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Is China 'Crowding Out' South African Exports of Manufactures?

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Abstract   This article analyses the impact of Chinese competition on South African manufacturing exports to its major markets in Europe, the United States and Sub-Saharan Africa. The article considers five related research questions. First, are China and South Africa competing with each other in export markets, how extensive is such competition and how is this changing over time? Second, to what extent has Chinese competition led to the displacement of South African exports? Third, in which countries have South African exports been most affected? Fourth, which South African export sectors face the greatest threat from Chinese competition? Finally, how does South Africa's experience compare to that of Brazil, another middle-income country and regional power. We find that competition between South Africa and China increased significantly over the past decade, particularly in African markets. All types of manufactured exports lost ground to China, but the impact is strongest in low-technology products. South African exports have nevertheless increased from 2001 so that 'crowding out' should be interpreted in relative terms.

Cet article analyse l'impact de la compétition chinoise sur l'exportation manufacturière Sud-Africaine vers ses marchés principaux en Europe, aux Etats-Unis et en Afrique Sub-Saharienne. L'article explore quatre sujets de recherche pertinents. Tout d'abord, la Chine et l'Afrique du Sud sont-elles en compétition sur le marché de l'exportation, jusqu'où va cette compétition et comment évolue-t-elle dans le temps? Ensuite, dans quelle mesure la compétition chinoise a-t-elle poussé l'exportation Sud-Africaine à se déplacer? Troisièmement, dans quels pays les exportations Sud-Africaines ont-elles été les plus touchées? Enfin, quel est le secteur d'exportation Sud-Africain le plus menacé par la compétition chinoise? Nous trouvons par le biais de cette étude que la compétition entre la Chine et l'Afrique du Sud a augmenté de manière significative cette dernière décennie, en particulier sur les marchés Africains. Toutes sortes de produits manufacturés Sud-Africains ont cédé la place à des produits chinois, mais l'impact est le plus visible pour les produits technologiquement peu sophistiqués. Cependant, les exportations Sud-Africaines augmentent depuis 2001, ce qui inique que ce « remplacement » par les produits chinois reste relatif.

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Introduction

The relationship between China and Sub-Saharan Africa (SSA) has attracted a great deal of attention in recent years, both in the media and by academics. Much of this interest has focused on the so-called 'new scramble for Africa' (FT, 2010) epitomised by the growing exports of commodities to China, Chinese foreign direct investment (FDI) in oil and mining and Chinese aid for infrastructure and other projects in the region (see, for example, Goldstein *et al*, 2006; Broadman, 2007; Zafar, 2007; Brautigam, 2009; Schiere *et al*, 2011). This is not surprising since African exports to China have been dominated by primary products, which have also been important sectors for Chinese FDI and loans. Concerns have been raised over

the potential negative effects of this relationship as a result of the possible 'Resource Curse' effects associated with booming commodity exports to China. On the other hand growing Chinese demand, cheap Chinese imports and financial support for much needed infrastructure projects are seen as key factors in the recent improvements in economic performance in many African countries.

Much less attention has been given to the impacts of China's global expansion on the manufacturing sector in SSA and what there is, has mainly considered the effects of Chinese imports on domestic manufacturing in the region. Given the lack of competitiveness of the manufacturing industry in most of SSA, it is not surprising that relatively little research has been done on the impact of Chinese competition on African exports of manufactured goods, in contrast to the extensive literature on Asia, particularly East Asia (Lall and Albaladejo, 2004; Eichengreen *et al*, 2007; Greenaway *et al*, 2008; Athukorala, 2009) and Latin America (Lall and Weiss, 2005; Freund and Ozden, 2009; Hanson and Robertson, 2009; Gallagher and Porzecanski, 2010; Jenkins, 2010).

Some authors have, however, expressed concerns that Chinese competition in third markets will inhibit exports of manufactures from Africa. Jenkins and Edwards (2006, Table 8) identified a number of SSA countries where more than half of exports were threatened by increased Chinese competition (Lesotho, Zambia, Mozambique, Malawi, Namibia and South Africa). Case studies of the textile and garment industries have found evidence that African exporters have lost out to Chinese competition in Kenya, Lesotho, Madagascar, Swaziland and South Africa (Kaplinsky and Morris, 2008). Giovannetti and Sanfilippo (2009) using a gravity model also found that Chinese exports displaced African exports across a range of manufactured products, not just textiles and garments, but also footwear and machinery and equipment. The latter also found significant displacement of intra-regional trade by Chinese exports, a view that was supported by several studies of individual countries' regional exports carried out as part of the African Economic Research Consortium scoping studies of China–Africa trade relations.[1]

The SSA country that is most likely to be affected by Chinese competition in its export markets is South Africa, which has the most advanced manufacturing sector in the region and has developed significant exports of manufactures. Unlike low-income countries where competition from China may inhibit the emergence of manufacturing, or high-income countries where we expect a high degree of specialisation in different products, the effect of Chinese competition on middle-income countries with a manufacturing base is likely to be largely about displacement or crowding out. The position of South Africa as a middle-income country and a regional power in SSA makes it a particularly interesting case.

The rapid growth of Chinese imports has had a major effect on production for the domestic market (Edwards and Jenkins, forthcoming) and Chinese competition may also lead to a crowding out of South African exports to third markets. Burke *et al* (2008, p. 19) claim that 'Chinese exports to South Africa's neighbours such as Swaziland, Lesotho, Namibia and Mozambique have reduced the demand for South Africa's exports to these countries and this has had a detrimental effect on South African producers that have not been able to compete'. However the evidence is largely anecdotal and there has been no systematic empirical study of the impact of Chinese competition on South African exports of manufactures.

