

Essays in export behaviour at the firm-level

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ABSTRACT

South Africa is a developing country afflicted with economic malaise, among others high unemployment and inequality levels. Export-led growth has been advocated as a possible way to achieve economic growth and alleviate the dire economic conditions. But to be able to optimise export-led growth, an aggregate-level view is not adequate enough, as policy makers need to understand firm-level behaviour. Until recently, the literature on South African exporting firms has been limited to cross-sectional surveys (using samples of limited size that are not representative of the broader population of firms). Although these studies provide a glimpse of South African exporting firm behaviour, there is a gap in the South African firm-level literature, which demands detailed, firm-level, panel data on the population of South African firms. This thesis sets out to fill this gap by being one of the first to have used the newly made available administrative panel data containing data for the population of South African firms. This data allows for the application of new novel approaches in investigating the behaviour of South African exporting firms (and workers) and their heterogeneous response to trade over time, which in-turn can inform policy makers on how to optimise export-led strategies (which are associated with economic growth and job-creation). This thesis is presented in the form of three independent articles, each addressing various interrelated aspects.

Article 1 contributes to the literature by deepening the understanding of the employment premium and the wage premium of South African exporters relative to non-exporters as well as within exporters (considering export destination, exporter dynamics, number of products exported and number of destinations served). The results are two-fold. Firstly, by using the Bernard and Jensen (1995) methodology on the estimation of the export premia, the results show that, for a possible solution to South Africa's high unemployment, it is not sufficient to simply drive employment creation by increasing exports, because of the heterogeneous nature of exporters. Enhancing exporters' competitiveness in the *international* market would contribute most to employment creation, as the results show that firms exporting to the *international* market employ the most workers and pay the highest wages (as opposed to those exporting only to *African* or *SACU* countries). Secondly, by following Biscourp and Kramarz (2007:34) in using a simple first-difference regression, the employment growth rate (in different types of employees) of exporters relative to non-exporters is measured. The results show that, although employment growth (for all types of employees) is higher for exporters, the growth is skewed towards a certain type of employee (they show higher growth in the employment of older, more experienced and higher earning, higher skilled or qualified employees).

The second article contributes to the limited South African and international literature by disentangling the wage differentials between non-exporters and exporters as well as within exporters (which includes a consideration of exporter dynamics and destinations served). It investigates the within-firm wage distributions and wage inequality within-firms. Furthermore, it also examines possible sources of the wage inequality by analysing firm characteristics, the type of product exported as well as the type of destination served. This article used the Bernard and Jensen (1995) export premia method to determine the wage differential of the average wage in a firm at the 5th, 25th, 50th, 75th and 95th percentiles. The results indicate that all employees (across the wage distribution) in an exporting firm earn a wage premium. This premium seems to increase in magnitude towards the upper tail of the distribution, indicating that the wage differential does contribute to wage inequality. The article shows that much of the wage inequality can be explained by the size (number of employees) and labour productivity (output per worker) of a firm, whereas, little evidence exists that the wage inequality is driven by either the type of destination economy or the quality of export products. This might suggest that the remaining wage inequality could be related to either the process of exporting or simply being in the export market. Another possible explanation is that the remaining wage inequality is due to a specific type of firm who has this (unequal) wage distribution, even before they start to participate in the export market.

The third and final article contributes to the South African and international literature by using an employer-employee matched dataset to investigate whether the export wage premium is due to observable or unobservable firm, individual or job characteristics, the distribution of wages or if it is due to exporting activities (export status). It further contributes by also considering other dynamics that can add to the wage premium by taking the influence of different export destinations (regional versus *international*), job dynamics (*enter*, *exit*, *continue* or *sporadic* jobs) as well as quantile regressions (with fixed effects) into account (which is a novel application of employer-employee datasets on exporting firms). The results indicate that the reason why exporting firms pay higher wages is not due to their export status or the distribution of their wages. It is rather due to a combination of observable as well as unobservable firm, individual and job characteristics. Moreover, it is about the inherent characteristics of a firm. In other words, a firm that is going to become an exporter creates a certain type of job in which a certain type of worker is hired and this worker is paid a premium.

In summary, when investigating the behaviour of South African exporting firms (and workers) and their heterogeneous response to trade over time (which can inform policy makers on how to optimise export-led strategies that are associated with economic growth and job-

creation), the results are threefold. Firstly, South African exporters are heterogeneous in nature. Firms exporting to the international market employ the most workers and pay the highest wages (as opposed to those exporting only to African or SACU countries). Furthermore, relative to non-exporters, the employment growth is higher for exporters, but the growth is skewed towards older, higher earning workers. Secondly, when considering the wage distribution, the results indicate that all employees (across the wage distribution) in an exporting firm earn a wage premium (which increases in magnitude towards the upper tail of the distribution, indicating wage inequality). Much of this wage inequality can be explained by the size and labour productivity of a firm. Finally, the results also indicate that the reason why exporting firms pay higher wages is not due to their export status or the distribution of their wages. It is rather due to a combination of observable as well as unobservable firm, individual and job characteristics (i.e. the inherent characteristics of a firm).

Keywords: exporters; firm-level data; labour demand; wage premium; wage inequality; wage distribution; South Africa

OPSOMMING

Suid-Afrika is 'n ontwikkelende land wat onder groot ekonomiese druk is, onder andere hoë werkloosheids- en ongelykheidsvlakke. Uitvoergedrewe groei is voorgestel as 'n moontlike manier om ekonomiese groei te bereik en die slegte ekonomiese toestande te verlig. Om hierdie uitvoergedrewe groei te kan optimaliseer, is 'n algehele siening nie genoegsaam nie, aangesien beleidsmakers gedrag op firma-vlak moet verstaan. Tot onlangs was die literatuur oor Suid-Afrikaanse uitvoerfirmas beperk tot kruissnit (met behulp van steekproewe van beperkte grootte wat nie verteenwoordigend is van die breër bevolking van firmas nie). Alhoewel hierdie studies 'n blik op Suid-Afrika se uitvoerfirma-gedrag bied, is daar 'n gaping in die vakliteratuur oor Suid-Afrikaanse firmas wat gedetailleerde, firma-vlak, paneeldata oor die bevolking van Suid-Afrikaanse firmas vereis. Hierdie proefskrif het gepoog om hierdie gaping te vul deur een van die eerstes te wees wat die nuut beskikbaar gestelde administratiewe paneeldata gebruik het wat data bevat vir die bevolking van Suid-Afrikaanse firmas. Hierdie data maak voorsiening vir die toepassing van nuwe benaderings in die ondersoek na die gedrag van Suid-Afrikaanse uitvoerfirmas (en werkers) en hul heterogene reaksie op handel oor tyd, wat op sy beurt beleidsmakers kan inlig oor hoe om strategieë vir uitvoer-gedrewe groei te optimaliseer (wat geassosieer word met ekonomiese groei en werkskepping). Hierdie proefskrif word aangebied in die vorm van drie onafhanklike artikels, wat elk verskillende verwante aspekte aanspreek.

Artikel 1 dra by tot die literatuur deur die begrip van die indiensnemingspremie en die loonpremie van Suid-Afrikaanse uitvoerders (relatief tot nie-uitvoerders sowel as binne-uitvoerders) te verdiep (in ag genome die uitvoerbestemming, uitvoerderdinamika, aantal uitgevoerde produkte en aantal bestemmings bedien). Die resultate is tweevoudig. Eerstens, deur gebruik te maak van die metodologie van Bernard en Jensen (1995) oor die raming van uitvoerderpremies, toon die resultate dat, vir 'n moontlike oplossing vir Suid-Afrika se hoë werkloosheid, dit nie voldoende is om werkskepping eenvoudig te verhoog deur 'n toename in uitvoere nie. Die rede hiervoor is die heterogene aard van uitvoerders. Die bevordering van die mededingendheid van uitvoerders in die internasionale mark sal die meeste bydra tot werkskepping, aangesien die resultate toon dat firmas wat na die internasionale mark uitvoer, die meeste werkers in diens neem en die hoogste lone betaal (in teenstelling met dié wat slegs na Afrika of SACU-lande uitvoer). Tweedens, in navolging van Biscourp en Kramarz (2007:34) se gebruik van 'n eenvoudige eersteverskilleregressie, word die groeikoers vir werkskepping (in verskillende tipes werknemers) van uitvoerders relatief tot nie-uitvoerders gemeet. Die resultate toon dat, hoewel die groei van werksgeleenthede (vir alle soorte werknemers) hoër is vir uitvoerders, die groeikurwe neig na 'n sekere tipe

werknemer (hulle toon hoër groei in die indiensneming van ouer, ervare en hoër verdienste, hoër geskoolde of gekwalifiseerde werknemers).

Die tweede artikel dra by tot die beperkte Suid-Afrikaanse en internasionale literatuur deur die loonverskille tussen nie-uitvoerders en uitvoerders sowel as binne uitvoerders (wat ook die oorweging van uitvoerderdinamika en bestemmings bedien) te ontrafel. Dit ondersoek die loonverdelings en die loonongelykheid binne-in firmas. Verder ondersoek dit ook moontlike bronne van loonongelykheid deur die firma se eienskappe, die tipe produk wat uitgevoer word asook die soort bestemming wat bedien word te ontleed. Hierdie artikel gebruik die Bernard en Jensen (1995) uitvoerderpremies-metode om die loondifferensiaal van die gemiddelde loon in 'n firma by die 5de, 25ste, 50ste, 75ste en 95ste persentiele vas te stel. Die resultate toon dat alle werknemers (regoor die loonverdeling) in 'n uitvoerfirma 'n loonpremie verdien. Hierdie premie blyk om toe te neem in grootte by die boonste punt van die verdeling, wat aandui dat die loonverskil bydra tot ongelykheid in lone. Die artikel toon dat baie van die loonongelykheid verklaar kan word deur die grootte (aantal werknemers) en arbeidsproduktiwiteit (uitset per werker) van 'n firma, terwyl daar min bewyse bestaan dat die loonongelykheid deur óf die tipe bestemmingseconomie óf die kwaliteit van uitvoerprodukte gedryf word. Dit kan daarop dui dat die oorblywende loonongelykheid verband hou met die proses van uitvoer of deur bloot deel van die uitvoermark te wees. Nog 'n moontlike verduideliking is dat die oorblywende loonongelykheid te wyte is aan 'n spesifieke soort firma wat hierdie (ongelyke) loonverdeling het, selfs nog voordat hulle begin deelneem aan die uitvoermark.

