An investigation of exporting and productivity amongst South African firms

by

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Abstract

Existing literature on South African exporters provide an insight into the exporting behaviour of firms in South Africa. In general it is found that exporting in South Africa is rare as well as concentrated, and that there are definite differences between exporters and non-exporters. However, much of the existing research on South African firms is based on samples of limited size that are not representative of the broader population of firms.

Our paper forms part of a project initiated by UNU-WIDER and National Treasury to utilise SARS data with the aim of updating existing firm-level research in South Africa. Our paper contributes to the project by focusing on exporters and aims to document the behaviour of exports at a micro-level and the dynamics of exporting at the extensive and intensive margin over time. To do this we link company income tax data, employee data and transaction data.

Our results show that exporters are different to non-exporters across a number of dimensions – they are larger in terms of output and employment, are more capital intensive and they pay higher wages. We also find a total factor productivity that differs by export destination. In addition to examining these difference in levels we use the transaction data to investigate the presence of multiple product exporters and how exporting evolves with time. In particular we distinguish between the contribution of the intensive margin (the same exporter exporting more), and the extensive margin (new exporters, new markets or new products exported). The data also allows us to investigate export expansion paths – we can examine whether the export of new products is more common than entry into new markets, and how these may differ by export market and types of product. Lastly, we are able to investigate whether multi-product exporting firms have different characteristics in terms of size, capital-intensity, wages and productivity compared to other exporters and how this may change as firms increase the number of products exported or destinations exported to.

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1. Introduction

Existing literature on South African exporters provide an insight into the exporting behaviour of firms in South Africa. In general it is found that exporting in South Africa is rare as well as concentrated, and that there are definite differences between exporters and non-exporters (World Bank, 2014, Rankin, 2001; Edwards *et al*., 2008; Matthee and Krugell, 2012; Naughtin, 2014). However, much of the existing research on South African firms is based on samples of limited size. Recently made available SARS data, as part of a firm-level project initiated by UNU-WIDER and National Treasury, allows us to update existing firm-level exporter research in South Africa. By linking company income tax data, employee data and customs transaction data, this update of existing exporter research involves two things. Firstly, a documentation of the behaviour of exports at a micro-level by focusing on the heterogeneity of firms (in terms of productivity, destinations and products) and secondly, detailing the dynamics of exporting at the extensive and intensive margins over time.

Our first set of results, as found by Naughtin et al. (2015), confirms existing research by showing that exporters are different to non-exporters - they are larger in terms of output and employment, are more capital intensive and they pay higher wages. Total factor productivity also differs between exporters and non-exporters but this difference differs by export destination. Like the Rankin (2001) originally found – African exporters have lower productivity levels than those exporting outside of Africa.

This paper follows on Naughtin et al. (2015) by illustrating how exporting evolves over time and, in particular, the presence of multiple product exporters. We distinguish between the contribution of the intensive margin (the same exporter exporting more), and the extensive margin (new exporters, new markets or new products exported). The data also allows us to investigate export expansion paths – we can examine whether the export of new products is more common than entry into new markets, and how these may differ by export market and types of product. The results show that the intensive margin is the main driver of export growth contributing to between 60% - 80% of total growth in export. The extensive margin accounts for the remaining export growth percentage of 15%-40%.This decides with the results of Matthee et al. (2015) as they found the intensive margin contributed to more than three quarters of South African export growth from 2002-2012. In terms of the export expansion paths, exports of new products are just as common as exports to new markets, however the type of new products falls mostly in the machinery and electrical and metal HS clusters. The new markets to which most exporters expand to are located in the African continent.

Lastly, we are able to investigate whether multi-product exporting firms have different characteristics in terms of size, capital-intensity, wages and productivity compared to other exporters and how this may change as firms increase the number of products exported or markets exported to. Overall, the results show that multi-product firms are responsible for 96% of the total value exported and that the firms, who export more than 11 products, contribute 77% of total exports. Multi-product exporting firms are larger in terms of output, number of employees, output per worker, they have higher labour cost, are more capital intensive, have a higher level of intermediate inputs and pay higher wages and their intermediate input level per worker is higher than single product exporters. However, we find no evidence of a premium in terms of total factor productivity for multi-product exporters exporting within and outside of Africa. This could be due to within-exporter heterogeneity that is obscured by treating multi-product exporters as one homogenous group.

The outline of the paper is as follows: section 2 provides a literature review on trade margins and multi-product exporters as well as the status quo regarding firm-level exporter research on trade

margins in South Africa, section 3 provides a description of the data, descriptive analyses and regression results. Section 4 concludes.

