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SOUTH AFRICAN EXPORTERS AND THE GLOBAL CRISIS: INTENSIVE MARGIN SHOCK, EXTENSIVE MARGIN HANGOVER

MARIANNE MATTHEE[†], THOMAS FAROLE[‡], TASHA NAUGHTIN[§] AND NEIL RANKIN[*]

Abstract
This paper examines how changes at the intensive (established exporters exporting existing products to established markets) and the extensive (new exporters, products or markets) margins contribute to South African export growth and how this was affected by the global financial crisis. We find that the intensive margin is the more important contributor to export growth, contributing more than three quarters of observed growth. The intensive margin contracted significantly during the global financial crisis of 2009 but bounced back to pre-crisis levels quickly. However, the impacts on the extensive margin persisted after the crisis with lower levels of entry of firms, new products and new destinations. The short-term impact of the crisis was mitigated by the concentration of South African exports among larger, more productive super-exporters. However, the fall in entry of new firms, products and destinations as a result of the crisis may mean that this concentration persists, and, at least over the next few years, South Africa does not diversify and broaden its exports.
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1. INTRODUCTION

South Africa is a relatively open economy and vulnerable to global events. Since re-entering the global economy after the democratic elections of 1994, it has been buffered by a number of external shocks. In 1998 and 2001, it experienced currency crises (Bhundia and Ricci, 2006) and most recently has, like many other countries, been affected by the global financial crisis. The South African economy began to be affected by the crisis in 2008 as portfolio capital flowed out (Kavli *et al.*, 2013). By 2009, exports had fallen dramatically, unemployment was rising and the economy, for the first time in 17 years, entered a recession.

* Corresponding author: Associate Professor, Department of Economics, Stellenbosch University, Stellenbosch Central, Stellenbosch, Western Cape 7602, South Africa. E-mail: neilrankin@sun.ac.za
† School of Economics, North-West University, Potchefstroom, South Africa.
‡ The World Bank, Washington, DC, USA.
§ Department of Economics, Stellenbosch University, Stellenbosch, South Africa.
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South Africa is particularly vulnerable to external crises since it has run a current account deficit, funded by capital inflows, for a relatively long period. Furthermore, compared with similar natural resource exporters, South Africa's export performance has been poor since it began trade liberalisation in 1994 (Hausmann and Klinger, 2006). The World Bank (2014b) estimates an average annual growth rate in exports of only 0.6% during 2005 and 2011, which is considerably less than the middle-income country average of 6.4% and suggests that exports have stagnated. More specifically, the small pool of super-exporters which contribute the bulk of exports is stagnating, large numbers of smaller firms only export on an occasional basis (World Bank, 2014b), and the majority of exporters export less than 20% of their output (Edwards *et al.*, 2008). It also seems as if South Africa is not diversifying in terms of the products exported and markets exported to. The majority of South African export growth is due to growth in the intensive margin – the exporting of existing products to existing markets (World Bank, 2014b), despite government's industrial policy framework which attempts to encourage export diversification by "improving our non-traditional export performance – particularly in more sophisticated, value added products . . ." (department of Trade and Industry (DTI), 2007:23).

If the government is to design policies to increase the growth of exports in line with the National Development Plan's (NDP) vision, it needs to know more about the behaviour of exports, and exporters, at a micro-level and how external crises such as the global financial crisis affect these. The aim of this paper is to provide insight into South Africa's trade margins, in order to contribute to the limited literature on this matter in South Africa, and to specifically examine how the global financial crisis affected these margins.

This paper uses two unique data sources to examine how the intensive margin (the export of existing products to existing markets by existing exporters) and the extensive margin (entry and exit of new exporters, products or markets) contribute to South African exports. The first source of data is customs transaction data at the firm-product-destination level provided by the South African Revenue Service. The second is data from Statistics South Africa's the Large Sample Survey (LSS) of manufacturing. Together, these datasets provide a more nuanced view of South African export behaviour at a micro-level than previously undertaken. The paper focuses on three periods: the pre-crisis period (2002-2008), the crisis period (2009) and the post-crisis period (2010-2012) to determine how South Africa's export growth composition changed as a result of the global financial crisis. The paper is similar to Bricongne *et al.* (2012) who investigate French exporters' response to the global financial crisis. They find that the crisis affected the intensive margin for large firms and reduced their portfolio of products exported. Smaller firms reduced the number of destinations served or exited exporting altogether.

The paper has three key findings. First, over the past 15 years, South Africa's exports are driven by the intensive margin, and the global financial crisis negatively affected export growth through this margin – more than three quarters of the contraction in exports happened at the intensive margin. However, post-crisis the intensive margin rapidly expanded again and returned to similar growth rates as before 2009. Second, the longer lasting effects of the crisis have occurred at the extensive margin. Entry (or diversification) of firms, countries and products has not recovered to the pre-crisis levels. This has differed across export destination, *e.g.* prior to the crisis, much of the export growth in African markets stemmed from the extensive margin but since the crisis, most export growth in Africa has been at the intensive margin. Third, the crisis had different effects across exporters of different size. South African exporting is highly

concentrated – the largest 1% of exporters contribute about three quarters of total export value, and the main channel of impact of the global financial crisis on South African exports was a contraction of exports at the intensive margin by these super-exporters. However, these super-exporters, which are larger, more capital intensive, pay higher wages and are more productive than other exporters, quickly returned to similar export growth rates post the crisis. The longer lasting effects at the extensive margin were felt by firms exporting smaller amounts. The short-term effect of the crisis on South African exports was thus mitigated by the highly concentrated nature of the export sector in South Africa. However, the longer-term effect of the crisis is likely to be continued export concentration as a result of the fall in export entry by firms, new products and new destinations.