Die derde en finale artikel dra by tot die Suid-Afrikaanse en internasionale literatuur deur gebruik te maak van 'n pasgemaakte werkgewer-werknemer-datastel om te ondersoek of die uitvoerloonpremie te wyte is aan waarneembare of onwaarneembare firma-, individuele of werkskenmerke, die verdeling van lone en of dit te wyte is aan uitvoeraktiwiteite (uitvoer status). Dit dra verder by deur die oorweging van ander dinamika wat tot die loonpremie kan bydra, naamlik deur die invloed van verskillende uitvoerbestemmings (streeks teenoor internasionale), werksdinamika (intree, uittree, voortgesette of sporadiese werk) sowel as kwantiele regressies (met vaste effekte) in ag te neem (wat 'n nuwe toepassing van werkgewer-werknemer-datastelle op uitvoerfirmas is). Die resultate dui daarop dat die rede waarom uitvoerfirmas hoër lone betaal, nie hul uitvoerstatus of die verdeling van hul lone is nie, maar, dat dit eerder te wyte is aan 'n kombinasie van waarneembare sowel as onwaarneembare firma-, individuele en werkskenmerke. Verder gaan dit oor die inherente eienskappe van 'n firma. Met ander woorde, 'n firma wat 'n uitvoerder gaan word, skep 'n

sekere soort werk waarin 'n sekere tipe werker aangestel word en hierdie werker word 'n premie betaal.

Om op te som, uit die ondersoek na die gedrag van Suid-Afrikaanse uitvoerfirmas (en werkers) en hul heterogene reaksie op handel oor tyd (wat beleidsmakers kan inlig oor hoe om strategieë vir uitvoer gedrewe groei, wat met ekonomiese groei en werkskepping geassosieer word, te optimaliseer), is die resultate drievoudig. Eerstens, Suid-Afrikaanse uitvoerders is heterogeen van aard. Firmas wat na die internasionale mark uitvoer, neem die meeste werkers in diens en betaal die hoogste lone (in teenstelling met dié wat slegs uitvoer na Afrika- of SACU-lande). Verder, relatief tot nie-uitvoerders, is die indiensnemingsgroei hoër vir uitvoerders, maar die groeikurwe neig na ouer, hoër verdienstewerke. Tweedens, wanneer die loonverspreiding binne-in 'n firma oorweeg word, dui die resultate daarop dat alle werknemers (regoor die loonverdeling) in 'n uitvoerfirma 'n loonpremie verdien (wat in grootte toeneem by die boonste punt van die verdeling, wat loonongelykheid aandui). Baie van hierdie loonongelykheid kan verklaar word deur die grootte en arbeidsproduktiwiteit van 'n firma. Ten slotte dui die resultate ook aan dat die rede waarom uitvoerfirmas hoër lone betaal, nie te wyte is aan hul uitvoerstatus of die verdeling van hul lone nie. Dit is eerder te wyte aan 'n kombinasie van waarneembare sowel as onwaarneembare firma-, individuele en werkskenmerke (dws die inherente eienskappe van 'n firma).

Sleutelwoorde: uitvoerders; firma-vlak data; arbeidsvraag; loonpremie; loonongelykheid; loonverdeling; Suid-Afrika

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CHAPTER 1: INTRODUCTION

1.1 Introduction

South Africa currently faces a number of economic challenges. Two of the most pressing are firstly, economic growth - since 2011, real per capita growth has averaged 1.92% and secondly, job creation - as of the fourth quarter of 2016, 5.781 million people were unemployed and unemployment rates remain stubbornly high (26.5% in the fourth quarter of 2016) (Statistics South Africa, 2017). One potential solution to both of these challenges, is increased exports. As a country's exports increase, it allows for specialisation, economies of scale (lower average cost) and higher productivity in a firm (Rankin, 2013). This, together with the fact that increased exports expand the market size (adding the international market to the domestic market) will lead to economic growth and job creation (Rankin, 2013).

The South African government recognised this and in their National Development Plan set the goal to grow exports by 6% (in volume terms) per year as a means to increase economic growth and employment (NDP, 2013). The question that arises is how does the NDP propose to achieve this growth in exports? The NDP proposes to "increase exports, focusing on those areas where South Africa already has endowments and comparative advantage, such as mining, construction, mid-skill manufacturing, agriculture and agro-processing, higher education, tourism and business services" (NDP, 2013:39). These broad-level views of plans to increase exports neglect the firm-level perspective and policy interventions may therefore not be adequate enough to achieve the proposed growth goal. It is important to understand the dynamics behind aggregate exports, namely the exporting firms and their export behaviour, as Edwards *et al.* (2008:68) explained by stating that "aggregate exports are merely the sum of exports at firm-level". Therefore, by understanding the heterogeneous behaviour of exporting firms, policy makers can more easily comprehend the causes and consequences of aggregate trade (Melitz, 2012).

Understanding the heterogeneous behaviour of exporters (through their decision-making) has become one of the main focus areas of theoretical research in international trade (Melitz, 2003; Bernard *et al.*, 2003; Helpman *et al.*, 2004; and Yeaple, 2005, Melitz, 2012). Melitz's (2003) study is one of the first that developed a model with a heterogeneous firm which investigated the intra-industry effect of international trade. He incorporated firm heterogeneity into Paul Krugman's new trade theory (the one-sector model of intra-industry trade) which allows productivity to differ between firms. Through his dynamic industry model, he investigated the role of trade in the reallocation of resources between firms and industry. Furthermore, his model investigated if all firms benefitted from trade, or if the gains

depended on their productivity. The results showed that it was the firms with the highest productivity that entered the export market whereas the least productive firms were forced to exit the export market. This caused the re-allocation of market share to the more productive firms, which in turn increased productivity (Melitz, 2003). The results also showed that, from a country's perspective, higher exposure to trade led to welfare gains. As these theoretical studies focused on understanding the heterogeneous behaviour of firms. It can inform policy makers to more easily comprehend the causes and consequences of trade, which will enable them to optimise export-led strategies.

The international trade literature on firm-level research has become increasingly popular. The following section provides more detail on the international as well as South African firm-level studies.

1.1.1 *International firm-level research*

Empirical firm-level research on exporters (predominantly in the manufacturing industry) was pioneered by Bernard and Jensen (1995). This initial paper used longitudinal administrative data from the United States at a plant-level to identify differences between exporting and non-exporting firms. Their results showed that exporting firms were larger (in terms of employment), paid higher wages, were more productive and had higher shipment levels and higher capital intensity than non-exporting firms (Bernard & Jensen, 1995). Therefore, the authors showed that exporting firms created more jobs and paid higher wages (relative to non-exporting firms).

These superior characteristics found in exporting firms and the availability of a plant-level panel dataset (which allowed them to follow the firms over time) led Bernard and Jensen (1999) to investigate whether it was “good firms” that became exporters or if it was exporting itself that enhanced firms’ performance (in order to become “good firms”). The results showed that it was not clear if exporting enhanced a firm’s performance. Moreover, there was little evidence of wage and productivity growth in the long-term (Bernard & Jensen, 1999). However, they found that entry into exporting was positively associated with increases in employment, shipments and wages and that “good firms” did indeed become exporters. Thus, they found that it was a certain type of firm (or “a good firm”) that entered the export market and employed more workers.

Bernard and Jensen (2004) extended on their work in 1999 (Bernard & Jensen, 1999) with a paper on the interaction between exporting and productivity (total factor productivity) growth. In this paper, they considered both within-firm effects of exporting and cross-firm and cross-

industry reallocation of resources. In their results, they do found a productivity premium in exporting firms (this premium existed in a firm even before they entered into exporting), but did not find exporting to increase productivity growth rates. Furthermore, exporting could be linked to the reallocation of labour and capital inputs (the reallocation goes from less efficient to more efficient firms) within as well as across industries (Bernard & Jensen, 2004). The reallocation of labour towards more efficient firms (or industries), implied providing workers with the opportunity to be part of a sustainable growing workforce. Therefore, Bernard and Jensen (2004) showed that efficient exporting firms were the ones that provided more sustainable jobs for workers.

Bernard and Jensen's (1995) first firm-level analysis and increasing access to firm-level data in many countries, paved the way for many firm-level empirical work on the differences between exporters and non-exporters. Multiple studies have been conducted where researchers utilise rich longitudinal datasets from their statistical offices in order to investigate firm-level export behaviour. Wagner (2007) provides an interesting summary of 48 firm-level studies on both developed and developing countries. From this, stylised facts are evident, which emphasises the difference between exporters and from non-exporting firms. In short, exporters are larger, pay higher wages, produce higher output per worker and have higher overall productivity.

Given these firm level studies, many focused on the relationship between exporting and firm demand for labour (on firm employment and wage characteristics). For example, the series of studies by Bernard and Jensen firstly showed that exporting firms created more jobs and paid higher wages (relative to non-exporting firms) (Bernard & Jensen, 1995). Secondly, they found that it was a certain type of firm (or "a good firm") that entered the export market and employed more workers (Bernard & Jensen, 1999). Finally, Bernard and Jensen (2004) concluded that efficient exporting firms were the ones that provided more sustainable jobs for workers.

1.1.2 South African firm-level research

The development of this literature in South Africa has been limited by access to large-scale micro data. This means that there have been multiple sample studies looking at various traits of South African exporting firms - predominantly in the manufacturing industry (see for example Rankin, 2001, Gumede & Rasmussen (2002), Gumede (2004), Naudé *et al.* (2005), Edwards *et al.* (2008), Rankin & Schöer (2008), Matthee & Krugell (2012), Rankin & Schöer (2013), Rankin (2013), Naughtin & Rankin (2014) and Matthee *et al.* (2016a)). Resonating from these studies are four main themes: there is a small group of super-exporters,

exporters have superior characteristics to non-exporters, South Africa's exports can be grouped into two distinct export markets and South African firm-level studies has been based on sample data.

Even though a large share of South African firms export, there are only a few firms who specialise in exporting (Rankin, 2001; Gumede & Rasmussen, 2002; Edwards *et al.*, 2008; Cebeci *et al.*, 2012; Rankin, 2013; Naughtin & Rankin, 2014; World Bank, 2014). For example, Rankin (2001) found that 71% of South African manufacturing firms exported, but they only exported an average of 18% of their output. Gumede and Rasmussen (2002) showed that, for half of the firms in their study, only 7% (or less) of their income came from exports. Edwards *et al.*'s (2008) results confirmed that the majority of exporters exported below 20% of their output.

