and information department (SRID) of the Ministry of Food and Agricultural (MOFA), which was prepared for a GIZ Crop Insurance Feasibility Study in 2010. We obtained the information on monthly market prizes for the last four years from the regional MOFA office in Sunyani.

⁶ Numbers on the market value of cocoa for the last four years in Brong Ahafo were provided by the regional cocoa board in Sunyani.

2011, while Berekum grew by 24 percent. We can observe a similar development for cocoa on the level of the Brong Ahafo region as for the other crops.

Figure 2: Inflation-adjusted market value of major cash crops



Source: Own calculations

These findings suggest that the local macroeconomic before-situation in 2007 was clearly different to the one in 2011. This has to be taken into account given that we are lacking a control group in our identification approach that would otherwise account for such general economic developments. In addition, since the relocation date of relocated firms is spread across four years (2007-2011), it has to be taken into account that the before-situation is not the same for all firms in the sample. At the time of the survey, 90 percent of firms had already worked for at least one year in the IZs.

4.2 Business Environment in the Industrial Zones

For starters, we undertook several key interviews with officials of the business associations and members of the district assembly. The major aim of these interviews was to assess the availability of various business relevant services like micro-finance or electricity, the quality of the road network and prizes of plots in the IZs.

The IZ in Berekum is located along the main road to Cote D'Ivoire. All plots in the IZ are either rented or sold to firms and have access to roads. Most of these roads are washed out by the rain, making it difficult in the rainy season to enter the zone. In most parts of the IZ electricity is available. All needed spare parts and raw material are available in the IZ and one micro-finance institution opened an office two years ago.

In Techiman only one third of the IZ's area is used by enterprises with the remaining two third being vacant. In order to obtain a plot in the IZ it is required to become a member of a local business association called EUREKA. The IZ is located at the highly frequented main road to Burkina Faso that has recently been rehabilitated. Roads are in a good condition and the electricity grid is available in most parts of the IZ. Only few spare part and raw material dealers operate in the zone so that most firms buy inputs in the town center. A major problem for further growth of the IZ is that many enterprises operating in informal business areas refuse to relocate. A reason for this lies in the fact that those enterprises still working in the old informal areas belong to a different business association that is in intense rivalry with the EUREKA association. In addition, many enterprises in town, especially mechanics, fear to lose walk-in customers if they relocate to the EUREKA IZ. Virtually all firms still favor being in the town center, where all transit vehicles arrive.

In Goaso, the smallest IZ in our sample, only 15 firms are in operation, while most parts of the IZ are vacant. All plots have access to non-paved roads, many of them insufficiently prepared for the rainy season and the hilly environment, making it impossible for cars to enter the IZ after heavy rain falls.

In structured interviews we asked respondents for why they relocated to the IZ or for the driving factor for creating a firm in the case of start-ups. It is striking to see that the dominating factor in both groups is the availability of land. Among start-up firms, almost 100 percent name this as the most important reason why they have created the firm after establishment of the IZ. But also the vast majority of relocated firms (80 percent) confirm this as the major reason to move to the IZ. These findings

are in line with the perceived problems that the enterprises indicated before relocating or starting in the IZs (see Table 1). Almost 80 percent name the limited access to land as a problem.

Table 1: Perceived problems before relocating or starting the enterprise (multiple answers possible)

| Problems | Relocated | Start-up | Total |
|-----------------------|------------------|-----------------|--------------|
| Scarce land | 77% | 85% | 79% |
| Security | 50% | 61% | 54% |
| Lack of cooperation | 47% | 64% | 53% |
| Access to electricity | 50% | 51% | 51% |

The background of this is that the existing informal business areas are overcrowded. Land property rights are unclear in many cases leading to conflicts between entrepreneurs and alleged land owners, making it impossible to open a new business without the steady risk of a sudden business closure. Apparently, the establishment of the new IZs has removed this bottleneck. The lack of electricity, security, and cooperation activities were additional constraints before relocating to the IZs.

4.3 Intermediate outcomes

Next to the provision of available land to create the business or expand activities, the usage of different services provided in the IZ is expected to positively affect firm performance. Table 2 summarized the take-up of different service types in the IZs. Furthermore, it displays intermediate outcomes on the employment level.