The purpose of this article is to carry out such a study, focusing on South African exports to its major markets in Europe, the United States and SSA. In analysing the impact of China on South African exports, we consider five related research questions. First, are China and South Africa competing with each other in export markets, how extensive is such competition and how is this changing over time? Second, to what extent has Chinese competition led to the displacement of

South African exports in its major markets? Third, in which countries have South African exports been most affected? Fourth, which South African export sectors face the greatest threat from Chinese competition? Finally, how does the South African experience compare to that of Brazil, another middle-income country that is also a regional power?

The next section explains the data that has been used in the article and the choice of countries and time period. The section 'South Africa and China's market share in major export markets' sets out the market shares of South Africa and China in the imports of each market and the way in which these have changed over time. Various indicators are presented in the section 'Do Chinese products compete with South African exports?' to show the extent to which China and South Africa compete with each other at the 6-digit level of the Harmonised System (HS) classification. This is followed by a Constant Market Share (CMS) analysis of South African exports that identifies the degree to which changes in overall market share are attributable to changes in market share at the product level as opposed to the product composition of South African exports. The section 'The displacement of South African exports by China' extends the CMS analysis to calculate the extent to which changes in the overall competitiveness of South African exports are attributable to changes in competitiveness *vis-à-vis* China. In the section 'Impacts by technology level and products', the overall picture with regard to the effects of Chinese competition is further disaggregated by technology level and products. Finally a brief comparison is drawn with the experience of Brazil, which in many ways faces similar problems from Chinese competition to those of South Africa.

Data

The article focuses on competition between South African and Chinese exports of manufactured goods in key export markets for South Africa. The EU and the United States are South Africa's largest markets accounting for 35 and 11 per cent of manufactured exports in 2008 (excluding exports to China). Given the large number of countries in SSA, it was decided to focus on 10 countries that were the most important export markets for South Africa in the region. These are Angola, Democratic Republic of Congo (DRC), Ghana, Kenya, Malawi, Mozambique, Nigeria, Tanzania, Zambia and Zimbabwe. Between them, they accounted for 87 per cent of South African exports of manufactured goods to SSA and 19 per cent of the country's total manufacturing exports in 2008. In total the markets covered account for almost two-thirds of South Africa's exports to countries other than China.[2]

We are interested in the competition between South Africa and China in each destination. To analyse this, we draw upon import data of each market. In the case of the United States and the EU, import data as reported by each country or region is used. However, the trade data of many SSA countries is often unreliable.[3] To remedy this problem, the data for SSA imports was constructed from export data to each SSA country reported by South Africa, China and a selection of major exporting countries.[4] This does not cover all sources of imports, but since the focus is on the performance of South African exports relative to China and other countries in these markets, this should not lead to significant biases in the results.[5]

Because the focus is on competition with China and Chinese exports are overwhelmingly manufactures, the analysis is concentrated on manufactured products. These are broadly defined to include resource-based manufactures using Lall's (2000) classification, which divides manufactured products into high-technology, medium-technology, low-technology and resource-based categories.

The data is obtained at the 6-digit level of the HS (Revision 1996), as it is important to have a sufficiently high level of disaggregation to ensure that the products that are being compared in the analysis do indeed compete with each other. The period of analysis covers the years 1997–2010. The data comes from UN Comtrade and was accessed using the World Bank's WITS software. In the case of the EU the data used relates to the extra-EU trade of the 25 countries that were members of the EU before the accession of Bulgaria and Romania. Unfortunately UN Comtrade only has data on EU imports on this basis from 2000 onwards, so that it was not possible to cover the entire period. However we are particularly interested in the period since 2001 when China became a member of the WTO, so that much of the analysis focuses on the period 2001–2010.

South Africa and China's Market Share in Major Export Markets

There are considerable variations in terms of South Africa's share of manufactured imports by different countries (see Figures 1 and 2). Not surprisingly, its share of imports to its neighbours in Southern Africa is much higher than in the West African and East African countries. South Africa accounts for more than half of exports going to its three landlocked neighbours: Zambia, Zimbabwe and Malawi. It also has relatively high shares of the market in Mozambique and the DRC, which are both also members of the Southern African Development Community (SADC).
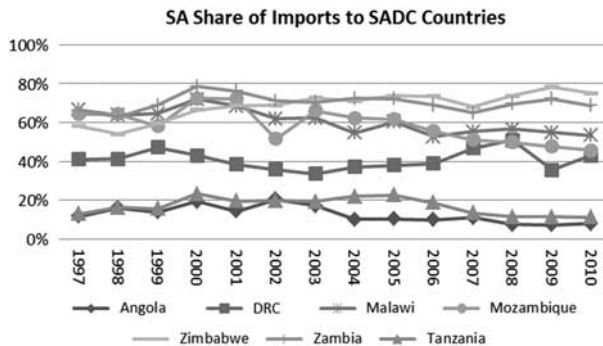

Figure 1: SA share of manufactured imports to SADC countries.
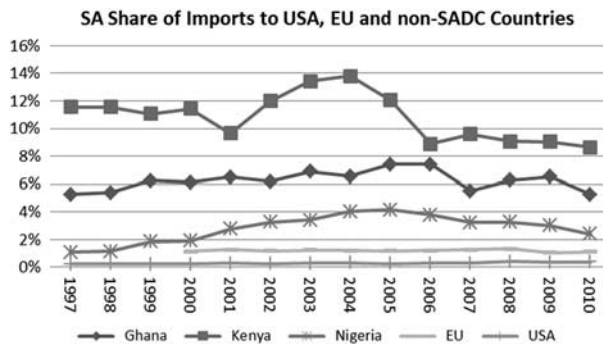*Source*: Own elaboration from UN Comtrade data.

