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# Firm Survival and Change in Ghana, 2003-2013

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**Abstract**

How did Ghanaian manufacturing firms change in the period between 2003 and 2013? This paper presents results from a survey of 1000 firms in Ghana, conducted in 2013, which were randomly selected from the 2003 Ghanaian National Industrial Census. This survey allows us to track survival and exit of firms between 2003 and 2013. We find strong regional differences and also differences for small, medium and large firms. The exit rate of firms in Kumasi, the second city, is lower than in Accra, but the growth rate of firms in Kumasi was also lower. Small firms were more likely to exit than large firms. Overall, the picture we paint of manufacturing in Ghana is not a positive one: total employment by firms operating before 2003 decreased from 134 863 in 2003 to 74 319 in 2013. It remains a question to what extent this was compensated by new employment by firms that entered after 2003, who were not surveyed. We also consider the firm size distribution evolution, and show that selection plays some role in explaining the positive correlation between firm size and age, but that this is less strong than in earlier studies.

**Keywords:** Firm survival, Firm growth, Ghana, Firm size, Firm size distribution, Selection

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# 1 Introduction

The Ghanaian economy has been characterised by important changes over the last few decades: high levels of GDP growth, an IMF reform process that led to many changes in policy, increases in consumption expenditure, the discovery and production of oil, and a rise of the service industry. Traditionally about a tenth of Ghanaian output was produced in the manufacturing sector, but this has been declining in recent years. Previous research has documented the lacklustre performance of manufacturing firms during the 1990s and early 2000s (Teal et al. 2006). In this paper we explore whether this trend continued in the last ten years. To do this we use a follow-up survey conducted in 2013 on manufacturing firms first interviewed as part of the 2003 National Industrial Census. This allows us to create a two wave panel data set of 1000 manufacturing firms.

In this research we focus on two indicators, *firm survival* and *firm employment changes*, and describe how different types of firms have performed over time. The picture our analysis paints is not a positive one – the firms we study have generally performed poorly over the last ten years, with high rates of exit and shrinkage of surviving firms. We also use the data to explore whether the evolution of the firm size distribution in Ghana is explained by growth, selection or entry (Cabral and Mata, 2003; Sandefur 2010) and we find some evidence that selection played a role here. Our work cannot speak to the importance of entry since we did not collect data on new firms that were born between 2003 and 2013. Previous research has shown, however, that entry may be an important and under researched contributor to the evolution of the firm size distribution in Ghana.

This paper makes a contribution to the literature by describing patterns of Ghanaian firm growth and survival between 2003 and 2013, and considering the factors that are correlated to firm survival. In particular, this paper contributes to the literature on firm size distributions (Cabral & Mata 2003, Luttmer 2007), and provides some insight to whether Ghana is facing a "missing middle" (Tybout 2000, Hsieh & Olken 2014). A recent literature has emphasized the role of management in firm survival and growth (Bloom & Van Reenen 2010, Bloom et al. 2014). Our paper provides some evidence that ownership and management matters: personal circumstances of owners and managers can be crucial for the survival of firms, in particular small ones.

The paper is structured as follows: Section 2 provides some background on the Ghanaian economic environment and discusses some earlier studies on Ghanaian manufacturing. Section 3 describes the survey and provides some main descriptive statistics.

Section 4 presents the evidence on firm exit and survival and explores the self-reported reasons for exit. Section 5 focuses on firm growth and decline and considers the role of selection and growth on the overall firm size distribution. Finally, Section 6 concludes.

# 2 The economic environment

The Ghanaian economy has recently exhibited high growth levels: according World Bank figures, between 2003 and 2012 the average percentage was 7.5 per cent. During this time the composition of the economy has also seen some considerable changes: the contribution to the gross domestic product by the service industry has been growing significantly, with an average annual growth rate of 12.94% between 2003 and 2012. Services constituted 50.0 percent of value added in 2012, while in 1990 this was only 38.1 percent.

Industrial output has also been growing considerably, but this growth has mainly been achieved in other industrial sectors than the manufacturing sector. The manufacturing sector has been growing by 3.3 per cent, while other industrial sectors, such as mining, water production and construction have grown by 9.1 per cent on average between 2003 and 2013. This means that the relative share of the contribution of the manufacturing to GDP has declined, from 9.8% in 1990 to 6.9% in 2012. Most of this decline seems to have happened after 2007. Household and government consumption has risen by 5.6% on average in the same time, indicating that Ghanaian manufacturing has profited less from this increase than other sectors.

Previous reports on the state of manufacturing firms have shown a sector that has not been growing much, despite several regulatory changes, such as trade liberalization and exchange rate reforms, which should have made it easier to compete (see e.g. Sutton & Kpentey, 2012, for a discussion of sector-specific policy measures). Teal et al. (2006) show results from firm surveys indicating that output by manufacturing firms fell between 2000 and 2003. Managers interviewed as part of this survey indicated that difficulties in accessing credit and raw materials and taxation were among the reasons why they could not grow further.

**Table 1. Share of sectors in value added (as a percentage of GDP).**

| | 1990 | 1995 | 2000 | 2005 | 2010 | 2012 |
|---|---|---|---|---|---|---|
| Agriculture | 45.1 | 42.7 | 39.4 | 40.9 | 29.8 | 22.7 |
| Manufacturing | 9.8 | 10.3 | 10.1 | 9.5 | 6.8 | 6.9 |
| Other industry | 7.0 | 16.5 | 18.3 | 18.0 | 12.3 | 20.5 |
| Services | 38.1 | 30.6 | 32.2 | 31.6 | 51.1 | 50.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Source:* World Bank Development Indicators.

The distribution and selection of firms within an economy has been widely studied, in both developed and developing countries. A particularly relevant question is what factors drive firms out of business. Frazer (2005) studies exit of Ghanaian manufacturing firms and how this relates to firm productivity. Frazer finds that low firm productivity is a good predictor of firm exits. The size and age of the firm also seem relevant in predicting whether a firm continues to operate or not: large firms and older firms are less likely to exit. The former can be explained by a simple model where firm growth is dependent on success: a less successful firm is less likely to grow, but also more likely to fail. An explanation for the latter might be that characteristics that helped to prevent exit in the past help prevent exits in the present as well, causing older firms to be more likely to survive. Trade models of firm selection, such as Melitz (2002) might predict that exporting firms are less likely to exit, as predominantly successful firms are able to become an exporter, but Frazer does not find evidence for this in Ghana. The importance of firm productivity on firm exits seems to challenge earlier studies done in sub-Saharan Africa, such as Liedholm, McPherson and Chuta (1994), who emphasize personal circumstances playing a role in at least a quarter of exits, but who do not consider productivity due to a lack of data.