In fact, Table 2 shows that most services provided in the IZs are more intensively used than before the relocation. The only substantial and also significant increase is the one for business training, which is systematically provided in the IZs. The training program of GIZ-PSED, which is uniquely available for enterprises in the IZs, focuses on sustainable production methods and developing basic business skills like business records keeping. Other complementary training programs offered by the government are available for all enterprises (IZ and informal business areas). The

share of firms that use loans increases only slightly. The share of firms that are connected to the electricity grid even goes down, as some enterprises report that they had shared a connection to the electricity grid with the neighbor's compound before the relocation. Since they do not necessarily require electricity for their business in the IZ, they abstain from getting an own connection in their new lot. Nonetheless, more firms use appliances now. The most common appliances are welding equipment, drilling machines, filing machines, grinding machines, battery charger, and spraying machines. All run on gas, carbide, or electricity. Table 2 shows that, beside the use of business trainings, there are no stark differences between start-ups and relocated firms in the take up of services.

For relocated firms, the number of workers declined substantially, which is mainly due to a decrease in apprentices. In several cases, former apprentices started their own businesses in the new IZs. This especially happened in Berekum, where land scarcity precluded apprentices to create a firm before. The reduction of workers is thereby partly the result of a positive development, as many senior apprentices are able to leave their former masters and create their own enterprises. In Techiman and Goaso the creation of start-ups was only moderate and seems not to be the reason for the reduction of workers. Probably, a deterioration in firm performance leads to the reduction of workers in these IZs, which we will examine in the next section.

Table 2 : Intermediate outcomes

| | Before relocation | Relocated | | | Start-up 2011 | Difference between Relocated and Start- up enterprises | |
|--------------------------------|----------------------|-----------|-------------|---------|------------------|--|---------|
| | | 2011 | Differences | p-value | | Differences | p-value |
| Connection status (in %) | 62.6 | 59.7 | -2.9 | 0.62 | 56.83 | 2.9 | 0.27 |
| Appliance usage (in %) | 54.7 | 58.3 | 3.6 | 0.42 | 51.1 | 7.2 | 0.29 |
| Number of appliances | 2.19 | 2.5 | 0.3 | 0.88 | 2.15 | 0.3 | 0.19 |
| Loan usage (in %) | 19.6 | 21.7 | 2.1 | 0.66 | 15.9 | 5.8 | 0.28 |
| Business training usage (in %) | 19.4 | 59.1 | 39.7 | 0.00 | 32.9 | 26.2 | 0.00 |
| Average working hours | 59.3 | 57.7 | -1.6 | 0.37 | 59.7 | -2.0 | 0.17 |
| Number of workers | 6.9 | 3.0 | -3.9 | 0.00 | 2.3 | 0.7 | 0.12 |

The firm clustering literature mostly refers to different types of cooperation between firms which, in turn, is expected to improve firm performance. In Table 3 we therefore look at some indicators for cooperation: we asked respondents if they cooperate with other firms in purchasing raw materials or in using equipment. Furthermore, we asked if they share know-how with other firms or if they apply jointly for loans. The results show that, while no increase in sharing equipment and joint raw material purchases can be observed, cooperation in terms of know-how exchange and joint loans increases substantially.

Table 3: Percentage of cooperating enterprises for different activities (multiple answers)

| | Before relocation | | | | 2011 | | | |
|------------------|-----------------------|-----------|-----------|------|-----------------------|-----------|-----------|-------|
| | Raw material purchase | Equipment | Knowledge | Loan | Raw material purchase | Equipment | Knowledge | Loan |
| Relocated | 17.1 | 96.2 | 79.2 | 4.7 | 13.9 | 92.6 | 91.2 | 17.2 |
| Start-up | - | - | - | - | 26.7 | 92.1 | 94.7 | 12.01 |

A pre-condition for expanding business activities is access to markets (for manufacturing firms) and new customers (for service and manufacturing firms). Only if new customers can be found for new products, the increase in business potentials can also translate into higher sales and, ultimately, improved firm performance. As an indicator for market access we look at where enterprises in the IZs sell their products.

As Table 4 shows, integration with external markets is very limited for enterprises in the IZs. Only very few sell their products to customers outside of the IZ. The low figure for car repair firms is straightforward given that they can hardly sell their services outside the firm compound. A few car repair firms, though, specialized on specific parts of the engine and axle that frequently break and are fixable at the roadside. In addition, respondents were asked whether they know where their products are consumed in the end. The vast majority declares that their goods are

consumed in the region and only few believe that the final destination of their products is outside the town or district.