This means that, within the South African export market, there are only a few firms responsible for exporting the largest share of total export value. These super-exporters (top 5% exporters), as labelled by Naughtin and Rankin (2014), contribute to 85% of the total export value of South African manufacturing firms. According to the World Bank Export dynamic database, South Africa's top five percent of total exporters account for 92% of export value (2006-2008 averages), which is high relative to the 81% average for developing countries (Cebeci *et al.*, 2012). Rankin (2013) stated that this phenomenon (having super-exporters) could be ascribed to historical reliance on mineral exports as well as to high concentration ratios in other (non-extractive) industries. Another study on these super-exporters showed that these firms were able to mitigate the short-term impact of the global financial crisis on South Africa's export growth (Matthee *et al.*, 2016a). This could be attributed to their characteristics, in that these super-exporters were larger (in terms of number of employees), more capital intensive (capital per employee), paid higher wages (average labour cost) and were more productive (measured by Cobb-Douglas gross output regressions) than other exporters (Matthee *et al.*, 2016a).

In general, South African exporting firms (similar to international exporting firms) have superior characteristics relative to non-exporting firms. This is evidenced in several firm-level studies. For example, Naudé *et al.* (2005), showed that exporters were larger and more efficient than non-exporters. They found that the size and efficiency of a firm increased with the proportion of production they exported (i.e. with export intensity). Rankin (2001) obtained similar results - exporters were larger, more efficient (measured in terms of output per employee) and had higher average labour cost (pay higher wages) than non-exporters.

Gumede (2004) provided a broader range of differences between exporters and non-exporters. His results showed that the former had a larger number of employees, was older, had greater access to information and had low financial constraints. Matthee and Krugell (2012) confirmed that access to finance (measured in terms of the firm's perception if finance was an obstacle to its operations and the proportion of finance obtained from either internal funds, credit or shares issued) mattered for exports. Moreover, they also found exporters to be larger (in terms of number of workers), to have higher labour costs, more capital and to be more productive (in terms of sales per worker) than non-exporters. By comparing exporters and non-exporters, Edwards *et al.* (2008) once again confirmed that exporters were larger (in terms of number of employees), older, more labour productive (in terms of output per employee), had higher value-added per employee and were more likely to be foreign-owned. Similarly, Rankin (2013) as well as Naughtin and Rankin (2014), also found that exporting firms were larger in size and more productive. Therefore, the superior characteristics of South African exporters include firms being larger (in terms of output and number of employees), more productive and efficient, having higher labour cost, being more capital intensive, having higher value-added per employee and being older than non-exporters.

Not only did the firm-level South African studies show that exporters had superior characteristics, they also illustrated heterogeneity within exporters serving different markets. Rankin (2001) showed that exporters exporting outside of SADC were more efficient (i.e. they produced higher output with the same amount of inputs) than those who only exported to the SADC region. Rankin (2001), Rankin and Schöer (2008), Rankin and Schöer (2013) and Rankin (2013) classified two groups of exporters, namely those who exported to high income countries (Europe and North America) and those who exported to lower-income markets (Africa, specifically SADC). Exporters exporting outside the region (Africa) were more productive, paid higher wages, produced high quality products and employed more skilled workers than non-exporters. They also tended to export a large proportion of their output. Exporters only serving the regional market (Africa) were no more productive than domestic firms. Moreover, they paid lower wages and produced lower quality products than their domestic counterparts (Rankin & Schöer, 2008; Rankin & Schöer, 2013; Rankin, 2013).

The South African firm-level studies discussed above use various sources of sample data. This paragraph provides a brief chronological overview of the studies which highlighted the data sources. The first firm-level study by Rankin (2001) used a firm-level survey data on 325 large firms (with more than 50 employees), from the Greater Johannesburg Metropolitan Area (GJMA), surveyed in 1999 and administrated by the World Bank. Gumede and

Rasmussen (2002) as well as Gumede (2004) used the National Enterprise Survey (NES) on small and medium manufacturing enterprises to conduct their analyses. Gumede and Rasmussen's (2002) study focused on 491 manufacturing enterprises from the 1999/2001 NES, whereas Gumede (2004) sample consisted of 941 small and medium manufacturing enterprises (from all provinces in South Africa except for the North West Province), of which 415 exported. On the other hand, Naudé *et al.* (2005) focused on the North West Province only and their study was based on interviews conducted with 135 manufacturing firms between 1999 and 2001. Edwards *et al.* (2008) use two different data sources: firstly (similar to Rankin (2001)) they used the 1999 GJMA (on 325 large firms) and secondly the World Bank Investment Climate Assessment (ICA) Survey of 2003. The World Bank Investment Climate Assessment (ICA) Survey of 2003, are also used by Rankin and Schöer in both 2008 and 2013 (Rankin & Schöer 2008; Rankin & Schöer 2013). The ICA survey was predominantly on manufacturing firms in the metropolitan areas of the Gauteng, Western Cape, Eastern Cape and KwaZulu-Natal provinces. As part of this survey, a subset of workers was interviewed providing more detail on worker characteristics. Furthermore, Matthee and Krugell (2012) also utilised the ICA survey, but by adding the 2007 data (1055 firms of which 707 were manufacturers) to the 2003 (603 firms) data, they were able to construct a panel from the firms present in both years. Rankin (2013) used data on 149 small and medium sized companies who were interviewed in 2009 and 2012. From all the companies, 82 (of which between 71% and 76% are exporters) were accounted for in both years (2009 and 2012). Naughtin and Rankin (2014) used Statistics South Africa's Large Sample Survey (LLS) on approximately 10 000 manufacturing firms in 2005 and in 2008 where less than a third of these firms were exporters. Similar to Naughtin and Rankin (2014), Matthee *et al.* (2016a) also used the LLS in conjunction with customs transaction data (2002-2012) from the World Bank's Exporter dynamic database collected from the South African Revenue Service (SARS).

In summary, the South African firm-level literature indicated that, within the export market, there were only a few firms responsible for exporting the largest share of total export value. Furthermore, from on the relationship between exporting and labour, it is found that South African exporting firms were larger (in terms of output and number of employees), more productive and efficient, had higher labour cost, were more capital intensive and had higher value-added per employee than non-exporting firms. Furthermore, there was heterogeneity within exporters serving different markets (for example exporters only serving the regional market paid lower wages and produced lower quality products). Most of the South African literature was based on cross-sectional survey data, which limited the in-depth

understanding of these firms. The importance of obtaining a better understanding of the South African firms (and its labour market) is discussed in the motivation.

1.2 Motivation

Over the last century, the majority of countries who achieved fast, sustainable economic growth did so by implementing export-led strategies (Spence, 2008). Increased exports are associated with economic growth and job-creation. According to the World Bank's (2014) economic update on South Africa, increased exports in the manufacturing industry specifically have the potential to create low-skilled jobs and decrease youth unemployment in South Africa. Furthermore, an export-led strategy is seen as a solution to South African widening current account deficit and external vulnerability (World Bank, 2014).

Given the advantages of an export-led strategy, the question that arises is how can policy makers optimise this export-led strategy? The national and international literature emphasise the importance for policy makers to understand the firm-level heterogeneous response to trade (Melitz, 2012; Rankin, 2013; Edwards *et al.*, 2016). Melitz (2012:2) highlighted this as he stated that "understanding all of the margins along which an economy adjusts to trade can be important for evaluating the overall welfare gains from trade". It is only when policy makers understand the firm-level heterogeneous response to trade over time that they can identify potential winners and losers from trade liberalisation and fit their policies accordingly (Melitz, 2012; Edwards & Lawrence, 2012).

Therefore, policy makers will be able to optimise export-led strategies if they understand the behaviour of South African exporting firms and their heterogeneous response to trade over time. There is a clear need for a detailed analysis of South African firm behaviour in order to provide an in-depth understanding of exporting firms. Research regarding South African firms' behaviour and their response to trade can inform policy makers and enable them to improve their policy. For example, if there is a better understanding of which type of exporting firms creates the most jobs and pays the highest wages (and why they pay the highest wages), it will enable policy makers to align their policies to reduce unemployment accordingly through exports.

1.3 Problem statement and research questions

A detailed analysis of firm-level panel data on the population of firms is needed to be able to understand the behaviour of South African exporting firms and their heterogeneous response to trade over time. Until recently, the literature on South African exporting firms

was limited to cross-sectional surveys. Although these studies provided a glimpse of South African exporting firm behaviour, there is a clear need for more detailed data. Rankin (2013:5) emphasised this point by stating that “much of the South African debate on exporting occurs in an environment based on anecdote and prejudice rather than fact”.

Firm-level studies on South Africa have been limited by the availability of consistent data (Rankin, 2001; Naughtin & Rankin, 2014; Edwards *et al.*, 2014). Edwards *et al.* (2008) emphasised the need for three types of data: population-level data, firm-level data as well as an employer-employee linked dataset. They reiterated that firm-level data needed to have information about the firm's input, output, employment, capital and investment and export behaviour (in terms of the type and value of products exported as well as destinations served). An employer-employee linked dataset would allow for research that controlled for employee and firm effects (i.e. employees can be compared across firms) (Edwards *et al.*, 2008).

There is not only a need for more detailed data, but also data that allows researchers to track firms and individuals over time, as Edwards *et al.* (2008:67) stated that “our understanding of firm-level export behaviour is severely constrained by the lack of adequate firm data, particularly panel data”. Therefore, in order to truly understand export dynamics, a panel population dataset (as opposed to sample cross-section data) is required (Rankin, 2013; Naughtin & Rankin, 2014; Edwards *et al.*, 2014). This will, for example, enable researchers to see the type of individuals exporters employ when they enter the export market (Edwards & Lawrence, 2012).

