University of Ghana

KIEL INSTITUTE FOR THE WORLD ECONOMY

On behalf of

Federal Ministry for Economic Cooperation and Development

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FINAL RESEARCH REPORT

Can trade foster development? Firm-level evidence for SMEs in Ghana

Charles Ackah
Holger Görg
Cecília Hornok

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Can trade foster development? Firm-level evidence for SMEs in Ghana

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Summary

This study provides new evidence on the benefits of exporting and importing among small and medium sized enterprises (SMEs) in the Ghanaian manufacturing sector. We use firm level data for Ghanaian manufacturing SMEs covering the period 2011 - 2015. We look at firms' export and import activities and estimate the effects of these on their productivity, employment, wages, skill structure, training activities and gender equality. This is done in two steps. In the first step, we analyse the impact of trade on the aforementioned firm level variables in the own firm (direct effects). In the second step, we then investigate how trading activities of firms impact the same set of firm variables in neighbouring firms that are not active on international markets (spillover effects).

Results show that firms benefit from exporting. **Firms that start to export employ more workers and pay higher wages**, in particular to skilled workers. This is in line with a large international literature on wage differences between exporters and non-exporters. Importantly, **exporting activity in a region also stimulates non-trading firms**, which are able to also pay higher wages and move towards hiring more skilled workers as a result. These so-called spillover effects are consistent with learning effects whereby non-traders learn from exporting firms and subsequently improve their performance.

In contrast to exporting, **starting to import production materials does not have any clear direct effects on the firm.** This stands in contrast to earlier literature studying other (non-African) developing countries, which find that importing impacts firm productivity and wages positively. **However, we find positive spillover effects from importing on the wages and skill intensity of neighbouring non-trading firms.** This result seems to be at odds with the finding that there are no direct effects. One possible explanation is that only firms that are more productive in the first place start to import. Even in the absence of any further learning effects, importers are, thus, "better" performing firms from which other local firms may learn. Our result is therefore consistent with learning effects from better performing firms.

Another important finding is that **spillovers accrue only to firms that already have a relatively high skill share**. This is consistent with literature that shows that firms need a certain level of "absorptive capacity", i.e., ability to use the knowledge that is transferred to them by trading firms. Firms with high levels of skilled workers have the necessary ability to benefit from spillovers.

A finding on gender equality is that all the direct benefits from exporting accrue to firms with male primary owners. **Female-owned SMEs miss out on the beneficial effects of exporting.** They do not only have a more limited potential to grow and enter the export market than

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male-owned businesses, but they also fail to hire more workers or increase wages when they happen to export.

Based on our overall findings, we derive a number of policy conclusions.

First, exporting has clear benefits for wages and employment of exporting firms and non-trading firms in their vicinity. Hence, **promoting exporting activity in the manufacturing sector can be a route for fostering development.**

Second, apart from some signs of spillover effects, the importing of material inputs is not found to benefit SMEs. **It needs to be investigated why – unlike firms in other developing countries – Ghanaian SMEs cannot benefit from importing**. Our findings are consistent with the view that many SMEs in Ghana import "out of necessity rather than out of choice". It is possible that – despite the achievements of the trade liberalization Ghana has gone through – the costs of importing certain inputs are still too high and inhibit SMEs' growth.

Third, skills play an important role. There seem to be stronger wage effects of exporting for skilled workers. Also, in order to benefit from spillovers, firms must have a reasonably high level of skilled workers. This suggests that **fostering skill development should be an important aspect for policy**. Recognizing the importance of skill upgrading in economic development, numerous skills development programs and initiatives have recently been proposed or implemented in Ghana. **We recommend that such skills development initiatives also take into account the role of skills in trade-driven development**, which is demonstrated by our study, and design measures accordingly.

Fourth, female-owned exporting firms fail to reap the gains of exporting. This finding suggests that gender inequality is present at various levels of economic activity. Policies pursuing gender equality should therefore **consider giving targeted support to female entrepreneurs** not only to access export markets, but **also to translate export success into business growth**.

Fifth, we do not find convincing positive productivity effects, either through starting to export or import, or through spillovers. This result, taken at face value, would be quite discouraging. However, productivity is notoriously difficult to measure and our results may just reflect mismeasurement. To improve this, one may need data with a longer time dimension and more detail. Our final policy recommendation is therefore to **invest more in data collection in order to facilitate quality empirical research**.

1 Introduction

The AfT (Aid for Trade) Initiative is based on the idea that free and fair trade can contribute significantly to economic development and poverty reduction in developing and emerging economies. This view, in turn, finds its basis in an extensive literature that has shown these benefits of trade, as discussed in a recent joint publication by the International Monetary Fund, the World Bank, and the World Trade Organisation (IMF et al., 2017). Research has established an empirical link between international trade and productivity increases in cross-country (Alcalá and Ciccone, 2004) or individual country studies (Ferreira and Rossi, 2003). There is also evidence that increased trade openness is associated with lower levels of absolute poverty (Santarelli and Figini, 2004) and reduced wage discrimination by gender or race (Black and Brainerd, 2004; Essaji et al., 2010). However, as IMF et al. (2017) also point out, the benefits from trading do not accrue to everyone equally but may entail substantial "adjustment". Trade changes the reallocation of resources in an economy with implications for the demand for skills and different types of labour according to countries' comparative advantages. This can have implications for wages and employment prospects for different types of workers in both developed and developing countries (Görg, 2011).

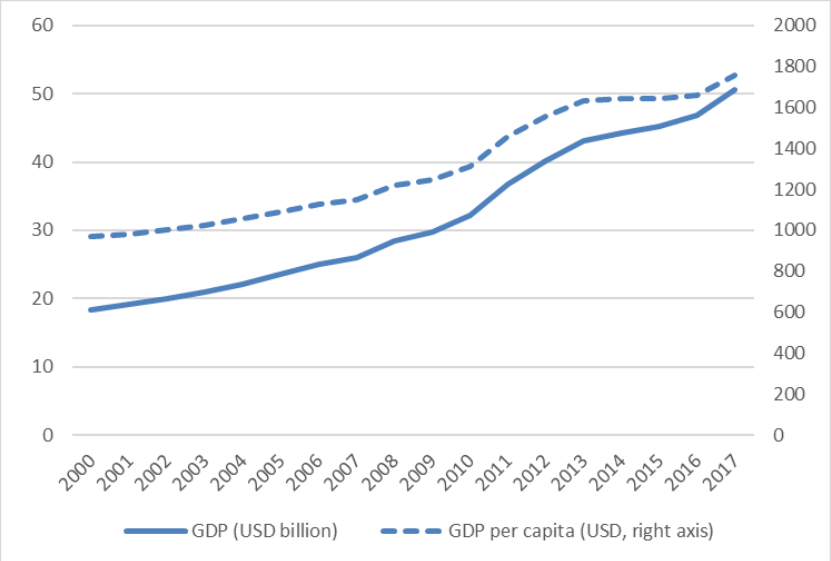
While the literature on trade and development could easily fill a number of volumes, two issues can be pointed out. Firstly, much of the research focuses on developed countries or emerging economies, specifically in South-East Asia and Latin America. Research on Africa and here in particular on Sub-Saharan Africa is comparatively small. Secondly, while much of the research establishes interesting and plausible correlations between trade and development related variables, causal relationships are hard to identify, in particular in cross-country studies. This was acknowledged as long ago as Edwards (1993), who writes "More complete evidence on the precise channels through which trade orientation affects growth, will have to wait, then, for new studies that not only look at history but also dig deeply into the microeconomics of innovation, trade, and growth." (p. 1390).

1.1 Country Context

Against this background, this study investigates the effects of increased international trade on economic development in Ghana. The Ghanaian economy has grown substantially over the last two decades as documented in Figure 1.1. GDP per capita at constant prices has increased from around 1000 US dollars in 2000 to 1800 US dollars in 2017.

Figure 1.1:

GDP and GDP per capita in Ghana (at constant 2010 prices)

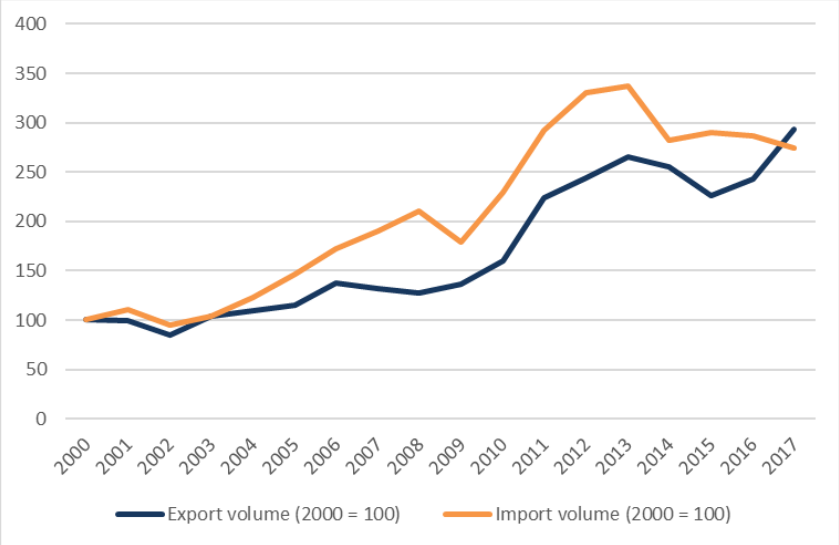


Source: World Bank, World Development Indicators.

This growth performance in the Ghanaian economy has been accompanied by similar developments in the volume of foreign trade. The volume index shown on Figure 1.2 for exports and imports reflects developments in the quantity of trade, relative to a base year. Both export and import volumes nearly tripled between 2000 and 2017. They increased at an especially fast pace between 2010 and 2013, which was then followed by a slowdown. The slowdown in exports in 2014-2015 was due to low sales in gold and oil, two of the main export commodities of Ghana. In contrast, the decline in imports in 2014 was mainly caused by a large depreciation of the Ghanaian cedi vis-à-vis the currencies of major trading partners, which reduced domestic demand for virtually all imported products (Bank of Ghana, 2014). In the most recent years, exports picked up while imports remained stable, leading to improving trade balance in Ghana.

Figure 1.2:

The volume of exports and imports in Ghana



Source: World Bank, World Development Indicators.

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Table 1.1 reports the top ten export and import products, and their shares in total trade, in both 2000 and 2017. Ghana's exports are heavily concentrated in the "Stone and Glass" and "Food Products" industries, categories that include gold and cocoa, the two major export commodities of Ghana. In the more recent year, Ghana also heavily exported fuels. In terms of importing, fuels play less of a role in 2017 than in 2000. In both years, Ghanaian imports were heavily concentrated in Machinery, Transportation and Chemicals.

Table 1.1:

Ghana's top export and import products

2000

Export:		Import:	
Category	Export share	Category	Import share
Stone and Glass*	37.4%	Fuels	21.4%
Food Products	25.7%	Mach and Elec	18.0%
Metals	9.9%	Transportation	12.2%
Wood	9.3%	Chemicals	10.1%
Fuels	4.9%	Metals	5.6%
Vegetable	4.3%	Textiles and Clothing	4.8%
Minerals	2.1%	Food Products	4.7%
Plastic or Rubber	1.9%	Plastic or Rubber	4.4%
Animal	1.2%	Vegetable	4.4%
Textiles and Clothing	1.0%	Animal	4.0%

2017

Export:		Import:	
Category	Export share	Category	Import share
Stone and Glass*	40.9%	Mach and Elec	17.1%
Fuels	25.4%	Transportation	15.0%
Food Products	18.7%	Metals	10.1%
Vegetable	4.7%	Chemicals	9.6%
Plastic or Rubber	3.1%	Vegetable	9.2%
Minerals	1.9%	Minerals	7.9%
Wood	1.5%	Wood	6.8%
Metals	1.1%	Food Products	5.6%
Chemicals	1.0%	Plastic or Rubber	5.1%
Textiles and Clothing	0.7%	Animal	4.0%

*Source: own calculations based on World International Trade Solution data. * Category includes gold.*

1.2 Sequence of Analysis

Our analysis proceeds at the microeconomic level. We use firm level data for small and medium sized enterprises (SMEs) in the Ghanaian manufacturing sector covering the period 2011 - 2015. SMEs are important players in the Ghanaian economy, for they provide about 85 percent of manufacturing employment and contribute about 70 percent of the country's GDP (Abeberese et al., 2017). We look at firms' export and import activities and estimate the effects of these on firms' productivity, employment, wages, skill structure, training activities and gender equality. This is done in two steps.

