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The South African manufacturing exporter story

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Abstract: Existing South African work on firm-level data has been limited by access to large datasets that track firms over time. This paper overcomes this by analysing a new dataset of the population of manufacturing firms that are matched to their export transactions. South African firm-level exporting is similar to the stylized facts of firm-level exporting found internationally. Moreover, heterogeneity that exists within exporting is evident. Not only do exporters differ in terms of the amount exported, but also in terms of the number of products and destinations they export too. These in turn are related to firm-level characteristics including productivity.

Keywords: heterogeneous firms, exports, productivity, firm-level data, multi-destination, multi-products
JEL classification: F10, F14

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1 Introduction

Internationally, our understanding of exports has improved dramatically with the availability of firm-level data. Initial work by Bernard and Jensen (1995, 1999) showed that, contrary to the assumptions of many of the 'new' trade models, exporting was relatively rare and exporters were different to non-exporters across many dimensions. This, in turn, led to the development of new models to explain this trade at the firm level, such as Melitz (2003). These types of models emphasize the importance of productivity, which differs across firms, for enabling firms to enter and succeed in the export market. Subsequently, this theoretical literature has developed to explain the additional variation in export behaviour at the product level (for example Bernard et al. 2011).

Although a number of studies have looked at the microeconomics of exporting in South Africa, this work has been hampered by a lack of access to the type of administrative data used in other countries. The lack of a 'corpus' of academic research in this field has also meant that the policy discussion around export policy has remained shallow. For example, the National Development Plan acknowledges the importance of increasing exports but has very limited discussions of the types of firms (rather than sectors) where this export growth would come from (National Planning Commission 2013). The availability of business-entity level data from the administrative records of the South African Revenue Service (SARS) now means that the type of research that has become commonplace internationally can be done on South Africa and this population data overcomes the sampling issues that plagued previous research.

In this paper we use the SARS data to highlight some 'stylized facts' about South African exporters and to investigate the relationship between exporting and productivity in more detail. This data shows that South African exporting at the firm level is similar to the stylized facts of firm-level exporting found internationally: less than a fifth of firms export in any given year; specialist exporting is very rare but total export value is dominated by a small number of firms; and exporters are larger, pay better, and are more productive. There is also a large degree of churn—entry and exit into the export market—but this does not seem to translate into sustained exporting. Most of South Africa's exporting growth comes from expansion on the intensive margin—existing exporters expanding their exports of existing products to existing destinations. The access to firm and transaction data shows the heterogeneity even within exporting. Not only do exporters differ in terms of the amount exported, they also differ in terms of the number of products and destinations they export to. These in turn are related to firm-level characteristics including productivity.

Multi-product, and multi-destination exporters contribute the most to total export value. They are also bigger and more productive than other types of exporters. Productivity varies by both the number of products exported and the number of destinations exported to. Single-product exporters, regardless of where they export to, have productivity levels that are similar to domestic firms. Multi-product exporters exporting within Africa are only about 4 per cent more productive, and multi-product exporters exporting outside of Africa are approximately 10 per cent more productive compared to producers for the domestic market.

2 Literature review

2.1 Exporters

Since the mid-1990s theoretical models of international trade have advanced substantially as new theories have been developed which focus on the role of firm heterogeneity in trade. This has become apparent through access to firm-level data (see for example the seminal contributions of Bernard et al. (2003) and Melitz (2003)). This research has shown that exporters are 'superior' to non-exporters across a number of dimensions: exporting firms are generally larger, more labour productive, as well as more capital- and skill-intensive than non-exporters. See, for example, Aw and Hwang (1995) for Taiwan; Bernard and Wagner (1997) for German manufacturers; Clerides et al. (1998) for Columbia, Mexico, and Morocco; Bernard and Jensen (1995, 1999) for US firms and Castellani et al. (2010) for Italy. Similar results have been found for Africa and South Africa. For example Van Biesebroeck (2005) finds significant export premia: African exporters are over 200 per cent larger, 50 per cent more capital-intensive, and 56 per cent more labour-productive in terms of value-added per worker than their non-exporting counterparts. The superior characteristics found among African exporters are confirmed by Bigsten et al. (2004) and Rankin et al. (2006). Both studies find that exporters are larger and more capital-intensive and produce more per worker than firms which sell domestically only.

While exporters are consistently found to be more productive than firms serving only the domestic market, there is a large degree of heterogeneity within exporters and this in turn is often correlated with firm characteristics and productivity (Berthou and Fontagné 2013). Firms can be specialist exporters, or export only a small amount of output; they may export one or many products, to a single or multiple destinations.

Multi-product exporters differ from single-product exporters in that they are more productive, have more employees, and are more capital-intensive. These differences have been found in studies on developed (e.g. the US, Norway, Denmark, France, and Belgium) and developing countries (e.g. India, Mexico, and Chile) alike (Eaton et al. 2004; Bernard et al. 2009, 2011; Goldberg et al. 2010; Arkolakis and Meundler 2010, 2013).

These multi-product exporters tend to dominate exports in both developed and developing countries (Arkolakis and Meundler 2010, 2013). The US is an example of this (Bernard et al. 2009). In 2000, 61.9 per cent of US exporters exported more than one product and they contributed 99.2 per cent of the total export value. The statistics for exporters exporting 2–4 products were similar to single-product exporters but those that exported between 5 and 9 products were approximately double the value of those exporting fewer products. The largest difference came with those exporters exporting more than ten products. 14.5 per cent of firms exported 10+ products but their contribution to total export value was 92.9 per cent. Similar results were found by the number of destinations exported to. Multiple-destination exporters were slightly less common in that less than half (43.5 per cent) of the firms exported to more than one destination. However, their contribution to the total value was 96.3 per cent. At the top end, i.e. those exporters who exported to 10+ destinations contributed 85.6 per cent of the total value. Bernard et al. (2009) further emphasize the importance of multi-product, and multi-destination exporters by showing employment numbers in these distributions, and there is a positive relationship between the number of products exported or number of destinations exported to and the number of workers per firm.

The export product mix decision of multi-product exporting firms is influenced by various factors, listed by Amador and Opromolla (2010). They are: production costs, market-entry costs

(see also Arkolakis and Meundler 2010); market structure (e.g. firms will export their top performing products to a more competitive market (Mayer et al. 2011)); and market size (e.g., Arkolakis and Meundler (2010) find a positive association between the number of varieties exported and the destination country's market size). Due to the dynamic nature of exporting, firms' product mix changes, as product characteristics and firm characteristics change (Görg et al. 2008). For example, Manova and Zhang (2012) find that as firms become more able, they tend to focus on exporting higher quality (more expensive) products and dropping cheaper export products, as the former results in higher revenues. Product switching is a common occurrence in multi-product firms, even more so in large exporters than in smaller ones (Bernard et al. 2006; Amador and Opromolla 2010). Similarly, exporters also tend to add and drop destinations, as is found in the case of Portuguese exporters (Amador and Opromolla 2010).