Thus, there is a gap in the South African firm-level literature, which demands detailed, firm-level, panel data on the population of South African manufacturing firms that include both exporting and non-exporting firms. Access to this new set of data will, for the first time, allow South African researchers to trace international studies (like for example the pioneering work of Bernard and Jensen (in 1995, 1999 and 2004)) as well as apply novel econometric approaches. For example, the panel dimension of the data will allow for the control for unobserved firm effects and/or worker effects, measurement of employment growth, and the determination of exporter dynamics. Furthermore the population data will make it possible to control for number of products exported and number of destinations exported to. This will provide a better understanding of the behaviour of South African exporters at firm-level which in turn can inform policy makers on how to optimise export-led strategies (which are associated with economic growth and job-creation). There are a few studies that have used this level of data to investigate the South African exporting firms (see Matthee *et al.*, 2016b,

Edwards *et al.*, 2016). However, these studies do not consider the labour dynamics and how export-led strategies are linked with economic growth and specifically job-creation. It is important to address this link, as economic growth and job creation are the most pressing economic challenges that South Africa is currently facing.

This study set out to fill this gap. Therefore, the primary research question is as follows: *What are the behaviour of South African exporting firms (and workers) and their heterogeneous response to trade over time?*

The secondary research questions are:

- To understand whether increased exporting is a viable path for widespread employment creation, there is a need for an in-depth understanding of exporting firms. The first secondary research question therefore is: *What is the relationship between exporting, labour demand and wages at a firm-level in South Africa?*
- There has been limited work done (in the South African as well as international literature) on how the higher wages found in exporting firms are distributed within these firms. The second secondary set of research questions therefore are: *How is the wage premium distributed within the exporting firms? And does the wage differential contribute to the wage inequality? What are the possible sources of wage inequality?*
- South African manufacturing exporters' behaviour is similar to the stylised findings in that they pay higher wages than non-exporters. The third secondary research question therefore is: *Why do exporting firms pay higher wages?*

1.4 Aims of the study

To answer the primary research question, the primary aim of this study was to provide insight into the behaviour of South African exporting firms (and workers) and their heterogeneous response to trade over time by using panel data on the population of South African manufacturing firms. This can inform policy makers on how to optimise export-led strategies, which are associated with economic growth and job-creation.

The secondary aims are each addressed in three articles:

- Article 1 aims to contribute to the understanding of the relationship between exporting, labour demand and wages at a firm-level in South Africa by using current longitudinal

data on the population of firms and their employees (as opposed to previous dated sample studies).

- Article 2 aims to investigate how the wage premium is distributed within the exporting firm (it considers whether or not all employees earn a wage premium or only some of them). Furthermore, it investigates how the wage differential contributes to wage inequality and considers possible sources of wage inequality.
- Article 3 aims to examine why exporting firms pay higher wages. Specifically, whether the export wage premium comes from observable or unobservable firm, individual or job characteristics, the distribution of wages or if it is due to exporting activities (export status) itself.

1.5 Contribution

The primary contribution of this study is threefold:

- Firstly, existing research on South African firms is based on samples of limited size that are not representative of the broader population of firms. This study contributes by being one of the first to have used the newly made available administrative data containing data for the population of South African firms (as opposed to relying on survey data). This data also allows for novel application of research methods.
- Secondly, this study contributes to the limited South African as well as international literature on exporting firms' (and workers') behaviour by linking trade data with firm and employee characteristics.
- Thirdly, part of this study was incorporated into a UNU-WIDER working paper entitled "Labour demand and the distribution of wages in South African manufacturing exporters" (Matthee, Rankin & Bezuidenhout, 2017)."

The secondary contributions per article are as follows:

- Article 1 contributes to the literature by deepening the understanding of the employment premium and the wage premium of South African exporters relative to non-exporters as well as within exporters (considering export destination, exporter dynamics, number of products exported and number of destinations served). Furthermore, it is the first South African firm-level study to investigate employment growth (change in the number of

employees) in South African exporting firms by considering the growth in employment of different types of employees.

- The second article contributes to the limited South African and international literature by disentangling the wage differentials between non-exporters and exporters as well as within exporters (which includes a consideration of exporter dynamics and destinations served). It investigates the within-firm wage distributions and wage inequality within-firms. Furthermore, it also examines possible sources of the wage inequality by analysing firm characteristics, the type of product exported as well as the type of destination served.
- Article 3 contributes to the South African and international literature by using an employer-employee matched dataset to investigate whether the export wage premium is due to observable or unobservable firm, individual or job characteristics, the distribution of wages or if it is due to exporting activities (export status). It further contributes by also considering other dynamics that can add to the wage premium by taking the influence of different export destinations (regional versus *international*), job dynamics (*enter*, *exit*, *continue* or *sporadic* jobs) as well as quantile regressions (with fixed effects) into account (which is a novel application of employer-employee datasets on exporting firms).

1.6 Research method

The research method included various literature and empirical studies in the format of three articles.

The first article starts with a literature review on what other studies have found regarding the employment and wage premium of exporters as well as employment growth of exporting firms. The empirical analysis is two-fold. The first part investigated the employment and wage premium of exporters, while taking export destination and exporter dynamics into account. The employment and wage premium of exporters were measured by using Bernard and Jensen's (1995) methodology on measuring export premia. The second part of the empirical analysis measured the employment growth rate of firms, which followed Biscourp and Kramarz (2007:34) by using a simple first-difference regression.

Article two provides a theoretical and empirical literature overview on the wage distribution and inequality of exporters. The empirical analysis of this article investigated the wage premium (at each percentile of the firm's wage distribution) by once again estimating Bernard and Jensen's (1995) export premia regressions. In order to investigate a possible

source of the wage inequality, Bernard and Jensen's (1995) export premia regressions were estimated on transaction-level data, where it was possible to control for the price of the export product and type of export destination (as possible sources of inequality).

The third and final article of this study first provides a literature review on the export wage premium found in firm-level studies with a specific focus on employer-employee matched datasets. It continues with the empirical analysis that investigated why exporters paid higher wages. It started by estimating a standard Mincerian earnings function using various control variables. Then firm-, individual- and job-fixed effects were sequentially added to control for unobservable characteristics (this is similar to the work of Schank *et al.*, (2007); Munch & Skaksen (2008) and Fafchamps (2009)). Furthermore, the study also considered the export wage premium at different parts of the wage distribution. This was done by running quantile regressions at the 5th, 25th, 50th, 75th and 95th percentiles of the wage distribution (Koenker & Hallock, 2001). The article concludes by combining quantile regressions with fixed effects (which is a novel application of employer-employee datasets on exporting firms) where it uses the quantile regression estimator for panel data (QRPD) developed by David Powell (2016).

In order to carry out all the empirical analyses mentioned above, detailed panel data were needed. The following section provides an overview of the source and level of data used in this study.

1.6.1 Data

This study forms part of a research programme initiated by UNU-WIDER (United Nations University World Institute for Development Economics Research). The programme has been running from 2014 to 2018 with the main focus on transformation, inclusion and sustainability in South Africa and other developing countries (UNU-WIDER, 2017). As part of this research programme, UNU-WIDER and National Treasury of South Africa in collaboration with SARS (South African Revenue Services) launched three projects where a detailed economic analysis on firm-level data sets based on tax data was done. The three projects applied the newly made available micro data and focused on a general firm-level analysis, labour market analysis and firm-level tax analysis. This study forms part of the second project.

The reasoning behind the second project (span from March to November 2016) on labour market analysis was that economic transformation necessitates the reallocation of production factors, particularly workers towards highly productive, value adding, job-rich sectors (UNU-WIDER, 2017). Therefore, the objective of this project was to obtain policy

relevant ideas related to economic growth and job creation, by exploring micro-level corporate and individual tax data. Parts of the first and second article in this study has been incorporated into the UNU-WIDER working paper entitled “Labour demand and the distribution of wages in South African manufacturing exporters” (Matthee, Rankin & Bezuidenhout, 2017). The fourth and final article of this study is also on the same panel dataset, but it has no project related output.

All participants in the projects gained access to generally inaccessible data sets located at National Treasury, but this was subject to agreed restrictions to preserve confidentiality. All analyses on the data had to be done at National Treasury's premises in the City of Pretoria. The limited access and booking procedure placed great emphasis on the protection of taxpayers' and firms' confidentiality.

There are three main sources of tax administrative data made available. The first is the job-level tax form (IRP5 certificates) completed by employers on behalf of their employees. The second is customs data of all export transactions of South Africa and the third is the income tax returns submitted by corporate firms (CIT) which include all the financial statements of firms. As all the firms in these three datasets were anonymised, there was no common identifier to link the firms across the datasets. Therefore, SARS provided a table (called a conjunction table) which enabled the anonymous firms to be linked across the three datasets.

The rich administrative data allows for the analyses of manufacturing firms, not only on firm-level, but also on individual (worker), job (individual and firm combination) and transaction level. The first article of this study is on firm-level which enables the understanding of the linkages between exporting, labour demand, wages and employment growth in South Africa. The second article uses the job-level data to obtain the within-firm distribution of wages and to measure inequality. It also investigates possible sources of wage inequality. Transaction-level data was used which allows one to control for product quality and type of destination. In the third article, the job-level data enables the estimations to control for firm and individual characteristics and fixed effects when examining the exporter wage premium.

1.7 Outline

The outline of the study is as follows:

- Chapter two follows this introductory chapter (Chapter one) with the first article on the employment premium and employment growth of South African manufacturing exporters.

- Chapter three (the second article) focuses on the wage distribution and inequality of South African manufacturing exporters.
- Chapter four presents the third and final article which focuses on the sources of the export wage premium found in South African manufacturing firms.
- Chapter five summarises, concludes and makes recommendations for future research.

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CHAPTER 2: THE EMPLOYMENT PREMIUM AND EMPLOYMENT GROWTH OF SOUTH AFRICAN MANUFACTURING EXPORTERS

2.1 Introduction

South Africa is a country that is plagued by economic malaise - most notably seen in the country's high unemployment rate (26.5% in the fourth quarter of 2016) and high youth unemployment rate (30.1% for youth aged 15-24 years, in the fourth quarter of 2016) (Statistics South Africa, 2017). Internationally, exports have been identified as a key driver of growth that would help to reduce such malaise as it can lead to employment creation (Rankin, 2013). Accordingly, South African policy makers also identified exports as a means to increase economic growth and decrease unemployment, as it is stated in the National Development Plan (2013:120) that "Expanded and diversified exports can be expected to increase employment". To understand whether increased exporting is a viable path for widespread employment creation, there is a need for an in-depth understanding about the relationship between exporting, labour demand and wages at a firm-level in South Africa.