Söderbom, Teal & Harding (2006) also focus on the relation between productivity and selection. They find, on the basis of firm surveys in Ghana and several other African countries, that efficiency concerns matter especially for larger firms. For small firms being productive does not prevent a firm from going out of business. This might indicate the important role of other considerations, such as personal circumstances, in the case of small enterprises.

The second question is how firms change over time, conditional on them surviving. Sandefur (2010) focuses on this question and finds that apart from firm exits, the firm size distribution of firms operating in both 1988 and in 2003 did not change much: "big firms were born big". This leads to the conclusion that industrial change in Ghana can primarily be explained by firm entry and exits, and that little in-firm growth seems to exist. This differs from results from for example firm studies done in other countries, e.g. Portugal (Cabral & Mata 2003). We take up this issue in Section 5.

# 3 Survey description

In 2013 a total of 1000 firms located in five locations (Accra, Tema, Kumasi, Sekondi-Takoradi and Cape Coast) were sampled from the 2003 Ghana National Industrial Census (NIC), conducted by the Ghanaian Statistical Service. Stratification was used and was based on firm size, firm age, region and sector, to make sure that firms with a wide range of characteristics were included. In total 135 strata were used (see table 2 for the breakdown of the factors determining the stratification). To account for the diversity of firms, sampling weights were adjusted on the basis of the variance of firm size in each stratum. This led to oversampling of certain strata, while others were undersampled. As can be seen in table 2, large and old firms have a much higher probability of being included in the final sample, while young and small firms have a lower probability of being included. Practically all large firms (with more than 75 employees) in the area sampled were included in the final sample.

The survey was conducted between August and November 2013. Attempts were made to interview each firm from the sample. In case the firm was operating, a questionnaire similar to the 2003 National Industrial Census was conducted, asking for main indicators on employment and firm productivity. In case a firm no longer was operating, enumerators attempted to find a former manager or representative of the firm and conduct a questionnaire with exit-specific questions. In case no former manager or representative could be found, a family member or neighbour was interviewed instead. In all cases where the main firm questionnaire was not undertaken, the enumerator was asked to record basic information on the firm, such as whether the firms was still operating or not, whether a firm sign was still present, and in case no interview was undertaken, what the reason was for this. The 2013 survey allowed the creation of a two wave panel of 1000 firms, some of which survived and some of which either died or were untraced.

Table 3 shows the results of our attempts to trace 1000 firms. 45% of the firms were found and interviewed whilst another 12% were found and were operating but refused to participate in the survey. 21% of the firms had exited whilst no trace was found of 22% of the firms. This last group is likely to be mainly exits but could also include firms that moved (although the enumerators did try and trace firms that were known to have moved within the city in which they were located). Table 3 also shows that the survey was less successful in finding and interviewing firms in Accra, small and young firms. Large firms, those in the "Other" sector and those in Accra and Takoradi were more likely to refuse.

**Table 2. Main summary statistics of the firms from the 2003 National Industrial Census, the sampled area and the sample of the survey.**

| | In 2003 National Industrial Census | | Sampling area | | Sampled | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| **Region** | | | | | | |
| Greater Accra (incl. Tema) | 6654 | 25.1 | 6655 | 59.2 | 579 | 57.9 |
| Kumasi | 3374 | 12.8 | 3374 | 30.0 | 304 | 30.4 |
| Sekondi-Takoradi * | 855 | 3.2 | 855 | 7.6 | 90 | 9.0 |
| Cape Coast * | 355 | 1.3 | 355 | 3.2 | 27 | 2.7 |
| Other | 15237 | 57.6 | - | - | - | - |
| **Sector** | | | | | | |
| Food & Beverages | 4257 | 16.1 | 913 | 8.1 | 132 | 13.2 |
| Textiles, garments & footwear | 11620 | 43.9 | 5359 | 47.7 | 299 | 29.9 |
| Wood & furniture | 6085 | 23.0 | 2416 | 21.5 | 215 | 21.5 |
| Machinery & metal | 2133 | 8.1 | 1266 | 11.3 | 135 | 13.5 |
| Other | 2381 | 9.9 | 1284 | 11.4 | 219 | 21.9 |
| **Age** | | | | | | |
| Founded 1999-2003 | 13499 | 51.0 | 5942 | 52.9 | 344 | 34.4 |
| Founded 1989-1998 | 9432 | 35.6 | 3923 | 34.9 | 377 | 37.7 |
| Founded before 1988 | 3348 | 12.7 | 1330 | 11.8 | 254 | 25.4 |
| Unknown | 197 | 0.7 | 43 | 0.4 | 25 | 2.5 |
| **Size** | | | | | | |
| Small (0-9 workers) | 22375 | 84.5 | 9394 | 84.6 | 386 | 38.6 |
| Medium (10-74 workers) | 3733 | 14.1 | 1619 | 14.4 | 392 | 39.2 |
| Large (more than 75) | 367 | 1.4 | 225 | 2.0 | 222 | 22.2 |

*Source:* own calculations. *Sekondi-Takoradi and Cape Coast were treated as one region in the stratification

**Table 3: Firm status in 2013 by 2003 characteristics.**

| | Found and Interviewed | Exit | Untraced | Operating but refusal |
|---|---|---|---|---|
| All Firms | 42.8 | 21.2 | 22.2 | 13.8 |
| **Region** | | | | |
| Greater Accra | 37.3 | 21.4 | 24.2 | 17.1 |
| Kumasi | 51.0 | 17.4 | 23.7 | 7.9 |
| Sekondi-Takoradi | 46.7 | 28.9 | 8.9 | 15.6 |
| Cape Coast | 55.6 | 33.3 | 7.4 | 3.7 |
| **Sector** | | | | |
| Food & Beverages | 35.6 | 25.8 | 16.7 | 22.0 |
| Textiles, garments & footwear | 44.1 | 20.7 | 31.8 | 3.3 |
| Wood & furniture | 42.3 | 23.7 | 27.0 | 7.0 |
| Machinery & metal | 52.6 | 14.8 | 16.3 | 16.3 |
| Other | 39.7 | 20.5 | 11.4 | 28.3 |
| **Age** | | | | |
| Founded 1999-2003 | 39.1 | 21.8 | 37 | 2.1 |
| Founded 1989-1998 | 50.0 | 24.2 | 15.6 | 10.2 |
| Founded before 1988 | 36.5 | 14.9 | 8.1 | 40.5 |
| **Size in 2003** | | | | |
| Small (0-9 workers) | 35.5 | 24.7 | 28.5 | 11.4 |
| Medium (10-74 workers) | 48.0 | 18.8 | 21.8 | 11.4 |
| Large (more than 75) | 45.7 | 19.7 | 13.8 | 20.9 |

*Note:* Numbers reported in this table are percentages. Row percentages sum to 100%. The data are unweighted. *Source:* own calculations.