In the first step, we analyse the impact of trade on the aforementioned firm level variables in the own firm (*direct effects*). Theory and existing evidence (e.g., Melitz, 2003; van Biesebroeck, 2005, Muuls und Pisu, 2009) show on the one hand, that only highly productive firms export or import, as they are able to bear the higher costs associated with these international activities. This implies that these firms should be more productive than firms that only operate on the domestic market. This higher productivity, in turn, should also imply that exporting or importing firms pay higher wages and have higher skill levels than purely domestic firms. On the other hand, literature also suggests that exporting or importing can lead to competition and learning effects, which means that firms can increase their productivity (and, wages and qualification) further as a result of being active on foreign markets. Whether or not these effects actually materialize in Ghanaian firms shall be investigated in this study.

In a second step, we then investigate how trading activities of firms impact productivity, employment, wages, skill structure, training and gender equality in neighbouring firms that are not active on international markets. The literature refers to such effects as externalities or *spillovers* (Driffield and Girma, 2003; Görg and Greenaway, 2004). Spillovers can be positive, as there may be learning effects through personal contacts, movement of labour etc. between trading and neighbouring non-trading firms. This can lead to increases in productivity (wages, qualification etc.) in these neighbouring firms. Spillovers could, however, also be negative, if movement of labour from non-trading to trading firms means that the productivity of the former

are lower as a result. It is an empirical question as to which effects dominate, and this shall be investigated in this study.

Before describing the data set used and results of the empirical analysis we briefly review the development of trade policy in Ghana.

2 Trade Policy in Ghana

The Ghanaian economy has undergone a major trade liberalization process during the 1980s and 1990s, which included the abolition of various trade and foreign exchange restrictions. This process has put an end to the import substitution industrialization policy, which mostly characterized the two decades that followed the country's gaining of independence in 1957.[2]

Currently, Ghana pursues an export-led industrialization strategy. The government of Ghana seeks to attract foreign investment and promote export activities, while at the same time ensuring that selected activities are reserved for Ghanaians (WTO, 2014).

In this section, we briefly look at the achievements of the trade liberalization process and describe different aspects of the current trade policy in Ghana.

2.1 Import Protection

During the trade liberalization process, several import protective measures were reduced or eliminated. Import tariffs, which ranged between 35% and 100% in 1982, were reduced in several steps to between zero and 20%. Quantitative restrictions on imports were eliminated. Sales taxes on imports, which in addition to tariffs had been a major source of fiscal revenue for the government, were replaced by a Value Added Tax (VAT) in 1998. The VAT is less distortive than an import sales tax, for it taxes both domestic and imported goods.[3]

Currently, the applied import tariffs of Ghana are relatively low. The unweighted average MFN (Most Favoured Nation) applied tariff was 12% in 2017 (WTO et al, 2018). Tariff protection for agricultural products is on average higher than for non-agricultural goods. In general, the tariff structure favours the imports of production inputs and penalizes the imports of final goods. Consumer goods and finished products typically fall into the highest MFN tariff band of 20%, while raw materials, intermediate and capital goods are either tariff-free or subject to a 10% import tariff.

Despite the relatively low applied rates, Ghana maintains bound tariff rates at the WTO with high ceilings. This is meant to allow the Ghanaian government to increase tariff rates – potentially together with internal taxes or charges on imports – in times of large fiscal or external deficits.[4] Trade policy hence remains an important instrument for generating budget revenues. According to Bank of Ghana (2018), budget revenues from international trade made up one-fifth of all tax revenues in 2017.

2.2 Foreign Exchange Restrictions

The import substitution policy of the 1960s required an overvalued exchange rate, in order to let in essential imported inputs cheaply. To maintain this overvalued rate, severe foreign exchange restrictions were put in place. As a result, parallel foreign exchange markets came into

[2] For a comprehensive overview of the Ghanaian economic and trade reforms, see Laryea and Akuoni (2012).

[3] Nevertheless, the base of VAT differs between imported and locally produced goods. In Ghana, VAT is levied on the c.i.f. value of imports plus import tariff, while domestic goods are charged based on the factory gate price.

[4] For instance, in July 2013, the Ghanaian government increased duties and taxes on trade in order to finance its budget deficit (WTO, 2014).

being. In 1983 the cedi was worth about 120 to one U.S. dollar on the black market, while the official rate was fixed at 2.8 cedis to a dollar.[5]

During the liberalization years, the exchange rate was gradually devalued and the foreign exchange market liberalized. By 1990, the exchange rate of the cedi was freely floating, fully determined by market forces (Laryea and Akuoni, 2012). Due to continued financial imbalances of the Ghanaian economy, however, the cedi's exchange rate has remained unstable and experienced repeated large depreciations also in the most recent years.

The Foreign Exchange Act of 2006 removed all remaining major exchange controls. In particular, the Act allows residents to hold foreign currency accounts. However, the repatriation and conversion requirement for certain export proceeds remained in place. For example, exporters are allowed to keep only a portion of their export proceeds in foreign currency at their local banks and these amounts cannot be freely transferred without further documentation (WTO, 2014).

2.3 Export Promotion

Ghana pursues an export-led industrialization strategy with the goal of becoming a leading agro-industrial country in Africa. For that aim, taxes or quantitative restrictions on exports have been abolished for all but a few exceptional products. Meanwhile, import protection on essential production inputs and machinery is kept at a low level. Furthermore, the government has implemented various policies to promote export activities and attract foreign direct investment.

The Ghana Export Promotion Authority (GEPA) provides technical assistance and advisory services to Ghanaian companies to help them access markets and develop their products and human resources. The GEPA works in close cooperation with the UNCTAD/WTO International Trade Centre in Geneva. Recently, Ghana has passed laws to facilitate small and medium-sized enterprises' access to private credit. This improved the legal rights of borrowers and lenders and made transactions more secure. The business environment has also been improved lately by infrastructural investments in ITC technology and in the physical road network (WTO, 2014).

A major aim is to make Ghana's export portfolio more diversified by promoting the exports of so-called *non-traditional* products. *Traditional* products are commodities in which Ghanaian export has traditionally been strong: gold, diamonds, bauxite, manganese, cocoa, coffee, timber, and electricity. Non-traditional products include processed forms of the above goods and all other products. To promote the non-traditional sector specifically, companies exporting these products are subject to a reduced corporation tax of 8% instead of the 25% standard rate.

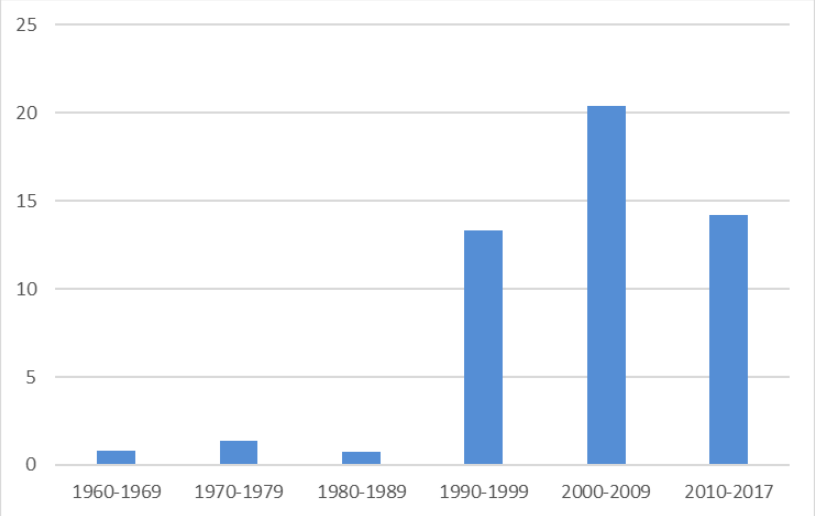
Ghana's export-led industrialization strategy has brought about considerable progress from the 1990s onward, when the share of manufactures in total exports rose from close to zero to double-digit levels (Figure 2.1). However, this trend seems to have come to a halt in the more recent years. According to the latest available data, Ghana's merchandize exports remain strongly concentrated in a few products, such as cocoa, gold and crude oil. These three commodities made up more than 80% of Ghana's annual export value in 2017.[6]

[5] https://en.wikipedia.org/wiki/Ghanaian_cedi

[6] Source of information: https://tradingeconomics.com/ghana/exports-by-category (retrieved on 7 March 2019).

Figure 2.1:

Share of manufactures in total exports of goods (%)



Source: World Bank, World Development Indicators. Simple averages of annual data points.

2.4 Major Trade Agreements

Ghana is an original Member of the WTO since 1995 and a founding member of the Economic Community of West African States (ECOWAS) since 1975. Of high significance for the Ghanaian economy is also its interim Economic Partnership Agreement (EPA) with the European Union, which offers Ghanaian exporters free access to the common EU market.

ECOWAS is a regional economic union of 15 countries in West Africa.[7] Its aim is to promote economic integration in the region by creating a customs union and allowing the free movement of persons. Within ECOWAS, Ghana and the other English-speaking countries (The Gambia, Guinea, Liberia, Nigeria, and Sierra Leone) also plan to form a currency union in the future.

ECOWAS trade integration, i.e. the removal of tariffs and non-tariff barriers in merchandize trade between members and the implementation of a common external tariff, has progressed rather slowly and is still ongoing. A common external tariff was adopted in October 2013 but its implementation is delayed. Consequently, the share of intra-ECOWAS trade in Ghana's total trade remains small, at least as reflected by official statistics (WTO, 2014).

One of the most important export markets of Ghana is the European Union, where its producers enjoy duty- and quota-free access. This market access is currently granted by an interim EPA between Ghana and the EU, which replaced the earlier non-reciprocal arrangement under the Lomé and Cotonou Agreements at the end of 2007. The interim EPA is meant to safeguard Ghana's free market access until the ECOWAS customs union is established and a permanent EPA between ECOWAS and the EU can be signed.

The EPA is reciprocal, meaning that Ghana should also open its market to imports originating from the EU. Recognizing the challenge an immediate and complete import liberalization would

[7] ECOWAS member states are Benin, Burkina Faso, Cape Verde, Côte-d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

pose on the Ghanaian economy, the EU agreed on a phase-out period of 15 years and accepted that a group of sensitive products will not be liberalized. At the same time, the EPA stipulates that imports from the EU cannot be subject to internal taxation or other internal charges at rates higher than what is applicable to domestic products in Ghana.

The EPA also has a chapter on technical barriers to trade and on sanitary and phytosanitary measures to help Ghanaian exporters to comply with international standards, a chapter on trade facilitation, and a dispute settlement mechanism.

3 Description of the Data

The analyses in this report are performed on a survey-based database of small and medium-sized manufacturing enterprises in Ghana. The data collection was undertaken by the Institute of Statistical, Social and Economic Research (ISSER) through a generous funding from the International Growth Centre (IGC). The survey was conducted in August/September 2016 and collected data for 5 consecutive years between 2011 and 2015. See Abeberese et al. (2017) for a detailed description and use of the data base.

The sample for the survey was derived from the first phase of the Ghana Integrated Business Establishment Survey (IBES), which is an economic census of non-household enterprises conducted by the Ghana Statistical Service (GSS) in 2014 through 2015. The sample of the survey consists of the universe of manufacturing SMEs located in the cities of Accra, Tema, Kumasi and Sekondi-Takoradi, the main industrial clusters of Ghana. From the IBES, all manufacturing SMEs located in the four cities were selected, which means 1,244 firms altogether. The enumerators attempted to survey all of these firms. Of these, 73 firms refused to participate in the survey, 55 had folded up and 231 could not be located using the contact information obtained from the GSS. In the end, out of the survey sample, 880 firms completed the questionnaire, which corresponds to a 70% response rate.

The sampled firms operate in 20 different 2-digit manufacturing industries as of the ISIC Rev. 4 classification, including food and beverage products, textiles and wearing apparel, chemicals, metal, machinery and equipment, wood and wood products, and other manufacturing. Nevertheless, the overwhelming majority of these firms are active in a few industries, namely the manufacturing of wearing apparel, foodstuff, wood products and furniture (Table 3.1), which reflects the Ghanaian industrial structure in the small and medium-sized segment.