The structure of the paper is as follows: section 2 provides a literature review on trade margins and contains a brief South African literature review, section 3 explains the data and method used, section 4 provides the results and discussion and section 5 concludes.

2. FIRM-LEVEL TRADE AND EXPORT MARGINS

2.1 Extensive and Intensive Export Margins

Monopolistic competition models (see, *e.g.* Krugman, 1980) stress the tension between scale, product differentiation and selection in trade. Using these models as a foundation, micro-models such as Melitz (2003) emphasise self-selection into trade where a movement from autarky to free trade results in an expansion of existing exporters and entry of new firms into the export market. Participation in trade, in these types of models, is dependent on firm productivity and export costs (which includes both fixed and variable, or transport, costs). Only the most productive firms export. Those firms who are at the bottom of the productivity distribution do not enter the export market, and may exit production altogether if faced with higher competition through increased trade openness (Melitz and Redding, 2012). Apart from the productivity threshold, export costs can also result in changes in export growth or export margins. More specifically, export costs directly affect the number of exporting firms (the extensive margin) and the average export sales per firm (the intensive margin). For example, a decrease in variable (transport) costs would lead to an increase in the extensive margin, as new firms (albeit less productive than existing exporters) enter the export market. The reduced variable costs would furthermore result in an expansion in existing exporters' export sales (which is the intensive margin) (Chaney, 2008; Lawless, 2010; Coughlin, 2012).

Based on these types of theoretical underpinnings, numerous empirical studies have emerged that aim to understand the dynamics behind countries' export growth rates. Some of these (*e.g.* Evenett and Venables, 2002; Berthou and Fontagné, 2008; Bernard *et al.*, 2009) find that the extensive margin contributes more to export growth while others (*e.g.* Eaton *et al.*, 2007; Amiti and Freund, 2008; Bingzhan, 2011) find the same to be true for the intensive margin. Overall though, the contribution of the intensive margin to export growth is a more dominant finding in the empirical literature on the subject (Türkcan, 2014).

In these empirical studies, the exact specifications (or measurement) of the intensive and extensive margins differ and depend on the focus of the research and the data available (Felbermayr and Kohler, 2006; Besedes and Prusa, 2007). For example, Eaton *et al.* (2007) use transactions-level trade data to decompose Colombia's export growth. In this study, they specify the extensive margin as the change in the number of exporters and the intensive margin as changes in these exporters' sales volumes. In a similar vein,

Bernard *et al*. (2009) use US firm transaction data, but extend the extensive specification to include the number of exported products. Their intensive margin is the average export value per product per firm. Continuing the focus on product diversification and using disaggregated product level data, Hummels and Klenow (2005) identify the extensive margin to be product variety and the intensive margin product quantity. Evenett and Venables (2002) broaden the scope of the extensive margin by examining both changes in product lines as well as changes in destinations in their study of export growth in developing countries. Collacelli (2010) builds on the work of Hummels and Klenow (2005) by specifying a bilateral extensive margin that includes all the product varieties exported to the importing countries and a bilateral intensive margin as the exporter country's relative volume of exports. Similarly, Amiti and Freund (2008) decompose China's export growth by focusing on disaggregated export data at the HS-8 level. Here the growth of existing products signifies the role of the intensive margin whereas the export of new varieties refers to the extensive margin.

There are now also a number of country-specific firm-level studies on intensive and extensive margins, which specifically examine these margins for firms, products and destinations. Using transaction-level customs data, Amador and Opromolla (2010) study Portuguese firms' decisions to enter foreign markets and, once involved, their decisions to diversify their exported products and destinations. Arkolakis and Muendler (2010) similarly consider Brazilian firms' choices of exported products and destinations. As mentioned earlier, Eaton *et al*. (2007) focus on Colombian firms and study these firms export patters through their entry into and exit from foreign markets. More recently, Reis and Taglioni (2013) provide a comprehensive analysis of Pakistan's trade, which includes an analysis of the country's sustainability margin (*i.e.* firm entry/exit, product entry/exit and country entry/exit) using the Exporter Dynamics Database (EDD) (the latter consists of country-specific customs level exporter data). A decomposition of export growth using Zambian customs data can be found in Banda and Simumba (2013). Using a more comprehensive dataset, Halpern and Muraközy (2011) combine transaction data with firm-specific data to decompose the trade margins in terms of firm size for Hungarian exporters. Bernard *et al*. (2014) do the same for multi-product exporters in Belgium but determine the connection between the trade margins and firm productivity. Finally, Bernard *et al*. (2009) link these types of datasets for US firms to disentangle the trade margins' contribution to export growth and specifically consider related party and arms-length trade. They also analyse the influence of the Asian crisis on US export behaviour, more specifically on the intensive and extensive margins in trade with Asian countries.

In summary, export growth can occur through either the extensive or the intensive margin, and the extensive margin can be further decomposed along destination (or geographical) diversification, product diversification and firm diversification. This is also the basis for the definitions we apply to the firm-level data. The intensive margin reflects expansion and contraction of existing products into already-established markets. The extensive margin takes into account the number of firms exporting (entries and exits), product diversification (entries and exits) and country diversification (entries and exits). The question asked, therefore, is what is the impact of a crisis on a relatively open, vulnerable economy's export composition? Our approach in answering this is to combine different types of South African data and examine how the intensive and extensive margins contribute to South Africa's export growth before, during and after the global financial crisis which affected South Africa in 2009 and 2010.