Export destination and firm characteristics, including productivity, are also correlated. Explanations can be grouped into three broad areas: the accessibility of the foreign market (proxied for by distance and trade barriers), the type of foreign market (e.g. high income or low income), and whether a single or multiple foreign markets are served. Foreign markets that have higher barriers to entry will require successful entrants to have higher levels of productivity. Barriers to entry into export market help to explain why most empirical work finds that more productive firms 'self-select' into exporting (Wagner 2012). However, in emerging and African countries, learning-by-exporting is becoming far more relevant to export success (Boermans 2013). Here, Colombian and African exporters provide good examples of how exporters' learning-by-doing can be achieved through regional trading. Eaton et al. (2007) find that Colombian exporters learn from exporting to neighbouring countries and subsequently use them as stepping stones into the international market when their productivity enhances. Similarly, Granér and Isaksson (2009) find that for Kenyan manufacturing firms there are some effects of learning-by-exporting to the region, as the entry-level productivity requirement (or the technological distance) is low when exporting to the region. This, according to Boermans (2013), gives African firms the chance to become more productive where they self-select into more developed (or technologically distant) countries that have higher entry costs and requirements. To this end, Boermans (2013) confirms firm heterogeneity in terms of exporting within and outside Africa. African firms exporting outside the continent are more capital and skilled-labour intensive and they have higher productivity levels than firms exporting within Africa. Exporting within Africa, he finds, actually decreases productivity.

Exporting to a high-income country is also associated with higher productivity. This finding has been confirmed in many country-specific studies. These include Fernandes and Isgut (2005) and Tromifenko (2008) for Colombian firms, Pisu (2008) for Belgian firms, De Loecker (2007) for Slovenian firms, Park et al. (2010) for Chinese firms, Vacek (2010) for Czech firms, Bastos and Silva (2010) for Portuguese firms, and Cebeci (2014) for Turkish firms.

Finally, exporter heterogeneity is also associated with the number of foreign markets served (i.e. single-destination versus multiple-destination exporters). There are fewer multi-destination exporters than single-destination exporters, but they contribute most to total exports (Bernard et al. 2009; Wagner 2012). For example, Bernard et al. (2009), find that in the US multiple-destination exporters make up 43.5 per cent of the total firms. However, their contribution to total export value was 96.3 per cent. The exporters who exported to 10+ destinations contributed 85.6 per cent of total value; these firms are rare—they accounted for only 7.7 per cent of total exporters in 2000. Productivity is also positively related to the number of destinations and the number of products exported (see for example the German manufacturing sector case (Wagner 2012) and that of the US manufacturing firms (Bernard et al. 2011)). Apart

from productivity differentials, Bernard et al. (2009) show that there is a positive relationship between the number of destinations served and the number of workers per firm.

In addition to the static aspects of exporting, export growth can be driven by a number of mechanisms at the firm–product–destination level. Firms can, for example, increase their exports of a product to a particular destination (expansion along the intensive margin), export that same product to a new destination, or start exporting new products (expansion at the extensive margin) (Bernard et al. 2006; Bernard et al. 2011).[1]

Bastos and Silva (2010) make two key findings in terms of the dynamics of exporters' productivity and their export behaviour. The first is that more productive firms are able to export a larger variety of products, of a higher quality, to larger (richer) markets. The second is that these productive firms are also able to export these higher quality products to more remote or 'difficult' markets. Why is this important? Iacovone and Javorcik (2010: 483) provide a succinct reason: 'Understanding the dynamics of introducing new export varieties *(and destinations)* at the firm level constitutes the first step in understanding how a country can upgrade its export structure and what policies, if any, can stimulate this process'. They emphasize that this is especially important for developing countries (as evidenced by Mexican exporting firms), as most of the export varieties do not survive for more than one year in foreign markets which contributes to the lack of upgrading in these countries' export structures.

2.2 South African literature

Although similar firm-level research to that undertaken internationally has been done in South Africa, its scope has been limited by the availability of comprehensive firm-level data on the population over time (Edwards et al. 2008). The main shortcomings of existing studies are that they are cross-sectional in nature and a sample, rather than the population, of firms. Examples of these studies are: Edwards (2004) and Edwards and Behar (2005) who study labour and firm-level trade; Viviers and Calof (1995), Viviers et al. (1995), Viviers et al. (1996), Soontiëns (2002), Van Eldik and Viviers (2005), and May and O'Neill (2008) who consider the internationalization process of South African firms; Gumede and Rasmussen (2002) and Naudé et al. (2005) who focus on the determinants of firm-level trade; Matthee and Krugell (2012) who determine the barriers to firm-level exports; and Koch and Peet (2007) who focus on non-tariff barriers.

Studies on exporter premia include Rankin (2001, 2013); Naughtin and Rankin (2014), and Matthee et al. (2015). Rankin (2001) uses cross-sectional survey data to examine exporter characteristics. In line with the stylized facts depicted above, he finds that South African exporters, on average, pay higher wages, employ more capital per worker, and produce more output per worker. These results are confirmed by Naudé (2000) and Edwards et al. (2008). In further support, a more recent study by Matthee and Krugell (2012) found significant differences between South African exporters and non-exporters in terms of age, size, foreign ownership, and productivity. In addition the authors show that, after controlling for unobserved firm heterogeneity, firm size, productivity, and access to finance affect the ability of a firm to export. Naughtin and Rankin (2014) investigate firms and the concept of super-exporters who are essentially very large manufacturing firms that dominate the export market. These firms are superior in many aspects: for example, the top 1 per cent tier of exporters employ around 500 employees while the top 5 per cent of firms employ around 100. Moreover, they are also more productive than the rest. Matthee et al. (2015) use transaction-level data from the Exporter

[1] For an illustration of this, refer to Figure 1.29 in Reis and Farole (2012: 55).

Dynamics Database made available by the World Bank to decompose the churning (in terms of firms, products, and destinations) within the trade margins. They focus on how the global financial crisis affected the super-exporters and that they were more resilient and able to recover faster than the rest. Finally, Rankin (2013) studies a group of 149 (mostly small and medium) firms between 2009 and 2012 and finds similar results in terms of export premia. For the exporters, however, he finds that their behaviour differs in terms of the destinations they serve and that it plays a role in their productivity levels. Those firms exporting to developed markets tend to export a higher proportion of their output, pay higher wages, produce higher quality products, and are more productive than their non-exporting counterparts. In contrast, exporters exporting to SADC and other African countries export a smaller proportion of their output, export less sophisticated products, are more capital-intensive, pay lower wages, and there is no productivity premium between them and domestic-orientated firms.

This paper extends the South African empirical literature because it uses the population of firms and export transactions. This means that, for the first time, we can examine the link between exporters' characteristics and behaviour in terms of destinations served and products exported over time for the entire population. In general, the previous South African research has found similar results to existing international studies. However, one area where the results have differed has been in terms of the productivity premium. Rankin (2001) found no productivity premium between exporters, in general, and non-exporters. It is only when these exporters trade outside of Africa that they exhibit a significant productivity premium. The missing productivity premium may simply be a characteristic of the small samples of firms used in this research, which may not be representative of South African exporters, and thus access to the population of exporting firms should clarify this.