Table 3.1:

Number of firms by broad manufacturing industries and location

Industry	Location of enterprise				Total
	Accra	Tema	Kumasi	Sekondi-Takoradi	
Food and beverages	40	20	41	16	117
Textiles and wearing apparel	198	35	218	62	513
Wood processing	59	22	84	14	179
Other manufacturing	28	3	31	9	71
Total	325	80	374	101	880

Data collected from the firms include information on output, material inputs including electricity, capital, investment, employment, wages, electricity outages and firms' engagement in international trade. Because of the retrospective nature of the survey, a potential cause for concern is recall error. However, this seems less likely, since data was collected through face-to-face interviews with enterprise owners/managers or senior representatives. Survey enumerators were instructed to directly record the information from the firm's written records whenever possible. For about 60 percent of the firms, the owner was the respondent. For another 30 percent of the firms, a manager was the respondent, and for the remaining firms an employee (not identified as the owner or a manager) was the respondent. Moreover, in an original paper

investigating the effects of electricity outages on productivity, Abeberese et al. (2019) proved that the data is less likely to suffer from recall error. Because the magnitude of recall error tends to increase over time, the authors tested the robustness of their results to recall error by successively dropping earlier years from the sample in estimating the effects of electricity outages on productivity and still observed statistically significant negative impacts of outages on productivity, with the magnitudes of the effects similar to those from the full sample.

We cleaned the raw data in two ways. First, for output and exports, which are reported both at the product level and as totals, we consolidated the two sources of information. Second, to reduce the impact of outliers, we winsorized the top and bottom 1 percentages of the distribution of important variables such as output, employment, capital, materials, average wages, skill intensity and training. Third, we deflate all monetary values to 2006 Ghanaian cedis using producer price indices from the Ghana Statistical Service. We deflate firm output with industry-specific producer price indices, machinery with the producer price index for machinery and all other variables with the overall producer price index.

The sample firms are dominantly privately and domestically owned. Their primary owner is reported to be female in 43% of the cases. Firms are majority state-owned only in 0.5% of the observations and have a foreign ownership share of at least 10 percent in only 1.7% of the cases (Table 3.2).

Firms report employment in three categories: production workers, non-production workers and apprentices. The average firm has 5.8 production workers, 1.3 non-production workers and 3.6 apprentices. Because non-production workers (management, supervision and administration) typically have higher skills, we define the skill intensity of a firm's workforce as the share of non-production workers in the workforce. This indicator ranges between 0 and 1 with a sample mean of 0.26. The higher skill of non-production workers is also reflected by the fact that, on average, non-production wages are higher than production wages.

Table 3.2:

Descriptive statistics of the main variables

Variable	N	mean	sd	min	max
		Ownership			
foreign (dummy)	4330	0.017	0.130	0.000	1.000
stateowned (dummy)	4330	0.005	0.068	0.000	1.000
femaleowned (dummy)	4330	0.428	0.495	0.000	1.000
		Employment			
workers_prod	4261	5.842	14.600	0.000	300.000
workers_nprod	4261	1.272	4.775	0.000	120.000
Apprentices	4241	3.620	4.785	0.000	113.000
skill (=workers_nprod/workers)	4238	0.261	0.343	0.000	1.000
train (=apprentices/workers)	4203	2.103	3.075	0.000	14.000
		Wages			
ln_wage	3868	8.228	0.869	5.427	10.457
ln_wage_prod	3462	8.150	0.875	5.380	10.491
ln_wage_nprod	2130	8.539	0.991	5.298	11.374
		Output and production factors			
lnY	4229	10.039	1.592	6.825	14.773
lnK	4063	8.104	1.860	3.211	14.154
lnL	4261	1.216	1.064	0.000	4.078
lnM	4098	8.285	1.949	2.587	13.623
		Foreign trade			
exporter (dummy)	3563	0.035	0.185	0.000	1.000
importer (dummy)	4100	0.025	0.155	0.000	1.000
export_intensity	3563	0.012	0.091	0.000	1.000
import_intensity	4100	0.012	0.091	0.000	1.000
export_scope	3004	0.078	0.475	0.000	5.000

Source: Own calculations.

Training activity at the firm is measured by the ratio of apprentices to regular workers. Not all firms have apprentices, but those that do tend to have many of them relative to the number of workers. Especially smaller enterprises are likely to employ apprentices (Table 3.3). As a result, the ratio of apprentices to workers is in many firms larger than one. The training of individuals with little work experience is only one motive behind apprenticeship. The fact that firms with fewer regular workers have more apprentices suggests that they are also used as (low-wage) substitutes for regular workers. Our estimation results will have to be interpreted with this caveat in mind.

Table 3.3:
Likelihood of having apprentices by firm size

Firm size by number of workers	N	Firm has apprentices
L<3	1,774	0.878
3<=L<7	1,321	0.625
L>7	1,166	0.378

Source: Own calculations. L is the sum of production and non-production workers

For each year, firms report the value of their output, the replacement cost of their capital items (land, buildings, machinery), and the cost of raw materials used in the production process. This information, together with the number of workers, enables us to estimate production functions and generate indicators for labor productivity and total factor productivity (TFP).

We generate firm TFP as the residual from a production function estimation, where we assume that gross output is produced by capital, labor and materials with a Cobb-Douglas technology. A well-know issue with production function estimation is that firms' decisions on how much input to use are not exogeneous but may depend on their productivity. Simple Ordinary Least Squares estimation is hence subject to a simultaneity bias, leading to upward-biased coefficients for labor and materials and a downward-biased capital coefficient. To account for this problem, we use three different estimation methods: estimation with firm fixed effects, the estimator of Levinson and Petrin (2003) and the estimator of Wooldridge (2009). All of the three methods provide some solution for the simultaneity bias, albeit under different assumptions (van Beveren, 2012). Nevertheless, in our case, the different methods lead to very similar TFP estimates, which are strongly correlated with each other (pairwise correlation coefficients above 0.9).

The survey questionnaire asks firms what share of their annual output was exported (export intensity) and what share of the production materials in each year was imported (import intensity). Based on this information we generate dummy variables for being exporter or importer in any given year, which take value 1 if a firm reports to have exported/imported in that year and 0 otherwise. In our sample, 3.5% of the firm-year observations are exporters and 2.5% are importers. These numbers reflect the small scale of the trading activity in the small and medium-sized business segment of the Ghanaian manufacturing sector.[8]

Nevertheless, those firms that trade export or import with relatively large intensity (Table 3.4). The average exporter sells a third of its output abroad and the average importer imports almost half of its material inputs. Because the survey reports output and export also at the product level, we are also able to see the number of exported products (export product scope) by firm and its change over time. The average exporter sells more than 2 distinct products abroad, this number slightly increasing over time.

There is small overlap between exporters and importers; only 3 to 4 firms are two-way traders in any year. This feature of the data helps us separately identify the effects of exporting and importing on firm performance. A less advantageous feature is that the trade indicators are quite stable over time. This can limit the performance of estimation methods which heavily rely on the time variation of the data, e.g., firm fixed effects or difference-in-differences estimation.

[8] According to the World Bank's Regional Programme on Enterprise Development (RPED) survey, which was conducted in the early 1990s and also contains large firms, the share of exporters in the Ghanaian manufacturing sector was 10-15% (Mengistae and Pattillo, 2004; Milner and Trandrayen, 2004; Van Biesebroeck, 2005).

Table 3.4:

Trading activity by year

Year	Number of exporters	Export intensity if exporter	Number of exported products if exporter	Number of importers	Import intensity if importer
2011	28	0.325	2.083	20	0.476
2012	26	0.372	2.350	22	0.480
2013	24	0.346	2.238	19	0.489
2014	25	0.327	2.316	20	0.462
2015	22	0.339	2.222	20	0.486

Source: Own calculations.

4 Estimation of Direct Effects

This section looks at the relationship between firm performance in several outcome variables and the firm's exporting and importing activity. First, we report cross-sectional correlation patterns in order to see how trading firms differ from non-traders. Then, we aim to measure how trading affects firm outcomes. This we do by looking at how firm outcomes change after the firm starts to trade or expands its trading activity. In a separate sub-section we also investigate the gender-related aspects of foreign trade.

4.1 Characteristics of Trading Firms

To what extent are Ghanaian exporting and importing firms different from their domestically oriented peers in terms of their productivity and employment-related outcomes (number of employees, wage, skill intensity, training)?

It is well-documented in the literature that exporters and importers differ significantly from domestically oriented firms. In their seminal paper, Bernard and Jensen (1995) show that US exporters are larger, more productive, more capital-, skill- and technology-intensive and pay on average higher wages to their employers, compared to non-exporters. These differences remain even after controlling for observable firm characteristics, as well as industry, year and location effects. A large body of follow-up literature documented similar patterns on microdata of several developed and developing countries (e.g., Bernard and Wagner (1997) for Germany; Isgut (2001) for Columbia; Mayer and Ottaviano (2008) for seven European countries).

A more recent line of literature has found that firms importing intermediate inputs are also more productive, larger, charge higher prices and pay more for their inputs, relative to non-importing firms (Bernard et al., 2007; Kugler and Verhoogen, 2009; Muuls and Pisu, 2009). This literature has mainly focused on the relationship between importing and productivity and established that the productivity premium of importing is at least as large as the productivity premium from exporting (e.g., Manova and Zhang, 2012; Halpern et al., 2015; Kasahara and Rodrigue, 2008; Vogel and Wagner, 2010).

Available evidence on Sub-Saharan African countries is usually supportive of the above findings – at least with regard to exporting. Mengistae and Patillo (2004) and Van Biesebroeck (2005), for example, document that exporters are significantly more productive than non-exports, while Milner and Tandrayen (2007) find a positive wage premium for exporters among manufacturing firms. Empirical evidence on importing in Sub-Saharan Africa is close to non-existent. Recently, Duda-Nyczak and Viegelahn (2018) looked at the cross-sectional correlation between importing and wages on data from 47 African countries and found that – in contrast to the mainstream literature – African importers do not pay higher wages. When they compare importers and non-importers with similar productivity levels, they even find that importers pay lower average wages.

As a first step of our empirical investigation, we examine how Ghanaian exporters and importers differ from non-trading firms in terms of productivity, number of employees, average wage, skill intensity and training activity. Instead of reporting overall sample correlations between the trading status and the firm outcomes, we infer partial correlations from an OLS regression, where we control for several firm characteristics, as well as industry, location and year fixed effects. The advantage of the regression approach is that we compare traders to non-traders

which are similar in many respects and operate in the same industry and location. Formally, the following equation is estimated:

$$y_{it} = \beta_1 Export_{it} + \beta_2 Import_{it} + \beta_3 Controls_{it} + d_t + d_s + d_l + \varepsilon_{jt} \quad (1)$$

The outcome variable y_{it} of firm *i* in year *t* is regressed on indicators of exporting and importing, some additional explanatory variables and fixed effects for years, 20 industries (*s*) and 4 locations (*l*). The trade variables take the form of dummies for being an exporter or an importer of inputs, as defined in Section 3. The set of control variables may vary with the outcome variable. The coefficients of interest, β_1 and β_2, measure how exporters and importers differ in the outcome variable from non-exporters and non-importers, respectively, which are similar in their observed characteristics (included in *Controls*) and operate in the same industry, location and year. These estimated partial correlations cannot be interpreted as causal relationships.

First, we look at the correlation between productivity and foreign trade. We estimate (1) with TFP as the outcome variable and, as control variables, we include three dummies for ownership (foreign, state-owned, owned by female) and a high-skilled dummy that takes value 1 for firms with higher-than-average skilled employment share. The results are reported in Table 4.1 for the three different TFP estimates obtained from fixed effects, Levinson-Petrin (tfp_lp) and Wooldridge estimations (tfp_w).

Table 4.1:

Firm productivity and trading status

	(1)	(2)	(3)
VARIABLES	tfp	tfp_lp	tfp_w
Exporter	0.389***	0.497***	0.566***
	(0.102)	(0.0998)	(0.106)
Importer	0.416***	0.704***	0.753***
	(0.134)	(0.131)	(0.139)
Controls included	skill_high foreign stateowned femaleowned		
Observations	3,260	3,260	3,260
R-squared	0.125	0.169	0.196

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include year, location and industry fixed effects.

Consistent with the literature, we find that both exporters and importers are considerably more productive than otherwise similar non-traders. Based on the 'fixed-effects' TFP, the average exporter in our sample is roughly 40% more productive and the average importer has 70% higher TFP than a similar non-trader (column 1). These numbers are similar in magnitude to the estimates of Mengistae and Pattillo (2004) and Van Biesebroeck (2005) for Sub-Saharan African countries on data from the early 1990s. The estimates are somewhat larger for the LP and the Wooldridge TFP variables (columns 2 and 3).