2.2 Firm-Level Trade Dynamics in South Africa

South African manufacturing firm-level export behaviour is similar to the now "stylised facts" of exporting found in many countries. Exporting is rare – fewer than 15% of firms export; for most firms it is a marginal activity – less than half of exporting firms export more than 10% of their sales, and, even in comparison to other similar countries, South African exports are highly concentrated – the largest 5% of exporters produce more than 90% of total export value (World Bank, 2014b).

Exporters are also larger than non-exporters, generally have higher levels of labour productivity and pay higher wages (Rankin, 2001; Edwards *et al.*, 2008; Matthee and Krugell, 2012; Naughtin, 2014). Like for Turkey (Cebeci, 2014) exporting to higher income countries outside the region is associated with higher wages and total factor productivity (Rankin, 2001; Rankin and Schöer, 2013).

There has been less research on the extensive and intensive margin either at the firm or at the product level, predominantly as a result of the lack of access to panel data; however, this is changing. Kwaramba (2014) shows that the decline in tariffs from 2000 for South African products into the European Union resulted in increase in exports at the both the intensive and extensive margins (measured at the product level). World Bank (2014b) uses the newly constructed EDD which tracks export transactions at the firm level, to investigate changes in the extensive and intensive margins at the exporter level. This shows that the larger "super-exporters" which dominate South African exports are losing dynamism and competitiveness but that smaller and more dynamic exporters are not yet large enough to make a substantial contribution to aggregate exports. This study adds to this growing literature.

3. DATA AND CALCULATIONS

3.1 Data

The firm-level information is drawn from two sources. The first is exporter level transaction data taken from the World Bank's EDD (Cebeci, Fernandes, Freund and Pierola, 2012). The South African data which forms part of this dataset is collected from the South African Revenue Service's customs and excise data. These data record individual exporter transactions and have information on the value and destination of exports at the product level for all exporters. Exporting firms each have a unique identifier and can be tracked over time. The current set of data spans the period from 2002 to 2012. The results from the EDD are grouped into three periods: pre-crisis (2002-2008), crisis period (2009)[1] and post-crisis period (2010-2012). Only export transactions with a value of more than US$1,000 are included. (The World Bank's EDD suggests that median exports for South African exporters is US$29,000. Using a cut-off value of US$1,000 will not exclude the median exporter but will exclude the very small exporters (or measurement errors)).[2]

[1] Although there is evidence that the collapse in global trade began in the last quarter of 2008 (*e.g.* Bricongne *et al.*, 2012; Chor and Manova, 2012), the data are only available on an annual basis and thus we cannot disaggregate the period further. The results are substantively unchanged if we define the crisis period as 2008-2009.

[2] Results have also been tested using a $10,000 cut-off for the annual export value of a firm. Differences are negligible as even within the bottom 80% of firms, export values are skewed

The second source of firm data is Statistics South Africa's LSS of manufacturing. This is a firm-level survey that is conducted periodically, approximately every three years, in South Africa. Approximately 10,000 firms are surveyed every round, and financial information, drawn primarily from the firm's balance sheet, is collected. This information is collected for the most recent completed financial year – thus, *e.g.* the 2005 round contains information which corresponds mostly to 2004. Larger firms are overrepresented in each round and very large firms are fully covered. The dataset contains population weights. A separate sample is drawn for every round but since firms have unique identifiers, a panel dataset can be constructed. Given the overrepresentation of larger firms in each cross-section, the larger firms are more likely to be present in panel dataset. The data were collected in 2005 and 2008. Since the data refer to the most recent completed financial year, even the 2008 round predates the financial crisis in South Africa.

3.2 Calculation of the Export Growth Rate

Export growth is computed using the so-called "mid-point growth rate" (Davis and Haltiwanger, 1992 as applied to firm-level exports by Bricongne *et al.*, 2012). A main advantage of this methodology is that it enables growth rates associated with newly created or destroyed flows to be estimated. Other methodologies which use normal growth rates are unable to do so, and for this reason, they rely on probabilistic methodologies to quantify the impact of determinants of exports at the extensive margin.

Mid-point growth rates are computed as follows. For a firm i exporting a value x to a country c of product k at year t, the mid-point growth rate is defined as:

$$g_{ickt} = \frac{x_{ickt} - x_{ick(t-1)}}{\frac{1}{2}(x_{ickt} + x_{ick(t-1)})}$$

This growth rate measure is symmetric around zero, and it lies in the closed interval [−2,2] with exits (entries) corresponding to the left (right) endpoint. Similarly, the weight attributed to each flow g_{ickt} is given by the relative share of the flow in total exports, where total refers to the exports of the whole population of a country's firms:

$$s_{ickt} = \frac{x_{ickt} + x_{ick(t-1)}}{(\sum_c \sum_i \sum_k x_{ickt} + x \sum_c \sum_i \sum_k x_{ick(t-1)})}$$

Finally, the year-on-year growth rate of the total export value is given by summing each individual flow g_{ickt} weighted by s_{ickt}:

$$G_t = \sum_c \sum_i \sum_k s_{ickt} \times g_{ickt}$$

The G measure is monotonically related to the conventional growth rate measure (gr_t), and it represents a good approximation of the latter for small growth rates. Both growth measures are linked by the following identity:

towards the larger firms. Firms exporting between $1,000 and $10,000 annually have almost no impact on overall results within the size category.

$$G_t \approx \frac{2gr_t}{(2 - gr_t)}$$

At the aggregate level, the index approximates well standard measures of growth rate.