2. Literature review

2.1 Multi-product exporters

A reduction in trade costs allows productive exporters to change their export behaviour (Berthou and Fogntagné, 2013). They can for example increase their exports of the same product to the same destination (expansion along the intensive margin), export the same product to a new destination or start exporting new products not part of their core business (expansion at the extensive margin) (Bernard et al., 2006; Bernard et al., 2011). Reis and Farole (2012:55) illustrate what this entails in table 1. de Lucio et al. (2011) add another dimension by also considering new combinations of old products and partners in their decomposition of Spanish export growth.

Table 1: Intensive and extensive margins with a 'geographic' dimension

	Existing country (destination)	New country (destination)
Existing product	Intensive margin	Extensive margin
New product	Extensive margin	Extensive margin

Source: Reis and Farole (2012:55)

Engaging in exports with more products and/or destinations also differentiates exporters, much like the differentiation between exporters and non-exporters. For example, these so-called multi-product exporters differ from single-product exporters: they are more productive, have more employees and are more capital insensitive. 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; Artolakis and Meundler, 2010 & 2013).

Multi-product exporters tend to dominate exports in both developed and developing countries (Artolakis and Meundler, 2010 & 2013). Bernard et al. (2009) using US data provide a decomposition of the extent to which they dominate exports. In 2000, 61.9% of the exporters exported more than 1 product and they contributed 99.2% of the total export value. The statistics for exporters exporting 2-4 products were more or less the same than for single product exporters. Those that exported between 5 and 9 products were slightly more with approximately double the contribution to value. The largest difference came with those exporters exporting more than 10 products. 14.5% of firms exported 10+ products but their contribution to total export value was 92.9%. 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%) of the firms exported to more than one destination. However, their contribution to the total value was 96.3%. At the top end, i.e. those exporters who exported to 10+ destinations contributed 85.6% of the total value. Bernard et al. (2009) further emphasise 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 such as production costs, market-entry costs (Artolakis 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 (Artolakis and Meundler (2010) find a positive association between the number of varieties exported and the destination country's market size) (Opromolla and Amador, 2010). 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; Opromolla and Amador, 2010). Similarly, exporters also tend to add and drop destinations, as is found in the case of Portuguese exporters (Opromolla and Amador, 2010).

Bastos and Silva (2009) 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) 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 emphasise 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 The South African trade margins story

Investigations into the dynamics behind South Africa's export growth have only recently begun to emerge in the literature. Using product-level data, Kwaramba (2015) shows the impact of trade liberalisation on the intensive and extensive margins of export growth. Matthee (2015), also using product-level data, considers how trade relationships with SADC countries have evolved through a decomposition of the intensive and extensive margins. Finally, Matthee and Santana Gallego (2015) use product-level data and apply a gravity equation to identify the determinants of South Africa's trade margins. Transaction-level data (contained in the World Bank's Exporter Dynamics Database) has been used by Matthee et al. (2015) to determine the impact of the Global Financial Crisis on South Africa's trade margins. Although insightful, these papers are not able to shed light on firm characteristics, due to a lack of data. This project, however, allows us to gain first-time insight into exporting firms' behaviour (in terms of products and destinations) by combining company income tax data with customs data.

3. Empirical analysis

3.1 Data

Our paper forms part of a project initiated by UNU-WIDER and National Treasury to utilise SARS data with the aim of updating existing firm-level research in South Africa. Our paper contributes to the project by focusing on exporters and aims to document the behaviour of exports at a micro-level and the dynamics of exporting at the extensive and intensive margin over time. To do this we link customs data, company income tax data (CIT) and employee data (IRP5).

The customs database comprises of all export transactions by firms in South Africa, on a daily basis from 2009-2013. A transaction includes trader id, tariff code (HS8-digit level), country of destination (market), customs value 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% of exports. The data is aggregated at an annual level by SARS and values are expressed in (current) Rand. 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 also appropriate since 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, like the 10 digit classification as in the case of Bernard et al. (2009), tend to underestimate the intensive margin and overestimate the extensive margin.

Using the destination and HS6 digit data, we created an African dummy (for firms that only export to Africa) as well as a multi-product dummy (for firms exporting more than 1 product).

In order to determine if multi-product exporting firms have different characteristics in terms of size, capital-intensity, wages and productivity compared to other exporters we link the customs data with the CIT and IRPR5 data. We used the 2013 ITR data (the data spans March 2012 to February 2013). In this dataset, we focus on firms in the manufacturing sector, using the SIC 7 edition. We extract firms that are classified between codes 10000 and 32909. From the ITR data we used the total sales to determine the output/size, plant and equipment to determine capital-intensity, and cost of sales to determine intermediate inputs.

The IRP5 data includes employee information on UIF contributions, SDL contributions, total employee tax amount, provident fund contribution, taxable income, and employment tax incentive contribution, etc. for the years 2009 to 2015. We used the 2013 data, period employed to 28/02/2013. From the IRP5 we could determine the number of employees per firm.