Note that the above productivity premia may not only reflect differences in physical productivity but also differences in product and input prices. For example, the large premia we find may partly be explained by trading firms charging higher prices for their products than non-traders. It is because TFP is estimated from a production function of output and input values and not quantities. Due to the lack of micro-level price data, much of the related literature estimates such a 'revenue productivity' instead of physical productivity (De Loecker and Goldberg, 2014). Unfortunately, with the data at hand, we are also unable to measure physical productivity.

Next, we look at whether trading firms are different in the number of workers they employ, the average wage they pay, in the skill structure of their workforce and in their training activity. Drawing on earlier literature, we expect exporters and importers to be larger in terms of employment and pay higher wages than non-traders. Because trading firms are typically more technology intensive and because engaging in cross-border trade requires special human capital, we also expect exporters and importers to be more skill intensive. Finally, we have no a priori expectations on the relationship between trade and training activity in Ghana.

We measure employment by the number of workers and the firm-level average wage by the ratio of the total wage cost to the number of workers at the firm, both in logarithms.[9] The skill structure is proxied by the share of non-production workers in the workforce and the training activity is measured by the ratio of the number of apprentices to the number of workers (see Section 3 for more on these definitions).

The regression results for these employment-related outcome variables are reported in Table 4.2.[10] Each regression contains different sets of control variables. Apart from the ownership dummies, which all regressions include, the employment regression controls for output and the average wage, while the other three regressions control for TFP ('fixed effects' type[11]) and the size of the firm, which is captured by three dummies (less than 3 workers, 3 to 6 workers, 7 workers and above). The wage and the training regressions also control for having above-average skill intensity.

In line with what is found in the literature for many countries, Ghanaian exporters are found to employ more workers (even conditional on output), pay higher wages (even conditional on productivity) and have a more skill-intensive workforce than non-exporters. Employment is by 16% higher and the average wage is by 15% higher at exporters than at similar non-exporters (columns 1 and 2). The wage difference is very close in magnitude to the estimate for Ghana in Milner and Tandrayen (2007).

[9] Our results are robust to using real wages, i.e. nominal wage deflated by the Ghanaian consumer price index.

[10] Given that the number of trading firm in our data is small, we chose to estimate each regression on the largest possible sample, which results in varying sample sizes by outcome variable.

[11] Our results are qualitatively the same if we use the Levinsion-Petrin or the Wooldridge TFP estimates.

Table 4.2:

Employment-related outcomes and trading status

	(1)	(2)	(3)	(4)
VARIABLES	lnL	ln_wage	skill	train
Exporter	0.149**	0.144*	0.0670**	0.331
	(0.0691)	(0.0781)	(0.0314)	(0.246)
Importer	0.357***	-0.274***	0.137***	0.875***
	(0.100)	(0.103)	(0.0412)	(0.323)
Controls included	lnY, ln_wage, foreign, stateowned, fe-maleowned	tfp, skill_high, foreign, stateowned, fe-maleowned, firm size dum-mies	tfp, foreign, stateowned, fe-maleowned, firm size dum-mies	tfp, skill_high, foreign, stateowned, fe-maleowned, firm size dum-mies
Observations	3,175	3,007	3,260	3,235
R-squared	0.538	0.283	0.266	0.406

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include year, location and industry fixed effects.

As for importing, we also find that importers employ significantly more workers and their workforce is more skill-intensive, as compared with similar non-importers. Importers also appear to have significantly more apprentices relative to the size of their regular workforce than non-importers (column 4). However, contrary to the mainstream literature and in line with the findings of Duda-Nyczak and Viegelahn (2018) on Africa, importers in our sample do not pay higher wages. In fact, importer firms pay roughly by 30% lower wages than similarly productive non-importers in the same industry and location (column 2).

It is surprising and unclear why importers pay lower wages in Africa. One possible reason may lie in the composition of their workforce. Importers may have more employees from lower-wage worker types (e.g. young or female). To investigate this possibility, Duda-Nyczak and Viegelahn (2018) use linked employer-employee information to control for employee characteristics. They find that the negative correlation is robust to controlling for age, qualification level, work experience, gender, marital status and trade union membership. Differences in the workforce compositions in these characteristics therefore cannot explain the negative correlation.

4.2 Effect of Foreign Trade on Firm Outcomes

So far we have reported cross sectional correlations, which have no causal interpretation. To answer questions on how trading impacts firm performance, one needs to understand what drives these empirical observations. In the literature, several theoretical models have been developed to explain firm behaviour, prominent examples being Melitz (2003) and Bernard et al. (2003). These models stress the importance of factors like firm heterogeneity and market entry costs in explaining the productivity and wage premia of traders. Two alternative, but not mutually exclusive hypotheses have emerged.

The *self-selection* hypothesis states that only the most productive firms (which are also more skill intensive, pay higher wages, etc.) become exporters and importers. The rationale behind the argument is that there exist fixed costs of trading across borders, which only highly productive firms can afford to pay (Melitz, 2003). These costs include for example the identification of potential customers and distribution channels, the acquisition of licenses, the analysis of new markets, possible adjustments to product quality and/or product services as well as the familiarization with the rule of law in the destination country. Firms differ in their productivity levels and only some of them are productive enough to make exporting and importing profitable.

Empirical evidence supports overwhelmingly the existence of such a self-selection. Isgut (2001) shows that Columbian exporters are more productive than non-exporters already three years prior to entering the foreign market. Likewise, Bernard and Wagner (1997) and Arnold and Hussinger (2005) document that German firms which decide to start exporting are already more productive than other firms.

The alternative hypothesis states that it is not only the self-selection of better performing firms, that explains the observed premia. Rather, international trade itself *causes learning effects and efficiency gains* (learning-by-exporting hypothesis). To begin with, higher competition for quality and prices on the export markets forces the new exporters to produce more efficiently. In addition, international exchanges facilitate cross-border spillovers of technology and managerial know-how (Grossman and Helpman, 1991). Importing inputs can also create efficiency gains through several channels. Studies have shown that the imports of intermediaries allow firms to specialize further according to their comparative advantages. Importing also enables firms to choose from a larger variety of intermediate inputs than what is available domestically (variety effect) and helps them, especially firms in less developed countries, access higher quality inputs (quality effect) and inputs which embed better technologies (Halpern et al, 2015; Kugler and Verhoogen, 2009; 2012). As a result, firms can improve their productivity and upgrade the quality of their final products.

While there is ample empirical evidence for the self-selection hypothesis, the findings on the hypothesis that exporting and importing causes better performance are more ambiguous.

A recent paper by Atkin et al. (2017) provides compelling evidence based on a Randomized Controlled Trial experiment in Egypt. Egyptian producers, which were provided access to international markets, experienced significant productivity improvements relative to control firms. There is also supporting evidence for learning-by-exporting on developed country data, such as Hansson and Ludin (2004) for Sweden, Greenaway and Yu (2004) for the UK and Serti and Tomasi (2008) for Italy. On African data, Bigsten et al. (2004; 2009), Van Biesebroeck (2005) and Abor (2011) also find positive learning-by-exporting effects. In contrast, Isgut (2001) documents for Columbian firms that, while output and employment of exporters grow faster after export entry, productivity growth does not seem to differ from non-exporters anymore. Similarly, Delgado et al. (2002) and Fryges and Wagner (2008) find only weak signs of learning-by-exporting on Spanish and German data, respectively.

Empirical studies which investigate the productivity-improving effect of importing production inputs typically look at trade liberalization episodes with large declines in import tariffs. A prime example is Amiti and Konings (2007), who find that falling input tariffs in Indonesia contributed significantly to the productivity increase of importing firms. Similarly, Halpern et al. (2015) find that one-quarter of the overall productivity growth in Hungary during the 1990s is attributable

to the imports of production inputs. Studies, which do not find such 'learning-by-importing' effects typically look at developed countries, such as Vogel and Wagner (2010) for Germany and Smeets and Warzynski (2010) for Denmark.

In what follows, we present estimation results on our Ghanaian sample which are free from the impact of self-selection and closer to reflect causal relationships. First, we do this by including firm fixed effects (d_i) in our earlier regression equation

$$y_{it} = \beta_1 Export_{it} + \beta_2 Import_{it} + \beta_3 Controls_{it} + d_t + d_i + \varepsilon_{jt} \quad (2)$$

The firm fixed effects control for the time-constant firm heterogeneity in the outcome variable (e.g. output or wage). Hence, this estimation accounts for the initial productivity, wage, etc., differences among firms. In other words, the firm fixed effects estimation uses the data variation over time for measurement.

In this exercise, we also consider the alternative trade indicators and report three regressions per outcome variable: one with trading status dummies, one with the export product scope variable (while also controlling for the importer status), and one with export and import intensities.[12] The interpretation of the coefficients changes with the trade indicator used. When trading status dummies are used, β_1 and β_2 measure how the outcome variable changes after the firm starts to export/import or stops doing so. When the product scope or intensity variables are used, the same coefficients measure how the outcome variable changes after the firm expands or contracts its export/import activity (in terms of number of products of intensity). Because firms change their trade intensities and export product scope more often than they change their trading status, the estimates from the scope and intensity regressions rely on more data variation and hence – in our sample with very few trading firms – can be considered as more reliable.

The estimation results for productivity are reported in Table 4.3. Here we opt for estimating a production function with firm fixed effects, augmented with the trade indicators. Running a regression with any of our estimated TFPs as outcome variable produces qualitatively identical (and quantitatively very similar) results.

The large productivity premia found for exporters and imports in the cross section vanish when we control for initial productivity differences with firm fixed effects (column 1). Although the estimate for the exporter status is positive with reasonable size (suggesting an 8% increase in productivity after export entry), it is not different from zero statistically. The same applies to exporters which introduce new products on the export market (column 2). The only statistically significant relationship we observe is between productivity and export intensity. An exporter which increases the export share of its sales (from its existing export products) becomes more productive. This estimate is quite large, suggesting an 1.5% increase in productivity following an increase of 0.01 in the export intensity.

[12] The estimation sample is somewhat smaller in regressions with the export product scope, because this variable is observed for fewer firms.

Table 4.3:

Productivity and foreign trade, within-firm estimates

	(1)	(2)	(3)
VARIABLES	lnY	lnY	lnY
lnL	0.248***	0.196***	0.242***
	(0.0301)	(0.0341)	(0.0301)
lnK	0.0244	0.0214	0.0236
	(0.0169)	(0.0190)	(0.0168)
lnM	0.146***	0.121***	0.143***
	(0.0147)	(0.0167)	(0.0147)
Exporter	0.0801		
	(0.108)		
export_scope		0.00162	
		(0.0667)	
export_intensity			1.553***
			(0.439)
Importer	-0.0123	-0.0183	
	(0.161)	(0.166)	
import_intensity			0.0339
			(0.532)
Controls included		skill_high	
Observations	3,260	2,734	3,260
R-squared	0.423	0.398	0.425
Number of entid	697	603	697

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include firm fixed effects and common year dummies.

In sum, we find some evidence for productivity improvements from exporting, which is present among exporters expanding their export activity. In contrast, no evidence is found for importing being followed by productivity gains at the firm. When assessing these results, however, it needs to be taken into account that the time frame of our sample may be too short for the full learning process to unfold.

Next, we consider the four employment-related outcome variables. Available literature on how trading affects these firm outcomes is less abundant than the literature on productivity. Moreover, the related literature focuses almost exclusively on the effect on wages and – to a lesser extent – skill intensity.

An increase in the average firm wage can come from two sources: from increasing wages at the individual worker level and from a shift in the composition of the firm's workforce toward high-earning worker types. Studies which aim to tell apart these two channels typically use linked employer-employee data, because such data enable the researcher to follow both firms and their individual workers and observe compositional changes in the workforce.

Available evidence on the effect of exporting on the wages of individual workers is somewhat mixed, finding either positive or no effects. Breau and Rigby (2006), e.g., do not find an exporter wage-premium on US linked employer-employee data, after worker characteristics are

controlled for. In contrast, Schank et al. (2007) and Hummels et al (2014) find a significant and positive wage premium on employer-employee data from Germany and Denmark, respectively, even after controlling for all observable worker characteristics. Recent papers that examine the exporter wage premium for African countries (Ackah and Bofah, 2019; Duda-Nyczak and Viegelahn, 2018) claim that exports do increase wages, and this effect is mainly transmitted indirectly through better technology and economies of scale.