3 Data

The data on which this paper is based comes from the administrative data of the SARS and was developed as a joint SARS/National Treasury/UNU-WIDER initiative. We use three specific datasets: the Company Income Tax (CIT) return data, the Pay as You Earn (or Personal Income Tax employee data (PAYE, or IRP5), and customs transactions data.

The CIT data is available for the tax years 2009 to 2013; however, the form used to generate the CIT return data was significantly changed in May of 2013 to accommodate the fact that larger firms require more detailed returns compared to smaller firms. As such, the CIT data is divided into two groups: those firms which completed the old CIT form (known as the IT14), and those which completed the newer, more detailed form (known as the ITR14). In order to create a panel, the ITR14 and the IT14 datasets were appended and key productivity variables were created. These are output, capital, labour costs, and intermediate inputs. The panel spans from 2010 to 2013. In this dataset, we focus on firms in the manufacturing sector, which we identify using the SIC code (SIC 7 edition). We extract firms that are classified between codes 10000 and 32909. Although this dataset contains information on company balance sheets and income statements used to determine productivity, it does not include any information on total

employment or exporting.[2] This information is obtained from the PAYE and customs transactions datasets respectively.

The IRP5 (or PAYE) data includes employee information on Unemployment Insurance Fund (UIF) contributions, Skills Development Levy (SDL) contributions, total employee tax amount, provident fund contribution, taxable income, and employment tax incentive contribution, etc. for the years 2010 to 2013. From the IRP5 we could determine the number of employees per firm. We calculated the number of employees per firm by using a full-time equivalent over each year (i.e. number of months worked across all workers/12).

The customs database comprises of all export transactions by firms in South Africa, on a daily basis from 2010–13. A transaction includes traderidentification, tariff code (HS8-digit level), country of destination (market), customs value (in Rand) of the transaction, and the statistical quantity of goods exported. In our analysis we considered only exporters who trade more than R10,000 per year, which still covers 99 per cent of exports. The HS8 digit tariff code is aggregated to HS6 digit level, as this level allows for cross-country comparisons. In terms of trade margin analyses, the HS6 digit level is appropriate since De Lucio et al. (2011) argue that high levels of product-aggregation (HS2) may overestimate the intensive margin and underestimate the extensive margin. Using a finer product classification, such as the 10 digit classification as in the case of Bernard et al. (2009), tends to underestimate the intensive margin and overestimate the extensive margin.

From the customs database, using the destination and HS6 digit product data, we created the following dummies: an African dummy (for firms that only export to countries in Africa), a multi-product dummy (for firms exporting more than one product), and a multi-destination dummy (for firms that export to more than one destination).

Our final database, therefore, is a merged dataset that includes CIT, employee data, and customs data from 2010–13 for all manufacturing firms. The next section provides the empirical results of the final dataset, which comprised of around 700,000 unique firms per tax year. In terms of manufacturing, there are on average 29,000 and around 5,711 exporters per tax year.

4 Empirical analysis and results

We divide our analysis into two parts. In the first we use descriptive statistics to illustrate some 'stylized facts' about South African exporters; in the second we examine the relationship between exporting and productivity in more detail.

[2] Firms do report foreign sales amounts and although these are closely correlated with the customs and excise data the amounts reported are inconsistent with this dataset. We thus base the trade behaviour on the customs and excise dataset.

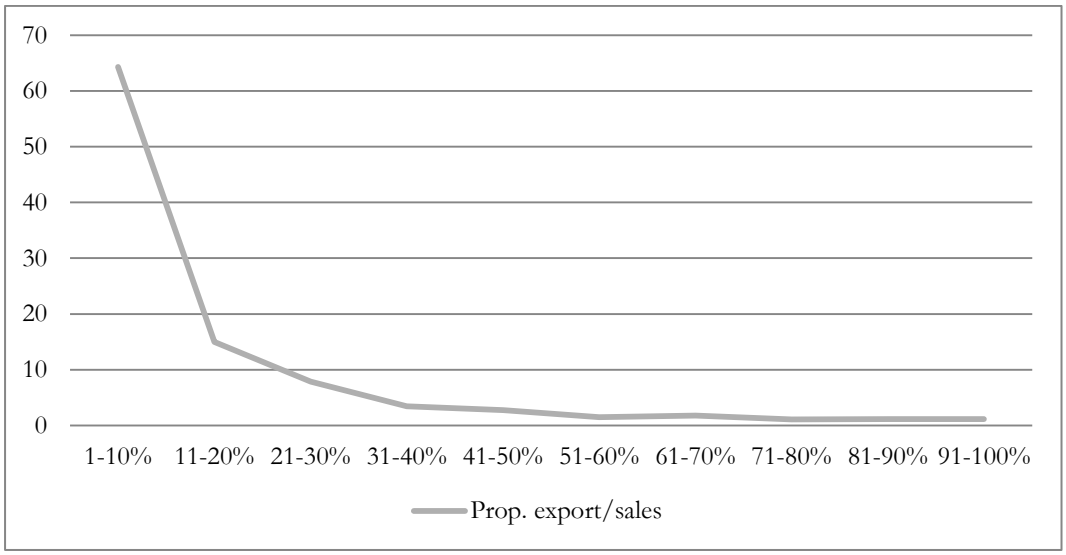
4.1 Descriptives

Stylized fact 1: Export participation is rare and export specialization is even rarer.

Export participation within the South African manufacturing sector is quite rare—less than a third export (19 per cent in 2013). This is not dissimilar to that of US manufacturing firms where 27 per cent export (Bernard et al. 2007). When the sample is restricted to only medium and large firms,[3] the proportion of exporting firms increases (45 per cent in 2013).

Not only is exporting rare among South African manufacturers, but as Figure 1 indicates, very few South African manufacturing firms specialize in exporting. Fewer than 10 per cent of exporters export more than half of their output. The average exporter exports around a fifth of their output but the median exporter exports only 4 per cent.

Figure 1: Proportion of output exported if a firm exports



Source: Authors' own calculations using SARS data.

Stylized fact 2: Exporters are different to non-exporters.

In order to distinguish between the characteristics of exporters and non-exporters, we follow the approach initially used by Bernard and Jensen (1995). This estimates regressions of the form:

$$\ln(X)_i = \alpha + \beta Exporter_i + \delta Industry_i + u_i$$

Where: X_i – firm characteristics, $Exporter_i$ – dummy variable of export status (exporter=1 and non-exporter=0), $Industry_i$ – control dummy (5 digit SIC Industry) to account for heterogeneity, β_i – export premia, μ_{it} – Error term.

[3] Medium and large firms are defined according to the SARS definition of medium and large firms based on their total assets and turnover.

Table 1 reports the export premia for the general case of manufacturing exporters relative to their domestic counterparts. The table indicates that for exporters relative to non-exporters the export premia are positive and significant for all characteristics. Exporters are notably larger, both in terms of output and number of employees, more labour productive, pay higher wages, and are more capital and intermediate-input intensive than non-exporters. Even after controlling for firm size, relative to non-exporters, exporters produce 46 per cent more output per worker, pay 27 per cent higher wages, and are 12 and 57 per cent more capital and intermediate-input intensive respectively.