3.2 Descriptive analysis

An overview of the customs data is given in Table 2, followed by a more detailed description on the distribution of firms and export value over the number of products and countries (Tables 3 and 4). A detailed analysis on the intensive and extensive margin is presented in Table 5, where after the expansion paths in terms of product and markets are contained in Tables 6 and 7.

Table 2: Summary statistics of the customs data

Summary statistics	2009	2010	2011	2012	2013
Firm-level					
Number of products					
mean	15.86	16.62	17.25	17.30	16.73
median	4.00	5.00	5.00	5.00	5.00
standard deviation	43.85	44.55	41.23	46.77	44.21
Number of destinations					
mean	3.22	3.30	3.34	3.27	3.23
median	2.00	2.00	2.00	2.00	2.00
standard deviation	4.27	4.32	4.30	4.39	4.41
Exports (million Rands)					
mean	7.12	4.41	5.63	5.86	5.78
median	0.21	0.20	0.22	0.22	0.22
standard deviation	262.49	77.45	125.04	137.44	113.10
Aggregate-level					
Number of firms	24576	27246	28214	30812	32210
Number of products	1145	1029	1080	1254	1137
Number of destinations	225.0	229.0	231.0	228.0	227.0
Exports (million Rands)	626334.40	739473.20	883707.30	911712.10	1017150.00

Source: Authors' own calculations

Table 2 shows that our data includes 24 576 firms exporting 1 145 products to 225 countries in 2009. The average exporter in 2009 exported 15.86 products to 3.22 countries to the value of R7.12 million. From the median figures it can be seen that a "typical" exporter in 2009 exported 4 products to 2 countries to the value of R0.21 million. On an aggregate level, the number of firms grew by 31% from 24 576 exporters in 2009 to 32 210 exporters in 2013. The number of products and destinations remained fairly steady over the 5 year period. There is a 62% growth in total exports from 2009-2013. The average number of products an exporter export (ranging from 15.86-17.30) appears to have remained stable over the time period, but this is misleading as the high standard deviation indicates that firms enter, exit and products are added and dropped (this will be elaborated on in Table 5).

The aggregate and average number of firms and destinations in Table 1 provide a broad framework of what South African exports look like at the micro-level. A more comprehensive view is given in Tables 3 and 4, which illustrate the distribution and contribution of multi-product and multi-destination firms. Table 3 reports the joint distribution of firms over number of products and countries, while Table 4 presents the joint distribution of export value over number of products and countries.

Table 3: Joint distribution of firms over number of products and countries, average 2009-2013

		Product categories						
Destination categories		**1**	**2**	**3**	**4-10**	**11-50**	**50+**	**Total**
	1	13.36	5.79	3.44	8.13	4.85	1.43	37.00
	2	1.30	3.55	2.49	6.60	4.00	1.07	19.01
	3	0.46	0.80	1.25	4.73	3.30	0.83	11.38
	4-10	0.58	0.84	0.92	7.33	11.02	3.58	24.26
	11-50	0.09	0.14	0.17	1.14	3.51	3.08	8.14
	50+	0.00	0.00	0.00	0.01	0.03	0.16	0.21
	Total	15.79	11.14	8.27	27.94	26.71	10.14	100.00

Source: Source: Authors' own calculations

Table 4: Joint distribution of export value over number of products and countries, average 2009-2013

		Product categories						
Destination categories		**1**	**2**	**3**	**4-10**	**11-50**	**50+**	**Total**
	1	0.69	0.45	0.11	0.26	0.30	0.37	2.17
	2	0.30	0.29	0.23	0.55	0.29	0.45	2.11
	3	0.32	0.25	0.28	0.67	0.37	0.37	2.26
	4-10	1.20	0.76	0.71	3.46	3.35	2.78	12.25
	11-50	1.61	0.56	1.14	8.92	37.17	20.61	70.00
	50+	0.01	0.01	0.01	0.18	1.67	9.35	11.22
	Total	4.13	2.30	2.48	14.02	43.14	33.92	100.00

Source: Source: Authors' own calculations

The first column of table 3 shows that 15.79% of the exporters are single product firms - these firms contribute to only 4.13% of the total export value (as seen in the first column in Table 4). On the other hand multi-product firms are responsible for 96% of the total value exported (refer to the last row in Table 4). In both these tables it is evident that 36.85% of firms export more than 11 products and these firms contribute 77.06% of total exports. Similar results were found by Bernard et al. (2009) where 14.5% of US firms exported 10+ products and their contribution to the export value

was 92.9%. Another study by Opromolla and Amador (2010) on Portugal's exports from 1996-2005 found that 9% of exporters export more than 11 products, and they account for 40% of total exports.