4. RESULTS

4.1 Trade Margins and the Global Financial Crisis Shock

South African export growth broadly mirrors GDP growth (Figure 1) and this collapsed during 2009 and with the Global Financial Crisis shock. Table 1 and Fig. 2 show export growth between 2002 and 2012 decomposed by margin. Both show that intensive margin growth – the growth of existing products to existing markets of exporters – dominates South African export growth. At the extensive margin, firm entry and exit contributes the least with net entry of existing exporters into new countries contributing twice this, and net entry of new products contributing about three times more to export growth rates.

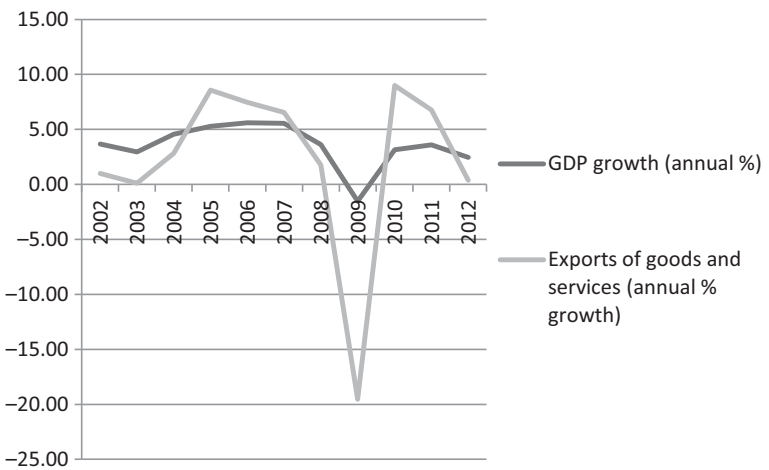

Figure 1. Export growth and GDP growth from 2002 to 2012
Source: World Bank (2014a).

Table 1. Decomposition of export growth at the firm level (pre, post and during crisis)

All regions	**Overall**	**Pre-crisis**	**During crisis**	**Post-crisis**
Firm entry	2.2	2.5	1.1	1.8
Firm exit	−1.8	−2.0	−1.7	−1.3
Net firm	**0.4**	**0.5**	**−0.6**	**0.5**
Country entry	6.6	7.3	3.6	5.7
Country exit	−5.5	−5.7	−7.0	−4.6
Net country	**1.0**	**1.6**	**−3.5**	**1.1**
Product entry	9.1	10.1	4.2	8.4
Product exit	−7.8	−8.3	−7.5	−6.7
Net product	**1.3**	**1.8**	**−3.3**	**1.8**
Net extensive	**2.8**	**4.0**	**−7.4**	**3.4**
Intensive positive	31.9	33.5	12.1	35.0
Intensive negative	−22.7	−20.9	−42.9	−20.3
Net intensive	**9.2**	**12.6**	**−30.8**	**14.7**
Total	**12.0**	**16.5**	**−38.1**	**18.1**

Source: Authors' calculation based on firm-level data from the EDD.

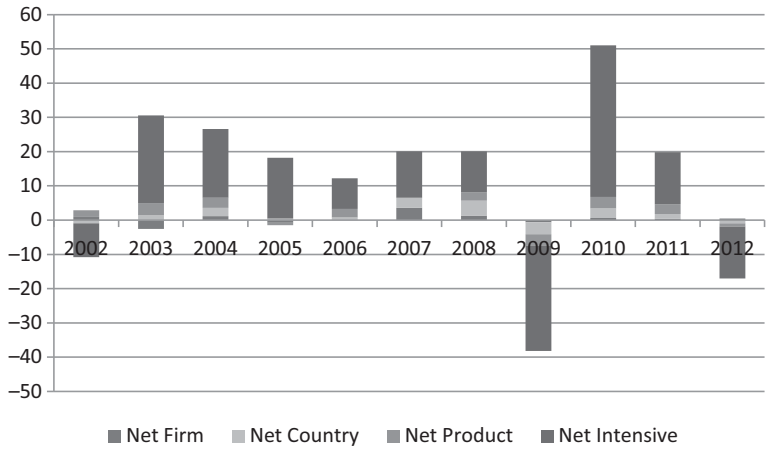

Figure 2. Extensive and intensive export margin growth 2002-2012
Source: Authors' calculation based on firm-level data from the EDD.
Notes: The sum of the net firm, net country and net product margins is equal to the net extensive margin.

The impact of the global financial crisis on South African exports was dramatic – the value of exports in 2009 was 60% of that in 2008, and remained below the 2008 value in 2010. Eighty per cent of this contraction was accounted for by the intensive margin.

Post the crisis, average export growth at the intensive margin returned to pre-crisis levels but extensive margin growth remained slightly less than what it had been before 2009. The overall relative measures of entry and exit (a measure of churn), at the various types of extensive margin, were substantially lower after the crisis than before. This happened at the firm, country and product levels. These results indicate that the crisis had two impacts. The first was a substantial but temporary export contraction among existing products to existing countries of existing exporters. The second was a longer lasting fall in the relative rate of entry and exit of new exporters, new products and new markets.

The impact of the global financial crisis also differed substantially across export destinations. South African exports to the "old growth pole" (*i.e.* the USA, Japan and Europe) of its traditional markets contracted by the most but exports to Africa and the rest of the world also fell during the crisis (Table 2). Like at the aggregate level, exports at the intensive margin fell by relatively more than at the extensive margin. This fall was relatively larger in the more established markets of the old growth pole, and Africa, where the contraction at the intensive margin accounted for 85% of the total contraction. For the rest of the world, the contraction at the intensive margin accounted for 63% of the contraction.