Table 1: Manufacturing exporter premia—exporters versus non-exporters

	Output	No of employees	Output per worker	Labour cost	Capital per worker	Intermediate inputs per worker
Exporter	2.118***	0.708***	0.343***	1.690***	0.151***	0.466***
	(0.0293)	(0.0283)	(0.0218)	(0.0281)	(0.0500)	(0.0263)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No
Controlling for firm size						
Exporter			0.460***	0.273***	0.124**	0.569***
			(0.0220)	(0.0210)	(0.0514)	(0.0267)
Industry controls			Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes
Observations	25,881	10,065	9,955	9,681	9,427	9,710

Notes: ***p<0.01 **p<0.05 *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.) (Values are given in natural logarithms.)

Source: Authors' own calculation using the Large Sample Survey (LSS) data and SARS data.

Stylized fact 3: Multi-destination, and multi-product exporters, although relatively small in number, contribute substantially to total export value.

Table 2 (the joint distribution of firms over number of products and countries) and Table 3 (the joint distribution of export value over number of products and countries) show that exporting is rare but that the firms that dominate exports are a small group. These firms export many products to multiple destinations.

Table 2: Joint distribution of firms over number of products and countries, average 2010–13

Destination categories	Product categories						
	1	2	3	4-10	11-50	50+	Total
1	9.7	4.9	2.9	6.9	2.9	0.4	27.6
2	1.0	3.3	2.8	7.4	3.6	0.4	18.4
3	0.4	0.8	1.4	6.3	3.5	0.4	12.7
4-10	0.4	0.8	1.0	9.6	15.5	3.0	30.3
11-50	0.0	0.2	0.2	1.5	5.1	3.6	10.6
50+	0.0	0.0	0.0	0.0	0.1	0.2	0.3
Total	11.5	9.9	8.3	31.6	30.7	8.0	100.0

Source: Authors' own calculations.

Table 3: Joint distribution of export value over number of products and countries, average 2010–13

Destination categories	Product categories						
	1	2	3	4-10	11-50	50+	Total
1	0.5	0.3	0.1	0.3	0.3	0.2	1.7
2	0.3	0.2	0.2	0.5	0.4	0.2	1.9
3	0.1	0.3	0.1	0.5	0.6	0.2	1.8
4-10	0.2	0.6	0.8	3.9	5.9	1.9	13.2
11-50	0.1	0.5	0.7	14.1	25.5	14.7	55.6
50+	0.0	0.0	0.1	0.4	7.8	17.6	25.9
Total	1.2	1.8	2.0	19.7	40.5	34.7	100.0

Source: Authors' own calculations.

The first column of Table 2 shows that 11.5 per cent of the exporters are single-product firms—these firms contribute to only 1.2 per cent of the total export value (as seen in the first column in Table 3). In contrast, multi-product firms are responsible for 98.8 per cent of the total value exported (refer to the last row in Table 3). In both these tables it is evident that 38.7 per cent of firms export more than ten products and these firms contribute 75.2 per cent of total exports. Similar results were found by Bernard et al. (2009) where 14.5 per cent of US firms exported 10+ products and their contribution to the export value was 92.9 per cent. Similarly, Amador and Opromolla (2010) examine Portugal's exports from 1996–2005 and find that 9 per cent of exporters export more than 11 products, and they account for 40 per cent of total exports.[4]

Destinations show a similar pattern to products, where 27.6 per cent of firms export to a single destination, but these firms contribute only 1.7 per cent of the total export value. The multi-destination firms are responsible for 98.3 per cent of the value exported (refer to the last column in Table 3). The 10.6 per cent of firms that export to between 11 and 50 destinations contribute to the majority (55.6 per cent) of exports. Amador and Opromolla (2010) obtained similar results as 6.7 per cent of the firms exported to between 11 and 50 countries contributed 56 per cent of total exports.

Stylized fact 4: Multi-destination, and multi-product exporters have even higher exporter premia.

Treating exporters as one homogenous group obscures within-exporter heterogeneity. We can analyse export behaviour by considering whether or not exporters exporting multiple products are different from those in terms of single-product exporters, and likewise for destinations served.

In terms of destinations, Table 4 reports that multiple-destination exporters are significantly larger, more labour productive, pay higher wages, and are significantly more capital and intermediate-input intensive than single-destination exporters, who, in turn, exhibit superior performance characteristics relative to non-exporters, even after controlling for firm size. Similar results are found after restricting the estimation to medium and large firms.

[4] Both of these studies (Bernard et al. 2009; Amador and Opromolla 2010) were on all exporting firms, whereas this study focuses on manufacturing exporters only.

Table 4: Manufacturing exporter premia—multiple destinations

	Output	No of employees	Output per worker	Labour cost	Capital per worker	Intermediate inputs per worker
Exporter	1.310***	0.124***	0.179***	0.939***	-0.00528	0.277***
	(0.0508)	(0.0426)	(0.0333)	(0.0487)	(0.0765)	(0.0400)
Multi-destination dummy	1.112***	0.798***	0.224***	1.028***	0.213***	0.258***
	(0.0574)	(0.0440)	(0.0344)	(0.0546)	(0.0790)	(0.0413)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No
Controlling for firm size						
Exporter			0.202***	0.0892***	-0.00826	0.296***
			(0.0324)	(0.0311)	(0.0766)	(0.0394)
Multi-destination dummy			0.366***	0.261***	0.188**	0.389***
			(0.0340)	(0.0326)	(0.0803)	(0.0413)
Industry controls			Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes
Observations	25,881	10,065	9,955	9,681	9,427	9,710

Notes: ***p<0.01 **p<0.05 *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.) (Values are given in natural logarithms.)

Source: Authors' own calculations.

In terms of products (see Table 5), multi-product exporters are larger in terms of output, output per worker, and have higher average labour costs and higher levels of intermediate inputs per worker than their single-product counterparts. They are not significantly different from single-product exporters in terms of capital per worker. The larger output and wage results for exporters and multi-product firms may be due to these firms just being larger than non-exporters and single-product firms, but if controlled for firm size, the same results hold. Interestingly when the sample is limited to medium to large manufacturing firms the results differ. For medium to large manufacturing exporters and non-exporters, the characteristics are not different, except for exporters having fewer employees. Medium to large multi-product firms have higher output (total and per worker) and higher average labour costs than single-product firms, but are not significantly different in terms of output, capital, or intermediate inputs per worker.

Table 5: Manufacturing exporter premia—multiple products

	Output	No of employees	Output per worker	Labour cost	Capital per worker	Intermediate inputs per worker
No firm size control						
Exporter	1.194***	0.0380	0.129***	0.861***	0.0472	0.207***
	(0.0763)	(0.0615)	(0.0478)	(0.0729)	(0.109)	(0.0576)
Multi-product dummy	1.040***	0.753***	0.238***	0.933***	0.106	0.290***
	(0.0797)	(0.0618)	(0.0480)	(0.0760)	(0.110)	(0.0578)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No
Controlling for firm size						
Exporter			0.139***	0.147***	0.0460	0.213***
			(0.0466)	(0.0447)	(0.109)	(0.0567)
Multi-product dummy			0.367***	0.141***	0.0803	0.407***
			(0.0471)	(0.0451)	(0.111)	(0.0573)
Industry controls			Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes
Observations	27,099	10,397	10,281	24,357	9,727	10,026

Notes: ***p<0.01 **p<0.05 *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.) (Values are given in natural logarithms.)