Destinations show a similar pattern to products: where 37% of firms export to a single destination, but these firms contribute only 2.17% of the total export value. The multi-destination firms, on the other hand are responsible for 97.83% of the value exported (refer to the last column in table 4). The 8.14% of firms that export to between 11 and 15 destinations contribute to the majority (70%) of exports. Opromolla and Amador (2010) obtained similar results as 6.7% of the firms exported to between 11-50 countries, contributing to 56% of total exports.

Tables 3 and 4 clearly show the within-exporter heterogeneity that is obscured by treating exporters as one homogenous group. Not only is exporting rare but the firms that dominate exports are small in number and export many products to multiple destinations.

Apart from the different levels of contribution to exports, 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 2009 to 2013. 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 continues 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 equation 1 and 2 by (Y_t +Y_{t-1})/2. Table 5 reports on the intensive and extensive margin's contribution to trade.

Table 5: Intensive and extensive margins of export growth over the period 2009 to 2013

		2009-2010	2010-2011	2011-2012	2012-2013
Exporter entry and exit	Enter	1.5	0.9	1.6	1.7
	Exit	-0.8	-1.2	-1.3	-0.5
	Net entry (enter-exit)	**0.8**	**-0.3**	**0.3**	**1.2**
Diversification	**Added/new:**	**13.60**	**12.32**	**11.84**	**12.06**
	1. New product, existing market	3.01	3.26	4.20	3.50
	2. Existing product, new market	3.97	3.71	2.60	3.47
	3. New product, new market	1.20	1.23	0.96	1.13
	4. New combination of existing product, existing market	5.42	4.11	4.07	3.97
	Dropped	**-9.71**	**-9.23**	**-11.63**	**-8.84**
	1. Dropped product, existing market	-2.37	-2.31	-4.84	-2.94
	2. Existing product, dropped market	-3.25	-2.67	-2.87	-2.12
	3. Dropped product, dropped market	-0.88	-0.92	-0.72	-0.86
	4. Dropped combination of existing product, existing market	-3.23	-3.33	-3.21	-2.94
	Net diversification (added-dropped)	**3.88**	**3.09**	**0.21**	**3.22**
	Net extensive margin (net entry & net diversification)	**4.6**	**2.8**	**0.5**	**4.4**
Intensive margin	**Net intensive margin (existing product market combinations)**	**11.9**	**15.0**	**2.7**	**6.5**
Total change in exports		**16.6**	**17.8**	**3.1**	**10.9**
% annual growth due to:					
Net entry (new-exit)		4.6	-1.5	8.3	10.7
Net diversification (added-dropped)		23.4	17.4	6.7	29.4
Net extensive margin (net entry & net divers)		**28.1**	**15.8**	**15.0**	**40.1**
Net intensive margin		**71.9**	**84.2**	**85.0**	**59.9**

Source: Source: Authors' own calculations

Three sections are depicted in Table 5 namely exporter entry and exit, diversification (product and market switching) and the intensive margin. The net effect is calculated for each section (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 5.

The net intensive margin (existing product-market combinations) is the largest contributor to the growth in exports (between 60%-85% of total export growth), whereas the extensive margin accounts for the remaining growth percentage (15%-40%). Usually a slowdown in export growth is associated with a relatively larger fall in growth at the extensive margin compared to the intensive margin (as can be seen in 2011-2012) (Matthee et al., 2015). A number of international studies found similar results (see for example Lucio et al. 2011; Opromolla and Amador, 2010; and Eaton et al., 2008).

The extensive margin consists of net entry and net diversification. Net entry is firms/exporters that enter and exit the foreign trade market. 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 and Freund & Pierola, 2010). For the period 2010-2011 more firms exited than entered, resulting in a net entry of -0.3. Net diversification includes added and dropped product-market combinations, which is also referred to as product-market switching. The added product-market combinations can be decomposed down into four categories, namely firms exporting: 1) a new product to an existing market, 2) an existing product to a new market, 3) a new product to a new market or 4) a new combination of an existing product to an existing market. Exporting a new product to a new market contributed around only 1.13% to the growth in added diversification of 12.06%. It is easier to diversify in terms of either a new product or a new market, but not both, as this creates more cost of discovery for the exporter (Freund & Pierola, 2010). Exporting new combinations of existing products to existing markets result in less uncertainty for the exporter. In 2009, 5.42% of the 13.6% growth in added product-market combinations was contributed by new combinations of existing products to existing markets. The dropped product-market combinations can also be decomposed into similar categories, i.e. firms 1) dropping a product from an existing market, 2) dropping a market of an existing product, 3) dropping the product and market or 4) dropping of existing product-market combinations. From 2010-2011 less than 1% of the 9.23% dropped product-market combinations was due to dropping a product and market at the same instance. It is more likely for a continuing firm to drop either a product or a market, but not both. In 2012-2013 the net entry's contribution to export growth is one third of the contribution of net diversification. This may allude to the fact that it is easier for an existing exporter to diversify in terms of products and markets, 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 markets* than to expand to *new markets, existing products*. The results are contradictory, in 2009-2010 and 2010-2011 *new markets, existing products* entries contributed 3.97% and 3.71% to the growth in export values and *new products, existing markets contributes* 3.01% and 3.26%. For 2011-2012 however, the contribution of *new products, existing markets* were 1.6% more than the contribution of *new markets, existing products*. In 2012-2013 these two types of contributions differ by 0.03%. It can therefore be concluded that it is equally common for exporters expand through both new product and new market.