Figure 2: SA share of manufactured imports to the United States, EU and non-SADC countries.
Source: See Figure 1.

It has a somewhat lower share of exports to two other SADC members: Angola and Tanzania. The lowest shares of imports from South Africa among the African countries included here are in the three non-SADC countries: Kenya, Ghana and Nigeria.

One concern is that the high values of South African exports to the three landlocked neighbours may reflect the transhipments of foreign goods through South Africa. Unfortunately, the data to evaluate this properly is unavailable. However, South African firms and retailers have an incentive to tranship goods in bond under Customs control to avoid paying import duties as the goods enter South Africa and then again when they enter the destination country. These trade flows are not declared as South African exports in the trade data.[6] What is not captured in this study is informal trade that is potentially large between South Africa and Zimbabwe.

Although both the United States and the EU account for a significant share of South Africa's manufactured exports, this reflects the large size of these markets. South Africa accounts for only slightly more than 1 per cent of imports of manufactures by the EU and less than ½ per cent of US imports.

Following the ending of apartheid, South African exports of manufactures to other African countries grew rapidly, averaging 9.5 per cent growth per annum over the period 1997–2010. Its share of imports also increased in most SSA countries in the late 1990s. However in recent years South Africa's market share has declined except in Zimbabwe and DRC. Its share peaked in other SADC countries around the start of the Millennium (Figure 1), whereas in the non-SADC African countries it began to decline from the middle of the decade (Figure 2). In contrast South Africa's share of the EU market has remained fairly stable since 2000, while in the United States it has increased significantly, although it still remains at a very low level.

In contrast, the import share accounted for by China is significant in all 12 markets. By 2010, China accounted for around a quarter of manufactured imports in the EU, United States and six of the ten African countries (Figures 3 and 4). The exceptions were the three landlocked countries that relied heavily on South African imports – Zambia, Zimbabwe and Malawi, and Mozambique – where China's share remained below 15 per cent. Looking over time, China's share of imports to all these markets increased significantly, particularly since 2001 when it became a member of the WTO.

Do Chinese Products Compete with South African Exports?

The last section showed that over the past decade South Africa's share of imports into most of its major markets have declined, while that of China increased significantly. These trends at an
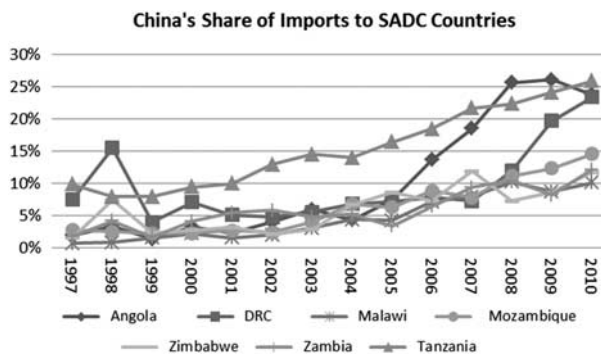

Figure 3: China's share of manufactured imports to SADC countries.
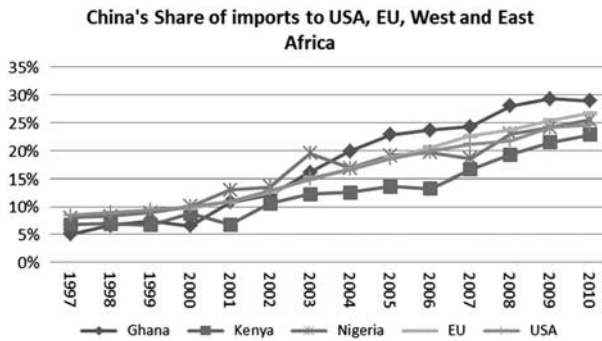*Source*: See Figure 1.

Figure 4: China's share of manufactured imports to the United States, EU and West and East Africa.
Source: See Figure 1.

Table 1: Share of South African manufacturing exports facing competition from China by export value and product count (%)

	Share value of SA exports with overlap		Share number of SA export products with overlap	
	1997 (1)	2010 (2)	1997 (3)	2010 (4)
EU	96.4[a]	98.8	94.6[a]	99.1
USA	71.1	97.7	94.8	98.0
SSA Total	16.8	73.8	11.0	54.7
Angola	9.2	78.9	8.7	65.5
Ghana	37.2	81.3	24.0	69.8
Kenya	18.0	74.1	25.3	71.6
Mozambique	7.7	72.3	5.5	50.9
Malawi	8.4	51.0	2.5	28.9
Nigeria	29.9	89.9	37.3	78.9
Tanzania	20.0	79.3	21.3	65.1
DRC	7.9	82.0	10.3	51.0
Zambia	10.3	76.4	5.2	45.6
Zimbabwe	24.7	64.9	11.2	41.0

[a]Data for 2000.
Source: Author's calculations using 6-digit HS-level trade data obtained from UN Comtrade.

aggregate level give no indication of whether South Africa and China compete with each other in these markets. A preliminary indication of whether they do or not can be obtained by looking at the extent to which they export the same products in each market. Table 1 shows the extent to which South African exports face competition from Chinese products in each country both in terms of the share of the value of South African exports (Columns 1 and 2) and in terms of the proportion of products exported (Columns 3 and 4).