As noted above, a positive exporter wage effect observed at the firm level may be partly due to a compositional shift in the workforce. Operating in foreign markets requires the firm to acquire additional knowledge such as international business skills, relevant language skills and knowledge related to the idiosyncratic components of the destination's specific markets (Matsuyama 2007). Moreover, exporting can also imply quality upgrading at the firm, as in Verhoogen (2008), especially if exports are directed to more developed markets (De Loecker 2007). Accordingly, exporter firms need relatively more highly qualified workers, who are then paid higher wages. Brambilla et al. (2012), e.g., show that Argentinian firms that export to high-income countries employ a higher share of qualified workers and pay them higher wages on average, compared to other exporters and non-exporters.

The literature on imported inputs and wages, like that on imports and productivity, typically looks at episodes of input tariff liberalization. Prominent papers such as Amiti and Davis (2011) stress the importance of distinguishing output tariff liberalization from input tariff liberalization. When output tariffs fall, wages at domestic producers of the respective products are found to decrease or remain unaffected (Goldberg and Pavcnik, 2005; Trefler, 2004). In contrast, input tariff liberalization tends to have positive wage effects at firms which import these inputs relative to firms that only source domestically (Amiti and Davis, 2012).

Now, let us look at our estimation results in Table 4.4. We only find statistically significant results for exporting. Export entry or expansion seem to be followed by rising employment, wages and training activity. The increase in employment following an export entry is estimated at 16%, the increase in the average wage at 18% (columns 1 and 4 in the upper panel). Interestingly, the size of the wage effect is very close to what we observe in the cross section (Table 4.2).

The positive exporter wage premium may potentially be due to a shift towards a more skill intensive workforce. Our estimates suggest that this is not the case (columns 1 to 3 in the lower panel). Exporting (or importing, for that matter) is not associated with an increase in the skill intensity. This non-result may of course lie in our measurement of skill intensity, which only takes into account two types of workers (production vs non-production). We cannot rule out that a more precise skill measure, e.g., one that explicitly takes into account individual worker qualification, would lead to different results.

We find that export entry or expansion is followed by an increase in the presence of apprentices at the firm (columns 4 to 6 in the lower panel). A likely explanation is that, in the short run at least, expanding firms can more easily adjust the size of their workforce by hiring apprentices. The same observation can be interpreted as a welcome development, a boost in training opportunities at firms where technology and human capital are known to be more advanced than elsewhere. No similar effect is found for importing.

Table 4.4:

Employment-related outcomes and foreign trade, within-firm estimates

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	lnL	lnL	lnL	ln_wage	ln_wage	ln_wage
Exporter	0.153***			0.170*		
	(0.0581)			(0.0970)		
export_scope		0.0180			0.127**	
		(0.0381)			(0.0592)	
export_intensity			1.162***			1.192***
			(0.253)			(0.396)
Importer	0.0227	0.0296		0.0124	0.0439	
	(0.107)	(0.105)		(0.145)	(0.148)	
import_intensity			-0.0451			-0.238
			(0.352)			(0.480)
Controls included		lnY, ln_wage			tfp, skill_high, firm size dummies	
Observations	3,175	2,698	3,175	3,007	2,543	3,007
R-squared	0.080	0.058	0.085	0.124	0.124	0.126
Number of entid	682	598	682	647	564	647
	skill	skill	skill	train	train	train
Exporter	0.00375			0.958***		
	(0.0224)			(0.305)		
export_scope		0.0186			0.408**	
		(0.0130)			(0.180)	
export_intensity			-0.178*			3.381***
			(0.0915)			(1.246)
Importer	-0.00786	-0.00364		-0.117	0.00807	
	(0.0336)	(0.0323)		(0.457)	(0.449)	
import_intensity			-0.0359			-0.286
			(0.111)			(1.511)
Controls included		tfp, firm size dummies			tfp, skill_high, firm size dummies	
Observations	3,260	2,734	3,260	3,235	2,710	3,235
R-squared	0.066	0.023	0.068	0.141	0.153	0.141
Number of entid	697	603	697	693	599	693

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include firm fixed effects and common year dummies.

Note that the negative cross sectional correlation between importing and wages, which we reported in the previous sub-section, disappears when firm fixed effects are included. This suggests that importing does not *cause* lower wages. This result is also more consistent with the lack of productivity gains from imports reported in Table 4.3.

The literature on the wage premium is particularly concerned about distributional impacts, i.e. whether trade has heterogeneous effects on the wages of different types of workers. Exporting and importing requires a more high-skilled workforce, which can result in more wage increase accruing to skilled workers. Indeed, quite a few studies find that exporting increases the wage of high-skilled workers relative to low-skilled workers, a phenomenon commonly termed as the

wage skill premium. Frias et al. (2012), e.g., estimate the effect of increased exports by Mexican firms, triggered by the 1994 peso devaluation, on the wages of workers at these firms. They find that wages did not increase uniformly but the increase mostly accrued to workers at the higher portions of the wage distribution. This finding is consistent with other studies, such as Verhoogen (2008) and Kandilov (2009), who find that exporting raised the ratio of high-skilled to low-skilled average wages. Regarding the distributional impacts of imported inputs, the results are more ambiguous and likely dependent on the level of development and the labor market characteristics of the country in question (Amiti and Cameron, 2012).

To examine whether the exporter wage premium we observe differ by worker type, we run separate regressions for the average skilled wage and the average unskilled wage as outcome variables. All these regressions, reported in Table 4.5, include the same set of control variables and firm fixed effects as the wage regressions in Table 4.4. However, because only a subset of firms report wages for the two types of workers separately, the sample size is reduced to less than half of the original sample.

In line with the literature, we find that export entry and expansion significantly increase the wages of skilled workers (columns 1 to 3), while the estimates for unskilled workers – though similar in magnitude – are not different from zero statistically (columns 4 to 6). This suggests that, there may be a positive 'skill wage premium' among Ghanaian exporters. The existence of this skill wage premium however cannot be proved rigorously on our sample. The point estimates for skilled and unskilled wages are very close to each other and statistical tests cannot reject that they are equal.

Table 4.5:

Wage of skilled and unskilled workers

VARIABLES	(1) ln_wage_s	(2) ln_wage_s	(3) ln_wage_s	(4) ln_wage_u	(5) ln_wage_u	(6) ln_wage_u
Exporter	0.226*			0.208		
	(0.120)			(0.149)		
export_scope		0.175**			0.111	
		(0.0877)			(0.110)	
export_intensity			0.902**			0.850*
			(0.406)			(0.502)
Importer	0.0922	0.150		-0.102	-0.0601	
	(0.160)	(0.163)		(0.197)	(0.205)	
import_intensity			0.0895			-0.526
			(0.468)			(0.578)
Controls included	tfp, skill_high, firmsize dummies			tfp, skill_high, firmsize dummies		
Observations	1,411	1,196	1,411	1,411	1,196	1,411
R-squared	0.125	0.135	0.126	0.096	0.101	0.097
Number of entid	325	280	325	325	280	325

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include firm fixed effects and common year dummies.

4.3 Gender-related Patterns

In this section, we investigate the gender-related aspects of foreign trade in Ghana. First, we look at whether our estimates for the productivity, employment and wage premia in Tables 4.3 and 4.4 vary with the gender of the firm's primary owner.

Female entrepreneurship has a long tradition in Ghana, which explains the relatively high share of female-owned businesses in international comparison (Langevang et al., 2015). Approximately 43% of the firms in our sample report to have a female primary owner, while the remaining firms are male-owned (Table 3.2). Female entrepreneurial activity in manufacturing however concentrates in a few industries (food, textiles and garments), while it is marginal in other manufacturing industries. Moreover, female-owned firms are smaller and less productive than male-owned businesses, even if we compare firms operating in the same industry and location. Female-owned firms are also less likely to export or import; only ca. one-fourth of exporters and importers are female-owned in our estimation sample.

Table 4.6:

Differential effects by gender of primary owner

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	lnY	lnY	lnY	lnL	lnL	lnL	ln_wage	ln_wage	ln_wage
exporter x maleowned	0.109			0.193***			0.202*		
	(0.124)			(0.0634)			(0.112)		
exporter x femaleowned	-0.00770			-0.0535			0.0686		
	(0.218)			(0.145)			(0.197)		
export_scope x maleowned		-0.0176			0.0243			0.149**	
		(0.0717)			(0.0404)			(0.0637)	
export_scope x femaleowned		0.122			-0.0436			-0.0143	
		(0.186)			(0.118)			(0.165)	
export_intensity x maleowned			1.898***			1.281***			1.355***
			(0.470)			(0.265)			(0.424)
export_intensity x femaleowned			-0.848			0.0296			0.103
			(1.244)			(0.826)			(1.124)
Importer x maleowned	0.0396	0.0221		0.0671	0.0661		0.0146	0.0199	
	(0.246)	(0.253)		(0.163)	(0.160)		(0.222)	(0.225)	
Importer x femaleowned	-0.0456	-0.00356		0.00227	-0.0209		0.0172	0.00890	
	(0.214)	(0.230)		(0.142)	(0.146)		(0.193)	(0.205)	
import_intensity x maleowned			-0.527			-0.710			-2.358
			(1.685)			(1.119)			(1.521)
import_intensity x femaleowned			-0.0282			-0.0299			-0.0599
			(0.563)			(0.373)			(0.509)
Controls included	lnK, lnL, lnM, skill_high			lnY, ln_wage			tfp, skill_high, firmsize dummies		
Observations	3,260	2,734	3,260	3,175	2,698	3,175	3,007	2,543	3,007
R-squared	0.423	0.398	0.426	0.081	0.058	0.086	0.124	0.125	0.127
Number of entid	697	603	697	682	598	682	647	564	647

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All regressions include firm fixed effects and common year dummies.

To examine gender-related heterogeneity in the productivity, employment and wage premia, we run eq. (2) with the export and import variables interacted with two dummies, femaleowned and maleowned. The dummy femaleowned is 1 if the primary owner is female and 0 otherwise, while the dummy maleowned is 1-femaleowned.

The estimation results for the interaction variables are reported in Table 4.6. All the significant coefficients found earlier for productivity, employment and wages among exporters are attributable to male-owned firms. The coefficients for the male-owned interaction variables are very close in magnitude to the overall estimates reported in Tables 4.3 and 4.4, while the female-owned point estimates are close to zero or even negative and never statistically significant. Female-owned firms do not only perform worse than their male-owned peers in the same industry, but they also seem to miss out on the beneficial effects of exporting.

To understand this finding, we turn to Langevang et al. (2015), who provide a comprehensive analysis of female entrepreneurship in Ghana. The reasons for worse performance and poor growth prospects of female-owned firms are at least threefold. First, female entrepreneurs in Ghana are more likely to be 'necessity entrepreneurs', meaning that many females start a business due to need (unemployment and poverty) and the lack of opportunities in the formal sector. Second, female entrepreneurs have, on average, more limited formal education than male entrepreneurs and are more likely to live in poor households. Third, growth aspirations for female entrepreneurs are generally lower than for men. This is partly driven by institutional factors, such as their more limited access to finance, and partly by the dual responsibility of women to be breadwinners as well as mothers and wives. These factors limit the entrepreneurial time and financial resources that would be necessary to make a business grow and capitalize on eventual export opportunities.

Next, we look at how exporting and importing associate with two measures of gender equality: the share of females in the workforce and the gender wage gap, i.e. the relative wage of females to males at the firm.

Literature on the gender wage gap and foreign trade usually find that the wage gap is larger, i.e. discrimination against women is stronger, at firms which are exposed to foreign competition. Berik et al (2004) argue that increased international competition may reduce women's bargaining power to achieve wage gains and show, on data from Taiwan and Korea, that foreign trade is indeed positively associated with wage discrimination against women. More recently, Bøler et al (2015) have documented on Norwegian linked employer-employee data that the gender wage gap is higher at exporting firms than at non-exporters. They also see the source of discrimination in stronger competition. Exporters require greater commitment and flexibility from their employees due to larger exposure to competition. If women are perceived as less committed workers than men, exporters will discriminate against female employees.

Literature looking at this issue in Africa is scarce. Duda-Nyczak and Viegelahn (2018), using linked employer-employee data from 16 African countries, do not find that African exporters would discriminate against women more than non-exporters. In contrast to them, when we look at cross sectional correlations in our Ghanaian data, we find that the gender wage gap among unskilled workers is significantly larger at exporting firms than at similar non-exporters in the

same industry and location (results not reported here). No such difference is observed for skilled workers or between importers and non-importers, though.