The expansion paths of the added product-market combinations are shown in tables 6 and 7. Table 6 presents the expansion paths in terms of new products (classified in HS clusters) and Table 7 shows the expansion pathways in terms of new markets (classified as trading inside or outside Africa). In table 6 each column links up to Table 5 added product-market combinations, where "1" represents expansion in terms of a new product to an existing market, and "3"expansion of a new product to a new market. For each year interval the number of transactions in the HS cluster is given as a percentage of all the transactions in that period.

Table 6: Expansion pathways in terms of new products

New product types	2009-2010		2010-2011		2011-2012		2012-2013	
HS clusters	1[5]	3[6]	1	3	1	3	1	3
Animal and animal products	0.9	0.2	0.7	0.1	1.2	0.2	1.0	0.1
Vegetable products	2.2	0.6	1.9	0.3	2.5	0.3	2.6	0.3
Foodstuffs	2.5	0.6	2.2	0.4	2.6	0.4	2.5	0.3
Mineral products	1.0	0.2	1.1	0.2	1.8	0.2	1.0	0.1
Chemicals and allied industries	6.5	1.4	6.7	1.0	6.5	0.9	6.6	0.9
Plastics and rubbers	6.7	1.4	7.1	1.2	6.8	1.1	7.0	1.0
Raw hides, skins, leather and furs	1.0	0.2	1.1	0.2	1.1	0.2	1.1	0.2
Wood and wood products	4.9	1.1	5.1	0.9	4.9	0.8	4.9	0.7
Textiles	6.7	1.3	7.0	1.1	7.2	1.0	7.2	0.9
Footwear and headgear	1.2	0.2	1.2	0.2	1.4	0.2	1.3	0.2
Stone and glass	2.9	0.6	3.0	0.5	3.0	0.5	3.2	0.4
Metals	13.6	2.7	14.6	2.4	13.8	2.2	14.1	2.1
Machinery and electrical	22.0	5.0	23.1	4.3	22.4	4.2	23.2	4.1
Transportation	2.3	0.6	2.3	0.4	2.4	0.5	2.6	0.5
Miscellaneous	7.8	1.8	8.0	1.7	8.1	1.6	8.2	1.5

Source: Authors' own calculations

The expansion pathway for new products falls mostly under machinery and electrical (27% in 2009) and metals (16.3% in 2009). These two HS chapters remain the HS clusters with the largest number of transactions for added products from 2009-2013. The expansion of a new product exported to an existing market is on average four to five times larger than the expansion of a new product to a new market, confirming the start-up cost and uncertainties of a new product and new market combination.

Table 7: Expansion pathways in terms of new markets

New destinations	2009-2010		2010-2011		2011-2012		2012-2013	
	2[7]	3[8]	2	3	2	3	2	3
Africa	25.9	47.6	27.8	44.8	26.9	46.1	26.5	28.3
Outside Africa	15.1	11.4	15.5	11.8	15.4	11.6	26.0	19.2

Source: Authors' own calculations

The markets to which most added product-market combinations expand to are located in Africa. For 2009-2010, 2010-2011 and 2011-2012 around 73% of the new market transactions were in an African country. In 2012-2013, however the percentage dropped to 54.8% of transactions. Outside of Africa the "existing product to new markets" transactions is more than the "new product to new market transactions", as expected. Interestingly, this is not the case inside Africa. It seems that exporters experiment more with diversification in terms of new products to new markets inside the African continent.

[5] Transaction of a new product exported to an existing market.
[6] Transaction of a new product exported to a new market.
[7] Transaction of an existing product exported to a new market.
[8] Transaction of a new product exported to a new market.

Now that we know what the expansion paths of the new product and market are, we can investigate whether multi-product exporting firms have different characteristics in terms of size, capital-intensity, wages and productivity compared to other exporters.

3.3 Regression results

In order to determine the characteristics of multi-product versus single product exporters we merged the customs data, company income tax data (CIT) and employee data (IRP5) for 2013. The focus is on the manufacturing sector.

3.3.1 Characteristics of multi-product exporting firms

In table 8 the characteristics of multi-product exporters are provided to show whether these firms differ from single product exporters.