Source: Authors' own calculations.

Stylized fact 5: The exporter premia in terms of multi-destinations and multi-products is higher when exporting outside of Africa.

Exporter premia by destination are reported in Table 6. Exporters to multiple destinations outside of Africa display superior characteristics relative to all other exporters, while firms which export to multiple destinations within Africa are larger, more labour productive, pay higher wages, and employ more intermediate inputs per worker than firms which export to single destinations (both inside and outside of Africa). Restricting the estimation to only medium and large firms yields similar results. Interestingly, these results indicate that firms exporting to a single destination within Africa seem to perform better than firms which export to a single destination outside of Africa in terms of output, labour productivity, wages, and intermediate-input intensity (and after controlling for firm size, labour productivity, and intermediate-input intensity). However, once the estimation is restricted to medium and large firms, these differences are no longer significant.

Table 6: Manufacturing exporter premia—multiple destinations within and outside Africa

	Output	No of employees	Output per worker	Labour cost	Capital per worker	Intermediate inputs per worker
Exporter	1.043***	0.140	-0.0271	0.754***	-0.140	0.0166
	(0.122)	(0.0966)	(0.0758)	(0.116)	(0.176)	(0.0909)
Africa only dummy	0.319**	-0.0223	0.244***	0.222*	0.158	0.309***
	(0.132)	(0.103)	(0.0809)	(0.126)	(0.187)	(0.0969)
Multi-destination dummy	1.634***	0.987***	0.482***	1.493***	0.491***	0.554***
	(0.127)	(0.0994)	(0.0780)	(0.121)	(0.180)	(0.0936)
Interaction: Afri*Multi-dest	-0.855***	-0.406***	-0.353***	-0.810***	-0.458**	-0.383***
	(0.145)	(0.112)	(0.0879)	(0.138)	(0.203)	(0.105)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No
Controlling for firm size						
Exporter			0.00304	0.116	-0.142	0.0404
			(0.0737)	(0.0707)	(0.176)	(0.0895)
Africa Only Dummy			0.236***	-0.0319	0.157	0.303***
			(0.0786)	(0.0753)	(0.187)	(0.0953)
Multi-destination dummy			0.659***	0.357***	0.465**	0.716***
			(0.0762)	(0.0730)	(0.181)	(0.0925)
Interaction: Afri*Multi-dest			-0.423***	-0.214***	-0.446**	-0.447***
			(0.0854)	(0.0818)	(0.203)	(0.104)
Industry controls			Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes
Observations	25,881	10,065	9,955	9,681	9,427	9,710

Notes: ***p<0.01 **p<0.05 *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.) (Values are given in natural logarithms.)

Source: Authors' own calculation using SARS data.

Table 7 reports results for products and shows that multi-product firms exporting to countries outside Africa have larger total output, number of employees, larger output per worker, pay more labour costs, have more capital per worker, and have a higher intermediate-input level than multi-product firms exporting only to African countries. Single-product exporters exporting to countries outside Africa show the lowest output premium and labour cost of all the exporters. For all single-product firms the number of employees and capital per worker are not significant, therefore no different from non-exporting firms.

When controlling for medium to large firms most of the characteristics (output, output per worker, labour cost, capital per worker, and intermediate inputs per worker) of single-product firms are not significantly different from non-exporting firms, except for single-product exporters exporting within Africa only having less number of employees than non-exporters. Multi-product medium to large firms exporting to countries outside of Africa show superior characteristics to multi-product medium to large firms exporting only to African countries.

Table 7: Manufacturing exporter premia—multiple products within and outside Africa

	Output	No of employees	Output per worker	Labour cost	Capital per worker	Intermediate inputs per worker
No firm size control						
Exporter	0.991***	0.149	-0.147*	0.738***	-0.113	-0.105
	(0.126)	(0.101)	(0.0788)	(0.119)	(0.180)	(0.0952)
Africa only dummy	0.298*	-0.180	0.410***	0.181	0.238	0.465***
	(0.157)	(0.122)	(0.0959)	(0.150)	(0.219)	(0.116)
Multi-product dummy	1.679***	0.964***	0.609***	1.502***	0.443**	0.681***
	(0.131)	(0.103)	(0.0809)	(0.124)	(0.185)	(0.0976)
Interaction: Afri*Multi-prod	-1.065***	-0.391***	-0.577***	-0.971***	-0.550**	-0.605***
	(0.166)	(0.129)	(0.101)	(0.158)	(0.231)	(0.122)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No
Controlling for firm size						
Exporter			-0.108	0.136*	-0.112	-0.0705
			(0.0762)	(0.0727)	(0.179)	(0.0931)
Africa only dummy			0.378***	0.0186	0.241	0.432***
			(0.0922)	(0.0883)	(0.217)	(0.113)
Multi-product dummy			0.774***	0.329***	0.414**	0.830***
			(0.0785)	(0.0749)	(0.185)	(0.0960)
Interaction: Afri*Multi-prod			-0.650***	-0.316***	-0.540**	-0.667***
			(0.0971)	(0.0929)	(0.229)	(0.119)
Industry controls			Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes
Observations	27,099	10,397	10,281	24,357	9,727	10,026

Notes: ***p<0.01 **p<0.05 *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.) (Values are given in natural logarithms.)

Source: Authors' own calculations.

Stylized fact 6: There is a lot of churning in exporter dynamics in terms of products exported and destinations served.

The data also allows us to analyse the variation in the exports through a decomposition of the intensive and extensive margins of trade over the period 2010–13. Firstly we decompose the total export growth between year t-1 and year t into the different types of firms, i.e. new exporting firms entering the foreign market (E), firms that exit the foreign market (X), and firms that continue to export (C).

$$\Delta Y_t = \sum_{f \in E} Y_{f,t} - \sum_{f \in X} Y_{f,t-1} + \sum_{f \in C} \Delta Y_{f,t} \quad (1)$$

The firms that continue to export (C) can further decomposed into:

$$\sum_{f \in C} \Delta Y_{f,t} = \sum_{f \in A_f} Y_{f,j,t} - \sum_{f \in D_f} Y_{f,j,t-1} + \sum_{f \in V_f} \Delta Y_{f,j,t}$$

where A_f is a set of product–market export combinations that is added by a firm. D_f are product–market export combinations that are dropped by a firm and V_f contain existing product–market combinations that continue from year t-1 to year t. The intensive margin is captured by V_f. The

extensive margin consists of the net effect of new exporting firms entering the foreign market (E) and firms that exit the foreign market (X) (the first two variables of Equation (1)) as well as the net effect of added (A_f) and dropped (D_f) product–market combinations (the first two variables of Equation (2)). We compute the percentage aggregate change in total exports by dividing each term in Equations (1) and (2) by $(Y_t + Y_{t-1})/2$. Table 8 presents export churning as decomposed by the intensive and extensive margins' contribution to trade.