Across all three groupings, the intensive margin recovered quickly to pre-crisis levels, and for African markets actually exceeded these levels. Differences across destinations help explain the longer-lasting effects at the extensive margin identified earlier. For the old growth pole, overall extensive margin growth returned to pre-crisis levels but with lower levels of churn across firms, countries and products. Churn at the extensive margin also fell for exports to the rest of the world. Overall extensive margin growth to these destinations was also lower due to a decline in net growth from the entry of firms. For

Table 2. Decomposition of export growth at the firm level by destination

Regions	Old growth pole				Africa				Rest of the world			
Periods	**Overall**	**Pre-crisis**	**Crisis**	**Post-crisis**	**Overall**	**Pre-crisis**	**Crisis**	**Post-crisis**	**Overall**	**Pre-crisis**	**Crisis**	**Post-crisis**
Firm entry	1.8	2.3	0.6	1.3	5.7	6.3	4.0	4.8	4.7	5.7	2.1	3.0
Firm exit	−2.5	−2.8	−2.2	−1.8	−3.7	−3.9	−4.0	−3.2	−3.1	−3.5	−3.1	−2.4
Net firm	**−0.6**	**−0.6**	**−1.6**	**−0.5**	**2.0**	**2.4**	**0.0**	**1.6**	**1.5**	**2.3**	**−1.0**	**0.6**
Country entry	3.1	3.7	1.2	2.4	9.6	10.6	7.2	7.8	9.2	10.7	4.7	7.2
Country exit	−2.8	−3.0	−3.1	−2.3	−6.5	−6.7	−7.4	−6.0	−7.8	−8.7	−10.6	−4.9
Net country	**0.3**	**0.7**	**−2.0**	**0.0**	**3.0**	**3.9**	**−0.2**	**1.9**	**1.4**	**2.1**	**−5.9**	**2.3**
Product entry	5.7	6.5	1.4	5.1	20.7	22.4	14.2	19.1	9.1	10.3	4.5	7.8
Product exit	−4.6	−5.2	−4.6	−3.2	−18.2	−18.6	−16.4	−17.9	−7.7	−8.5	−8.5	−5.7
Net product	**1.1**	**1.3**	**−3.2**	**1.9**	**2.5**	**3.8**	**−2.2**	**1.2**	**1.4**	**1.8**	**−4.1**	**2.1**
Net extensive	**0.7**	**1.5**	**−6.7**	**1.5**	**7.5**	**10.1**	**−2.4**	**4.7**	**4.3**	**6.1**	**−11.0**	**5.0**
Intensive positive	29.8	31.5	5.1	34.0	30.8	32.2	18.6	31.8	35.7	37.2	19.9	37.5
Intensive negative	−21.3	−18.2	−47.2	−19.7	−28.2	−29.3	−34.5	−23.5	−21.1	−19.7	−38.8	−18.6
Net intensive	**8.5**	**13.3**	**−42.1**	**14.2**	**2.6**	**2.8**	**−15.9**	**8.2**	**14.6**	**17.5**	**−18.9**	**18.9**
Total	**9.2**	**14.7**	**−48.9**	**15.7**	**10.1**	**13.0**	**−18.4**	**12.9**	**18.8**	**23.6**	**−29.9**	**24.0**

Source: Authors' calculation based on firm-level data from the EDD.

Table 3. Decomposition of export growth at the firm level by product type

Regions	Minerals				Non-minerals			
Periods	**Overall**	**Pre-crisis**	**Crisis**	**Post-crisis**	**Overall**	**Pre-crisis**	**Crisis**	**Post-crisis**
Firm entry	2.6	3.2	0.9	1.5	2.6	2.9	1.6	2.3
Firm exit	−2.2	−2.9	−0.7	−1.1	−2.1	−2.1	−2.5	−1.9
Net firm	**0.4**	**0.3**	**0.2**	**0.4**	**0.5**	**0.8**	**−0.9**	**0.4**
Country entry	6.1	6.7	3.0	5.9	7.7	8.7	4.3	6.6
Country exit	−5.1	−5.2	−7.9	−4.0	−6.6	−6.7	−8.2	−5.8
Net country	**1.0**	**1.5**	**−4.9**	**1.9**	**1.1**	**2.0**	**−3.9**	**0.7**
Product entry	4.3	4.5	1.1	4.9	10.7	11.6	5.6	10.2
Product exit	−2.8	−3.3	−1.6	−2.1	−9.6	−9.8	−9.5	−9.2
Net product	**1.5**	**1.2**	**−0.5**	**2.8**	**1.1**	**1.8**	**−3.9**	**1.0**
Net extensive	**2.8**	**3.0**	**−5.2**	**5.1**	**2.7**	**4.6**	**−8.8**	**2.1**
Intensive positive	33.6	34.9	14.7	36.9	30.6	32.3	10.3	33.5
Intensive negative	−20.2	−18.3	−43.5	−17.1	−23.6	−21.7	−42.1	−22.0
Net intensive	**13.4**	**16.7**	**−28.8**	**19.8**	**7.0**	**10.6**	**−31.8**	**11.5**
Total	**16.2**	**19.7**	**−34.0**	**24.9**	**9.7**	**15.2**	**−40.6**	**13.7**

Source: Authors' calculation based on firm-level data from the EDD.

African destinations, the relative contributions of extensive and intensive margin growth changed substantially post the crisis – net extensive margin growth was less than half that prior to the crisis, while intensive margin growth was approximately four times higher. The decline in extensive margin growth happened across the firm, country and product dimensions and was primarily driven by falls in entry rather than increasing exit levels. These results suggest that the crisis may have allowed existing exporters to consolidate their positions in African markets but discouraged the entry of new firms, products and markets.