Table 8: Multi-product exporters vs. single product exporters (all manufacturing firms)

Full Manufacturing								
No firm size control								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Multi-product	1.132***	0.669***	0.332***	1.017***	0.906***	1.200***	0.178*	0.447***
	(0.0698)	(0.0585)	(0.0525)	(0.0731)	(0.123)	(0.0743)	(0.107)	(0.0601)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No	No	No
observations	4,790	4,150	4,127	4,602	4,509	4,735	3,945	4,091
r-squared	0.149	0.129	0.095	0.113	0.110	0.161	0.098	0.110
Controlling for firm size								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Multi-product			0.450***	0.211***	0.104	0.556***	0.104	0.556***
			(0.0523)	(0.0509)	(0.108)	(0.0603)	(0.108)	(0.0603)
Industry controls			Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes	Yes	Yes
observations			4,127	4,037	3,945	4,091	3,945	4,091
r-squared			0.131	0.565	0.368	0.505	0.101	0.133

Source: Authors' own calculations

Notes: ***p<0.01**p<0.05 *p<0.1

(Is significant at the 1% level, 5% level and 10% level respectively)

Multi-product exporters are larger in terms of output, number of employees, output per worker, they have higher average labour costs, are more capital intensive, have higher level of intermediate inputs, pay higher wages and their intermediate input level per worker is higher than their single product counterparts.

The larger output, number of employees and wage results of multi-product firms may be due to these firms just being larger than single product firms, but if controlled for firm size, the multi-product firms still have 45% larger output per worker (with a higher intermediate inputs level and intermediate input level per worker of 56%). The labour cost is 21% higher than single product firms.

Interestingly, when controlling for firm size, multi-product exporters are not significantly more capital intensive (on aggregate or per worker level) than single product exporters[9]. Therefore the multi-product exporting firms are larger in terms of size, capital-intensity and wages compared to single product exporters.

Table 9 add firms exporting only to African countries, in order to see whether these firms have different characteristics from firms exporting outside Africa (i.e. destination of exports does not include an African country). The multi-product versus single product firms is also included in this analysis. Therefore we can determine the characteristics of multi-product firms who export only to African countries.

Table 9: Multi-product exporters vs. single product exporters exporting only to African countries (all manufacturing firms)

Full Manufacturing								
No firm size control								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Africa only	-0.034	-0.119	0.113	-0.0370	-0.502**	0.0501	-0.181	0.218*
	(0.134)	(0.114)	(0.104)	(0.140)	(0.239)	(0.144)	(0.212)	(0.120)
Multi-product	1.527***	0.900***	0.496***	1.417***	1.103***	1.606***	0.290	0.679***
	(0.115)	(0.0989)	(0.0904)	(0.121)	(0.207)	(0.124)	(0.184)	(0.105)
AfricaXmulti	-0.728***	-0.452***	-0.273**	-0.744***	-0.481*	-0.735***	-0.248	-0.367***
	(0.143)	(0.121)	(0.111)	(0.150)	(0.255)	(0.153)	(0.225)	(0.128)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No	No	No
observations	4,790	4,150	4,127	4,602	4,509	4,735	3,945	4,091
r-squared	0.149	0.129	0.095	0.113	0.110	0.161	0.098	0.110
Controlling for firm size								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Africa only			0.0900	-0.0919	-0.171	0.193	-0.171	0.193
			(0.102)	(0.0989)	(0.211)	(0.118)	(0.211)	(0.118)
Multi-product			0.671***	0.324***	0.215	0.838***	0.215	0.838***
			(0.0892)	(0.0862)	(0.185)	(0.104)	(0.185)	(0.104)
AfricaXmulti			-0.359***	-0.201*	-0.212	-0.443***	-0.212	-0.443***
Industry controls			Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes	Yes	Yes
observations			4,127	4,037	3,945	4,091	3,945	4,091
r-squared			0.141	0.571	0.372	0.509	0.107	0.141

Source: Authors' own calculations

Notes: ***p<0.01**p<0.05 *p<0.1

(Is significant at the 1% level, 5% level and 10% level respectively)

Table 9 firstly shows the characteristics of firms exporting only to African countries, versus firms exporting outside Africa. Secondly, shows the characteristics of multi-product firms, versus single-

[9] The same analysis for multi-product exporters versus single product exporters is conducted done for medium to large manufacturing firms (see appendix).

product firms and finally shows the characteristics of the multi-product firms who export only to African countries.

Firms who only export to African countries' characteristic variables are negative and non-significant across most variables. Even though not significant, the results are interesting and similar to the findings of Rankin and Schöer (2013) which showed that workers in African-only exporting firms actually earned less than those in firms that produced only for the domestic market. Multi-product firms have larger output (152%), pay more labour costs (90%), and have a higher intermediate input level (160%) than single product firms. Multi-product firms that only export to African countries have larger output (76%), pay more labour costs (33%), have a higher intermediate input level (92%) than single product firms exporting only within Africa.