# 4 Firm survival and exit

In this section we discuss survival and exit patterns between 2003 and 2013, and show how these differ between regions and sectors. Furthermore, we present the reasons for exits, as reported by the respondents.

## *4.1 Patterns of survival and exit*

Table 4 shows correlates of two measures of firm exit: exit measure 1 excludes firms that were not found whilst exit measure 2 assumes that firms that were not found actually exited. Weights increase the contributions of small firms to any statistics since these firms were less likely to be sampled whereas large firms had a selection probability close to one.

**Table 4. Correlates of firm exit.**

| | **Exit measure 1** (excluding firms not found) | | **Exit measure 2** (treating not found as exit) | |
|---|---|---|---|---|
| | no exit | exit | no exit | exit |
| **Region** | | | | |
| Greater Accra (incl. Tema) | 61.1 | 38.9 | 36.7 | 63.3 |
| Kumasi | 77.5 | 22.5 | 53.6 | 46.4 |
| Sekondi-Takoradi | 67.7 | 32.3 | 55.5 | 44.5 |
| Cape Coast | 53.1 | 46.9 | 52.3 | 47.7 |
| **Sector** | | | | |
| Food & Beverages | 61.6 | 38.4 | 44.6 | 55.4 |
| Textiles, garments & footwear | 63.6 | 36.4 | 38.6 | 61.4 |
| Wood & furniture | 66.4 | 33.6 | 39.8 | 60.2 |
| Machinery & metal | 79.8 | 20.2 | 64.8 | 35.2 |
| Other | 66.6 | 33.4 | 51.3 | 48.7 |
| **Age** | | | | |
| Founded 1999-2003 | 59.9 | 40.1 | 36.7 | 63.3 |
| Founded 1989-1998 | 75.2 | 24.8 | 51.3 | 48.7 |
| Founded before 1988 | 68.1 | 31.9 | 52.8 | 47.2 |
| **Size in 2003** | | | | |
| Small (0-9 workers) | 64.8 | 35.2 | 40.1 | 59.9 |
| Medium (10-74 workers) | 71.6 | 28.4 | 60.1 | 39.9 |
| Large (more than 75) | 83.9 | 16.1 | 77.2 | 22.8 |
| **All firms** | **66.6** | **33.4** | **43.7** | **56.3** |

*Note:* Exit measure 1 excludes firms not found from the analysis whereas exit measure 2 assumes firms not found exited. The data are weighted, and hence the figures are different to those reported in Table 3. Source: own calculations. *Source:* own calculations.

Using the first measure of exit firms located in Accra and Cape Coast, smaller firms and younger firms are more likely to have exited between 2003 and 2013. By this measure around one third of the firms from the 2003 sample had exited ten years later. However if we assume, as in the second measure of exit variable, that firms that could not be traced also

exited then around 56% of firms had exited after ten years. This also makes some difference to the other results reported above: Accra firms are now unambiguously more likely to have exited than firms from the other regions whilst the smallest firms were much more likely not to be traced and therefore have much higher rates of exit.

**Table 5. A linear probability model of exit.**

| Dependent variable: | **Exit measure 1** (excluding firms not found) | **Exit measure 2** (treating not found as exit) |
|---|---|---|
| Kumasi | -0.157*** | -0.156*** |
| | (0.0523) | (0.0478) |
| Sekondi-Takoradi | -0.0486 | -0.180** |
| | (0.0830) | (0.0777) |
| Cape Coast | 0.0495 | -0.162 |
| | (0.134) | (0.124) |
| Textiles & Garments | -0.0270 | 0.00707 |
| | (0.0868) | (0.0754) |
| Wood & Furniture | -0.0216 | 0.0588 |
| | (0.0914) | (0.0800) |
| Machinery & Metal | -0.166* | -0.203** |
| | (0.0913) | (0.0870) |
| Other sector | -0.0479 | -0.0788 |
| | (0.0963) | (0.0876) |
| Medium size firm (10-74) | -0.0257 | -0.137*** |
| | (0.0424) | (0.0391) |
| Large size firm (75+) | -0.184*** | -0.316*** |
| | (0.0526) | (0.0491) |
| Founded 1989-1998 | -0.138*** | -0.110** |
| | (0.0530) | (0.0468) |
| Founded before 1988 | -0.0577 | -0.0762 |
| | (0.0708) | (0.0632) |
| Constant | 0.500*** | 0.718*** |
| | (0.0861) | (0.0738) |
| Observations | 778 | 1,000 |
| $R^2$ | 0.063 | 0.089 |

*Note:* Reference (omitted) categories are firms located in Accra, in the food and beverage sector, with 0-9 employees and younger than 4 years old in 2003. Standard errors in parentheses. Significance levels are: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *Source:* own calculations.

Table 5 reports the results of a simple linear probability model of exit. Using the measure of exit that excludes firms not traced column 1 shows that firms located in Kumasi, the largest firms, firms in the middle age category (5-14 years old in 2003) and machinery and metals firms were less likely to exit than other firms. Column 2 assumes that firms that were not traced exited. Accra now stands out as being the location most likely to be

correlated with exit, suggesting that tracing firms was more of an issue here than in Takoradi or Cape Coast. Small firms are now much more likely to have exited than large or medium sized firms, implying that small firms were more likely not to be traced. This differential exit rates for small and medium or large firms is a pattern that has been documented more widely in sub-Saharan Africa (see e.g., Van Biesebroeck 2005).

### *4.2 Self-reported reasons for firm exit*

Table 6 shows reasons for exit amongst the 191 of 212 exiting firms that provided a reason for exit (firms that were not found are not included in this analysis). Circumstances of the owner accounted for around a third of all reasons for exit given- such as illness, retirement, moving to another region or country etc. Falling demand and loss of land, buildings or equipment each account for just under 20% of exits whilst around 20% responded that they did not know why the firm had exited (if the owner, a manager or a worker could not be traced a neighbour was asked).

**Table 6. Reasons given for exits by respondents.**

| Reasons for exit | Weighted Percentage |
|---|---|
| **Illness or death of owner or manager** | 12.3 |
| **Set up other business, merged firm or found wage employment elsewhere** | 7.1 |
| **Owner moved** | 13.6 |
| **Falling demand** | 19.4 |
| **Increased competition from imports** | 3.6 |
| **Increased competition from local competition** | 1.5 |
| **Increased costs** | 4 |
| **Loss of building, land or equipment** | 16.7 |
| **Debt or credit problems** | 1.5 |
| **Managerial problems** | 0.2 |
| **Don't Know** | 19.7 |
| **Refused** | 0.6 |
| **Total:** | 100 |

*Note:* The respondents were either former managers, owners or workers of the firm, or if they could not be found, a neighbour or family member. *Source:* answers from the exit questionnaire.