There is considerable variation between markets in terms of the extent of overlap between South African and Chinese products exported. The overlap is highest in the EU and the United States where virtually all the products that South Africa exports are also exported by China. In terms of the share of products exported this was already the case in these markets by the late 1990s, although in the United States the share of the value exported by South Africa that competed with Chinese products was lower (71 per cent).

Competition with Chinese exports was less prevalent in SSA than in developed country markets, particularly in 1997 where on average competing exports only made up 16.8 per cent of the value and 11 per cent of the number of products exported by South Africa to the region. However, this proportion increased dramatically over the period reflecting the significant growth of Chinese exports at the extensive margin (that is, through exporting new products).[7] By 2010, more than half of products exported by South Africa and almost three-quarters of the value of exports to SSA faced competition from Chinese goods.

Despite the variation between countries in the degree of overlap between South African and Chinese exports, the trend in terms of increased competition is the same in all of them. The lowest overlap is in Malawi, which only established diplomatic relations with China in 2007 and where Chinese market penetration is less than elsewhere in the region. It is followed by Zimbabwe, where 40 per cent of products exported from South Africa faced competition from China in 2010 (up from 11 per cent in 1997) and these accounted for almost two-thirds of the value of exports. The overlap in 2010 was greatest in Nigeria (nearly 80 per cent of products and 90 per cent of value) followed by Kenya and Ghana (around 70 per cent of products).

A major weakness of the overlap measure of competition between China and South Africa is that it does not distinguish between products where China exports US$1 and those products where it is a major exporter. As a result it is only affected by changes in China's exports at the extensive margin and not by changes at the intensive margin. Moreover once China exports virtually the full range of products to a market as is now the case in the EU and the United States (see Table 1), it is impossible for the index to show increased competition.

An alternative measure that avoids some of these problems is the Index of Competitive Threat (ICT) (Jenkins, 2010).[8] The ICT attempts to capture the effect of the growth of Chinese exports at both the extensive and intensive margins on South African exports. It does so by taking the share of each product in South African exports to a particular destination (the overlap share measure) and weighing it by China's share in the total imports of the destination market from all sources. Thus

$$\text{ICT} = \Sigma x_{\text{SA}i} * k_{\text{C}}i \tag{1}$$

where $x_{\text{SA}i}$ – Share of product i in South African exports to destination country. $k_{\text{C}i}$ – Share of China in destination country's total imports of product i.

Over time the ICT can increase both because the number of products that face competition from China increase (extensive margin) and because the Chinese penetration of existing product markets rises (intensive margin). The value of the ICT could range from 0, when South Africa and China have no exports in common, to 1 when South Africa's exports are entirely made up of products in which China's exports account for the entire market.[9] In practice the value of the index is unlikely to be anywhere approaching unity.

Figures 5 and 6 show that competition between China and South Africa was limited in all markets in the late 1990s but increased markedly during the following decade. The countries where South Africa is least threatened by Chinese exports according to this indicator are Malawi, Zimbabwe and Zambia, which are the countries where China's share of imports is lowest (see Figure 3). The low similarity between the structure of exports to the United States and EU mean that competition from China is also relatively low in those markets. The ICT declined in the United States and stabilised in the EU from the mid-2000s. The countries where China poses the greatest threat are Nigeria, Ghana, Angola and Tanzania, all of which had an ICT in 2010 of over 0.1.
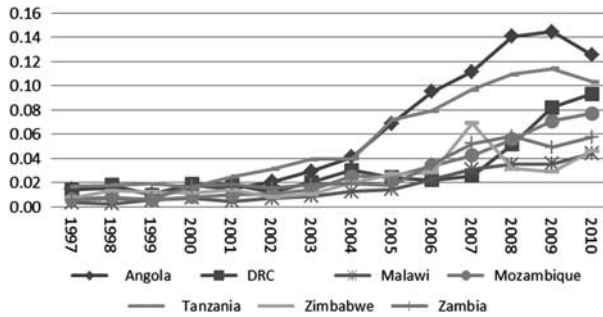
Figure 5: ICT in SADC markets.
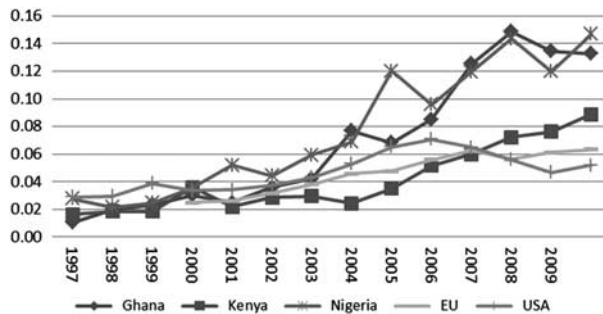*Source*: See Figure 1.

Figure 6: ICT in non-SADC markets.
Source: See Figure 1.

A CMS Analysis of South African and Chinese Exports

As was seen in the section 'South Africa and China's market share in major export markets' above, South Africa has experienced a decline in its market share of imports in most of its major export markets in recent years, while China has seen its share increase significantly. In order to analyse this further it is useful to decompose changes in the share of imports into that part that is attributable to the type of products that each country exports and that which reflects the decline in the country's share of imports of each product. To do this, the CMS method developed by Fagerberg and Sollie (1987) is used. This decomposes the change in Country B's share of Country A's total imports of manufactures into a *competitiveness effect*, a *product composition effect* and a *relative adaptation effect*. Thus the change in the market share can be expressed as:

$$\Delta k_{B} = \Sigma \Delta k_{Bi} * m_{Ai} + \Sigma k_{Bi} * \Delta m_{Ai} + \Sigma \Delta k_{Bi} * \Delta m_{Ai} \tag{2}$$

where k_{Bi} is the share of Country B in Country A's imports of product i, and m_{Ai} is the share of product i in Country A's total imports of all manufactured goods.