The detailed data also show the effect of the crisis on different product groupings, such as on mineral and non-mineral export growth (see Table 3). The intensive margin contributes the bulk (83%) of export growth for mineral exports. For this group of products growth along the extensive margin increased slightly after the crisis, largely due to increases in product diversification. Non-mineral export growth (which includes metal manufactures) is also driven by the intensive margin. The crisis seems to have changed the relative contribution of the intensive margin to export growth from 70% during the pre-crisis period to 84% in the post-crisis period. The fall in the relative contribution of the extensive margin is due to a significant decrease in country diversification (13% to 5%) and, to a lesser extent, product diversification (12% to 7%).

4.2 Super-Exporters and the Global Financial Crisis

As Table 4 shows, South Africa's exports are highly concentrated – the 1% of exporters with the largest export values contributes between 65% and 81% of total export value and the top 10% generally contribute more than 90%. The absolute numbers of these "super-exporters" are also very small. The LSS data suggest that in 2008 only 38 firms made up the top 1%.

The sharp decrease in export value during the crisis was driven by a sharp contraction in the intensive margin of these super-exporters (Table 5). The contraction in other tiers of exporters was both relatively smaller and less concentrated at the intensive margin: the top 1% of exporters experienced a net contraction of 42%, of which the intensive margin accounted for three quarters; exports for the 2% to 20% tier contracted by 25% of which the intensive margin accounted for just over one half; and exports from the bottom 80% of exporters by volume contracted by 9% of which only one third was due to the contraction at the intensive margin. These differences mean that during this period, there was a reduction in the concentration of exporting. However, these large exporters were able to rapidly adjust their exports back to pre-crisis levels by expanding on the intensive margin as the global economy recovered. Among the super-exporters, growth at both the intensive and extensive margins was higher post the crisis when compared with pre-crisis

Table 4. Contribution to total exports by top firms

Year	Value (US$ million)	Cumulative share in total exports by top firms			
		Top 1%	Top 5%	Top 10%	Top 20%
2001	21,960	76.8	90.7	95.2	98.1
2002	19,543	72.1	88.9	94.1	97.6
2003	24,889	74.3	89.9	94.6	97.8
2004	32,775	76.8	91.3	95.5	98.2
2005	37,039	76.8	91.1	95.4	98.1
2005 – LSS		65.6	76.8	87.1	94.9
2006	42,043	78.6	91.8	95.7	98.3
2007	48,338	80.4	92.7	96.2	98.5
2008	57,100	80.9	92.9	96.2	98.5
2008 – LSS		72.2	88.1	92.6	96.5
2009	34,074	75.4	89.8	94.5	97.7
2010	49,885	79.7	92.0	95.7	98.3
2011	55,985	79.0	92.0	95.7	98.3
2012	44,489	76.7	91.1	95.3	98.1

Source: Authors' calculation based on firm-level data from EDD, constructed from firm-level transaction export data provided by SARS, and from the LSS.

Table 5. Decomposition of export growth at the firm level by firm type

Periods	Top 1%				Top 2% to 20%				Rest 80%			
	Overall	Pre-crisis	Crisis	Post-crisis	Overall	Pre-crisis	Crisis	Post-crisis	Overall	Pre-crisis	Crisis	Post-crisis
Firm entry	7.0	8.2	3.1	5.5	18.2	19.5	13.1	17.0	37.2	39.7	31.4	33.3
Firm exit	–6.1	–6.9	–6.6	–4.2	–16.9	–17.2	–19.6	–15.3	–32.4	–32.7	–32.1	–31.6
Net firm	**0.9**	**1.4**	**–3.5**	**1.3**	**1.4**	**2.3**	**–6.5**	**1.7**	**4.8**	**7.0**	**–0.7**	**1.7**
Country entry	3.5	3.9	1.9	3.1	8.6	9.2	6.0	8.2	19.8	20.7	15.9	19.1
Country exit	–3.0	–3.0	–4.9	–2.5	–6.8	–6.8	–7.4	–6.6	–17.7	–17.7	–18.2	–17.4
Net country	**0.5**	**0.9**	**–3.0**	**0.6**	**1.8**	**2.4**	**–1.4**	**1.6**	**2.1**	**2.9**	**–2.2**	**1.7**
Product entry	5.6	6.1	2.1	5.4	14.2	15.0	9.1	14.0	21.8	22.6	18.2	21.2
Product exit	–4.2	–4.5	–4.6	–3.4	–12.7	–12.7	–12.2	–12.6	–21.5	–21.3	–21.8	–21.8
Net product	**1.3**	**1.6**	**–2.6**	**2.0**	**1.6**	**2.3**	**–3.1**	**1.3**	**0.3**	**1.2**	**–3.6**	**–0.6**
Net extensive	**2.7**	**3.8**	**–9.0**	**4.0**	**4.7**	**7.0**	**–11.1**	**4.6**	**7.2**	**11.1**	**–6.6**	**2.8**
Intensive positive	30.7	31.9	10.4	34.5	25.6	26.7	13.1	27.2	11.2	11.5	8.7	11.3
Intensive negative	–20.5	–18.4	–43.2	–17.9	–20.1	–19.2	–27.4	–19.8	–10.4	–10.1	–11.4	–10.7
Net intensive	**10.1**	**13.5**	**–32.8**	**16.6**	**5.4**	**7.4**	**–14.3**	**7.4**	**0.8**	**1.4**	**–2.7**	**0.6**
Total	**12.8**	**17.3**	**–41.8**	**20.5**	**10.2**	**14.4**	**–25.4**	**12.0**	**8.1**	**12.5**	**–9.3**	**3.3**

Source: Authors' calculation based on firm-level data from the EDD.

levels. For these types of firms, the increase in the extensive margin growth rates was driven by the entry of new products. The lasting negative effects of the crisis are concentrated among the smallest 80% of exporters. As Table 5 shows, this group has the highest relative rates of entry and exit of new firms, countries and products. The dramatic fall in extensive margin growth among this group, which prior to the crisis was the biggest contribution to export growth, was driven mostly by the fall in the contribution from entry of new firms into the export market. These results are consistent with predictions from the Melitz (2003) model: an export demand shock results in the exit of less productive firms (in this case most likely the firms in the bottom 80% of exporters), which is a contraction at the extensive margin, and a reduction in export levels for more productive firms (those in the top part of the export distribution), which is a contraction at the intensive margin.