Table 7 breaks down reasons for exit by firm size. Circumstances of the owner, decreasing demand and loss of land, buildings and equipment are more likely to be given as a reason for exit amongst small firms compared to large firms. Large firms were more likely to have exited due to increased costs than small firms and this was the most common amongst large firms. That small firms are more likely to exit due to circumstances of the owner accords with the work of Liedholm, McPherson, and Chuta (1994), who found this in their survey of smaller firms (fewer than 50 employees) in several African countries. Teal, Söderbom and Harding (2006) find that selection on efficiency is a more important determinant of exit amongst large firms than small firms. If rising costs imply lower efficiency then the fact that Table 5 shows a high fraction of large firms exiting due to increased costs suggests that our results accord with those of Teal et al. (2006).

**Table 7. Breakdown of exit reasons by firm size.**

| Reason for exit | 0-9 employees | 10-74 employees | 75+ employees | All |
|---|---|---|---|---|
| **Illness or death of owner or manager** | 12.3 | 12.8 | 3.9 | 12.3 |
| **Set up other business, merged firm or found wage employment elsewhere** | 7.9 | 2.9 | 3.9 | 7.1 |
| **Owner moved** | 14.4 | 9.9 | 3.9 | 13.6 |
| **Falling demand** | 20.1 | 16.5 | 3.9 | 19.4 |
| **Increased competition from imports** | 3.3 | 4.5 | 7.9 | 3.6 |
| **Increased competition from local competition** | 1.3 | 2.3 | 3.9 | 1.5 |
| **Increased costs** | 3.7 | 4.1 | 25 | 4 |
| **Loss of building, land or equipment** | 16.6 | 18.4 | 3.9 | 16.7 |
| **Debt or credit problems** | 1.3 | 2.9 | 3.9 | 1.5 |
| **Managerial problems** | 0 | 0.9 | 3.9 | 0.2 |
| **Don't Know** | 19.3 | 21.3 | 31.6 | 19.7 |
| **Refused** | 0 | 3.4 | 3.9 | 0.6 |
| **Total** | 100 | 100 | 100 | 100 |

*Note.* The data have been weighted.

# 5 Firm growth and decline

The next question we address is what happened to the firms that survived? This section presents evidence on firm growth and decline and again, shows that there are regional and industry differences in the evolution of surviving firms. Furthermore, we focus on the question what the selection and growth patterns meant for the overall firm size distribution and focus in particular on the performance of "young" firms (founded between 2000 and 2003), to give some idea how young firms performed in the Ghanaian manufacturing sector over the last decade. Finally, we consider the changes in aggregate employment by the firms in our sample and show that total employment by the firms in our sample dropped by 45 percent.

## *5.1 Patterns of growth and decline*

Table 8 explores the patterns of growth and shrinking amongst the firms that survived and were traced. The first part of the table shows that 54.0 percent of the surviving firms shrank, and that 34.9 percent grew.[2] Including exits, refusals and not found firms about 14.0 percent of the firms in the 1000 firm sample grew, 21.6% shrunk, 21.1% exited, 33.1% were not traced and 5.7% were operating but refused to be interviewed.

Focusing on the surviving firms Table 9 explores correlates of growth and decline. Firms in the "Other" sector (e.g. chemical products) were more likely to grow than those in other sectors. Textiles and Wood were the two worst performing sectors. Conditional on survival firms in Accra and Takoradi were more likely to grow than firms in Kumasi. Firms in Cape Coast performed terribly with only six percent of firms reporting more employment than in 2003! Younger firms were more likely to grow than older firms whilst the smallest and largest firms were more likely to grow.

Table 10 shows similar analysis but including exits, refusals and untraced firms. An important point to highlight is that large firms had a high refusal rate.

[2] Firm size is measured as the number of persons engaged, and includes both paid and unpaid workers. This is the same definition as used by Sandefur (2010) for his analysis of firm growth and selection between 1989 and 2003.

**Table 8. Firm status.**

| For continuing firms | Number | Percentage | Weighted percentage |
|---|---|---|---|
| Shrunk | 256 | 62.9 | 54.0 |
| Same Size | 31 | 7.6 | 11.1 |
| Grew | 120 | 29.5 | 34.9 |
| **Including exits and refusals** | | | |
| Not found | 222 | 22.2 | 33.1 |
| Exit | 212 | 21.2 | 21.1 |
| Refusal, but still operating | 159 | 15.9 | 5.7 |
| Shrunk | 256 | 25.6 | 21.6 |
| Same Size | 31 | 3.1 | 4.5 |
| Grew | 120 | 12.0 | 14.0 |

**Table 9. Changes in firm size.**

| Sector | Shrunk | Same Size | Grew | Total |
|---|---|---|---|---|
| Food & Beverages | 46.8 | 12.6 | 40.5 | 100 |
| Textiles, garments & footwear | 61.9 | 11 | 27.2 | 100 |
| Wood & furniture | 56.4 | 7.6 | 36 | 100 |
| Machinery & metal | 45.1 | 13.8 | 41.1 | 100 |
| Other manufacturing | 41.9 | 12.5 | 45.6 | 100 |
| **Location** | | | | |
| Greater Accra | 49.6 | 10.1 | 40.3 | 100 |
| Kumasi | 62.6 | 11.2 | 26.2 | 100 |
| Takoradi | 50.7 | 1.2 | 48.1 | 100 |
| Cape Coast | 36.3 | 57.8 | 5.9 | 100 |
| **Age group** | | | | |
| Founded 1999-2003 | 51.2 | 13.2 | 35.6 | 100 |
| Founded 1989-1998 | 51.9 | 10 | 38.2 | 100 |
| Founded before 1988 | 68.3 | 8.3 | 23.4 | 100 |
| **Size group** | | | | |
| Small (0-9) | 48.4 | 13.2 | 38.4 | 100 |
| Medium (10-74) | 74.1 | 4.9 | 20.9 | 100 |
| Large (75+) | 58.4 | 1.9 | 39.7 | 100 |
| **Total** | **54** | **11.1** | **34.9** | **100** |

*Note:* The data is weighted. The "same size" category includes all firms that experienced an increase or decrease in employment of less than 5%. Firm size is measured as the number of "persons engaged" with the firm, and includes both paid and unpaid workers.