The first term on the right-hand side of equation (2) measures the competitiveness effect, the second term the product composition effect and the third the relative adaptation effect. A positive value for the first term indicates that Country B is gaining competitiveness in those products that it exports to Country A. A positive value for the second term shows that Country B is specialised in products that are increasing their share in the total imports of Country A. Finally, the sign of the

third term is positive if Country B is gaining market share most in those products that are increasing their share in the total imports of Country A. This is referred to as the relative adaptation effect, as it shows the extent to which a country's exports are responding to changing import demand patterns in their markets. By using base year (Laspeyre) weights throughout and providing a meaningful interpretation of the interaction (third) term, this method resolves the inconsistencies and arbitrariness of earlier applications of CMS that were pointed out by Richardson (1971).

Tables 2 and 3 present the decomposition of changes in South Africa and China's shares of imports in the 12 markets since 2001. This period was chosen as being of particular interest, as it covers the time since China became a member of the WTO and which saw an acceleration of its penetration of the market, particularly in SSA. As noted earlier, the markets in which South Africa increased its share were Zimbabwe and the DRC, and marginally the United States. However if one looks at its position in terms of competitiveness at the product level, this shows a somewhat more positive picture with competitiveness also increasing in Angola, Ghana, Nigeria

Table 2: CMS analysis of South African exports by market (2001–2010)

	Competitiveness (%)	Product composition (%)	Relative adaptation (%)	Total change (%)
Angola	5.8	12.2	−24.2	−6.3
DRC	3.4	1.4	−0.4	4.5
Ghana	0.7	0.4	−2.3	−1.2
Kenya	−2.5	12.9	−11.4	−1.0
Malawi	−10.0	−2.3	−3.0	−15.3
Mozambique	−24.2	1.9	−4.2	−26.5
Nigeria	0.2	1.9	−2.5	−0.4
Tanzania	−6.3	11.6	−13.6	−8.3
Zambia	−9.4	1.1	0.8	−7.6
Zimbabwe	3.6	4.5	−1.8	6.3
EU	0.1	−0.1	−0.1	−0.1
USA	0.1	0.1	−0.1	0.1

Source: See Table 1.

Table 3: CMS analysis of China's exports by market (2001–2010)

	Competitiveness (%)	Product composition (%)	Relative adaptation (%)	Total change (%)
Angola	8.1	2.0	11.4	21.5
DRC	11.9	0.8	5.6	18.3
Ghana	13.9	0.1	4.1	18.1
Kenya	9.0	2.0	4.9	16.1
Malawi	7.2	−0.0	1.4	8.6
Mozambique	7.5	1.0	3.4	11.9
Nigeria	12.6	1.9	−2.0	12.5
Tanzania	14.6	1.0	0.4	15.9
Zambia	3.3	−2.0	5.5	6.7
Zimbabwe	4.7	−0.2	4.1	8.6
EU	12.1	−0.2	3.9	15.8
USA	11.8	−1.2	3.1	13.7

Source: See Table 1.

and the EU. South Africa suffered large losses of competitiveness in Mozambique (−24.2 percentage points), Malawi (−10 percentage points) and Zambia (−9.4 percentage points), as well as moderate losses in East Africa (−2.5 to −6.3 percentage points).[10]

The initial product composition of South African manufactured exports was not a factor in the declining market share, as this is negative in only two of the twelve countries (Malawi and EU). On the other hand, South Africa has not been able to shift its exports towards more dynamic products over time, as the relative adaptation effect has been negative in 11 cases.

Table 3 decomposes the growth of China's market share in the 12 countries and shows quite a different picture from the one for South Africa. First of all, China's share of imports has increased substantially in every market over the period, ranging from a low of 6.7 per cent in Zambia to 21.5 per cent in Angola. The most important factor contributing to this increased market share was the growing competitiveness at the product level. The initial composition of Chinese exports has not been a major factor, only accounting for a small part (less than 2 percentage points) of the total increase in market share and in five cases actually depressing China's share of imports. Finally, it is worth noting that whereas for South African exports the relative adaptation effect was negative in all but one case, in the case of Chinese exports this effect was positive in all markets apart from Nigeria. Thus whereas South Africa tended to lose market share in products where imports were growing fastest, China's exports were increasingly oriented towards those fast-growing imports.

The Displacement of South African Exports by China

Having analysed the extent to which South Africa faces competition from China in its major markets and the degree to which its loss of market share is attributable to declining competitiveness at the product level, the next step is to look at how far the latter can be attributed to Chinese competition. In order to do this we apply an extension of CMS analysis developed by Batista (2008) to divide the loss of market share by a country attributable to the *competitiveness effect* to the different countries with which it competes in a given market.

The loss of market share by South Africa (SA) to China (C) (Δk_{SACi}), in a particular product i in a specific country is defined as:

$$\Delta k_{SACi} = \Delta k_{SAi} * k_{Ci}^{t0} - \Delta k_{Ci} * k_{SAi}^{t0} \qquad (3)$$

where k_{Ci}^{t0} and k_{SAi}^{t0} are the shares of China and South Africa in Country A's imports of product i in base year t0. In other words the total loss of market share by South Africa in a particular product is allocated between other exporters in proportion to their share of the market at the beginning of the period and the increase in their share of the market over the period.

Summing over all products gives the aggregate loss of market share to China:

$$\Delta k_{SAC} = \Sigma m_{Ai}^{t0} * \Delta k_{SACi} \qquad (4)$$

where m_{Ai}^{t0} is the share of product i in Country A's total imports of all manufactured goods in base year t0.