Table 4: Where enterprises sell their products (distance in km from shop)

| | | Before relocation | | | | 2011 | | | |
|------------------|---------------|-------------------|------|--------|--------|------|------|--------|-------|
| | | Shop | 5 km | 5 - 50 | | Shop | 5 km | 5 - 50 | |
| | | | | km | >50 km | | | km | 50 km |
| Relocated | Manufacturing | 73.3 | 20.0 | 6.7 | 0.0 | 86.7 | 0.0 | 13.3 | 0.0 |
| | Car repair | 100.0 | 0.0 | 0.0 | 0.0 | 95.8 | 0.8 | 3.4 | 0.0 |
| | TOTAL | 96.1 | 2.2 | 1.7 | 0.0 | 95.7 | 0.7 | 3.6 | 0.0 |
| Start-up | Manufacturing | - | - | - | - | 88.9 | 11.1 | 0.0 | 0.0 |
| | Car repair | - | - | - | - | 97.5 | 0.0 | 2.5 | 0.0 |
| | TOTAL | | | | | 95.6 | 2.3 | 2.3 | 0.0 |

4.4 Impacts on firm performance

We look at the indicators *number of customers*, *monthly sales*, *wage payments*, and *firm profits* and compare the before and the after situation to analyze the impact of the IZ treatment on firm performance. *Wage payments* were calculated by multiplying the number of workers with the monthly average labor compensation. Firm profits were calculated by subtracting all running expenses from monthly average sales. In most cases, these profits will be equivalent to the owner's income. For start-ups, there is – as a matter of course – no before situation. Here, we evaluate if the entrepreneurs would have started their business without the establishment of the IZs. In case the establishment of the IZs in fact was a pre-condition for entrepreneurs to start their own business, the firm creation of start-ups as well as their generated income can be considered as an impact of the treatment. In fact, all start-ups indicate that access to land was the most important factor for their creation, as land property rights in informal business areas were unclear and land in general was scarce in all of the surveyed towns. As a consequence, plots in town were often not affordable for young entrepreneurs. Most of all in Techiman's overcrowded informal business areas, it was impossible to start an enterprise. Accordingly, 60 percent of all start-up enterprises in the IZs report that they would not have opened a business at all if the

IZs had not been established. This indicates that most of the created labor and profits can be attributed to the IZ intervention.

Table 5 presents results of regression analysis for the four firm performance indicators: *Number of customers, monthly sales, monthly wage payments* and *monthly profits*. We employ a fixed-effect model to estimate the average changes in these indicators. The first two columns show the changes for relocated enterprises. As most of the business volume of start-up enterprises can be attributed to the IZ intervention, we also include start-ups in our regression analysis and set their before values to zero (since they had not existed before operating in the IZ). Columns three and four present the development of start-up enterprises in terms of the four performance indicators. Finally, we present average changes in the business performance for the total sample, relocated and start-up enterprises, in the last two columns.

In the first column we present the estimates of a univariate specification in which we only include a dummy that indicates the difference before and after the relocation. We find a significant loss of customers for all relocated enterprises, which translates into a statistically significant reduction of monthly sales and profits. Monthly profits are reduced on average by 97 GH¢ after moving to the IZs. Monthly wage payments also decline due to the decrease of workers. These negative impacts on firm performance reflect the difficult business situation for relocated enterprises in Techiman and Goaso, facing intense competition from enterprises still operating in town. Most of these competing enterprises operate close to the town centers where all transit traffic passes by. These favorable business locations make it difficult for the relocated enterprises to compete with them and may induce the loss of customers and the decrease in profits after the relocation. The situation is slightly different in Berekum. Here, the rapid increase of start-ups confronts already established enterprises with more intense competition, which leads to the loss of customers and a reduction of profits.

This simple univariate specification does not yet account for the general economic development (since there is no control group). Hence, in a second specification we try to correct for the regional macroeconomic development by including a variable that reflects local agricultural market values (see Section 4.1). As shown in the second column, the effect of relocation becomes worse compared to the univariate model. This reflects the fact that parts of the negative effect of relocating to the IZ is compensated by the improvements in the general economic situation. This development – as it has nothing to do with the IZ intervention – is netted out by accounting for the regional agricultural market values.