**Table 10. Firm status.**

| Sector | Untraceable | Exit | Refusal | Shrunk | Same Size | Grew | Total |
|---|---|---|---|---|---|---|---|
| Food & Beverages | 27.6 | 27.8 | 7.1 | 17 | 5.4 | 15.1 | 100 |
| Textiles, garments & footwear | 39.4 | 22.1 | 3.9 | 21.3 | 3.8 | 9.5 | 100 |
| Wood & furniture | 40.1 | 20.2 | 3.8 | 21.1 | 2.9 | 11.9 | 100 |
| Machinery & metal | 18.8 | 16.4 | 9.5 | 23.7 | 7.7 | 23.8 | 100 |
| Other | 22.9 | 25.8 | 12.9 | 16.5 | 4.2 | 17.6 | 100 |
| **Location** | | | | | | | |
| Greater Accra | 39.9 | 23.4 | 5.7 | 15.5 | 3.4 | 12.2 | 100 |
| Kumasi | 30.9 | 15.5 | 6.7 | 29.6 | 4.8 | 12.5 | 100 |
| Takoradi | 18 | 26.5 | 4.1 | 25.7 | 0.4 | 25.2 | 100 |
| Cape Coast | 1.4 | 46.3 | 4.4 | 17.5 | 27.9 | 2.5 | 100 |
| **Age group** | | | | | | | |
| Founded 1999-2003 | 38.7 | 24.6 | 4.9 | 16.3 | 4.4 | 11.1 | 100 |
| Founded 1989-1998 | 31.7 | 16.9 | 6.5 | 24 | 4.1 | 16.8 | 100 |
| Founded before 1988 | 22.5 | 24.8 | 7.9 | 30.3 | 3.9 | 10.7 | 100 |
| **Size group** | | | | | | | |
| Small (0-9) | 38.1 | 21.7 | 4.1 | 17.7 | 4.7 | 13.6 | 100 |
| Medium (10-74) | 16.1 | 23.8 | 10.3 | 37.8 | 2.3 | 9.6 | 100 |
| Large (75+) | 8 | 14.8 | 43.5 | 21.3 | 0.4 | 12 | 100 |
| **Total** | **34.4** | **21.9** | **5.8** | **20.6** | **4.2** | **13** | **100** |

*Note:* The data is weighted. Same size includes all firms that did not change employment by more than 5%.

### *5.2 The evolution of the firm size distribution and the "missing middle"*

The next question is what these patterns of selection and growth mean for the evolution of industry, and in particular for the firm size distribution. The firm size distribution and its evolution can give us insights into which dynamics influence industrial change. Cabral & Mata (2003) compared the firm size distribution in Portugal of a cohort of young firms over time and showed that industrial evolution was mainly caused by within-firm growth. In a study on older firm-level data from Ghana, Sandefur (2010) showed that there was actually little evidence for within-firm growth: firms that were small in 1988 remained small in 2003, and the big firms operating in 2003 were already big in 1988. Changes in the firm size distribution were caused by selection effects. Hsieh and Klenow (2014) also showed that within-firm growth was negative in formal Indian firms and that selection effects were stronger even than in the US.

In the literature constraints to firm growth have been argued to be one of the reasons why there is a "missing middle" in developing countries, an underrepresentation of medium

size firms (Tybout 2000).[3] In this section we will consider the overall firm size distribution, look at how firm age affects the firm size distribution and finally consider the growth and selection patterns of young firms (those founded between 1999 and 2003).

Figure 1 shows the overall firm size distribution of the firms in the four cities surveyed. The figure also includes a best fit of the log-normal distribution, based on the firm size distribution in 2013. We find some evidence for a "missing middle" in the sense that firms in the medium-sized categories are underrepresented compared to the log-normal distribution and there is an overrepresentation of larger firms. Just like Hsieh & Olken (2014) we do not find evidence for bimodality in the firm size distribution.

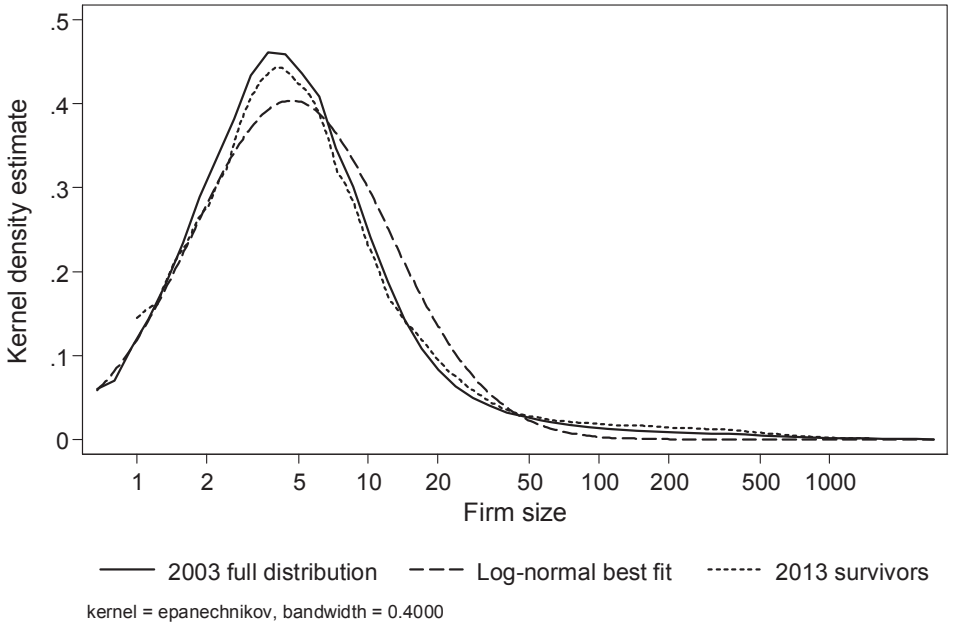


**Figure 1.** The overall firm size distribution of all the firms in 2003, the log-normal best fit distribution and the overall firm size distribution of the surviving firms in 2013. Firm size is defined as the number of persons engaged with the firm. *Note:* 2013 includes only 401 surviving firms with positive employment. Weights are applied.

[3] As Hsieh & Olken (2014) argue, a "missing middle" is an exaggeration, as there are indeed medium-sized firms operating and we do not see strong signs of bimodality. In a reply, Tybout (2014) argues that the term "missing middle" does not relate to a bimodality in the firm size distribution, but to an underrepresentation compared to an "undistorted" distribution. Theoretically it has been argued that this "undistorted distribution" should resemble a Pareto distribution (see e.g. Luttmer 2007).