Summing over all exporters to the destination market gives the total competitiveness effect in a conventional CMS analysis. It can be shown that this formula satisfies four desirable properties.[11] A country cannot lose or gain from itself. A gain for China from South Africa is equal to the loss by South Africa to China. The sum of the gains and losses of any country to all its competitors is equal to the total gain or loss of market share by that country. Finally the gain

Table 4: Crowding out of South African exports by China (2001–2010)

	As percentage of SA exports to market in 2010	As percentage of crowding out in all markets
Angola	−26.3	7.1
DRC	−8.8	3.0
Ghana	−16.0	2.3
Kenya	−9.8	2.7
Malawi	−8.8	1.5
Mozambique	−11.5	7.2
Nigeria	−11.3	2.8
Tanzania	−22.7	5.0
Zambia	−5.3	3.7
Zimbabwe	−3.0	2.5
SSA Total	−9.9	37.7
EU	−7.8	49.8
USA	−5.6	12.5
Total	−8.1	100.0

Source: See Table 1.

(loss) of a country to another country is a function of, and has the same sign as, the difference between the growth rates of their exports.[12]

As in the previous section, the relevant period for considering the impact of China on South African exports is from 2001 to 2010. Table 4 presents the results of the calculations.

Column 1 of Table 4 shows how much higher South African exports to each market would have been in 2010 had it not lost market share to China since 2001. It shows that the country lost to China in all markets; the fact that in some countries the CMS analysis showed an increase in competitiveness is because in those markets losses to China were more than offset by gains in market share from other exporters. In both Angola and Tanzania, exports would have been more than 20 per cent higher had it not been for increased Chinese competition, while in Mozambique and Nigeria they would have been over 10 per cent higher. The impact of Chinese competition was least severe in Zimbabwe and Zambia, followed by the United States and EU. This is broadly consistent with the ICT analysis where these were four of the five markets where South Africa was least threatened by Chinese competition in 2010.[13]

South Africa enjoys several advantages relative to China in both Zimbabwe and Zambia, where according to the decomposition analysis losses were relatively small. These include the preferential access to the markets as a result of SADC Free Trade Agreement and their geographical proximity. As both countries are landlocked, Chinese exports have to pass through South Africa or other countries to reach the market, giving South African goods an advantage in terms of transport costs. South Africa tends to export a wider range of products to these countries than to other markets, which may reflect a particular advantage in goods that are relatively costly to transport and which they do not export to other African countries or to Europe and the United States.

Column 2 of Table 4 shows the importance of different markets in terms of the total crowding out effect on South African exports. Because of the importance of the EU as a market for South African exporters, almost half the total loss to China came in the EU, despite the fact that it was one of the markets in which the impact of China was less marked. The 10 SSA countries accounted for 38 per cent of the total loss, with three countries (Angola, Tanzania and Mozambique) responsible for half of all the crowding out in the region. These are also three of the top four countries in terms of the relative crowding out.

One limitation of this analysis is that it only considers products that have been exported to a country during the period under consideration. It is also possible that China's presence may prevent South African exports from even getting off the ground in a particular market. This could limit the diversification of South African manufactured exports, thus further constraining their growth. In another paper (Edwards and Jenkins, 2014) that uses a gravity type model to estimate the effect of Chinese exports on South Africa, we found that both the presence and the level of Chinese exports had a negative impact on whether South Africa exported to a particular market. In other words the growth of Chinese exports at both the extensive and intensive margins limited South African growth at the extensive margin. This implies that the figures in Table 4 may underestimate the negative impact of Chinese competition on South African exports.

Impacts by Technology Level and Products

It is sometimes claimed that Chinese competition is felt mainly in low-technology, labour-intensive products and that the threat is much less severe for exports of more sophisticated products or processed raw materials. As low-tech products account for less than 15 per cent of South African exports to its main markets, if this were indeed the case, the impact would be relatively limited. However, Chinese exports have diversified considerably in recent years into medium- and high-technology products.

Table 5 provides estimates of the impact of Chinese competition on South African exports of manufactures to the EU, United States and the 10 SSA economies in 2010 by level of technology. As expected the largest reduction in exports as a result of Chinese competition was in low-technology products over the period 2001–2010, while resource-based manufactures were least affected overall. Exports of low-technology products were particularly affected in developed country markets. What is also noteworthy is the extent to which South African exports of high-tech products have been affected, particularly in the EU and SSA, although it should be noted that these account for a relatively small share of South African exports to all these markets.

There are striking differences between the different markets with low- and high-technology exports being affected more in the EU market, while medium-technology exports have suffered more in SSA markets than in the high-income countries. Comparing exports with the United States and other African countries shows that low-technology products have been affected more in the United States, possibly reflecting the impact of the ending of the Multifibre Arrangement in January 2005 and the erosion of African Growth and Opportunity Act (AGOA) preferences (Kaplinsky and Morris, 2008), while all other types of products have suffered more from Chinese competition in SSA.

Table 5: Loss of exports to China by technology level (2001–2010) as percentage of South African exports in 2010

	USA (%)	EU (%)	SSA (%)	Total (%)
Resource-based	−3.8	−3.0	−6.4	−3.8
Low technology	−34.0	−46.1	−13.0	−25.2
Medium technology	−3.2	−5.7	−9.3	−6.2
High technology	−2.2	−20.8	−17.5	−17.5

Note: Figures refer to the loss of market share to China over the period 2001–2010 as a percentage of South Africa's total exports to each market in 2010.
Source: Own elaboration from UN Comtrade data based on Lall (2000) classification of technology level.