Can we also observe more gender discrimination for traders within the firm (instead of between firms in the cross section)? We run regressions as eq. (2) with the share of females in the workforce (femshare), the relative wage of skilled females to skilled males (fs_wage) and the relative wage of unskilled females to unskilled males (fu_wage) as outcome variables. The relative wage variables are in logarithm and their higher value means less discrimination against women. Note that the sample size gets substantially smaller for the relative wage regressions, because only a subset of firms employ both males and females or report wage information in this detail. The estimates are reported in Table 4.7.

Table 4.7:

Employment of females and gender pay gap

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	femshare	femshare	femshare	fs_wage	fs_wage	fs_wage	fu_wage	fu_wage	fu_wage
Exporter	0.00810			-0.0340			0.0164		
	(0.0158)			(0.528)			(0.290)		
export_scope		0.00116			-0.0523			-0.117	
		(0.00949)			(0.261)			(0.259)	
export_intensity			0.0735			-0.0343			-0.162
			(0.0647)			(1.495)			(0.919)
Importer	0.0168	0.0170		0.153	0.139		-0.502*	-0.539*	
	(0.0237)	(0.0237)		(0.306)	(0.315)		(0.265)	(0.285)	
import_intensity			0.110			0.0975			-1.558**
			(0.0784)			(0.685)			(0.723)
Controls included	tfp, skill_high, firmsize dummies			tfp, skill_high, firmsize dummies			tfp, skill_high, firmsize dummies		
Observations	3,260	2,734	3,260	205	190	205	690	607	690
R-squared	0.036	0.043	0.037	0.057	0.096	0.056	0.018	0.017	0.020
Number of entid	697	603	697	52	48	52	174	153	174

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include firm fixed effects and common year dummies.

We do not find evidence for either exporting or importing to increase the share of females in the workforce (columns 1 to 3). Nor do we find that the skilled female relative wage would significantly change after export or import entry or expansion (columns 4 to 6). The significantly negative relationship between exporting and unskilled female relative wage that we observed in the cross section also vanishes when we look at within-firm variation (columns 7 to 9). That is, we do not find statistically significant evidence for firms starting to discriminate more against their unskilled female employees after their export entry or expansion. What we find is that import entry and rising import intensity are both followed by decreasing female relative wages among unskilled workers. This suggests that starting to import increases discrimination against unskilled female workers.

The above results on the gender wage gap should be taken with a pinch of salt. The small sample size and the large coefficient standard errors mean that they are based on very few observations with a large amount of noise.

4.4 Estimates Based on Export Starters

Next, we modify our identification strategy in order to obtain estimates which are one step closer to causal relationships. Because we found no significant role for importing in the firm fixed effect estimation (Tables 4.3 and 4.4), we continue focusing on exporting only.

Our strategy is to compare firms which start to export during our sample period (export starters) to firms which remain non-exporters. Hence, we drop those firms from the sample that reported positive exports already in the first year (2011). This approach has the advantage that we compare only those firms to each other that were similarly non-exporters in the first year. Firms which already traded in 2011 are likely to be established exporters and, as such, very different from starters.[13]

Unfortunately, we have very few export starters. There is one export entry per year in 2012 and 2013 and two per year in 2014 and 2015. Hence, our estimation results must be interpreted with this limitation in mind.

The estimating equation is

$$y_{it} = \beta_1 \, Exportstarter_{it} + \beta_2 \, Controls_{it} + d_t + d_i + \varepsilon_{jt} \qquad (3)$$

The variable *Exportstarter* captures firm-years following a firm's entry to the export market. It takes value 0 for all firms in 2011 and switches to 1 when the firm starts to export. Coefficient β_1 therefore measures by how much switching firms improved their performance after they started to export relative to firms which did not start to export (a so-called difference-in-differences estimator). In separate regressions we also look at the export product scope and the export intensity, simply by replacing the *Exportstarter* dummy with either of these two variables. In those regressions we identify not only from the fact that a firm starts to export, but also from the size of its export activity (measured either as number of products or intensity) and from changes in this activity over time. All regressions include the usual control variables, a dummy for the importer status, firm fixed effects and common year dummies.

The estimation results are reported in Table 4.8.[14] We report regressions only for those outcome variables, where significant β_1 coefficients are found (employment, wage, training). Despite the small number of export starters, some of our earlier findings that exporters increase their employment, average wage and training activity remain robust. Export starters which also increase their export intensity during the sample period significantly increase their employment (column 3). Export starters are also found to increase their average wage, although this finding is statistically significant only for those firms which also change their product scope during the sample period (column 5). Furthermore, our finding that export entry and expansion is followed by an increase in the share of apprentices remain fully robust to the change in the identification strategy (columns 10 to 12).

[13] Note that in the firm fixed effects estimation in the previous sections these `established' traders were part of the comparison group.

[14] The regressions are run on samples of varying sizes. The results are qualitatively the same if we run all regressions on the smallest sample.

Table 4.8:

Estimates with export starters

VARIABLES	(1) lnL	(2) lnL	(3) lnL	(4) ln_wage	(5) ln_wage	(6) ln_wage	(7) train	(8) train	(9) train
Exportstarter	0.127			0.127			0.879*		
	(0.0882)			(0.150)			(0.470)		
export_scope		0.0544			0.271**			0.884**	
		(0.0707)			(0.120)			(0.368)	
export_intensity			1.141**			0.620			7.087***
			(0.501)			(0.741)			(2.336)
Controls included	lnY, ln_wage, importer			tfp, skill_high, importer, firmsize dummies			tfp, skill_high, importer, firmsize dummies		
Observations	2,990	2,484	2,933	2,850	2,359	2,797	3,077	2,527	3,021
R-squared	0.070	0.055	0.073	0.114	0.121	0.120	0.137	0.154	0.140
Number of entid	612	534	612	586	509	586	631	544	631

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include firm fixed effects and common year dummies.

4.5 Summary

Let us sum up briefly our findings on the direct effects of exporting and importing in Ghana and draw some policy conclusions.

First, exporting is found to be contributing to development by increasing wages and creating more employment and more apprenticeship positions. Of course, the increase in the number of apprentices contributes to development only as long as apprenticeship is not solely a source of cheap labour but it also entails training activity. The wage gains from exporting seem to benefit skilled workers somewhat more than non-skilled workers, which suggests that exporters demand and reward skilled workers more than non-exporters. Nevertheless, we find no evidence that starting to export or expanding the export activity would further increase the skill intensity of the firm.

Second, we find limited evidence for learning-by-exporting and no evidence that importing material inputs would improve productivity among Ghanaian SMEs. Exporting is found to lead to higher productivity, but only when established exporters increase their export intensity and not when firms start to export. These findings, together with the observation that exporters and importers are much more productive than non-trading firms, suggests that strong self-selection is taking place when firms enter the foreign market. Only the most productive firms start to trade because only they can afford to pay the costs of entry.

Third, we find no direct effects originating from importing materials on any of the outcome variables. One likely reason for this non-result is that importer firms are especially few in our sample. Another reason may lie in the different nature of importing in Sub-Saharan African countries, as compared with other developing economies. An interesting cross-sectional observation is that importers of materials in Ghana do not pay higher wages, even though they are more productive and have a more skill-intensive workforce than similar non-importers. This

phenomenon is consistent with the idea that the costs associated with importing materials are prohibitively high and those firms that import do it “out of necessity rather than out of choice” (Duda-Nyczak and Viegelahn, 2018).

Finally, we find that the productivity, employment and wage gains associated with exporting are fully attributable to firms with male primary owners in our sample. Female-owned firms do not only perform worse in general than their male-owned peers, but they also seem to miss out on the beneficial effects of exporting. Otherwise, we find no evidence that exporting would lead to more or less gender discrimination against female workers.

These findings are based on data for small and medium sized enterprises. Whether they also extend to large firms can, to some extent, be judged based on available literature using Sub-Saharan African data that also include large firms. We suspect that most of the direct effects we find for exporting SMEs are similar or larger for large firms. For example, Milner and Tandrayen (2007) find a very similar direct wage effect from exporting for Ghana on the World Bank’s RPED database. Using the same database, Bigsten et al. (2004) and Van Biesebroeck (2005) find strong support for the learning-by-exporting hypothesis. Given that we find only weak support for learning-by-exporting among SMEs, this implies that the productivity gain from exporting appear larger for large firms.

As is the case with virtually all empirical research on Sub-Saharan African countries, our analysis is constrained by data limitations. Although the time span of our panel is longer than for most available databases in Africa, it is still quite short to assume that any effect had time to fully take place. Especially learning processes may need more time to unfold. Furthermore, our sample contains only few trading firms, simply because very few SMEs trade in Ghana. A sufficiently larger sample, possibly also including large firms, would contain more traders and help us produce more reliable results. Finally, to carry out a more sophisticated analysis on wages and the skill intensity, one would need a linked employer-employee panel with sufficiently long time dimension, which unfortunately does not exist for Ghana (or for any Sub-Saharan African countries).

5 Estimation of Spillover Effects

5.1 Introduction

This part of the study looks at the effects of trading activities of firms on productivity, wages, qualification and training in *neighbouring non-trading* firms. These effects are generally referred to as externalities or "spillovers" in the literature (Görg, 2016). The academic literature mostly looks at such spillover effects from the presence of foreign multinational firms rather than exporting or importing.[15] However, the basic idea behind "spillovers" also applies to exporting or importing. The main idea is that non-trading firms, i.e., those that are only active on the domestic market, may learn from exporting or importing firms and through this learning can improve their own company performance.

The reason for this is, as mentioned in the previous section above, that firms active on the international market (through exporting or importing) are exposed to international competition and new management techniques or technology, and therefore can improve their own performance. This creates the potential for learning also for neighbouring non-trading firms, who may learn from the traders through technology transfer (either voluntary or involuntary). This leads to learning effects in the non-trading firms. This learning, in turn, allows firms to improve their productivity through new technology. This may also increase the skill structure and training activities of firms. Improved technology and skills may also then lead to higher average wages being paid as a result.

The literature discusses several channels through which such knowledge transfers may take place (Görg, 2016). Firstly, non-traders may imitate production processes or management practices implemented at trading firms. Such imitation may be made possible through personal contacts, which in turn may depend on the geographical distance between firms. Personal contact and, therefore, exchange of information can be expected to be stronger the more closely located the firms are (Driffield and Girma, 2003).

A second mechanism for spillovers is the acquisition of human capital from trading firms. It is generally the case that firms that export or import goods have a higher share of skilled workers (Wagner, 2018), and this is also true in our data (Section 4.1). The knowledge embedded in this human capital may be transferred to non-trading firms if employees move from trading to non-trading firms. Görg and Strobl (2005), e.g., show using firm level data for Ghana that firms have a higher productivity growth performance if their manager / owner worked previously for internationally oriented firms.

Furthermore, international trade leads to stronger competitive pressure on firms who have to be able to compete with international firms. This is not only the case for firms that are active on international markets but also for domestic competitors in the home market. Increased competition can lead firms to make more efficient use of their existing technology or implement new technologies, which in turn can improve their performance (Glass and Saggi, 2002).

However, spillover effects can also have negative implications on domestic non-trading firms if, e.g., employees move from non-trading to trading firms in order to benefit from higher wages or better working conditions. There can also be crowding out effects on domestic firms through expanding operations of trading firms. In this case, non-traders lose market share to trading

[15] An important exception is Alvarez and Lopez (2008) who look at productivity spillovers from exporting using data for Chile. They find evidence for such effects, though they are strongest from foreign firms that export.

firms. Both of these aspects can lead to reductions in firm productivity and also wages in non-trading firms (Aitken and Harrison, 1999).

In order to estimate spillovers of exporting and importing activity in a cluster on performance of neighbouring non-trading firms we use variants of the following equation

$$y_{jt} = \gamma_1 \, Spillover\text{-}Cluster_{rt} + \gamma_2 \, Control_{jt} + d_t + d_r + d_j + \varepsilon_{jt}$$

Contrary to the estimations of direct effects in the previous section, this is estimated using only data on firms that do not export or import (index *j*). y_{jt} are, depending on the specification, productivity, wages, employment, skill structure or training activities in firms that do not export or import.