Table 8: Percentage of intensive and extensive margins' manufacturing export growth over the period 2010–13

		2010–2011	2011–2012	2012–2013
Exporter entry and exit	Enter	0.8	2.8	1.4
	Exit	-0.5	-0.7	-5.7
	Net entry (firms enter minus firms exit)	0.3	2.1	-4.2
Diversification	Added/new:	14.9	16.7	12.8
	1. New product, existing destination	3.6	4.0	3.0
	2. Existing product, new destination	3.9	3.4	4.3
	3. New product, new destination	2.5	1.5	1.3
	4. New combination of existing product, existing destination	4.9	7.9	4.2
	Dropped	-10.8	-15.6	-11.9
	1. Dropped product, existing destination	2.6	7.0	3.3
	2. Existing product, dropped destination	2.8	3.1	3.1
	3. Dropped product, dropped destination	0.6	0.9	1.1
	4. Dropped combination of existing product, existing destination	4.8	4.5	4.5
	Net diversification (added minus dropped)	4.1	1.2	0.9
Intensive margin	Net intensive margin (existing product–market combinations)	10.7	4.0	12.0
Total change in exports		15.2	7.3	8.7
per cent annual growth due to:				
Net extensive margin (net entry & net diversification)		29.5%	45.2%	-38.2%
-Net entry (new minus exit)		2.2%	29.1%	-48.5%
-Net diversification (added minus dropped)		27.3%	16.1%	10.3%
Net intensive margin		70.5%	54.8%	138.2%

Source: Authors' own calculations.

Three sections are depicted in Table 8: exporter entry and exit, diversification (product and market churning or switching), and the intensive margin. The net effect is calculated for each, adding the positive export growth contribution and subtracting the negative growth contribution). The relative contribution of each margin to the total change in exports is provided at the end of Table 8.

The net intensive margin (existing product–destination combinations) is the largest contributor to the growth in exports (between 54.8 and 138.2 per cent of total export growth), whereas the extensive margin accounts for the remaining growth percentage (-38.2 to -45.2 per cent).

The extensive margin consists of net entry and net diversification. Net entry is firms/exporters that enter and exit the foreign trade destination. The start-up cost for a firm to enter into the trade environment may be high and therefore some of the firms that enter the trade environment exit after a year (Eaton et al. 2007; Freund and Pierola 2010). For the period 2012–13 more firms exited than entered, resulting in a net entry of -4.2. Net diversification includes added and dropped product–destination combinations, which is also referred to as product–destination switching. The added product–destination combinations can be decomposed down into four categories, namely firms exporting: 1) a new product to an existing destination, 2) an existing

product to a new destination, 3) a new product to a new destination, or 4) a new combination of an existing product to an existing destination. In the period 2012–13, exporting a new product to a new destination contributed only 1.3 per cent to the growth in added diversification of 12.8 per cent. It is easier to diversify in terms of either a new product or a new destination, but not both, as this creates more cost of discovery for the exporter (Freund and Pierola 2010). Exporting new combinations of existing products to existing destinations results in less uncertainty for the exporter. In 2011–12, 7.9 per cent of the 16.7 per cent growth in added product–destination combinations was contributed by new combinations of existing products to existing destinations. The dropped product–destination combinations can also be decomposed into similar categories, i.e. firms: 1) dropping a product from an existing destination, 2) dropping a destination of an existing product, 3) dropping the product and destination, or 4) dropping of existing product–destination combinations. From 2010–11, less than 1 per cent of the 10.8 per cent dropped product–destination combinations was due to dropping a product and destination at the same instance. It is more likely for a continuing firm to drop either a product or a destination, but not both. In 2012–13 the exporter entry's contribution to export growth was 1.4 per cent, whereas added/new products and destinations were 12.8 per cent. This alludes to the fact that it is easier for an existing exporter to diversify in terms of products and destinations, than for a new exporter to start exporting.

It is not clear whether it is more common for exporters to expand in terms of *new products, existing destinations* than to expand to *new destinations, existing products*. The results differ across years, in 2010–11 and 2012–14 *new destinations, existing products* entries contributed 3.9 per cent and 4.3 per cent to the growth in export values, and *new products, existing destinations contributes* contributed 3.6 per cent and 3.0 per cent. For 2011–12, however, the contribution of *new products, existing destinations* was 0.6 per cent more than the contribution of *new destinations, existing products*. It can therefore be concluded that it is equally common for exporters to expand through both new products and new destinations. When expansion does occur, to what extent does exporting multiple products and/or multiple destinations have on exporters' productivity? This question is investigated in the next section.

4.2 The exporter productivity premium

The descriptive results showed that manufacturing exporters differ from non-exporters across a number of dimensions and that there is within-exporter heterogeneity in terms of firm characteristics, the amount exported, the number of products traded, and export destinations. In this section we examine the relationship between various aspects of this exporter heterogeneity and total factor productivity. Given the uniqueness of the data, we can examine these relationships in more detail than has been done previously, and we can use estimation techniques which control for the simultaneity issues that characterize production function estimation.

Method

Production function analysis enables inference about the productivity difference between traders and non-traders. One can deduce these productivity differences from the estimated production functions because the coefficient of the expected trade status dummy variable gives the difference between the productivity of traders and non-traders (Yasar et al. 2006).

South African manufacturing firms' total factor productivity (TFP) can be estimated with a Cobb–Douglas specification:

$$ln(^{Y_{it}}/_{L_{it}}) = \alpha_{it} + \beta_1(EX_{it}) + \beta_2(ln\,^{K_{it}}/_{L_{it}}) + \beta_3\left(ln\,^{I}/_{L_{it}}\right) + \beta_4(\ln L_{it}) + \beta_5(Ind_{it}) + \mu_{it} \quad (2)$$

Where: i is the firm subscript, t is the time subscript, $^{Y}/_{L}$ is real output per worker, $^{K}/_{L}$ represents real capital per worker, and $^{I}/_{L}$ represents real intermediate inputs per worker, Ind is a vector of industry characteristics (measured at the 5 digit SIC), and μ_i is the residual. The variable EX_{it} is a dummy variable that will represent exports status. It takes the form $EX_{it} = 1$ if the firm exports; $EX_{it} = 0$ otherwise.

Initially, we estimate the production function using Ordinary Least Squares (OLS) as a comparison with what has been previously undertaken in the South African literature. In this approach β_2 , β_3 and β_4 are the elasticity of output productivity with respect to capital per worker, intermediate inputs per worker, and labour respectively. The coefficient of interest, β_1, signifies productivity differences between exporting firms and domestic traders. Industries are explicitly included in the regression equation to account for some of the heterogeneity in this sample.

An issue with OLS estimation lies with its key assumption that inputs of production are uncorrelated with omitted unobservables, i.e. the error term in Equation (2) is assumed to be uncorrelated with the factor inputs. In reality, however, the level of factor inputs is likely to be influenced by unobservables: for example, a positive productivity shock, which is observed by the firm but not by the analyst, will lead the firm to increase output levels and, consequently, input levels. By ignoring this relationship, OLS estimation is likely to give biased and inconsistent estimates.