Work has been done in the South African context to explore this relationship (see for example Rankin (2001), Edwards *et al.* (2008), Gumede & Rasmussen (2002), Gumede (2004), Matthee & Krugell (2012), Rankin (2013), Naughtin & Rankin (2014) and Matthee *et al.* (2016a)). The existing research on the linkages between exports, employment (in terms of both levels and growth) and wages in the South African economy has, however, a number of limitations. The first is that existing work has relied on samples rather than the population of firms and workers and thus the existing results may be influenced by sampling procedures (see for example Rankin (2001), Edwards *et al.* (2008), Gumede & Rasmussen (2002), Gumede (2004), Matthee & Krugell (2012), Rankin (2013), Naughtin & Rankin (2014) and Matthee *et al.* (2016a)). The second is that most of the results examine firm-level averages and do not link workers to firms. In the cases where they do, they use a sample of workers and often the sampling procedure for selecting the workers is not clear (see for example Edwards *et al.* (2008), Rankin & Schöer (2008), Rankin & Schöer (2013), Matthee & Krugell (2012)). Lastly, many of the studies are now relatively outdated and may not reflect current labour market dynamics (see for example Rankin (2001), Edwards *et al.* (2008), Gumede & Rasmussen (2002), Gumede (2004), Matthee & Krugell (2012)).

Despite the above-mentioned limitations, the existing studies on South African exporting firms show that exporters are larger and pay more, but this differs by destination and the number of products exported, as well as whether firms are two-way traders (Rankin &

Schöer, 2013; Matthee *et al.*, 2016b; Edwards *et al.*, 2016). Moreover, a study by Rankin and Schöer (2013) used data from the World Bank's Investment Climate Assessment Survey (conducted in 2004) and showed that only some exporters had a wage premium, which was influenced by the export destination. More recently (although not having a specific labour focus), Matthee *et al.* (2016b) and Edwards *et al.* (2016) used South African Revenue Service (SARS) administrative data and illustrated the complexity within the behaviour of South African manufacturing exporters. Exporter heterogeneity in terms of whether they are two-way traders, the number of products they export, the number of destinations exported to and the type of destinations exported to all contribute to different levels of number of employees and wages.

This article contributes to the limited literature in three ways. Firstly, it uses newly made available administrative data containing data for the population of South African firms (as opposed to relying on survey data). The population data makes it possible to control for number of products exported and number of destinations exported to. Secondly, it broadens the literature to deepen the understanding of the employment premium and the wage premium of South African exporters relative to non-exporters as well as within exporters (considering export destination, exporter dynamics, number of products exported and number of destinations served). The panel dimension of the data made it possible to determine the "exporter dynamics". Finally, this article is the first to have investigated employment growth (change in the number of employees) in South African exporting firms by distinguishing between adding different types of employees. Measuring employment growth is made possible by the availability of panel data.

From the results, it is evident that South African manufacturing exporters employ more workers (employment premium) and pay higher wages (wage premium) than non-exporters, indicating that they create more and better jobs. Within exporters, the employment premium and wage premium are affected by the destination served, the dynamic status of the exporter, the number of products exported and number of destinations exported to. There is a hierarchy in both size (number of employees) and wages for exporters exporting to *international* countries (both African and non-African countries), only *African* countries and only *SACU* countries as an export destination (while controlling for capital, industry and year). When considering exporter dynamics, the results show that firms *entering* exporting already pay high wages (the average wage is similar to *continuous* exporting firms (this is true for *African* as well as *international* firms). In terms of size (number of employees/employment premium), firms *continuing* to export in the *international* market are the largest, followed by firms *entering* the *international* market, firms *continuing* in the *African* market,

entering Africa, *exiting Africa* and *exiting the international* market. Therefore, firms seem to already be quite large (relative to non-exporters) when they enter the export market, but the entrants may grow over time (since they are smaller than *continuous* exporters).

The growth in employment can occur through the intensive margin (i.e. continuous or existing exporters) or the extensive margin (i.e. entering or new exporters). The largest growth in employment appears to be through the extensive margin, where new firms that entered the export market between 2010 and 2013 had the fastest growth in employment. At the intensive margin, continuous exporters grow “unskilled jobs” (earning below R6500 pm) at a slower rate and grow “skilled jobs” (earning above R6500 pm) at a faster rate than non-exporters. *International* exporters grow employment faster than firms exporting to *Africa only* and firms only serving the domestic market (non-exporters). These results indicate that overall, exporters (relative to non-exporters) show faster growth in employment of all types of workers (earning above and below R6 500 pm as well as being older and younger than 30 years of age). However, the growth in jobs is skewed towards higher skilled (earning above R6 500 pm), more experienced (older than 30 years) workers.

The rest of the article is outlined as follows: section 2.2 contains a discussion of the literature on exports employment premium, wage premium and employment growth, section 2.3 places the literature in a South African context, section 2.4 provides the empirical analysis and section 2.5 concludes¹.

2.2 Literature overview

2.2.1 Broad literature review

The initial firm-level work of Bernard and Jensen (in the late 1990s) led to the development of the Melitz model on heterogeneous firms and their productivity (Bernard & Jensen, 1995; Bernard & Jensen, 1999; Melitz, 2003). This pioneering empirical and theoretical research collectively inspired a new series of micro-econometric studies on firm heterogeneity and productivity. One stylised fact resonating from this literature is that exporting firms (in developed and developing countries) are more productive than their non-exporting counterparts. See for example Delgado *et al.* (2002), Wagner (2002), Girma *et al.* (2004), Mengistae and Pattillo (2004), Hallward-Driemeier *et al.* (2005), Van Biesebroeck (2005), Fariñas and Martín-Marcos (2007), De Loeker (2007), Bernard *et al.* (2007), Serti and Tomasi (2008), and Sinani and Hobdari (2010). The productivity of exporting firms can also

¹ As stated in Chapter 1, part of this chapter was incorporated into the UNU-WIDER working paper entitled “*Labour demand and the distribution of wages in South African manufacturing exporters*” (Matthee, Rankin & Bezuidenhout, 2017).

be associated with other characteristics, such as employing more workers (thus having an employment premium and generating employment growth) and paying higher wages (resulting in a wage premium) than non-exporters.

2.2.2 Employment premium

The export employment premium shows that an exporting firm employs (on average) more workers (or a larger number of workers) than non-exporters (Brambilla *et al.*, 2015). This employment premium is evident in cross-country studies, such as Germany (Bernard & Wagner, 1997), Taiwan (Aw & Hwang, 1995), Indonesia (Blalock & Gertler, 2004), Sub-Saharan Africa (Van Biesebroeck, 2005) and Tunisia (Mouelhi, 2007).

To indicate the degree of this employment premium, Bernard and Jensen (1995) showed that exporters employed 94% more workers than non-exporters (in the US manufacturing industry), after controlling for plant size, industry and location. Using similar controls, Isgut (2001) also established that Columbian exporting firms in the manufacturing industry had an employment premium of 123% (relative to non-exporting firms). After controlling for firm size, exporters in nine Sub-Saharan African countries were shown to employ about three times more workers than their domestic counterparts (which was a 213% employment premium) (Van Biesebroeck, 2005). Also, focusing on Africa, Bigsten *et al.* (2004) and Rankin *et al.* (2006) expressed the employment premium in absolute number terms. Exporters in Cameroon, Kenya, Ghana and Zimbabwe, for example, were found to employ on average 342 workers, where non-exporters in these countries employed only 51 workers (Bigsten *et al.*, 2004). Rankin *et al.*'s (2006) results on five African countries (Kenya, Ghana, Tanzania, South Africa and Nigeria) showed that exporters employed on average 206 more workers than non-exporters (273 versus 67 workers).

Therefore, there was a clear employment premium in firms that exported relative to non-exporters. Not only did exporters employ more workers, but they also seemed to show faster growth in the number of workers they employed (Bernard & Jensen, 1999).

2.2.3 Employment growth

Exporting firms experience superior growth rates in firm size (relative to non-exporters) as they have higher growth in the number of jobs they create (Bernard & Jensen, 1999). According to Bernard and Jensen (1999), these jobs (at exporting firms) are also more sustainable as the firm's survival rate is higher than non-exporters'. A study on French manufacturing firms confirmed the high employment growth found in exporters (Biscourp and

Kramarz, 2007). The study also showed that it was the large firms that contributed most to employment creation. Turco and Maggioni (2013) showed that the trade intensity of exporters also mattered, as they found a positive relationship between a firm's trade intensity and its employment growth rates for the Turkish manufacturing industry. To indicate the scale of the employment growth in exporters, Rankin (2005) showed that African exporters (in Ghana, Kenya and Tanzania) obtained an employment growth of 56% over an eight-year period. A more recent study on the employment growth rate of Small and Medium-sized Enterprises (SMEs) in 20 European countries for the period 2008-2010, showed that, on average, exporting firms had a 0.6% higher average employment growth rate per year (after controlling for firm size, ownership and innovation activities) (Falk & Hagsten, 2015). Another study on 7 673 European SMEs from 18 European countries in 2003 confirmed the significant relationship between export status and employment growth (Hessels & Parker, 2013). Moreover, the authors showed that there was a positive relationship between exporting and employment growth of "skilled labour-constrained firms" (Hessels & Parker, 2013:145).

Employment growth, or labour demand, of exporting firms is influenced by the level of skills that workers have (Brambilla *et al.*, 2015). This means that exporters tend to employ a certain type of worker. In the literature, workers were generally divided into being able to do either blue-collar jobs (done by the lower skilled workers) or white-collar jobs (done by higher skilled workers) (Klein *et al.* 2013). This differentiation was made by using the level of the workers' education or their employment status or job level. Klein *et al.* (2013), Brambilla *et al.* (2010) and Rankin and Schöer (2013) used the workers' education levels in their respective datasets on German, Latin American and Caribbean and South African firms. Bernard and Jensen (1997) categorised US workers according to their worker status, by distinguishing between production workers and non-production workers.

Maurin *et al.* (2002) analysed how exports could affect a firm's employment composition and found that export activity required more skilled personnel for example, lawyers, marketing and sales persons. Isgut (2001) explained this phenomenon by stating that there was a certain barrier to enter the export market. In order for a firm to become competitive enough for exporting, they (their employees) need to acquire a certain amount of technical and managerial skills. Due to the complex nature of exporting, which usually requires quality upgrading, improving operational services and skills to operate specific technology, exporters tend to hire more skilled (white collar) workers (Bas 2012; Brambilla *et al.* 2015). Contradicting the link between exporting and demand for skilled labour, Fajnzylber and Fernandes (2009:564) showed that some countries 'play to their strengths' – for example

China focuses on exporting low skilled labour intensive goods, which they have an abundance of.