In the third and fourth columns we look at the development of start-up enterprises in the IZs. Here, the before-after dummy indicates the difference in firm performance between the time before they had started their business in the IZ and the time of the survey. Since these enterprises had not operated before the creation in the new IZ, their before values are zero and accordingly the performance indicators show significant benefits for start-ups from their establishment in the IZ. However, the before-situation concerning profits is not easily assessable with our data, since we do not have exact information on income of start-up firm owners before opening the enterprise in order to calculate profits net of former income. As some of the start-up owners had been paid workforce of relocated enterprises before, we only can state that the monthly labor compensation of 53 GHC paid before the relocation is partly included in the start-up profits afterwards.

In column 4 we again include the regional agricultural market values which cancel out parts of the benefits.

The last two columns present average changes in the business performance for the total sample (relocated and start-up firms). If we do not include the regional agricultural market values the difference in the before and the after situation for the number of customers is positive, but not statistically significant (see column 5). In fact, qualitative examinations in the field underpin the impression that relocated firms suffer from a movement of customers towards the newly founded start-ups.

Many start-up owners, especially in Berekum are former apprentices that compete with their former masters by attracting customers with lower prices. Therefore, the positive but statistically insignificant coefficients of the before-after dummy indicate that the additionally served customers of start-ups cancel out on average the loss of relocated enterprises. Monthly sales and profits are only slightly negative and not statistically significant, suggesting that business activities have slowed down only slightly in general in the IZs, but most importantly have spread over a higher number of firms. For monthly wage payment we find a significant overall reduction of wage payment. The reason for this is that the overall workforce in the before situation still included the apprentices that now are owners of the start-ups. Hence, parts of the loss in monthly wage payments are compensated by the created profits of start-up firms.

In order to see to which extent start-up enterprises absorb the loss of profits in the relocated enterprises, we look, in a next step, at the overall volume of business activities by calculating sums for the different indicators of all firms in our sample (see Table 6). The averages across the firms in our sample in Table 5 do not reveal this. As our sample is representative for the manufacturing sector of the new IZs, we use for this purpose the averages provided in Table 5, multiplied by the absolute number of firms in our sample to obtain the total number of customers, sales, wage payments, and profits.

Table 5 : Regression results for all firm performance indicators (*p*-values in parentheses)

| Dependent Variables | Relocated | | Start-up | | Total | |
|------------------------------|--------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Number of customers | | | | | | |
| Before-after dummy | -5.08 (0.000) | -12.83 (0.000) | 9.06 (0.000) | 8.88 (0.001) | 0.55 (0.535) | -3.55 (0.229) |
| log Reg. Market Value | | 12.86 (0.018) | | 0.30 (0.944) | | 6.83 (0.123) |
| Number of observations | 266 | | 174 | | 440 | |
| Monthly sales | | | | | | |
| Before-after dummy | -166.81 (0.000) | -202.91 (0.039) | 156.41 (0.000) | 111.41 (0.002) | -19.43 (0.190) | -71.44 (0.251) |
| log Reg. Market Value | | 60.48 (0.653) | | 75.05 (0.230) | | 70.25 (0.428) |
| Number of observations | 252 | | 176 | | 428 | |
| Monthly wage payments | | | | | | |
| Before-after dummy | -164.50 (0.000) | -202.21 (0.034) | 101.71 (0.000) | 73.18 (0.004) | -56.52 (0.016) | -66.74 (0.251) |
| log Reg. Market Value | | 63.22 (0.667) | | 50.50 (0.351) | | 17.49 (0.851) |
| Number of observations | 215 | | 146 | | 361 | |
| Monthly profits | | | | | | |
| Before-after dummy | -141.91 (0.000) | -253.6 (0.105) | 98.38 (0.000) | 72.83 (0.004) | -32.15 (0.114) | -80.23 (0.295) |
| log Reg. Market Value | | 19.77 (0.887) | | 41.95 (0.371) | | 46.64 (0.575) |
| Number of observations | 226 | | 167 | | 393 | |

Note: Monthly sales, wage payment and profits are inflation-adjusted by using the Consumer Price Index of the World Bank (2012).