Table 6: Distribution of total loss of exports to China by technology level (2001–2010)

	USA (%)	EU (%)	SSA (%)	Total (%)
Resource-based	26.5	18.3	17.6	19.1
Low technology	41.2	41.9	30.6	37.6
Medium technology	31.2	28.0	39.8	32.9
High technology	1.1	11.8	12.0	10.5

Source: See Table 4.

Table 7: Leading sectors in terms of aggregate loss of market share to China, 2001–2010, by major market

USA	EU	SSA
Apparel (knitted)	Electrical machinery	Non-electrical machinery
Iron and steel	Furniture	Electrical machinery
Non-electrical machinery	Iron and steel	Iron and steel products
Other base metals	Non-electrical machinery	Vehicles and parts
Vehicles and parts	Vehicles and parts	Rubber
Prepared vegetables, fruits and so on	Iron and steel products	Iron and steel

Source: See Table 1.

Table 6 shows the share of each type of product in the total loss of exports to China. In each market, low- and medium-technology exports account for around 70 per cent of the total, with low-technology products being more significant in the United States and EU and medium technology in SSA. While low-technology products were shown in Table 5 to have suffered large losses, the losses in medium-tech products reflects their large share in South Africa's exports. The low share of high-tech products in total losses is because they only make up around 5 per cent of South African manufacturing exports.

The loss of market share to China in low-technology products would not be a cause of concern if South Africa had responded by gaining market share from other exporters in medium- and high-tech products. There is some evidence that this has occurred in the US market where South Africa's exports of medium-technology products trebled between 2001 and 2010 and its share of US imports more than doubled.[14] In the EU and SSA, however, South Africa's share of imports of medium- and high-tech products changed relatively little over the period.

A more disaggregated view of the products most affected by Chinese competition can be obtained by looking at the HS chapters where losses have been greatest. Table 7 shows that there are three chapters that feature in the top six in all three markets, iron and steel, non-electrical machinery and vehicles and parts. Two more sectors are among the most significant in both the EU and SSA, namely, electrical machinery and iron and steel products. The main concentration of losses of market share to China in the United States over the period was in knitted apparel, supporting the point made earlier that exports to the US market were affected by the erosion of AGOA preferences with the ending of the Multi-Fibre Arrangement. Losses in other base metals are mainly in manganese and to a lesser extent cobalt. Perhaps surprisingly the sixth chapter in the United States where South Africa has lost market share to China is in prepared fruit and vegetables where tinned pears and peaches and apple juice are the main products affected.

The more detailed sector and product analysis reinforces the point that South Africa has lost markets to China in a range of products, not just labour-intensive products.

The South African Experience in Comparative Perspective

South Africa is by no means unique in having lost export markets to China since the latter joined the WTO in 2001. Brazil makes a particularly appropriate point of comparison for the South African experience. Both are regional powers and are members of the BRICS alongside China, India and Russia. They have very similar economic relations with China, exporting raw materials to China, while the manufacturing sector faces Chinese competition both at home and abroad. Both are the most industrialised countries in their respective regions and have developed significant exports of manufactures to neighbouring countries. Given the similarities between the two countries, how has the impact of China on South African exports compared with its impact on Brazil?

In order to explore this question, we examine the impact of Chinese competition on Brazilian exports of manufactures to the United States, the EU and seven Latin American countries.[15] The impact of China on Brazilian manufactured exports to its major markets over the period 2001–2010 was calculated using the same methodology that was applied to South African exports. Table 8 shows that overall the crowding out of South African exports was slightly greater than in the Brazilian case. The difference was particularly marked in the case of exports to the EU, where the loss of market to China over the period was double that experienced by Brazil. The reverse was the case in the US market where there was a much stronger negative impact on Brazilian exports.

Table 9 disaggregates the impact of Chinese competition by the technology level of the product concerned. The impacts are again quite similar with low-technology products suffering the most severe effects followed by high-technology products in both South Africa and Brazil. In contrast the effect on resource-based manufactures has been relatively small. Again for the majority of product types, the loss of market has been slightly greater for South Africa, except in the case of high-technology products. As noted earlier, these account for a relatively small proportion of South Africa's manufactured exports.

Table 8: Crowding out of Brazilian and South African exports by China (2001–2010)

	Brazil (%)	South Africa (%)
USA	−12.5	−5.6
EU	−3.8	−7.8
Regional Market[a]	−8.1	−9.9
Total	−7.4	−8.1

[a]Latin America for Brazil, SSA for South Africa.
Source: Table 3 and own elaboration from UN Comtrade data.

Table 9: Loss of exports by Brazil and South Africa to China by technology level (2001–2010)

	Brazil (%)	South Africa (%)
Resource-based manufactures	−2.7	−3.8
Low technology	−23.8	−25.2
Medium technology	−5.2	−6.2
High technology	−20.6	−17.5

Source: Table 4 and own elaboration from UN Comtrade data.

As was seen in Table 4, the pattern of crowding out of South African exports by technology levels was somewhat different in developed country markets and regional markets. In the former, the most severely affected exports were low-technology products, whereas in SSA it was high-technology products, where South African exports lost out most. The same pattern occurred in Brazil with low-technology products being most affected in the United States and EU, and high-technology products worst hit in other Latin American countries.