Export expansion also has an influence on the employment of certain types of workers, as exporters require more skills in order to expand (Bernard & Jensen, 1997). For example, Turco and Maggioni (2013) showed that, as export intensity increased in the Turkish manufacturing industry, firms required more highly skilled workers. Bernard and Jensen (1997) ascribed the link between export expansion and the demand for higher skilled jobs to either changes in the technology used in production, or to the level of skills required to produce a certain product. They distinguished between in-between plant skills upgrading and within plant skills upgrading. In-between plant skills upgrading is due to a change in export sales, whereas within plant skills upgrading is a result of new technology upgrading. Similarly, while studying trade liberalisation in Argentina and Tunisia, Buston (2011) and Mouelhi (2007) also established that the rise in the demand for more skilled labour was caused by technology upgrading. In accordance with Bernard and Jensen (1997), Manasse *et al.* (2004) also found that technology upgrading resulted in within firm changes for skilled workers in Italy. Interestingly, Manasse *et al.* (2004) showed that a change in export demand brought about a relative reduction in the demand for skills. Therefore, they reasoned, exporters influenced the type of worker employed in the Italian labour market through either demand or technological changes. A more recent study on trade induced layoffs by U.S firms investigated the link between trade liberalisation, firm productivity and job destruction (Uysal *et al.*, 2015). The authors concluded that the number of trade-induced layoffs in exporting firms decreased as firm productivity increased.

Thus, there is a large body of research which shows that exporters employ and grow more workers than non-exporters (Serti *et al.* 2010). Furthermore, when exporters expand they usually employ more skilled workers. Similarly, this body of research shows that these exporters also pay higher wages relative to non-exporters, which is referred to as a wage premium (Bernard & Jensen 1997; Verhoogen 2008).

2.2.4 Wage (and skills) premium

Schank *et al.* (2007) summarised studies investigating the export wage premium (by using different wage variables, namely average wages, average labour cost or wages per employee) of firms. Again, the differences between exporters and non-exporters are significant. Evidence on exporting firms in the US shows that they pay a wage premium of 6% when controlling for industry and size (Bernard *et al.*, 2007). In a developing country context, Brambilla *et al.* (2015) illustrated that Chilean exporters paid 31% higher wages

than non-exporters. Also, Isgut (2001), through an analysis of Colombian data found that, over time, wages (and employment) of firms that started exporting tended to grow faster than that of non-exporters.

Interestingly, Brambilla *et al.* (2015) considered three possible mechanisms through which an exporter is able to pay a wage premium. Firstly, the export wage premium can be due to a skills premium. The reasoning behind this is that exporters require more skilled workers due to the quality of products they produce, the complexity of the production and export processes and management required to administer it. In order to retain these skilled workers, exporting firms need to pay them higher wages. Exporting firms can afford to pay the wage premium as they earn a premium when selling their products to the foreign market (Brambilla *et al.*, 2015). This leads to the second mechanism through which exporters pay an export wage premium, namely productivity rent sharing or profit sharing (Fafchamps, 2007). The reasoning behind productivity rent sharing (profit sharing) is that productive exporting firms earn a larger profit (than non-exporting firms). This profit can be shared with the workers (resulting in higher wages) (Brambilla *et al.*, 2010; Amiti & Davis, 2011; Baumgarten, 2013). Similar to the productivity rent sharing argument, Schank *et al.*, 2007 also made the point that the wage premium may be a specific firm-worker match (the so-called “non-transferable know-how incorporated in the firm’s workforce” (Schank *et al.*, 2007:13)). Therefore, workers in exporting firms have certain firm-specific skills and an exporting firm pays a premium to retain these. Thirdly, the final reason for the export wage premium (which links to the first reason) is technology upgrades. To be able to operate, new technologies require a higher level of skills. Firms have been found to upgrade their technology and invest in R&D as trade liberalisation occurs (see for example the case of Argentina and Taiwan in Bustos (2011) and Aw *et al.* (2011) respectively). Aw *et al.* (2011) argued that these investments bring forth productivity gains which over time enable more firms to self-select into exporting, resulting in more productivity gains.

The wage premium paid by exporting firms is not homogenous across all exporting firms as exporting firms themselves are heterogeneous (Bernard *et al.*, 2009). Next follows a discussion on the heterogeneity of exporters in terms of their dynamics (if they enter, exit or continue to export), the number of products a firm export, the number of destinations they serve and the location destinations they serve.

2.2.5 Exporter heterogeneity

Wages and employment are also affected by heterogeneity that occurs within exporters. For example, the number of products a firm exports and the number of destinations they serve.

Using US manufacturing data, Bernard *et al.* (2009) showed that there was a clear difference between exporters who export multiple products (multi-product exporters) to multiple destinations (multi-destination exporters) relative to their single-product, single-destination counterparts. These multi-product and multi-destination exporters usually paid higher wages and employed more workers. Furthermore, the higher the number of products exported and destinations served, the higher the wage and employment levels were. A more recent study by Kruz and Senses (2016) on US exporters, focused among others, on their (the exporting firms') employment volatility. They proved that employment volatility was higher in firms with lower average incomes, large export intensities (i.e. a large share of exports), exporting to fewer number of destinations, or destinations which were located further away.

In the same way as the number of products and destinations exported to influence wages, the location of the destination also plays a role. Two studies on Spanish and Italian exporters by Alcalá and Hernández (2010) and Serti *et al.* (2010) both found the wage premium to increase as the distance to the destination country increased. Alcalá and Hernández (2010) showed that, even after controlling for worker and firm characteristics, there was a wage premium that increased as exporters exported further away. In a study on African exporters, Milner and Tandrayen (2007) proved the opposite to be true, when they found a wage premium when African exporters exported to other African markets. This premium lessened (the results show a negative export wage premium) when African exporters exported to non-African markets. The authors explained this by arguing that the non-African market was more competitive which had "a disciplining effect on wage costs" (Milner & Tandrayen, 2007:24). Furthermore, regional trade agreements and natural barriers within Africa added to the wage effect.

Exporter dynamics (whether a firm enters, continues in or exits the export market) also have an impact on the employment premium and employment growth of a firm. As Bernard *et al.* (2007) stated, firms that entered the export market were usually more productive than those who exited. Entering and exiting firms are, on average, found to be smaller than continuing firms (Amador & Opromolla, 2010). Amador and Opromolla (2010) also stated that firms entering the export market either did not survive longer than a year or showed high growth rates in sales. A Danish study tracked 23 201 manufacturing start-up companies from 1994 to 2008. They showed that Born Globals (which were defined as "New ventures that from their inception generate a significant share of their turnover on international markets" (Choquette *et al.*, 2016: 2)) had significantly higher employment levels and employment growth rates relative to firms with other start-up histories (Choquette *et al.*, 2016). Interestingly, Biscourp and Kramarz (2007) found that it was the exporting firms that

continued to export who were more likely to destroy unskilled production jobs and create more skilled production jobs in the French manufacturing industry.

From the international literature, it is clear that, even though exporting firms are heterogeneous, they do have an employment premium and higher employment growth rate than non-exporters. The next section focuses on what the status quo is in the literature on South African exporting firms.

2.3 South African firm-level literature review

Firm-level studies on South Africa have been growing steadily over the last few years. Until recently, most of these studies were restricted to the use of sample survey data. The stylised facts, emanating from these studies, are that South African exporters are larger (in terms of number of employees) (Edwards *et al.*, 2008; Gumede & Rasmussen, 2002; Gumede, 2004; Naughtin & Rankin, 2014; Rankin, 2013), they pay higher wages and are more productive (and or labour productive) (Matthee & Krugell, 2012; Rankin, 2001; Rankin, 2013; Matthee *et al.*, 2016a) and they have a higher demand for skilled workers than non-exporting firms (Rankin, 2001; Edwards *et al.*, 2008; World Bank, 2014). South Africa exporters are also found to be heterogeneous in terms of their export dynamics, the type of destination to where they export, as well as the number of destinations and products exported (Rankin, 2001; Rankin & Schoër, 2013; Rankin, 2013; Matthee *et al.*, 2016b).

There is a robust relationship between the size of a South African firm (number of employees) and its export status (Edwards *et al.*, 2008). While investigating 491 small and medium sized firms from the National Enterprise Survey (NES) in 1999 and 2000, Gumede and Rasmussen (2002) also found a link between firm size and exporting, as 25% of small firms (between 6 and 20 employees) exported and 59% of medium firms (between 51-200 employees) exported. Therefore, the larger the firm, the more likely they are to export. Similar results were found by Naughtin and Rankin (2014) who used the large sample survey (LSS) for 2005 and 2008 which covered 10 000 South African firms. They showed that the top 5% of exporting firms employed 100 or more employees. By revisiting the NES data, Gumede (2004) included 941 firms in his analysis and showed that, among other characteristics, there was a positive relationship between exports and firm size. Furthermore, in Rankin's (2013) study on 149 South African companies (that were interviewed in 2009 and 2012) he found a correlation between export size and export success (survival). Smaller exporters did not seem to remain in the export market if they did not reach a certain size (more than 50-100 employees).

South African exporters do not only employ more workers, but they seem to pay these workers higher wages and they usually have higher levels of productivity. A study by Matthee and Krugell (2012), using panel data constructed from the World Bank Enterprise Survey (2003 and 2007), showed that the differences between exporters and non-exporters could be seen not only in their number of full-time and temporary employees (skilled and unskilled employees), but also in total labour cost, total sales, the net value of machinery and land (capital) and the percentage of the workforce that was unionised. Another study by Rankin (2011), using Greater Johannesburg Metropolitan Council data from the World Bank in 1999 (which covered 325 firms), found exporters to have higher labour productivity (output per worker) and higher average labour cost. Rankin (2013) further stated that the labour productivity of exporters (output per employee) was more than double the output of non-exporting firms. Furthermore, Matthee *et al.* (2016a) found that exporters (relative to non-exporters) had an export premium in terms of labour cost per employee, output per worker (labour productivity) and capital to labour ratio. This premium increased as exporter's export revenue increased.