Similar results are found when we control for firm size. Here, the multi-product firms that only export to African countries have a larger output (40%), pay more labour cost (3%), have a higher intermediate input level (58%) than single product firms exporting only within Africa.

The final section determines if multi-product firms are more productive than single product firms and if the productivity premium holds for multi-product firms that only export to African countries.

3.3.2 Do multi-product exporting firms have a productivity premium?

The productivity premium is determined by using the Cobb Douglas Production function:

$$\ln {}^{Y_i}/_{L_i} = \alpha_i + \beta_1 \ln {}^{K_i}/_{L_i} + \beta_2 \ln {}^{M_i}/_{L_i} + \beta_3 \ln L_i + \beta_4(EX_i) + \beta_5(Ind_i) + \mu_{it}$$

Where:
i – firm subscript
Y/L – real output per worker
K/L – real capital per worker
L - total employment
M/L – real intermediate inputs per worker
Ind – vector of industry characteristics
EX – dummy variable of export status

Tables 10 and 11 contains estimations of the production function in order to determine whether or not multi-product firms have a productivity premium and if the productivity premium depends on destination of exports (i.e. within or outside of Africa).

Table 10: OLS estimation of the relationship between multi-product exporters and single product in terms of TFP-R

	Multi-product - HS6	
Variables	Full Manufacturing	Medium - large manufacturing
Multi-product dummy	-0.00188	0.00584
	(0.0151)	(0.0188)
log(employment)	-0.0469***	-0.0645***
	(0.00414)	(0.00513)
log(capital/worker)	0.0203***	0.0233***
	(0.00239)	(0.00275)
log(intermediate inputs/worker)	0.818***	0.826***
	(0.00427)	(0.00543)
Industry controls	Yes	Yes

Observations	*3,903*	*2,528*
R-squared	*0.931*	*0.943*

Source: Authors' own calculations

Notes: ***p<0.01**p<0.05 *p<0.1

(Is significant at the 1% level, 5% level and 10% level respectively)

The estimates on multi-products are negative and not significant, indicating that there is no real difference in productivity between multi-product exporters and single-destination exporters. This can be due to the different product and destination categories (i.e. 1, 2, 3 etc.) in table 3 and 4 that indicates different levels of contribution to exports. It is clear that there is within-exporter heterogeneity that is obscured by treating exporters as one homogenous group. Not only is exporting rare but the firms that dominate exports are small in number and export many products to multiple destinations. A next step for these analyses would be to estimate the production function and take into account the number of products an exporter export (i.e. 1, 2, 3, 4-10, 11-50 and 50+).

Table11: OLS estimation of the relationship between multi-product exporters and single product exporters exporting only to Africa or outside of Africa

	Africa-only X Multi-product - HS6	
Variables	Full Manufacturing	Medium - large manufacturing
Multi-product dummy	-0.0686**	-0.133***
	(0.0294)	(0.0368)
Africa-only dummy	-0.0118	-0.0490
	(0.0261)	(0.0314)
Africa-only X Multi-product	0.00762	0.0712*
	(0.0313)	(0.0383)
log(employment)	-0.0515***	-0.0698***
	(0.00421)	(0.00518)
log(capital/worker)	0.0196***	0.0223***
	(0.00239)	(0.00273)
log(intermediate inputs/worker)	0.817***	0.824***
	(0.00427)	(0.00541)
Observations	*3,903*	*2,528*
R-squared	*0.931*	*0.944*

Source: Authors' own calculations

Notes: ***p<0.01**p<0.05 *p<0.1

(Is significant at the 1% level, 5% level and 10% level respectively)

Table 11 shows that the estimates on multi-products are negative. The estimates on the African dummy is also negative and not significant, indicating that there is no real difference between multi-product exporters and single-destination exporters exporting inside Africa or outside of Africa.

Once again, the same regression can be run in terms of the multi-product categories, as suggested above. These results also link up with Table 7, where the markets to which most added product existing market combinations expand to, changed from inside Africa (2011-2012) to inside and outside Africa (2012-2013).

4. Conclusion

Our paper forms part of a project initiated by UNU-WIDER and National Treasury to utilise SARS data with the aim of updating existing firm-level research in South Africa. Our paper contributes to the project by focusing on exporters and aims to document the behaviour of exports at a micro-level and the dynamics of exporting at the extensive and intensive margin over time. To do this we link company income tax data, employee data and transaction data.

The net intensive margin (existing product-market combinations) is the largest contributor to the growth in exports. The extensive margin consists of net entry and net diversification. In 2012-2013 the net entry's contribution to export growth is one third of the contribution of net diversification. This shows that it is easier for an existing exporter to diversify in terms of products and markets, than for a new exporter to start exporting. Furthermore, an existing exporter can expand/diversify in terms of a new product or a new market. The results show that in the expansion path, exports of new products are just as common as exports to new markets. When exporters expand into new products, the type of products is mostly falls in the machinery and electrical as wells as metals HS cluster groups. Expansion paths in terms of new markets are mostly to countries inside Africa.