Although the overall impact of Chinese competition has been slightly more severe for South African exporters than Brazilian ones, the general pattern is broadly similar. The Brazilian manufacturing sector is larger and more sophisticated than South Africa's and this may have made it slightly more resilient to Chinese competition. In both countries around 80 per cent of manufactured exports are either resource-based or medium-technology products, which are the two groups that have been least affected by Chinese competition.[16] This has made them less subject to crowding out in export markets than countries that have specialised in either high- or low-technology products.[17] Nevertheless, as complaints from exporters in both countries illustrate, they have by no means been immune from crowding out effects.

Conclusion

The evidence of this article shows that competition between South Africa and China in the former's main export markets was relatively limited in the late 1990s before China joined the WTO. The last decade, however, has seen a significant increase in the competition faced by South African exporters, particularly in African markets. This has been a result of growth of Chinese exports both at the intensive and the extensive margins, with the number of products that they export in common increasing, as well as China increasing its share of the import market for products which it already exported at the start of the period.

There is evidence of 'crowding out' of South African exports by Chinese products in all the country's major export markets (see Table 4). This was most marked in SSA where, on average, exports in 2010 were almost 10 per cent lower than they would have been had South Africa maintained its market share vis-à-vis China. This compared with a 7.8 per cent loss in the EU and 5.6 per cent in the United States (see Table 4). There was also considerable variation in the degree of crowding out within SSA with exports being most affected in Angola, Mozambique and the West and East African countries, while displacement has been relatively less marked in the neighbouring land-locked countries (Zimbabwe and Zambia).

Although the analysis by technology level showed that in general it was exports of low-technology products that had been most severely affected by Chinese competition, all types of manufactured exports lost ground to China. South Africa has not been able to compensate for losses to China by expanding its share of imports of more sophisticated products except in the case of exports of medium-technology products to the United States.

While South Africa has lost market share to China in its major markets, this has not led to a reduction in the absolute level of manufactured exports from South Africa. Indeed South African exports to the 10 SSA countries more than trebled between 2001 and 2010, while those to the United States more than doubled and to the EU increased by more than 90 per cent.[18] The 'crowding out' that has been described in the article is therefore a relative story and not one of absolute declines in South African exports. The 'crowding out' also only refers to manufacturing and not to primary products where Chinese economic growth and demand for resources has enhanced South African exports to third countries through rising commodity prices.

Acknowledgements

Notes

1. These include studies on Cameroon, Kenya and South Africa, all quoted in Ademola *et al* (2009).
2. The most important markets for South African exports of manufactures that were not included in the analysis were Japan (6 per cent share), where close to 70 per cent of manufactured exports are basic iron and steel and other resource-based products, and India (3 per cent), Taiwan (2 per cent), Korea (2 per cent) and Brazil (1 per cent), where export values were considered to be too low and variable to be included in the analysis.
3. See Yeats (1990) for a detailed exposition of the quality of SSA trade data.
4. The exporters included were South Africa, Australia, Canada, Germany, Spain, France, the United Kingdom, Italy, the Netherlands, the United States, South Korea, ASEAN 5 (Singapore, Malaysia, Indonesia, Thailand, Philippines), Hong Kong, India, China. The Philippines and Thailand only reports HS6 Revision 1996 data from 2000 and 1999, respectively, and are not therefore included in earlier years.
5. It does, however, mean that the market shares of both South Africa and China in these countries will be overestimated, as not all imports have been included in the denominator. This means that comparisons between the import penetration of China and South Africa in SSA and their shares of the United States and EU markets need to be made with caution.
6. Correspondence with South African distributors of clothing products to the region confirmed that they declare the origin of the goods they export to the region on their export invoices.
7. Growth at the extensive margin accounted for more than half of the total growth in Chinese exports of manufactures to the 10 SSA countries between 1997 and 2010 (Edwards and Jenkins, 2014).
8. One of the most common indices used to measure the extent of Chinese competition in the literature is Finger and Kreinin's (1979) Export Similarity Index. This index suffers from a number of limitations, particularly in terms of measuring changes in competition over time (see Jenkins, 2008).
9. This of course is a logical impossibility since, if China accounted for the entire market, then South Africa would not be exporting the product at the same time.
10. The much larger losses in the first three countries reflect the higher initial share of South Africa in their imports compared with the East African countries. In relative terms, the losses were greatest in Mozambique and Tanzania.
11. See Batista (2008) for the mathematical proof that equation (5) satisfies these requirements.
12. One should note, however, that the decomposition is based on accounting identities and should therefore be careful in making any causal inferences from it.
13. Malawi is something of an anomaly, as it had the lowest ICT throughout the period, but nevertheless South Africa saw larger losses to China than in the markets ranked immediately above it.
14. Own calculation from UN Comtrade data. This may reflect the influence of preferential access granted by the United States to South Africa under the AGOA.
15. The countries selected were Argentina, Chile, Colombia, Mexico, Paraguay, Uruguay and Venezuela, which were Brazil's most important export markets in Latin America during the period. Only the aggregated results for exports to Latin America are presented here for comparison with South African exports to the 10 SSA countries. For more details on the impact of China on exports to the individual Latin American economies, see Jenkins (2014).
16. While China accounted for 23.6 per cent of world exports of low-technology products and 18.4 per cent of high-technology exports in 2010, the shares for medium-technology and resource-based manufactures were only 9.9 and 4.9 per cent, respectively. Own calculation from UNIDO (2013, Tables A7.3–A7.6).

17. Eichengreen *et al* (2007) find that within Asia the countries most affected by Chinese competition are low-income countries whose exports are mainly labour-intensive products. In Latin America, Mexico especially has faced competition from China in high-technology products in recent years (Gallagher and Porzecanski, 2010, Chapters 4 and 5).

18. On the basis of values in current US$ taken from UN Comtrade.

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