A fixed-effects regression is therefore run on the dataset in order to obtain more consistent estimates. This methodology, however, is also problematic in that it assumes that the relationship between firm behaviour and productivity is time invariant. Since this may not necessarily be the case, the semi-parametric methodologies of Olley and Pakes (1996) and Levinsohn and Petrin (2003) are used.

The Olley–Pakes (OP) estimation addresses the endogeneity problem by making use of investment as a proxy, whereas the Levinsohn–Petrin (LP) methodology makes use of intermediate inputs. The success of the OP investment method in controlling for bias can be hampered if the data contains a large number of zero-investment observations. Since the monotonicity condition will not hold for these observations, they will be truncated from the dataset. The dataset used in this study contains a large number of observations where investment is zero. As such, the LP methodology is used to estimate productivity, making use of intermediate inputs as a proxy.

The first stage in estimating TFP is to estimate the log-linearized form of the Cobb–Douglas production function represented by Equation (2). Unlike OLS, LP recognizes that the error

term, μ_{it}, is comprised of two components: transmitted productivity (observed by the firm, but not the analyst) and an error term that is uncorrelated with the choice of inputs, given by ω_{it} and ε_{it} respectively. The transmitted productivity component is the source of the simultaneity problem and the root of inconsistent estimates when using OLS.

Levinsohn and Petrin assume that intermediate inputs, I_{it}, can be written as a function of the two state variables K_{it} and ω_{it}. Under the condition of monotonicity, Levinsohn and Petrin show that the unobservable ω_{it} can be written as a function of intermediate inputs and capital:

$$\omega_{it} = \omega_{it}(K_{it}, I_{it}) \tag{3}$$

Using this expression, the production function in (2) can be expressed as:

$$ln(Y_{it}/L_{it}) = \beta_1(EX_{it}) + \vartheta_{it}(ln\, K_{it}/L_{it},\ ln\, I/L_{it}) + \beta_4(\ln L_{it}) + \beta_5(Ind_{it}) + \varepsilon_{it} \tag{4}$$

$$\text{where } \vartheta_{it}\left(ln\, K_{it}/L_{it},\ ln\, I/L_{it}\right) = \alpha_{it} + \beta_2\left(ln\, K_{it}/L_{it}\right) + \beta_3\left(ln\, I/L_{it}\right) + \omega_{it}(K_{it}, I_{it}) \tag{5}$$

The estimation procedure involves two steps. First, a third-order polynomial approximation is used to estimate $\vartheta_{it}\left(ln\, K_{it}/L_{it},\ ln\, I/L_{it}\right)$. The second step involves solving the generalized methods of moments (GMM) minimization problem in order to identify β_2 and β_3, the coefficients on capital and intermediate inputs. The LP technique will thereby give rise to consistent parameter estimates of the productivity Equation (2).

Results

Tables 9 and 10 present the results for the production function estimates. Each specification is estimated using three different estimators: OLS, firm fixed-effects, and LP. Table 9 focuses on destinations and Table 10 focuses on the number of products. Across the specifications the results are generally robust to the choice of estimator and thus we focus our discussion on the LP estimates.

Columns (1)–(3) in Table 9 show that exporters are approximately 5 per cent more productive than non-exporters and this relationship remains relatively constant between the years. Columns (4)–(6) indicate that this productivity comes mostly from exporting outside of Africa—firms that export outside of Africa are about 8–10 per cent more productive than domestic firms, but

African-only exporters are only approximately 2 per cent more productive. Columns (7)–(12) show that multi-destination exporters are more productive than single-destination exporters and that productivity increases with the number of destinations but at a decreasing rate.

The results for the number of products also show that productivity is positively related to the number of products exported, but like destinations, at a declining rate. Firm productivity levels also differ by the number of products destination interactions. Firms exporting a single product outside of Africa are on average no more productive than domestic firms and there is little evidence that single-product within-Africa exporters are more productive either. Rather, the productivity premium comes from exporting multiple products. Exporting multiple products within Africa only is associated with a productivity premium of approximately 4 per cent, whereas exporting multiple products, at least some of them outside of Africa, has a premium of approximately 10 per cent. These results further illustrate the heterogeneity within exporting firms and suggest that different types of exporting behaviour are associated with different productivity premia. They also suggest a hierarchy in terms of the productivity levels associated with exporting: domestic firms and single-product exporters have similar productivity levels; these increase with multiple-product within-African exporters, and jump substantially in multi-product firms that export outside of Africa.

Table 9: Exporter productivity premium by OLS, FE, and LP estimation—multi-destinations

	Standard			Africa			No. of Destinations			Multi-destinations		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OLS	FE	LP	OLS	FE	LP	OLS	FE	LP	OLS	FE	LP
2013	0.0246**	0.0237**	0.0326***	0.0242**	0.0238**	0.0324***	0.0235**	0.0237**	0.0316***	0.0244**	0.0238**	0.0325**
	(0.0117)	(0.00992)	(0.0117)	(0.0117)	(0.00993)	(0.0105)	(0.0116)	(0.00992)	(0.0104)	(0.0117)	(0.00997)	(0.0130)
Exporter	0.0523***	0.00506	0.0448***	0.100***	0.00687	0.0814***	-0.0138	-0.00220	-0.00393	-0.0119	0.00266	-0.0157
	(0.0141)	(0.0192)	(0.0144)	(0.0172)	(0.0242)	(0.0158)	(0.0148)	(0.0205)	(0.0125)	(0.0217)	(0.0226)	(0.0184)
Exporter*2013	-0.0373**	-0.00446	-0.0227	-0.0424**	-0.00303	-0.0362**	-0.0258	-0.00507	-0.0148	-0.0249	-0.0119	-0.00125
	(0.0159)	(0.0136)	(0.0149)	(0.0195)	(0.0160)	(0.0160)	(0.0158)	(0.0136)	(0.0127)	(0.0248)	(0.0251)	(0.0229)
Africa_only				-0.0875***	-0.00182	-0.0677***						
				(0.0189)	(0.0215)	(0.0127)						
Africa_only*2013				0.0175	-0.00315	0.0305*						
				(0.0217)	(0.0188)	(0.0156)						
Number of dest							0.0153***	0.00483	0.0114***			
							(0.00130)	(0.00484)	(0.00131)			
Number of dest square							-0.00013***	-2.69e-05	-0.0001***			
							(2.53e-05)	(9.40e-05)	(3.02e-05)			
Multi-dest										0.0905***	0.0142	0.0847***
										(0.0221)	(0.0242)	(0.0195)
Multi-dest.*2013										-0.0153	0.00826	-0.0275
										(0.0252)	(0.0247)	(0.0221)
ll	-0.0579***	-0.303***	-0.041***	-0.0611***	-0.303***	-0.0432***	-0.0707***	-0.304***	-0.0507***	-0.0614***	-0.303***	-0.0440***
	(0.00253)	(0.0158)	(0.00363)	(0.00256)	(0.0158)	(0.00384)	(0.00265)	(0.0158)	(0.00348)	(0.00257)	(0.0158)	(0.00331)
lkl	0.0237***	0.00412	0.00615	0.0234***	0.00417	0.00622	0.0231***	0.00413	0.00924	0.0238***	0.00412	0.00662
	(0.00151)	(0.00447)	(0.0153)	(0.00151)	(0.00448)	(0.0168)	(0.00150)	(0.00447)	(0.00753)	(0.00151)	(0.00447)	(0.0147)
lil	0.754***	0.578***	0.875***	0.753***	0.578***	0.872***	0.747***	0.577***	0.840***	0.752***	0.578***	0.871***
	(0.00284)	(0.0107)	(0.171)	(0.00284)	(0.0108)	(0.152)	(0.00286)	(0.0108)	(0.0283)	(0.00285)	(0.0108)	(0.161)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609
R-squared	0.888	0.737		0.888	0.737		0.890	0.738		0.888	0.737	
Number of id		9,940			9,940			9,940			9,940	

Notes: ***p<0.01, **p<0.05, *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.)