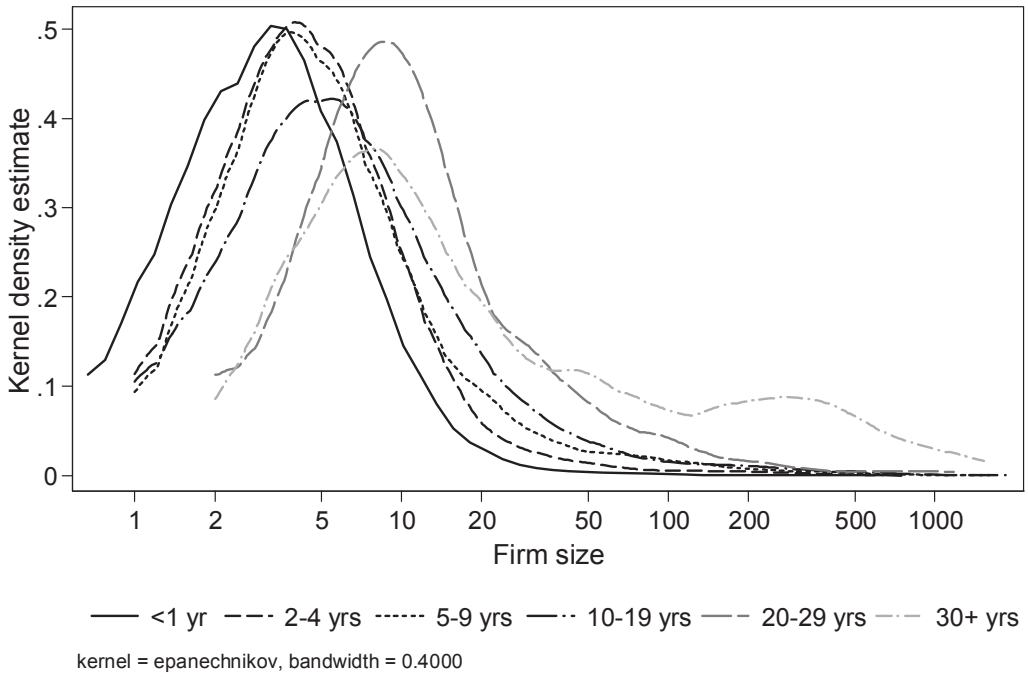


**Figure 2.** Cross sectional relationship between age and size in 2003. The data is weighted. The age refers to the age of the firm in 2003.

Figure 2 shows the firm size distributions of several cohorts of firms. This figure shows a positive relation between size and age: older firms are larger than younger firms. Some bimodality is present in firms founded before 1973: there is a clear chunk of large firms with between 150 and 1000 employees.

### *5.3 The evolution of entrants*

Our survey did not collect information on entry of firms after 2013, since only firms from the 2003 industrial census were revisited. We can therefore not make any claims what happened to entrant firms founded after 2003. However, we can have a look at young firms in 2003 and see how they fared in the time period 2003-2013 to explore whether growth or selection is responsible for the evolution of the firm size distribution. Figure 3 shows the firm size distribution of firms founded between 2000 and 2003, both in 2003 and 2013. The 2003 firms are further split out in the firms that survived until 2013 (the survivors) and the firms that did not survive until 2013 (the non-survivors).

We can use Figure 3 to replicate the test for growth and selection suggested and tested by Cabral and Matta (2003) for Portugal, and later implemented in Ghana by Sandefur (2010). This test involves comparing (1) the firm size distribution at the initial measure point

with (2) the firm size distribution of firms "destined to survive" at the initial measure point (i.e. excluding firms that exited) as well as (3) the firm size distribution of the surviving firms at the final measure point. By comparing these distributions, we can attribute changes to the firm size distribution within a cohort to growth and selection. Comparing distribution (2) with distribution (3) gives an idea of the role of firm growth, as both distributions follow the same group of firms that did not exit in the measured time period. Comparing distribution (1) with distribution (2) gives an idea of selection, as both distributions relate to the same (initial) point in time, but to a different group of firms: distribution (1) includes both surviving and exiting firms, while distribution (3) only includes the firms that survived up to the final measure point.

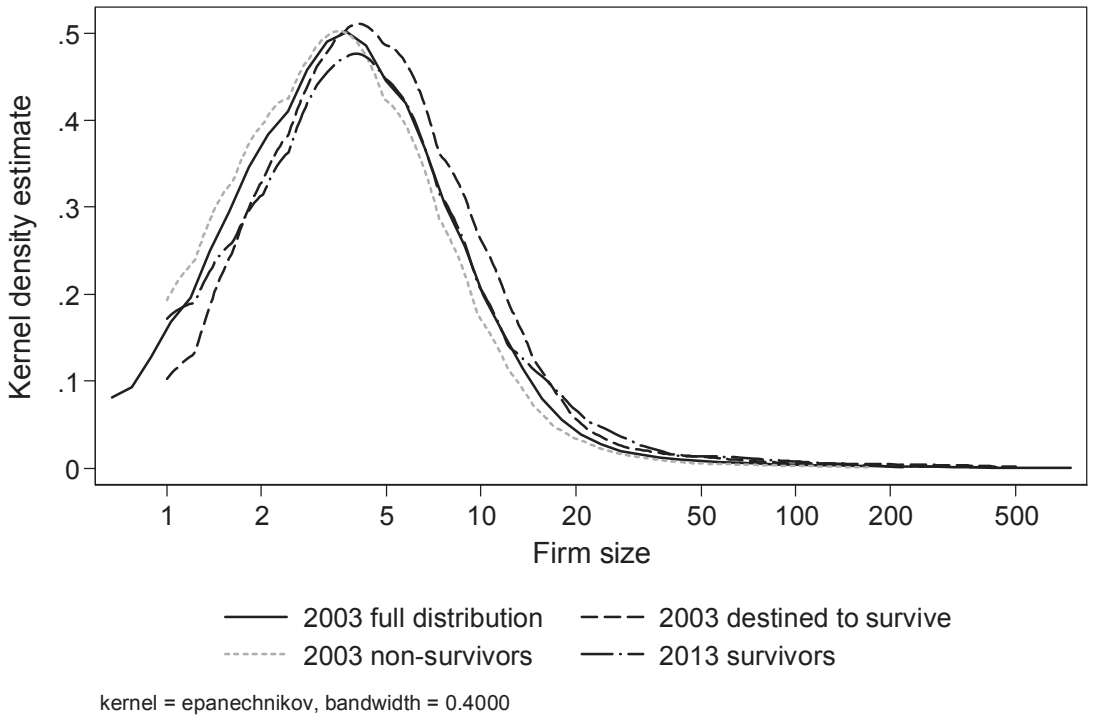


**Figure 3.** Selection or decline? The weighted firm size distribution of the 2003 full distribution, the 2003 "destined to survive" firms, the 2003 "destined to exit" firms and the 2013 surviving firms. Only firms founded between 2000 and 2003 are included. *Note.* 2003 sample weights used and adjusted for refusals in 2013.