These higher wages that South African firms pay are associated with the sophistication of exporters and their demand for skilled workers (Rankin, 2001). Moreover, exporters are unlikely to create a large number of unskilled jobs as they pay higher wages, which indicates a demand for skilled workers (Rankin, 2001). Edwards *et al.* (2008) agreed that South African manufacturing exporters tended to have a higher demand for skilled workers. Therefore, a growth in exports will lead to higher demand for skilled labour. Currently, South African unemployment is more common among the lower educated workers (Bhorat & Oosthuizen, 2005). Thus, export growth is unlikely to have an especially large multiplier effect on employment, because exporter's demand is skew toward higher skilled employment (indicating a skills mismatch) (World Bank, 2014).

The large firm size (number of employees) and higher wages are not the same for all South African exporters as they are heterogeneous in terms of their dynamics (whether they are entering, exiting or continuing in the export market), the type and number of destination they serve as well as the number of products they export.

When considering firm dynamics, South African firms entering the export market seem to already be larger than non-exporting firms and they have increased employment by 15% with entry (Rankin, 2001). On the other hand, firms that exit the export market is on average smaller (than all the firms in the sample) and with exiting, they have decreased in size by 60% (Rankin, 2001).

In the South African export market, Rankin and Schoër (2013), Rankin (2013) and Matthee *et al.* (2016b) showed that export destination mattered. Rankin and Schoër (2013) found that workers in all types of exporting firms did not necessarily earn higher wages. Exporters that exported outside of the SADC region earned higher wages, whereas the exporters serving the SADC market did not earn an export wage premium. According to Rankin and Schöer (2013), the wage premium was about 17% for firms exporting to non-African countries. Furthermore, Rankin and Schöer (2013) as well as Rankin (2013) linked export destinations with product quality and workers' skills levels. Rankin and Schöer (2013) showed that non-African exporters had a skills premium, but African exporters did not. While Rankin (2013) found that firms exporting to developed countries were associated with having higher productivity levels, producing higher quality products and employing higher skilled workers who got paid more. This concurs with international evidence arguing that exports to high income countries require higher skilled workers to produce better quality products, for which the workers are paid higher wages (see for example Verhoogen (2008), Brambilla *et al.* (2012) and Brambilla & Porto (2016)). Matthee *et al.* (2016b), confirmed the findings of Rankin and Schöer (2013) as well as Rankin (2013). In their study, they distinguished between exporters serving different export markets, namely Africa (firms only exporting to African countries) and non-Africa (firms also exporting to countries outside of the African region). The results indicated that the so-called non-African exporters employed more workers and paid higher wages than African exporters. Although not the focus of their study, Matthee *et al.* (2016b) also provided new perspectives on firm size (through the number of employees) and wages by taking the number of products exported and the number of destinations served into account. In a similar vein to international studies (e.g. Bernard *et al.* (2009)), they showed that multi-product and multi-destination exporters employed more workers and paid higher wages than single-product single-destination exporters.

This study by Matthee *et al.* (2016b) was one of the first studies to use longitudinal administrative data (provided by SARS) on the population of South African firms. Recently, UNU-Wider in collaboration with National Treasury, launched an initiative where this data was made available for research purposes. During the first round of studies conducted, two specifically focused on trade and identified the characteristics of South African exporters (and importers) over time (Matthee *et al.*, 2016b; Edwards *et al.*, 2016). The stylised facts emanating from these studies are that exporters are rare, larger (they have a higher number of employees), pay higher wages and are more productive than non-exporters (Matthee *et al.*, 2016b).

Considering that most of South African firm-level studies are based on survey data and the heterogeneity within South African manufacturing exporters, it is useful to investigate the employment premium, wage premium and employment growth of not only exporters relative to non-exporters, but also within different types of exporters using longitudinal administrative data. The next section presents the detail on how this is done by providing the empirical analysis.

2.4 Empirical analysis

2.4.1 Data

In order to investigate the employment premium, wage premium and employment growth of exporting firms in the South African manufacturing sector, a panel dataset was created by combining three different administrative datasets collected by the South African Revenue Service (SARS). These datasets are the Company Income Tax (CIT) return data, the Personal Income Tax (also known as Pay as You Earn (PAYE), or IRP5) employee data and customs transactions data.

The CIT data contains the balance sheet and income statements of firms from which variables describing firm characteristics can be obtained. The variables used in this article included the balance sheet item “property plant and equipment” (to measure capital intensity), the income statement item “employee expenses including directors” (to measure labour cost/ total wages) as well as a profit code classifier (main industry code) to identify the sector in which they operated. The profit code classifier was condensed to the four digit ISIC classification used by SARS to select the firms in the manufacturing sector (ISIC 4 classification: codes 1010 – 1033) (for an illustration of the number of firms per sector in the dataset, see Table A1 in the Appendix).

It is important to take note of two technicalities concerning the CIT data. Firstly, the form which firms used to complete their income tax changed in May of 2013. The IT14 was replaced with the ITR14 (for differences and how these were adjusted, see Table A2 in the Appendix). Secondly, a grace period was provided to firms for submitting their ITR14 forms. At the time of this analysis, not all firms had submitted their 2014 ITR14 forms (consequently there are fewer firms in the 2014 CIT data).

Additionally, two shortcomings of the CIT data are that it has no variables on the number of employees in a firm or identifiers on whether it is an exporter or not. Therefore, in order to overcome this, these variables were obtained from the IRP5 and customs data respectively. Linking all three datasets (CIT, IRP5 and customs data) was done through a conjunction

table which was provided by SARS. This table links the various datasets through different firm-specific identifiers (as the data is anonymised).

The IRP5 data contains IRP5 certificates completed by employers on behalf of their employees. This data is on a job- level (defined as a unique individual and firm combination) and provides information on the period an individual worked in a specific job (in days), their income and age². The raw IRP5 data was cleaned to remove duplicate certificates, multiple job spells and invalid periods worked (see Table A3 in the Appendix). As the IRP5 data is on job level and it needs to match onto the firm-level CIT data, the IRP5 variables were collapsed onto firm-level. Three variables were obtained from the IRP5 data. Firstly, a measure of firm size (number of employees) had to be created. As the number of days an individual worked differed, a weighted number of employees were created by calculating the length of employment (in days) for each worker within a year, totalling within the firm and divided by 365. The aim was to essentially generate the stock of worker inputs into production per firm for the whole year. Secondly, the age of workers was used to count the number of workers in a firm who were younger than 30 years of age and the number of workers who were older than 30 years of age. Thirdly, each employee's monthly income was used to count the number of workers in a firm earning above and below R6500 per month. These three variables were merged onto the CIT data (using the conjunction table).

The third and final dataset is the customs data. It reports all the export transactions of South African firms on a monthly basis. The customs data contains the following variables: trader id (firms), tariff code (HS6-digit level product code), country of destination (market), country of origin (SA), customs value of the transaction (in South African Rand) and the statistical value (the number of units). While cleaning the customs data, two adjustments were made. First, duplicate transactions (see Table A4 in the Appendix) were removed. Second, only exporters trading more than ZAR10 000 per year were included in the dataset (this, however, still covers 99% of export data). From the transaction-level customs data five types of variables were created (on firm-level) to link onto the CIT and IRP5 data. These variables are dummy variables indicating if a firm is an exporter (or not), the destination to where it exports (SACU only³, *Africa only* or *international*), its exporter dynamics (if a firm *enter*⁴,

² It is important to note that the IRP5 data is limited in terms of variables on worker characteristics (no variables on education, skills and experience).

³ SACU is a customs union between Botswana, Lesotho, Namibia, Swaziland, and South Africa

⁴ Entering firms are defined as firms that did not export in t-1, but export in t.

*exits*⁵ or *continues*⁶ in the export market), the *number of products* (on HS6-level) it exports and the *number of destinations* it served.

A panel dataset was created by adding the customs data onto the IRP5 and CIT data. In conclusion, it is important to note that the dates of the three datasets were not aligned, as all three datasets worked on different reporting years/periods (see Table A5 in the Appendix for details). Therefore, the final panel consists of manufacturing firms and dates from the 2010 to 2014 tax year (February 2009 to March 2014). The next section (section 2.4.2) provides descriptive statistics on the employment premium and wage premium of exporters using this panel dataset.

2.4.2 Descriptive statistics on the employment premium and wage premium of exporters

2.4.2.1 Exporter destination and dynamics

The descriptive statistics first provide a broad overview of the data on the manufacturing sector to illustrate the number of non-exporters and exporters (exporting to different destinations).⁷

Table 2-1: Number of manufacturing non-exporters and exporters (different destinations)

	2010 ⁸	2011	2012	2013	2014
Non-exporters	24 959	25 561	24 868	27 256	22 992
Exporter	4 957	6 868	7 145	8 117	7 257
- <i>SACU only</i>	1 124	1 726	1 770	2 027	1 636
- <i>Africa only (excluding SACU)</i>	1 836	2 284	2 454	2 719	2 590
- <i>International</i>	1 997	2 858	2 921	3 371	3 031
Total manufacturing firms	29 916	32 429	32 013	35 373	30 249

Source: Authors' own calculations.

Table 2.1 shows that the data includes (for example in 2011) 32 429 manufacturing firms from which 21% (6 868) are exporters. In terms of the destination of exports, 1 726 firms export only to the SACU, 2 284 export only to *African* countries (excluding SACU exporters) and 2 858 export to *international* markets (these firms export to both African and non-African countries). It is important to note that the total number of firms declined in 2014. This was

⁵ Exiting firms are firms that exported in t-1, but not in year t.

⁶ Continuing firms are firms that export both in year t-1 and t.

⁷ As the total number of firms declined in 2014 (due to data availability of the CIT) all regressions were estimated with and without including 2014 (see Table A7-A10 in the Appendix).

⁸ Exporters cannot be classified in 2010, due to the fact that export dynamics are defined based on year t and t-1 and there is no data available on 2009.

due to data availability as some firms had not submitted the CIT forms for 2014 (see explanation above in section 2.4.1).

Figure 2.1 provides a broader perspective as it shows the average number of exporters (as in Table 2.1 above) and compares it to the value of exports (in percentage terms) to each of these different destination categories.

The left side of Figure 2.1 corresponds with Table 2.1, where exports to *SACU only* (35%) and *Africa only* (24%) contribute more than 59% of South Africa's manufacturing exporting firms, but they only export 10% in value terms (as seen on the right side of Figure 2.1). Around 41% of exporting firms export to the *international* market (green section on the left-hand side) and these firms contribute 89% of the total export value (green section on the right-hand side).