Source: Authors' own calculation using SARS data.

Table 10: Exporter productivity premium by OLS, FE and LP estimation—multi-products

	Number of products			Multi-products			Multi-products in Africa		
	OLS (1)	FE (2)	LP(3)	OLS (4)	FE(5)	LP (6)	OLS (7)	FE (8)	LP(9)
2013	0.0241**	0.0237**	0.0323***	0.0245**	0.0236**	0.0326***			
	(0.0117)	(0.00992)	(0.0107)	(0.0117)	(0.00996)	(0.0113)			
Exporter	0.0249*	0.00146	0.0249*	-0.0255	-0.0202	-0.0334			
	(0.0144)	(0.0194)	(0.0135)	(0.0309)	(0.0301)	(0.0269)			
Exporter*2013	-0.0338**	-0.00542	-0.0204	-0.0145	-0.00138	0.00743			
	(0.0159)	(0.0136)	(0.0126)	(0.0356)	(0.0385)	(0.0385)			
Number of products	0.00190***	0.00102	0.00144***						
	(0.000216)	(0.000771)	(0.000188)						
Number of products square	-2.40e-06***	-1.52e-06	-2.29e-06***						
	(4.92e-07)	(1.66e-06)	(4.89e-07)						
Multi-product dummy				0.0888***	0.0397	0.0891***			
				(0.0309)	(0.0304)	(0.0207)			
Multi-product dummy*2013				-0.0254	-0.00389	-0.0336			
				(0.0355)	(0.0380)	(0.0324)			
Non-exporter 2013							0.0243**	0.0236**	0.0325***
							(0.0117)	(0.00997)	(0.0119)
Single-product out Africa 2013							-0.0530*	0.0413	-0.0519
							(0.0301)	(0.0510)	(0.0461)
Single-product out Africa 2012							0.0125	-0.0206	-0.0188
							(0.0455)	(0.0435)	(0.0528)
Single-product in Africa 2013							0.00443	-0.0183	0.0373**
							(0.0229)	(0.0371)	(0.0187)
Single-product in Africa 2012							-0.0504	-0.0189	-0.0416
							(0.0400)	(0.0388)	(0.0282)
Multi-product in Africa 2013							0.0150	0.0380*	0.0426***
							(0.0130)	(0.0225)	(0.0118)
Multi-product in Africa 2012							0.0227	0.0188	0.0227*
							(0.0174)	(0.0227)	(0.0136)
Multi-product out Africa 2013							0.0978***	0.0380	0.0926***
							(0.0139)	(0.0264)	(0.0155)
Multi-product out Africa 2012							0.113***	0.0206	0.0950***
							(0.0177)	(0.0266)	(0.0208)
ll	-0.0643***	-0.304***	-0.0457***	-0.0593***	-0.303***	-0.0424***	-0.0627***	-0.303***	-0.0448***
	(0.0026)	(0.0159)	(0.00411)	(0.00254)	(0.0158)	(0.00367)	(0.00257)	(0.0159)	(0.00377)
lkl	0.0241***	0.00403	0.0107	0.0239***	0.00406	0.00611	0.0234***	0.00424	0.00549
	(0.0015)	(0.00447)	(0.0421)	(0.00151)	(0.00447)	(0.0142)	(0.00151)	(0.00448)	(0.0151)
lil	0.749***	0.578***	0.814***	0.753***	0.579***		0.751***	0.579***	0.872***
	(0.0028)	(0.0107)	(0.132)	(0.00285)	(0.0108)		(0.00285)	(0.0108)	(0.171)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609	12,609
R-squared	0.889	0.738		0.888	0.738		0.889	0.738	
Number of id		9,940			9,940			9,940	

Notes: ***p<0.01 **p<0.05 *p<0.1. (Is significant at the 1 per cent level, 5 per cent level, and 10 per cent level respectively.)

Source: Authors' own calculations.

5 Conclusion and policy recommendations

Exports matter for South Africa's economic growth: exporting firms provide jobs, foreign receipts pay for imports, and the international market allows for economies of scale and learning opportunities. Despite the importance of exports in economic policy, most research has focused at an aggregate level with limited understanding of the dynamics of the firms that actually export. The existing South African work on firm-level data has been limited by access to large datasets that track firms over time. This paper overcomes this through the use of a new dataset of the population of firms matched to the export transactions of these firms.

Analysis of this dataset indicates that South African exporting at the firm-level is similar to the stylized facts of firm-level exporting found internationally: less than a fifth of firms export in any given year; specialist exporting is very rare but total export value is dominated by a small number of firms; and exporters are larger, pay better, and are more productive. There is also a large degree of churn—entry and exit into the export market—but this does not seem to translate into sustained exporting. Most of South Africa's exporting growth comes from expansion on the intensive margin—existing exporters expanding their exports of existing products to existing destinations. The access to firm and transaction data shows the heterogeneity even within exporting. Not only do exporters differ in terms of the amount exported, they also differ in terms of the number of products and destinations they export to. These in turn are related to firm-level characteristics including productivity.

Multi-product, and multi-destination exporters contribute the most to total export value. They are also bigger and more productive than other types of exporters. Productivity varies by both the number of products exported and the number of destinations exported to. Single-product exporters, regardless of where they export to, have productivity levels that are similar to domestic firms. Multi-product exporters exporting within Africa only are about 4 per cent more productive, and multi-product exporters exporting outside of Africa are approximately 10 per cent more productive compared to producers for the domestic market.

What do these results mean for South African policy that aims to grow exports? The results show that exporters are different from non-exporters but there is heterogeneity even within exporting. This means that export policy needs to be clearer on the 'type' of exporting firms it wants to grow and export policy needs to be more focused to encourage this type of behaviour. It also means that it will be very difficult to encourage firms to become exporters or grow exports if they do not have the underlying characteristics (or the ability to acquire the characteristics), particularly productivity levels, that characterize successful exporters. More broadly, the results indicate that productivity matters for exporting, particularly for exporting to multiple destinations outside of Africa. Policies which increase firm-level productivity are thus likely to enable more firms to enter exporting, expand their markets, and grow the range of products exported. More productive domestic firms can also better compete against foreign competition. Productivity enhancing policies thus have benefits beyond exporting.

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