The variable *Spillover-Cluster* captures the potential for spillovers from exporters or importers in the neighbourhood of firm *j*. There is no universally accepted and theoretically founded approach to measuring such spillover potentials. The basic idea is to attempt to gauge how important exporters and importers (i.e., the firms that generate spillovers) are in a particular cluster. This is usually measured using their share of output or employment within a region and / or industry (index *r*) (Görg and Greenaway, 2004). A positive coefficient γ1 then indicates that an increase in output in neighbouring exporters / importers, relative to total output in the cluster, has a positive spillover effect on productivity, wages, skills or training in non-trading firms in the same region / industry cluster.

In this analysis, cluster *r* is defined as an industry-region combination. This is based on the assumption that spillovers materialize from exporters/importers to non-trading firms located in the same industry-region combination (e.g., in the textile industry in Accra region), following Driffield and Girma (2003). We can distinguish four regions (Accra, Tema, Kumasi, Sekondi-Takoradi) und 20 ISIC Rev. 4 industries, leading to potentially (4 * 20 =) 80 clusters. We use alternative measures to define the spillover variable. Firstly, it is defined as output in exporters or importers relative to total output in a cluster *r*. Secondly, we use the total value of exports (imports) relative to total output (total inputs respectively) in cluster *r*.

The vector Control includes important characteristics of firms that are not active traders and that may be correlated with productivity, wages, skills or training. The specific variables included depend on the outcome variable used and will be described below. The empirical specification furthermore includes fixed (time invariant) effects for firms and clusters. The latter also control for the possibility that non-trading firms may have higher productivity or wages in specific clusters because of particular cluster-specific (e.g., locational) advantages, which also benefit exporters and importers. If this were not controlled for, then a positive correlation between the spillover variables and productivity or wages may be erroneously interpreted as evidence for spillovers even though they merely reflect cluster-specific advantages. Including the cluster fixed effects therefore implies that the estimated coefficient γ_1 can be interpreted as a causal spillover effect (Javorcik, 2004)[16].

As pointed out above, five different dependent variables are used in the analysis. Productivity will be estimated in the form of an augmented production function with output as dependent variable *y*. In this case, the control variables (Control) include factors of production employ-

[16] Strictly speaking, the interpretation as causal effect then still necessitates the assumption that there are no time varying cluster specific variables that are driving the result. This is unlikely in our case, as we only have a short panel with five years of data.

ment, capital and material inputs, as well as proxies for the skill structure in firms. The coefficient γ_1 then reflects the spillover effect on total output controlling for factor inputs. In other words, this is the spillover effect on productivity (i.e., the variation in output that is not explained by variation in inputs, see Javorcik, 2004). Wages are measured as firm level average wages. Employment is total number of employees in a firm. Skill structure is approximated as share of employees in management, supervision and administration (non-production workers) relative to total employment. Training activities are the number of apprentices relative to total employment.

5.2 Productivity Spillovers

The first estimations, reported in Table 5.1, are based on an augmented production function which also includes a dummy variable equal to one if the share of skilled non-production workers in the firm is higher than the average value in the sample. This allows us to contrast firms with high and low skill structure.

The estimation distinguishes four types of spillover variables. Firstly, total exports relative to total output in cluster *r* (column 1), second output produced by exporters relative to total output in cluster *r* (column 2), third import spillovers as share of output produced by importers relative to total cluster-level output (column 3) and, finally, total import value relative to total inputs used in the cluster (column 4).

The estimations show in three out of four cases positive spillover coefficients which are, however, statistically not different from zero. The specification in column 2 even returns a negative and statistically significant spillover coefficient. However, this negative coefficient is not robust to the alternative definition of spillovers.

Overall, the estimations do not show evidence for positive spillover effects on non-trading firms in Ghana on average, neither through exports nor imports. However, this does not necessarily imply that spillovrs do not exist. The literature on spillovers from foreign multinationals frequently finds that not all domestic firms benefit equally from spillovers (Görg and Greenaway, 2004). Rather, the characteristics of the domestic firms play an important role in determining spillovers. A frequent finding is that domestic firms need a certain level of “absorptive capacity” (Girma, 2005) in order to be able to apply the knowledge transferred from exporters or importers. The underlying idea is that firms with low levels of absorptive capacity (i.e., own knowledge) cannot use the knowledge, technology or management techniques that could potentially be transferred from trading firms, because they are too far behind these internationally active firms.

Table 5.1:

Productivity spillovers

VARIABLES	(1) l_output	(2) l_output	(3) l_output	(4) l_output
l_employment	0.237***	0.240***	0.203***	0.203***
	(0.0280)	(0.0279)	(0.0291)	(0.0291)
l_capital	0.0298*	0.0307*	0.0392**	0.0389**
	(0.0163)	(0.0162)	(0.0173)	(0.0173)
l_materials	0.132***	0.131***	0.136***	0.136***
	(0.0133)	(0.0133)	(0.0160)	(0.0160)
skill_e	-0.0775*	-0.0776*	-0.100**	-0.101**
	(0.0463)	(0.0461)	(0.0480)	(0.0480)
Export value / Output	0.0247			
	(0.120)			
Share output by exporters		-0.0304***		
		(0.00778)		
Share output by importers			0.000599	
			(0.0947)	
Import value / Inputs				0.182
				(0.627)
Observations	2,853	2,853	2,349	2,349
R-squared	0.123	0.129	0.111	0.111
Number of entid	662	662	516	516

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The estimations presented in Table 5.2 include a measure of absorptive capacity based on the skill structure in a firm (following Girma and Wakelin, 2001; Haskel, Pereira and Slaughter, 2002). The dummy-variable for high skill structure is interacted with the spillover variable. This allows the estimation of differential spillover effects for firms with high skill structure (dummy variable equal to one) and those with low skill structure (dummy equal to zero).

The estimations now return statistically significant and positive coefficients on the interacted variable in columns 2 and 4. This indicates that, in these specifications, non-trading firms with high skill structure benefit from export spillovers and can subsequently improve their productivity performance. This is not true for non-trading firms with low skill structure, who either reduce their productivity as a result of spillovers (column 2) or are not affected (column 4). This results is, however, not robust to alternative definitions of the spillover variables. In column 1, the interacted spillover variable returns a negative and statistically significant coefficient, while it is statistically insignificant in column 3.

Table 5.2:

Spillover estimations with skill interactions

VARIABLES	(1) l_output	(2) l_output	(3) l_output	(4) l_output
Export value / Output * high skill	-0.550**			
	(0.241)			
Export value / Output	0.0955			
	(0.124)			
Share output by exporters * high skill		0.0281**		
		(0.0128)		
Share output by exporters		-0.0375***		
		(0.00843)		
Share output by importers * high skill			-0.0665	
			(0.217)	
Share output by importers			-0.0226	
			(0.120)	
Import value / Inputs * high skill				3.542**
				(1.743)
Import value / Inputs				2.100
				(1.322)
Observations	2,853	2,853	2,129	2,129
R-squared	0.125	0.131	0.104	0.110
Number of entid	662	662	468	468

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls as in Table 1

After looking at spillover effects on productivity (as an indicator of firm performance) we now turn to the impact of spillovers on labour market aspects, namely, wages, skill structure and training activities in non-trading firms.

5.3 Spillovers on Wages, Employment, Skills and Training

Table 5.3 shows results for estimations of spillovers on average wages in firms. The spillovers are allowed to differ depending on skill structure, as in Table 5.2. Included controls are the dummy for skill structure as well as dummies for size class (measured in terms of employment size). Furthermore, the equation controls for firm level productivity.[17] The model also includes fixed effects for firm, cluster and year.

[17]This is calculated as total factor productivity, as the residual from a production function estimation including firm level fixed effects (van Beveren, 2012).

Table 5.3:

Wages spillover

VARIABLES	(1) l_avg_wage	(2) l_avg_wage	(3) l_avg_wage	(4) l_avg_wage
Export value / Output * high skill	0.880*** (0.269)			
Export value / Output	0.149 (0.148)			
Share output by exporters * high skill		0.0134 (0.0142)		
Share output by exporters		-0.00101 (0.00911)		
Share output by importers * high skill			0.505*** (0.145)	
Share output by importers			-0.0414 (0.0930)	
Import value / Inputs * high skill				0.464** (0.215)
Import value / Inputs				-0.986 (0.615)
Observations	2,007	2,007	2,227	2,227
R-squared	0.168	0.161	0.177	0.174
Number of entid	449	449	497	497

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Productivity: dummies for firm size, skill structure. Cluster, year, firm fixed effects

Results show that importing activity in the cluster has a positive impact on wages in non-trading firms in the same cluster, if these firms already have a high skill structure (columns 3 and 4). This is similar for export spillovers only when they are measured as the value of exports relative to total output in a cluster (column 1). The estimates in column 2 are statistically insignificant.

The data set also provides information on average wages for high and low skilled employees (defined as non-production respectively production workers). This information is used in Table 5.4, where we use the relative wage of skilled relative to unskilled workers as dependent variable. The estimations thus can indicate, whether one skilled group benefits more relative to another. Unfortunately, the number of observations are substantially lower than in Table 5.3. This is due to the fact that in many cases firms do not provide that detailed information, or that firms report to have only one type of workers, either skilled or unskilled. This implies that the following estimations are not directly comparable with the estimations in Table 5.3.

Table 5.4:

Spillovers on relative wages of high / low skilled workers

VARIABLES	(1) rel_wage	(2) rel_wage	(3) rel_wage	(4) rel_wage
Export value / Output * high skill	0.487			
	(0.444)			
Export value / Output	0.0841			
	(0.278)			
Share output by exporters * high skill		0.00329		
		(0.0217)		
Share output by exporters		0.0285*		
		(0.0148)		
Share output by importers * high skill			0.157	
			(0.264)	
Share output by importers			0.159	
			(0.184)	
Import value / Inputs * high skill				-0.0556
				(0.452)
Import value / Inputs				-0.315
				(1.285)
Observations	734	734	861	861
R-squared	0.020	0.025	0.021	0.019
Number of entid	186	186	214	214

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Productivity: dummies for firm size, skill structure. Cluster, year, firm fixed effect

The results show that the estimated coeffcients vary depending on the exact specification of the spillover variables. While we find positive spillover coefficients for export spillovers, this is only statistically significant in column 2, indicating that a higher share of output due to exporters in a cluster positively affects the relative wage for skilled workers. To put it differently, spillovers from exporting increase the wage for skilled workers more than that for unskilled workers. This effect is independent of the skill structure in the firm (as shown by the statistically insignificant interaction term). The estimates for import spillovers are inconclusive. While they are statistically insignificant in both estimations, the estimated coefficients are positive in column 3 and negative in column 4.

We have, thus, established some evidence that average wages are positively affected by spillovers from both exporting and importing if firms already have a high share of skilled workers. If anything, it also seems that spillovers may favour in particular skilled workers' wages relative to those of unskilled workers.

In Table 5.5 we look at spillovers on employment, i.e., the question whether firms expand their employment as a result of trading activity in the vicinity. While column (1) indicates that there is a positive effect of export spillovers on total employment for firms with a high skill structure, this result is not robust to the other measure of export spillovers in column (2) or to measuring import spillovers.

Table 5.5:

Spillovers on employment

VARIABLES	(1) Ln(employment)	(2) Ln(employment)	(3) Ln(employment)	(4) Ln(employment)
Export value / Output * high skill	0.362**			
	(0.178)			
Export value / Output	-0.123			
	(0.0900)			
Share output by exporters * high skill		-0.000524		
		(0.00566)		
Share output by exporters		0.000895		
		(0.00106)		
Share output by importers * high skill			0.00598	
			(0.116)	
Share output by importers			0.0123	
			(0.0749)	
Import value / Inputs * high skill				-0.00480
				(0.176)
Import value / Inputs				-0.229
				(0.497)
Observations	2,863	3,421	2,346	2,346
R-squared	0.116	0.121	0.130	0.130
Number of entid	666	786	523	523

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Average wages, output: dummies for skill structure. Cluster, year, firm fixed effects

While there is, thus, no robust effect on total employment, further results show that firms with an already high skill structure are able to improve this further due to export- or import activities in the cluster (Table 5.6). This implies that firms hire more skilled workers relative to unskilled workers due to trading activity in the vicinity. This result is robust in all four specifications. The opposite result holds for firms with low skill structure, however – the skill structure falls due to negative spillovers. This indicates a polarization of skill structure in non-trading firms.