The LSS data allow us to examine the underlying characteristics of the exporting firms and how these may differ from non-exporters since it has firm-level information on inputs and outputs rather than just export transaction data as the EDD has. These data precede the crisis but can be used as a basis to better understand the observed outcomes during and after the shock. The LSS data can be used to track the export values of firms over the 2005-2008 period. This shows a large degree of stability among the top 1% of exporters – 70% of initial super-exporters in 2005 remained in the top 1% of exporters three years later (Table 6). This is higher than for any other export category and even exceeds the proportion of the top 2-5% exporters remaining in the export market. This, like Table 5, indicates that super-exporters are more likely to remain super-exporters than the next group down are to remain in the export market in general and this suggests an entrenched tier of firms at the top of the export distribution but a lot of churn and movement at the extensive margin for those outside this relatively small top tier.

Super-exporters are also significantly different in terms of their characteristics when compared with other types of exporters. Table 7 shows the results from a series of regressions on the pooled LSS data which control for industry-specific effects, and in columns 2-5, firm size. The exporting categories are dummy variables and the coefficient estimates measure the marginal difference between adjacent categories (*e.g.* a top 1% exporter will have values of 1 for the top 20% category as well as the exporter dummy). Across all variables, super-exporters are substantially different from even the top 20% exporters. As column 1 illustrates, export participation is strongly correlated with firm size – exporters are about 30% larger than non-exporters, and the top 20% of exporters are more than one and a half time larger than firms exporting lower amounts. In turn, the super-exporters are more than seven times larger than firms which fall into the 2-20% category.

Table 6. Transitions over the period between groups

2005 Status	**2008 Status**					
	Top 1%	**2-5%**	**6-10%**	**Other exporter**	**Non-exporter**	**Not in sample**
Top 1%	70.59	5.88	0	5.88	11.76	5.88
2-5%	8.93	32.14	7.14	14.29	23.21	14.29
6-10%	0	18.92	22.97	27.03	21.62	9.46
Other exporter	0.38	1.13	2.89	50.44	31.12	14.05
Non-exporter	0.61	1.25	1.41	20.27	46.69	29.77
Not in sample	0.07	0.29	0.63	24.72	74.29	–

Source: Authors' calculation based on firm-level data from the LSS.

Table 7. Differences between super-exporters (the top 1% of exporters by value), other types of exporters and non-exporters. Pooled LSS data

	(1) Employment	(2) Output per employee	(3) Capital per employee	(4) Average labour cost	(5) TFP-R
Top 1% exporter	2.135***	0.924***	0.890***	0.314***	0.0999**
	(0.168)	(0.126)	(0.178)	(0.0981)	(0.0480)
Top 20% exporter	0.962***	0.595***	0.506***	0.260***	0.0475***
	(0.0470)	(0.0361)	(0.0507)	(0.0278)	(0.0139)
Exports	0.254***	0.0498**	0.322***	0.169***	−0.0172**
	(0.0271)	(0.0206)	(0.0289)	(0.0158)	(0.00791)
Observations	9,951	9,515	9,771	9,946	9,359
R^2	0.181	0.181	0.217	0.185	0.880

Standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Notes: Base category is non-exporters and coefficient estimates on export groups indicate the marginal difference from the immediately lower category. Dependent variables are all in natural logarithms and are real values. All regressions control for industry specific fixed effects at the three-digit level and year. Except for (1) all other regressions control for firm size measured by the number of employees. TFP-R is estimated from a Cobb-Douglas regression of gross output, in revenue terms, against capital, labour and intermediate inputs.

Labour productivity (output per worker), capital-intensity (the capital-labour ratio) and average wages (labour costs per employee) also exhibit a hierarchy where exporters have higher values of these variables than non-exporters on average, and in turn firms with higher export revenues have even higher values. On average, the super-exporters produce one and a half times more output per worker, have one and a half times more capital per worker and pay almost 40% more on average, than the next tier of exporters. They are also more productive in general. As both Rankin (2001) and Naughtin (2014) have previously found, levels of total factor productivity in revenue terms are on average no higher for exporters when compared with non-exporters but average productivity values increase markedly with export revenue. The top 2-20% of exporters are about 5% more productive than other exporters and super-exporters are in turn 10% more productive.

Super-exporters also derive more of their revenue from exports compared with other exporters. On average the top 1% of exporters export more than half of their output, compared with just over one third for the 2-20% group and 7% for the bottom 80% of the export distribution (Fig. 3).

How can we relate this observed pre-crisis behaviour and characteristics of exporters to the observed impact of the crisis on exporters of different scale? The EDD data showed that unlike for the top 1% of exporters, post-crisis export growth rates were lower than pre-crisis rates primarily due to declines in growth at the extensive margin. This was particularly the case for the bottom 80% of exporters where growth at the extensive margin, which dominates export growth for this part of the export distribution, contracted from 11.1% pre-crisis to 2.8% post-crisis as a result of a fall in new entrants.