Cabral & Mata (2003) found strong differences between distributions (2) and (3), but not between distributions (1) and (2), indicating that growth played a more important role than selection in the evolution of the firm size distribution. Sandefur (2003) found the opposite pattern in Ghana: strong differences between (1) and (2), but little between (2) and (3). However, the differences in the distributions in Figure 3 is not as clear as in the Portuguese case of Cabral & Mata (2003) nor as in the previous study of Sandefur (2003). The

2003 distribution of firms that survived is very similar shaped to the 2003 distribution of all firms (including non-survivors).[4] Table 11 compares the averages of these two distributions, and we see that, in 2003, the surviving firms had on average 1.88 more workers than all firms together, and on average 2.89 workers more than firms that did not survive. These differences are statistically significant at respectively a 5% and 1% level of significance, but are much smaller than the differences in distribution found by Sandefur.[5] We nevertheless find evidence for differential selection based on firm size.

But what about changes in the firm size of the surviving firms? From Figure 3 we see that the 2003 distribution of surviving firms is very similarly shaped to the 2013 distribution of surviving firms. The test of the differences shows a similar picture: the average firm size of the young cohort that survived was 7.25 in 2003 and 7.05 in 2013. This decline is not significant, but nevertheless reveals that on average, firm size stagnated.

**Table 11. Comparison of the mean firm size of firms founded between 2000 and 2003 and all firms.**

| **Firms founded between 2000-2003** | | | **All firms** | | |
|---|---|---|---|---|---|
| All firms in 2003 | Surviving firms in 2003 | *p* value | All firms in 2003 | Surviving firms in 2003 | *p* value |
| 5.37 | 7.25 | 0.016** | 12.0 | 17.91 | 0.000*** |
| (.30) | (.71) | | (.66) | (1.35) | |
| Surviving firms in 2003 | Surviving firms in 2013 | *p* value | Surviving firms in 2003 | Surviving firms in 2013 | *p* value |
| 7.25 | 7.05 | 0.864 | 17.91 | 15.91 | 0.384 |
| (.71) | (.95) | | (1.35) | (1.85) | |
| Surviving firms in 2003 | Non-surviving firms in 2003 | *p* value | Surviving firms in 2003 | Non-surviving firms in 2003 | *p* value |
| 7.25 | 4.36 | 0.000*** | 17.91 | 7.40 | 0.000*** |
| (.71) | (.26) | | (1.35) | (.58) | |

*Note.* Firm size is defined as the number of "persons engaged" and includes apprentices. The *p* value is reported for a t-test of the difference between means of column 1 and 2.

[4] A Kolmogorov-Smirnov equality-of-distribution test, using weights, does not reject the null hypothesis that the distributions are the same (the *p* value is 0.248). Note that we are comparing the 2003 full distribution with the 2003 distribution of surviving firms, of firms founded between 2000 and 2003. The 2003 full distribution includes both the surviving and non-surviving firms.

[5] Note that our methodology differs from the methodology used by Sandefur (2003). Sandefur (2003) was limited in the number of firms he could match: only 13% of the firms from 2003 that claimed to have been in existence before 1987 were matched with the 1987 observations of these firms. For his analysis he therefore used all firms, since his sample was too small to use only new firms. We follow the methodology of Cabral and Mata (2003) who only used a cohort of new firms for their analysis. For our figures we use the cohort of firms founded between 2000 and 2003 (i.e. at most four years old). If we follow Sandefur (2003) and use all firms, we find stronger differences, as can be seen in the right part of Table 11.

In Section 4 and in Section 6 we saw strong regional differences between Accra and Kumasi: Accra firms were more likely to exit and Kumasi firms were less likely to grow. We see similar patterns when comparing the firm size distributions. Figure 4 shows the evolution of the firm size distribution for young firms for both Accra and Kumasi. In Kumasi we see little effect of differential selection, as the 2013 firm size distribution of surviving firms resembles the 2003 overall firm size distribution quite closely, but we see a strong pattern of decline: the firm size distribution of surviving firms has shifted to the left in 2013 compared to 2003. In Accra we find a stronger pattern of differential selection, but less evidence for a decline in firm growth: in fact, firms in Accra grew on average by 0.45 worker, even though this change is not significant (the *p* value is 0.825).

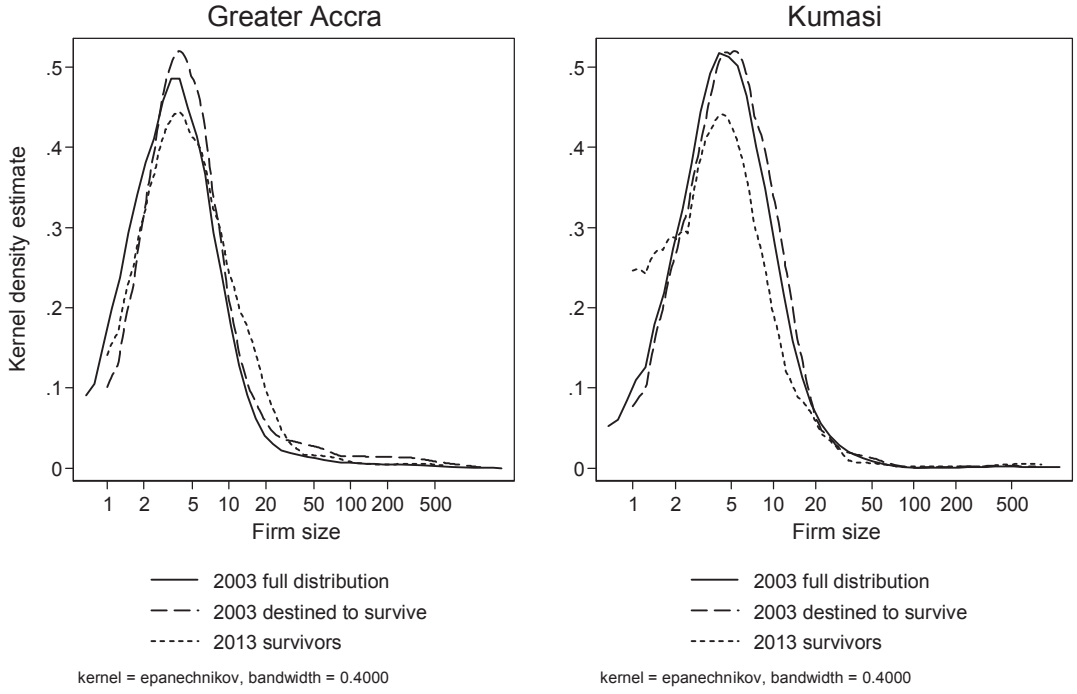


**Figure 4.** The weighted firm size distribution of the 2003 full distribution, the 2003 "destined to survive" firms and the 2013 surviving firms, for both Accra and Kumasi. Only firms founded between 2000 and 2003 are included. *Note.* The 2003 sample weights were used (adjusted for refusals).