Similarly to other studies we find that multi-product firms are responsible for 96% of the total value exported. Specifically, firms that export more than 11 products, contribute to 77.06% of total exports.

Multi-product exporting firms have different characteristics in terms of size, capital-intensity, wages and productivity compared to other exporters. They are larger in terms of output, number of employees, output per worker, they have higher labour cost, are more capital intensive, have higher level of intermediate inputs and pay higher wages and their intermediate input level per worker is higher than single product exporters. However, we find no evidence of a premium in terms of total factor productivity for multi-product exporters exporting inside and outside of Africa. This can be due to the fact there is within-exporter heterogeneity that is obscured by treating exporters as one homogenous group. Not only is exporting rare but the firms that dominate exports are small in number and export many products to multiple destinations as seen in Table 3 and 4. This analysis will be extended by estimating a new the production function and take into account the number of products an exporter export (i.e. 1, 2, 3, 4-10, 11-50 and 50+).

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6. Appendix

A1: Multi-product exporters vs. single product exporters (medium to large manufacturing firms)

Medium large manufacturing								
No firm size control								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Multi-product	0.659***	0.520***	0.165**	0.580***	0.431***	0.692***	0.0781	0.233***
	(0.0798)	(0.0802)	(0.0721)	(0.0959)	(0.160)	(0.0850)	(0.144)	(0.0801)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No	No	No
observations	2,929	2,686	2,678	2,871	2,771	2,903	2,552	2,657
r-squared	0.162	0.151	0.103	0.109	0.154	0.165	0.137	0.118
Controlling for firm size								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Multi-product			0.376***	0.167**	0.138	0.445***	0.138	0.445***
			(0.0649)	(0.0722)	(0.145)	(0.0733)	(0.145)	(0.0733)
Industry controls			Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes	Yes	Yes
observations			2,678	2,641	2,552	2,657	2,552	2,657
r-squared			0.285	0.480	0.333	0.422	0.140	0.272

Source: Authors' own calculations

Notes: ***p<0.01 **p<0.05 *p<0.1

(Is significant at the 1% level, 5% level and 10% level respectively)

A2: Multi-product exporters vs. single product exporters exporting only to Africa (medium to large manufacturing firms)

Full Manufacturing								
No firm size control								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Africa only	-0.246	-0.219	0.0198	-0.492***	-0.702**	-0.144	-0.390	0.172
	(0.153)	(0.159)	(0.145)	(0.185)	(0.311)	(0.164)	(0.288)	(0.162)
Multi-product	0.782***	0.589***	0.224*	0.577***	0.366	0.869***	-0.0189	0.387***
	(0.128)	(0.134)	(0.122)	(0.155)	(0.260)	(0.138)	(0.242)	(0.137)
AfricaXmulti	-0.326**	-0.217	-0.115	-0.144	-0.0916	-0.398**	0.0584	-0.248
	(0.160)	(0.165)	(0.151)	(0.193)	(0.325)	(0.171)	(0.300)	(0.168)

Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control	No	No	No	No	No	No	No	No
observations	2,929	2,686	2,678	2,871	2,771	2,903	2,552	2,657
r-squared	0.201	0.177	0.105	0.147	0.175	0.197	0.142	0.119
Controlling for firm size								
	Output	**No of employees**	**Output p worker**	**Labour cost**	**Capital**	**Intermed inputs**	**Capital p worker**	**Intermed inputs p worker**
Africa only	-0.0742	-0.428***	-0.414	0.0706	-0.414	0.0706	-0.0742	-0.428***
	(0.128)	(0.142)	(0.287)	(0.146)	(0.287)	(0.146)	(0.128)	(0.142)
Multi-product	0.473***	0.0416	0.0668	0.631***	0.0668	0.631***	0.473***	0.0416
	(0.109)	(0.120)	(0.242)	(0.124)	(0.242)	(0.124)	(0.109)	(0.120)
AfricaXmulti	-0.202	0.132	0.0270	-0.329**	0.0270	-0.329**	-0.202	0.132
	(0.134)	(0.148)	(0.299)	(0.152)	(0.299)	(0.152)	(0.134)	(0.148)
Industry controls			Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes	Yes	Yes	Yes	Yes	Yes
observations			2,678	2,641	2,552	2,657	2,552	2,657
r-squared			0.298	0.490	0.339	0.429	0.147	0.281

Source: Authors' own calculations

Notes: ***p<0.01 **p<0.05 *p<0.1

(Is significant at the 1% level, 5% level and 10% level respectively)