As the firm-level data showed, the bottom 80% of exporters are generally marginal exporters, exporting only a relatively small proportion of their output and experiencing a lot of churn between being in and out of the export market. Importantly as well, these firms are not substantially different from non-exporters in productivity but have much lower productivity levels and are of much smaller size than firms higher up the export

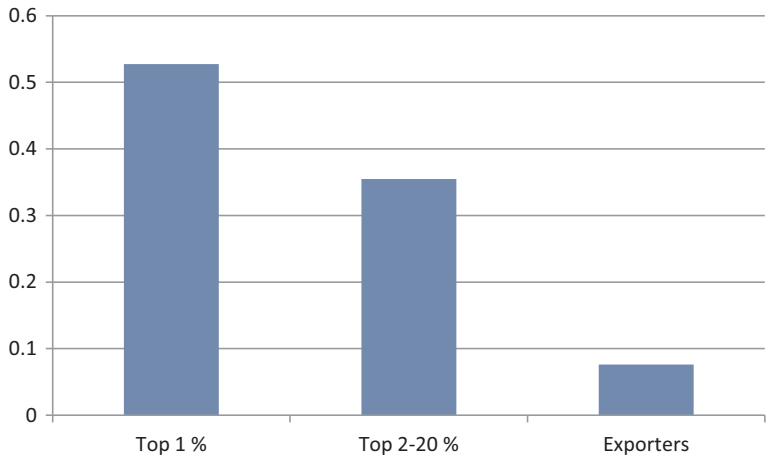

Figure 3. Average proportion of output exported
Notes: These are calculated from regression estimates which control for industry fixed-effects at the three-digit level and year. These categories are significantly different from each other at the 1% level.

distribution. One explanation for the similarities between these marginal exporters and non-exporters is that these firms are experimenting with exporting. The crisis made this experimentation more difficult. The super-exporters though are entrenched exporters, which derive a large proportion of their revenue from the international market. An external crisis like that of 2008-2009 impacted on export demand and thus export revenues fell, but these firms are large, well-established and have high productivity levels which would have allowed them to weather the storm. The short-term impact of the crisis on South African exports was thus mitigated by the concentration of export value among these super-exporters.

5. CONCLUSION

This paper has used firm-level data to examine how South African exports responded to the global financial crisis and how export behaviour has changed after this crisis at the intensive – existing exporters of existing products to existing countries, and the extensive – new products, countries or exporters, margins. This is an area where very little research has been undertaken on South African exports.

The results show the relative importance of the intensive margin compared with the extensive margin for South African export growth – over the period 2002 to 2012 the intensive margin explained 77% of export growth. This suggests that the policy aim to diversify and broaden the export base as articulated by the DTI and NDP is justified. The results also show that the decline in overall South African exports which occurred in 2009 as a result of the global financial crisis was overwhelmingly a response at the intensive margin, particularly among the large super-exporters at the top of the export distribution.

Overall the effect of the crisis seems to have "intensified" growth on the intensive margin with less diversification taking place after the crisis than before. The impact of the crisis differs across destinations, products and firms. For example, prior to the crisis Africa

was a region in which export diversification took place – most of the export growth to the African region stemmed from the extensive margin. Since the crisis, however, the majority of export growth in Africa is as a result of growth in the intensive margin. The effects of the crisis also seem to differ across different sized exporters. Post-crisis the overall export growth rate for the top 1% of exporters is higher, mostly driven by an increase in the intensive margin. It thus seems for these firms the crisis was a temporary shock. However, particularly for firms in the bottom 80% of the export value distribution export growth rates have fallen substantially compared with pre-crisis levels and are lower than export growth rates for exporters further up the distribution – smaller exporters now contribute a smaller share of total exports than prior to the crisis. This reduction is driven by a fall in the extensive margin, particularly among firms entering exporting.

The high concentration of South African exports among the super-exporters mitigated the short-term effects of the crisis since these firms temporarily reduced exports in 2009 but bounced back quickly. However, the "intensification" of export growth may have detrimental longer-term effects for broadening and diversifying the export base since it reduced entry of new exporters, new export products and new export destinations. This reduction in the levels of entry was largest in non-traditional, but arguably important, export markets.

One key factor which may explain why the super-exporters were only temporarily affected by the crisis is that these firms are different to other exporters and domestic market producers across a number of important dimensions – they are larger, more capital intensive, pay higher wages and are more productive. Productivity levels may also explain why the bottom 80% of exporters were particularly hard hit at the extensive margin – these firms were, on average, no more productive than the firms focusing solely on the domestic market. These productivity levels may be too low to overcome the fixed and variable costs associated with entry into and continued success in export markets. Furthermore, a fall in export demand as a result of the crisis may have also meant that these firms could not obtain the scale to justify exporting.

The differences between super-exporters and other firms suggest that what may be constraining South African exports is that there are not enough existing firms with the characteristics of, or likely to become like, these super-exporters. Although, size and higher productivity levels may be endogenous to successful exporting much of the existing empirical literature suggests that more productive firms self-select into exporting (see, *e.g.* Wagner, 2007, for a review). If South Africa wants more exporters and more super-exporters, it needs policies that increase firm-productivity. This may be through policies that encourage productivity growth among existing firms or that encourage the entry of new more productive firms. There are many types of policies that can do this: trade reform can lead to cheaper intermediate inputs and competitive pressures which stimulate productivity; labour market reforms can closer align worker productivity and remuneration; educational reforms can improve worker productivity; and support for research and development and capital upgrading can increase the productivity of capital.

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