### *5.4 Changes in aggregate employment*

How did these changes affect employment for the firms sampled? Table 12 shows the levels of aggregate employment in each sector, both in 2003 and 2013. In the table can be seen *how important large firms are in providing employment*: in 2003 firms with more than 75 employees provided almost half of the total employment measured. We can see that aggregate weighted employment of the Ghanaian manufacturing firms sampled in 2003 (the last row of the table) has decreased from 135 000 in 2003 (column 1) to 74 000 in 2013 (column 2). Part of this decrease has come from firms that exited by 2013 (column 3); these firms employed an estimated 20 000 workers in 2003. Another 24 000 workers were employed in 2003 in firms that we were not able to trace in 2013 (column 4).

If we only consider the firms that survived, we also see that the total employment in these firms decreased. The declines in total employment in between 2003 and 2013 were the largest in textiles and garments and wood and furniture making and the smallest in machinery and metals. Again, size matters: the decline was the highest in small firms and the lowest in medium sized firms.

Table 13 shows the declines amongst different kinds of workers. Declines in apprentices were very high, which perhaps suggests that the 2013 survey may have under-captured apprentices.[6] However, the declines were still large amongst production workers and other workers. Declines were similar for men and women.

Our dataset only covers firms that were operating in 2003. Therefore, it should be emphasized that we cannot conclude with certainty that total employment in Ghanaian manufacturing declined between 2003 and 2013. We do not have data on new entrants and the amount of employment in these new firms. We are thus only able to say that total employment in the weighted sample of firms decreased by around 45% between 2003 and 2013. Average firm size actually increased slightly due to the exit of small firms: the average firm size was 12 in 2003 and 16 for those surviving in 2013, which is mainly caused by the differential exit rates of small and large firms.

[6] The 2013 questionnaire was modelled after the Phase II questionnaire of the original 2003 census. The question about apprentices only includes unpaid apprentices, while paid apprentices are reported as production workers. The 2003 figures reported over here are from the Phase I questionnaire, as the coverage of firms in the Phase II questionnaire was limited. In the Phase I questionnaire respondents were asked just to report the number of "learners" (apprentices), with the question not specifying whether it referred to paid or unpaid workers.

**Table 12. Aggregate weighted employment in 2003 and 2013.**

| | Total 2003 Employment | Total 2013 Employment in surviving firms | 2003 Employment in exiting firms | 2003 Employment untraced firms | 2003 Employment in surviving firms |
|---|---|---|---|---|---|
| **Sector** | | | | | |
| Food & Beverages | 19735 | 13283 | 3083 | 1484 | 15168 |
| Textiles, garments & footwear | 35272 | 13795 | 5010 | 11706 | 18556 |
| Wood & furniture | 29119 | 13059 | 6034 | 6591 | 16494 |
| Machinery & metal | 15722 | 11618 | 1774 | 2270 | 11678 |
| Other manufacturing | 35015 | 22564 | 4742 | 2056 | 28217 |
| **Size** | | | | | |
| Small (0-9 workers) | 37060 | 15446 | 7247 | 13775 | 16038 |
| Medium (10-74 workers) | 32335 | 19725 | 7195 | 4768 | 20373 |
| Large (more than 75) | 65468 | 39148 | 6201 | 5565 | 53702 |
| Total | 134863 | 74319 | 20643 | 24107 | 90112 |

***Note.*** Employment here is measured as the number of "persons engaged" with the firm, and includes apprentices. The 2013 weights are adjusted only for refusals by continuing firms.

**Table 13. Aggregate employment by worker category and gender.**

| | | Employment | |
|---|---|---|---|
| | | 2003 | 2013 |
| **Worker category** | Apprentices* | 35276 | 7016 |
| | Production workers | 73840 | 48845 |
| | Other workers | 19893 | 15564 |
| **Gender** | Male | 99085 | 52047 |
| | Female | 34369 | 17501 |

*Note.* The 2013 weights are adjusted only for refusals by surviving firms. Firms report total persons engaged and are then asked about each kind of worker- thus totals do not add to exactly the totals reported in Table 12. * The 2003 figure on apprentices include paid apprentices. For the 2013 figure, paid apprentices are classified as production workers.

# 6 Conclusion

The manufacturing sector has been seen as a potential engine of growth and employment in the Ghanaian economy. But our research has shown that Ghanaian manufacturing firms that existed in 2003 performed poorly over the ten years between 2003 and 2013, a continuation of poor performance that has been documented for the 1990s and early 2000s in other research.

We found that around 21 percent of firms exited between 2003 and 2013 whilst another 22 percent were untraced. If the untraced firms were likely to have exited then these figures are similar to those estimated in Ghana over the 5 years between 1993 and 1998 by Söderbom et al. (2006). Firms in Accra, young firms and small firms were more likely to have exited.

Exploring the reasons for exit amongst those owners or managers of firms who could be found suggested that small firms were more likely to exit due to personal circumstances of the owner whilst the most cited reason for exit in large firms was increasing costs.

Broadening our analysis to surviving firms we have shown that only about 35% of the surviving firms that were successfully interviewed grew employment by more than 5 percent, whilst 54% shrunk by more than 5 percent. Aggregate weighted employment fell by 45%, from 135 000 in 2003 to 74 000 in 2013, an estimate that includes adjustments for the non-response of some surviving firms. We cannot know total manufacturing employment in Ghana without surveying new firms, but our estimates do not paint a positive picture of the state of manufacturing in Ghana.

We also explored the importance of selection in explaining the evolution of the firm size distribution in Ghana. Using the simple graphical test suggested by Cabral & Mata (2003) we found some evidence of selection, but less strong than in earlier studies (Sandefur 2010). But unlike Cabral & Mata (2003) we also find little role for within-firm growth in explaining the evolution of the firm size distribution. Entry could potentially be a key factor, and this would seem to be a crucial area for future research.

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