Table 5.6:

Spillovers on skill share

VARIABLES	(1) Skill	(2) Skill	(3) skill	(4) skill
Export value / Output * high skill	0.324***			
	(0.0553)			
Export value / Output	-0.0472			
	(0.0296)			
Share output by exporters * high skill		0.00651**		
		(0.00306)		
Share output by exporters		-0.00518**		
		(0.00204)		
Share output by importers * high skill			0.365***	
			(0.0263)	
Share output by importers			-0.0375*	
			(0.0203)	
Import value / Inputs * high skill				0.575***
				(0.0425)
Import value / Inputs				-0.0670
				(0.135)
Observations	2,842	2,842	2,340	2,340
R-squared	0.081	0.070	0.163	0.161
Number of entid	661	661	515	515

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Controls: Productivity: dummies for firm size. Cluster, year, firm fixed effects

This indicates that firms that already have a “good” skill structure are able to improve this due to spillovers – they can hire relatively more high than low skill workers as a results of benefiting from spillovers. By contrast, firms with low skill structure fail to benefit from spillovers and their skilled employees therefore may have a stronger incentive for leaving the firm and join a better performing competitor, thus reducing the skill structure in the firm.

The final model estimated in Table 5.7 shows that export activities in a cluster have no implications for training activities in non-trading firms. Import activities, however, reduce the training activities in firms with high skill structure. However, firms with low skill structure increase their training activities due to import spillovers, although this result is only statistically significant in one of the specifications.

Table 5.7:

Spillovers on training activities

VARIABLES	(1) train	(2) Train	(3) train	(4) train
Export value / Output * high skill	0.821			
	(1.252)			
Export value / Output	0.533			
	(0.747)			
Share output by exporters * high skill		0.0283		
		(0.110)		
Share output by exporters		-0.0102		
		(0.0679)		
Share output by importers * high skill			-1.532**	
			(0.624)	
Share output by importers			0.359	
			(0.561)	
Import value / Inputs * high skill				-5.457***
				(1.074)
Import value / Inputs				8.217**
				(3.528)
Observations	2,078	2,078	1,777	1,777
R-squared	0.174	0.174	0.210	0.222
Number of entid	501	501	413	413

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Productivity: dummies for firm size, skill structure. Cluster, year, firm fixed effects

In further estimations we consider the impact of spillovers on gender balance in the firm. We find in column 1 of Table 5.8 that the higher the share of exports relative to output in a cluster, the higher the share of female workers in a non-trading firm. This results is, however, not robust in column 2. There is also no evidence that importing activity has any effects on the share of female workers.

Table 5.8:

Spillovers on share of female workers

VARIABLES	(1) female	(2) Female	(3) female	(4) female
Export value / Output * high skill	-0.0460			
	(0.0462)			
Export value / Output	0.0430*			
	(0.0238)			
Share output by exporters * high skill		-0.000206		
		(0.00247)		
Share output by exporters		0.000840		
		(0.00163)		
Share output by importers * high skill			0.00343	
			(0.0292)	
Share output by importers			-0.000414	
			(0.0188)	
Import value / Inputs * high skill				0.0668
				(0.0434)
Import value / Inputs				-0.0131
				(0.124)
Observations	2,842	2,842	2,340	2,340
R-squared	0.042	0.040	0.042	0.043
Number of entid	661	661	515	515

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Productivity: dummies for firm size, skill structure. Cluster, year, firm fixed effects

We then consider the relative wage of female to male workers by skill group. For skilled workers (Table 5.9) we find that, the more important importers are in a cluster, the higher the relative wage of female workers in firms with already high skill structure (column 3). This result is however not robust in column 4. The result for export spillovers is even more ambiguous, unfortunately, with an estimated positive coefficient in column 1 and negative in column 2.

Table 5.9:

Spillovers on female wage gap for skilled workers

VARIABLES	(1) fs_wage	(2) fs_wage	(3) fs_wage	(4) fs_wage
Export value / Output * high skill	2.964**			
	(1.319)			
Export value / Output	-0.291			
	(1.218)			
Share output by exporters * high skill		-0.364***		
		(0.0759)		
Share output by exporters		0.0469		
		(0.0349)		
Share output by importers * high skill			2.144**	
			(1.012)	
Share output by importers			-1.020	
			(0.694)	
Import value / Inputs * high skill				1.457
				(1.160)
Import value / Inputs				1.838
				(3.359)
Observations	113	113	121	121
R-squared	0.257	0.426	0.205	0.182
Number of entid	34	34	32	32

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Productivity: dummies for firm size, skill structure. Cluster, year, firm fixed effects

For unskilled workers we find an effect only when defining export spillovers as share of output by exporters (Table 5.10). In this case (column 2) we find that export spillovers lead to increases in the relative wage of female workers but only when the skill structure in the firm is high. If this is not the case, then the relative wage of females actually decreases as a result of spillovers from exporting firms.

Table 5.10:

Spillovers on female wage gap for unskilled workers

VARIABLES	(1) fu_wage	(2) fu_wage	(3) fu_wage	(4) fu_wage
Export value / Output * high skill	-1.258			
	(1.064)			
Export value / Output	0.585*			
	(0.333)			
Share output by exporters * high skill		0.0807**		
		(0.0395)		
Share output by exporters		-0.0484**		
		(0.0205)		
Share output by importers * high skill			-0.119	
			(0.918)	
Share output by importers			0.133	
			(0.302)	
Import value / Inputs * high skill				-2.969
				(6.763)
Import value / Inputs				-2.086
				(3.798)
Observations	628	628	569	569
R-squared	0.141	0.150	0.148	0.150
Number of entid	178	178	151	151

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Controls: Productivity: dummies for firm size, skill structure. Cluster, year, firm fixed effects

5.4 Summary

To summarize, we do not find any convincing evidence that there are spillovers from exporting / importing on productivity growth or total employment of neighbouring non-trading firms in the same industry and region. This is true even when we allow for the importance of firms' absorptive capacity, i.e, their ability to assimilate the knowledge that is available from trading firms.

What is more convincing is evidence of spillovers on wages and skill structure of firms. We find that those non-trading firms that nevertheless already have a high absorptive capacity are able to increase their average wage and their share of high skilled workers as a result of export and import activity in their industry-region cluster.

This suggests that local non-trading firms are able to learn from internationally active firms in their cluster. They are able to absorb knowledge and technology from these firms and implement these in their own firms, allowing them to hire more skilled workers and increase average wages. While this should also be accompanied by higher productivity, we do not find this. This may be due to measurement issues – i.e., we are not able to estimate productivity appropriately with our data – or to the fact that productivity increases may only be observable with a time lag. Given the short time dimension we have in our data, this is not something we can accommodate.

For further analysis and more robust policy conclusions it would be important to establish what exactly the channels are that underlie our results. How exactly is technology transferred? Do only newly hired workers benefit from this, or does this also trickle down to workers already employed in the firm? Unfortunately, with the data at hand we cannot answer these questions but must leave them for future research.

6 Concluding Discussion

Our analysis provides new evidence on the benefits of exporting and importing among small and medium sized enterprises in the Ghanaian manufacturing sector. SMEs are important players in the Ghanaian economy, for they provide about 85 percent of manufacturing employment and contribute about 70 percent of the country's GDP (Abeberese et al., 2017).

These firms benefit from exporting: firms that start to export employ more workers and pay higher wages, in particular to skilled workers. This is in line with a large international literature on wage differences between exporters and non-exporters (e.g., Hijzen et al., 2013). Importantly, exporting activity in a region also stimulates non-trading firms, which are able to also pay higher wages and move towards hiring more skilled workers as a result. These so-called spillover effects are consistent with learning effects whereby non-traders learn from exporting firms and subsequently improve their performance (e.g., Görg and Greenaway, 2004).

In contrast to exporting, starting to import does not have any clear direct effects on the firm. In other words, firms do not seem to improve their performance as a result of starting to import. However, there are also spillover effects from importing: non-traders in clusters with a high presence of importing firms also pay higher wages and increase their skill structure. This result is at first sight unexpected, as there are no direct effects of importing. However, one possible explanation is that, as we show, more productive firms self-select into importing. Even in the absence of any further learning effects these are, thus, "better" performing firms from which other local firms may learn. Our result is therefore consistent with learning effects from better performing firms. What role, if any, importing – as opposed to just better performance – play for these spillovers is not clear but deserves of further investigation.

An important finding relating to spillovers, be it from exporting or importing, is, that these only accrue to firms that already have a relatively high skill share (above the average). This is consistent with literature that shows that firms need a certain level of "absorptive capacity", i.e., ability to use the knowledge that is transferred to them by trading firms (e.g., Girma, 2005). Firms with high levels of skilled workers have the necessary ability to benefit from spillovers.

There are interesting gender differences regarding the direct effects from exporting. All the estimated positive effects are fully attributable to firms with male primary owners. Female-owned firms do not only perform worse in general than their male-owned peers, but they also miss out on the beneficial effects of exporting.

Based on our overall findings, we derive a number of policy conclusions.

First, exporting has clear benefits on both exporting firms and non-trading firms in their vicinity. Hence, **promoting exporting activity among manufacturing SMEs can be a route for fostering development** through providing additional employment opportunities and increased wages. Moreover, our results may have implications over and above what we estimated. Through the movement of workers, higher skills and wages may also transfer to firms in other sectors and/or locations seeking to hire new employees. It is worth pointing out that Ghana's exports are heavily concentrated in "traditional industries", in broad sectors of "stone and glass" (which includes gold), "food products" as well as, more recently, "fuels". As this is the export structure on which our positive effects are based, it may make sense to focus on these in terms of policy as well. However, it may also be worthwhile trying to diversify the export portfolio in order to make the economy less dependent on world price movements of its traditional export products.

Second, apart from signs of spillover effects from better performing firms, the importing of material inputs is not found to benefit SMEs in any way, which is at odds with existing evidence on other developing countries. We think that **further investigations are necessary to find out why Ghanaian SMEs cannot benefit from importing**. One might consider two issues here. Firstly, Ghana's imports are concentrated in "machinery" and "transportation equipment", products which are used as physical capital in the production process. High-technology imported capital is potentially an important source of productivity improvement for Ghanaian businesses. This aspect, however, cannot be taken into account with our data, which only include information on imported materials. A second issue is related to the cost of importing. Our findings are consistent with the view that many SMEs in Ghana import "out of necessity rather than out of choice". It is possible that – despite the achievements of the trade liberalization Ghana has gone through – the costs of importing certain inputs are still high. This, in particular when no alternative inputs are available locally, is detrimental to firm development.

Third, skills play an important role. There seem to be stronger wage effects of exporting for skilled workers. Also, in order to benefit from spillovers, firms must have workforces with reasonably high skill levels. This suggests that **fostering skill development should be an important aspect for policy**. Not only because firms need skilled workers in order to enable them to enter into exporting or importing (e.g., Wagner, 2018) but also because reaping the benefits from these activities relies on skilled workers. Recognizing the importance of skill upgrading in economic development, numerous skills development programs and initiatives have recently been proposed or implemented in Ghana (e.g., the Ghana Skills Development Initiative or the Skills Development Fund). These aim to develop management capabilities, modernize the apprenticeship system, and provide demand-driven training for employees and jobseekers. **We recommend that skills development initiatives also take into account the role of skills in trade-driven development**, which is demonstrated by our study, and design measures accordingly.

Fourth, female-owned SMEs do not only have a limited potential to grow and enter the export market than male-owned businesses, but they also fail to reap the gains of exporting when they happen to export. This suggests that gender inequality is present at various levels of economic activity. Literature suggests that several factors – regulatory, normative or cultural – may contribute to this phenomenon (Langevang et al., 2015). Factors like females' limited access to finance and their dual responsibility to be breadwinners as well as mothers and wives at the same time limit the entrepreneurial time and financial resources that would be necessary to make a business grow and capitalize on eventual export opportunities. Policies pursuing gender equality should therefore **consider giving targeted support to female entrepreneurs** not only to access export markets, but **also to translate export success into business growth.**

Fifth, our finding that trade does not contribute much to productivity growth either directly or via spillovers, when taken at face value, would be quite discouraging. However, productivity is notoriously difficult to measure (e.g., van Beveren, 2012) and our results may just reflect mismeasurement. In particular, one data problem is that we cannot distinguish revenues into prices and quantities. If firms, e.g., were able to increase their output via exports but also charge lower prices on the export market, then this would not be measurable with our data. Moreover, the time span of our data may be too short for more complex learning effects to take place. To improve measurement, one may need data with a longer time dimension and more detail, especially on output and input prices and quantities, and / or information on productivity

enhancing activities such as R&D or innovation. Our final recommendation to policy makers is therefore to **invest more in data collection in order to facilitate quality empirical research**.

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