As can be seen in Table 6, the totality of relocated firms has 661 customers less than before, and has experienced a decrease in sales of around 17,500 GHC and in profits of around 13,300 GHC. If we do not take into account the general economic development, the inclusion of the absolute number of start-up firms and their customers overcompensates the loss of the relocated firms. Monthly sales are almost compensated, while monthly wage payments and profits are clearly smaller than in the before situation. If we use the average numbers from Table 5 that account for the

regional agricultural market value, all firm performance indicators turn to be clearly negative.

Table 6: Changes in firm performance – Total numbers

| | No control for Regional Market Value | | | Control for Regional Market Value | | |
|------------------------------|--------------------------------------|----------|----------|-----------------------------------|----------|-----------|
| | Relocated | Start-up | Total | Relocated | Start-up | Total |
| Number of customers | -661.1 | 779.0 | 117.9 | -1,667.9 | 763.4 | -767.0 |
| Monthly sales | -17,515.1 | 13,764.1 | -3,750.0 | -21,305.6 | 9,804.1 | -13,787.9 |
| Monthly wage payments | -13,982.5 | 5,899.2 | -8,082.4 | -17,187.9 | 4,244.4 | -9,543.8 |
| Monthly profits | -13,339.5 | 7,772.0 | -5,562.0 | -23,838.4 | 5,753.6 | -13,879.8 |

5. Conclusion

Altogether, this impact study has shown that the clustering of firms by establishing and upgrading Industrial Zones (IZs) does not necessarily translate into positive impacts on the firm performance of clustered enterprises. The net effect across all relocated enterprises working today in the IZs is clearly negative. This is first of all due to the fact that the new availability of land in the IZs enables new entrepreneurs to start-up a business, which, in turn, increases competition for the firms that relocated to the IZ. While this is clearly a problem for the individual firm that relocates to the new IZ, from an economic perspective it bears the potential of improving productivity. The increase in competition can be expected to identify the more promising firms that can innovate to survive under competitive pressure (PORTER 1990).

Another particularity of the set-up under research is problematic for the firms in the IZ: The relocation of enterprises to the new IZs was not effectuated consequently. While it had been first announced that enterprises operating in the old informal business areas would be removed in succession, this has not happened and many firms simply decided to stay in these areas. This, in turn, again increases competition for the firms in the new IZs, in particular, because many customers obviously prefer

enterprises in the town center. In addition, most clustering effects increase with the number of firms that are working in the cluster. The reluctance of many firms in the informal business areas implies that the new IZs are constructed for a larger number of firms and, consequently, are in parts sparsely populated. This suggests that in comparable set-ups in which policy makers intend to trigger positive clustering effects by establishing new IZs, a more consequent implementation should be aspired.

In Techiman and Goaso, rivalries between the business associations are responsible for the deferred implementation. Political representatives and project staff assured that this situation would be solved in the future and it can be expected that it takes a turn to the better for the relocated enterprises. In order to circumvent this fundamental problem in the future, feasibility studies are necessary that carefully investigate the local business situation including political and social relationships between groups of enterprises before a new IZ is chosen for intervention. The studies should clearly focus on the question if within a reasonable period of time all or at least a critical number of enterprises will relocate to the industrial zone.

In Berekum the increase of start-ups along with declining prices due to the intensified competition is first of all positive, since customers benefit from a greater choice and lower prices. Furthermore, one might think of increasing specialization thanks to the increasing number of enterprises. This, however, is not the case as the senior apprentices often establish enterprises offering exactly the same service as their former masters.

From a methodological point of view, the caveat of our approach is of course the vulnerability of before-after comparisons to distorting secular changes and of retrospective questions to different types of biases in the respondents' answers. However, the consistency of the quantitative data in itself and also as compared to complementarily collected qualitative information is quite convincing. Although the level of values should be interpreted with care, the approach has nonetheless shown that with a mix of quantitative and qualitative methods and meticulously collected

survey data it is possible to establish a coherent picture and to draw interesting conclusions in spite of an unorthodox retrospective identification approach. At least one can conclude that the magnitude of the negative effects we find makes it unlikely that they are fully due to biased answers, also as there is no reason to expect any clear distortion in one direction. As outlined in the methodological section, we have found no indication for reasons why firms should understate their current situation without also understating the before-situation.

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