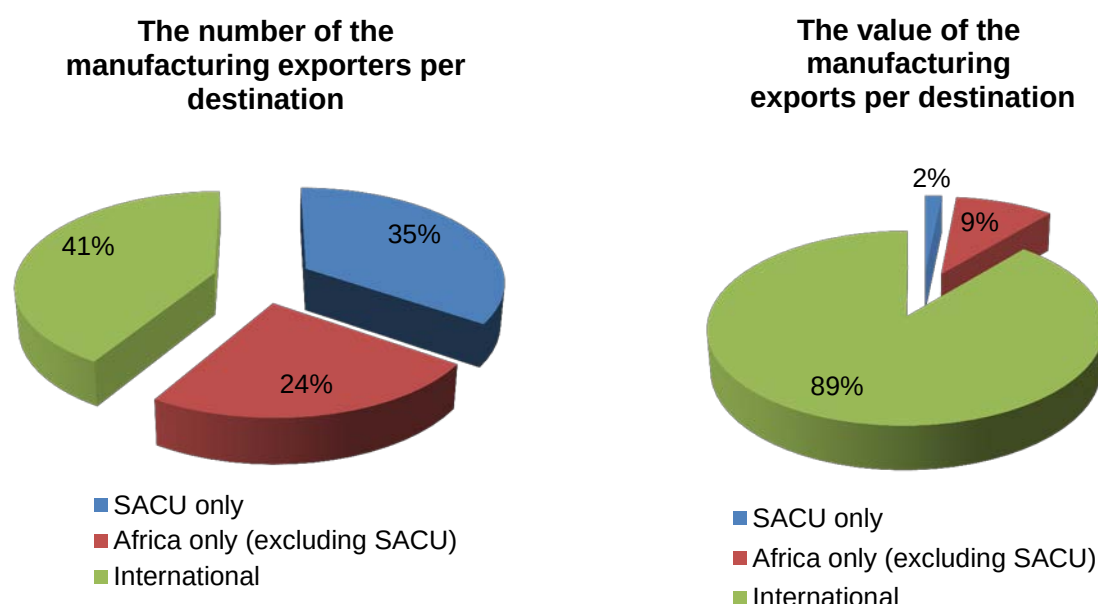


Figure 2-1: The average number and value of the manufacturing exports per destinations (2010–14)

Source: Authors' own calculations.

It is clear from the literature that there is a lot of churning in terms of exporter status, as firms often enter and exit the export market. Therefore, a distinction is made between firms with different export dynamics (Amador & Opromolla, 2010). Table 2.2 provides an overview of the number of firms *entering*, *continuing*, or *exiting* the export market each year. The figures are also decomposed in terms of destination, indicating where *entering*, *exiting*, or *continuing* exports occur. *Entrants* are defined as firms that did not export in $t-1$, but export in t , *continuing* firms are firms that export both in year $t-1$ and t and *exiting* firms are firms that

exported in *t-1*, but not in *t*. The percentage of exporting firms in each dynamic category is indicated in brackets.

Around 70% of exporting firms *continue* to export year after year and the remainder (30%) are new or *entering* firms. The number of firms that *exit* the export market (they exported in the previous year) is quite small (around 8% of the number of exporters in the previous period). Lastly, there is more churning in the *African* market than in the *international* market as the percentage of firms that *enters* and *exits* the *African* market is higher than the *international* market (i.e. in 2012 17% of firms *enter Africa only* (7% *enter the international market*) and 6% *exit Africa only* (2% *exit the international market*).

Table 2-2: Exporter dynamics per destination

	2010 ⁹	2011	2012	2013	2014
Non-exporter	24 959	25 561	24 868	27 256	22 992
Exporter	4 957	6 868	7 145	8 117	7 257
	-	(100%)	(100%)	(100%)	(100%)
Continuous	—	3 956	5 396	5 234	5 663
		(58%)	(76%)	(64%)	(78%)
Africa only	—	2 338	3 010	2 845	3 143
		(34%)	(42%)	(35%)	(43%)
International	—	1 618	2 386	2 389	2 520
		(24%)	(33%)	(29%)	(35%)
Enter	—	2 912	1 749	2 883	1 594
		(42%)	(24%)	(36%)	(22%)
Africa only	—	1 672	1 214	1 901	1 083
		(24%)	(17%)	(23%)	(15%)
International	—	1 240	535	982	511
		(18%)	(7%)	(12%)	(7%)
Exit¹⁰	—	457	570	519	663
		(7%)	(8%)	(7%)	(9%)
Africa only	—	300	401	374	456
		(4%)	(6%)	(5%)	(6%)
International	—	157	169	145	207
		(2%)	(2%)	(2%)	(3%)
Total	29 916	32 429	32 013	35 373	30 249

Source: Authors' own calculations.

Tables 2.1 and 2.2 and Figure 2.1 delivers an overview of the number and value of non-exporters and exporters (exporting to different destination with different dynamics). The next section provides more detail on these firms' characteristics in terms of number of employees and wages.

⁹ Exporters cannot be classified in 2010, due to the fact that export dynamics are defined based on year *t* and *t-1* and there is no data available on 2009.

¹⁰ The percentages for exits are based on the number of exporters in the previous period. Therefore the total number of exporters in a year consists of those who *continue* and *enter*.

2.4.2.2 Firm characteristics

Table 2.3 offers a detailed description of the number of employees and wages (per firm and per person) of exporting firms. Once again it also distinguishes between exporters serving different destinations, namely firms exporting to *Africa only* and those serving the *International market*.

Exporting firms employ, on average, four times (82 versus 19) more workers than non-exporters. By distinguishing between export destinations (*Africa* versus *international*), it is clear that firms serving the *international* market employ the most workers and pay the highest wages (per person and per firm). The median figures give a picture of a 'typical' exporter in each category. Here, the *international* exporters are still the largest (in terms of number of employees and wages), followed by *African* exporters and then non-exporters.

The number of employees is quite low relative to what is found on African manufacturing firms in the literature. For example, Bigsten *et al.* (2004) indicated that exporters in Cameroon, Kenya, Ghana and Zimbabwe employed on average 342 workers, where non-exporters in these countries only employed only 51 workers. Rankin *et al.* (2006) found that exporters employed on average 273 workers and non-exporters 67¹¹.

Table 2-3: Number of employees, wages, and wages per person (average for 2010–14)¹²

	Number of employees	Wages per person	Firm wages
Non-export			
Mean	19	201 976	2 116 382
Median	7	96 468	667 673
Exporters			
Mean	82	262 130	16 260 000
Median	20	144 725	2 771 373
- International			
Mean	137	324 834	31 340 000
Median	28	164 132	4 294 574
- Africa only			
Mean	47	233 918	6 660 803
Median	18	149 071	2 588 920

Source: Authors' own calculations.

From the descriptive statistics, it is clear that 59% of firms export to the African market (*SACU only* and *Africa only*), but they only contribute to 10% of the total export value. On the

¹¹ The studies by Bigsten *et al.* (2004) and Rankin *et al.* (2006) used sample survey data from 1992-1995 and 1992-2003. Rankin *et al.*'s (2006) sample dataset was on between 145 and 268 firms per country and for South Africa specifically; they only had data on 145 firms of which 102 were exporters.

¹² The number of employees and wage figures are all weighted.

other hand, the 41% of firms which serve the *International* market contribute to 89% of the total export value. When considering the export dynamics, one can see that, from all firms in the export market (100%), around 30% *enter* into exporting each year and around 70% *continue* exporting from one year to the next. Firms that *exit* the export market are around 8%, of which most are firms serving the African market. Exporters employ about four times more workers than non-exporters and they pay higher wages. To be more specific, it is the firms exporting to the *international* market that employ the most workers and pay the highest wages. These differences in wages and number of employees can be due to firms being in different industries, having more capital or just being larger. Therefore, the next sections estimates regressions to determine the employment premium, wage premium (see section 2.4.3) and employment growth (see section 2.4.4) of exporting firms, while controlling for these differences (for example industry, capital intensity or size).

2.4.3 Regressions on the employment premium and wage premium of exporters

2.4.3.1 The estimation strategy to determine the employment premium and wage premium of exporters

From the descriptive statistic tables above, there is a clear difference in the number of employees and wages between exporters and non-exporters. As mentioned, this difference may be due to exporters just being larger (in terms of size and capital) than non-exporters or serving different industries. Therefore, it needs to be tested in terms of OLS regressions, using control variables.

The starting point of this analysis is to estimate the export premium for firm characteristics (namely the number of employees and wages) by following the methodology used by Bernard and Jensen (1995). The firm characteristics are estimated by using regressions of the general form:

$$\ln(X)_{it} = \alpha + \beta_1 Exp_{it} + \beta_4 lkl_{it} + \beta_5 Industry_{it} + \beta_6 year_{it} + u_{it} \quad (1)$$

Where:

X_{it} – ln of firm characteristics (number of employees, wages per person, total wages (total labour cost))

Exp_{it} – dummy variable of export status (exporter=1 and non-exporter=0)

lkl_{it} – control for capital per worker (ln capital per worker)

$Industry_{it}$ – control dummy (4-digit ISIC classification) to account for heterogeneity of the industry

$year_{it}$ – control dummy for the years 2010 to 2014¹³

β_i – export premia

μ_{it} – Error term

One limitation of estimating equation 1 is that it assumes a common premium (β_1) across all exporters, whereas theory suggests that there is a heterogeneous effect within exporters. One aspect in which exporting firms differ is in terms of productivity. The theory predicts that more productive firms have a higher export premium (Melitz, 2012). Furthermore, these more productive firms usually export more products to more destinations (due to product scope and scale) (Melitz, 2012). To observe possible heterogeneity in the exporter premium across exporters, $No.dest_{it}$ and $No.prod_{it}$ is added to equation 1 to form equation 2.

$$\ln(X)_{it} = \alpha + \beta_1 Exp_{it} + \beta_2 Exp_{it} * No.dest_{it} + \beta_3 Exp_{it} * No.prod_{it} + \beta_4 lkl_{it} + \beta_5 Industry_{it} + \beta_6 year_{it} + u_{it} \quad (2)$$

The results of equation 2 will indicate if the export premiums differ within exporters (in terms of the number of export destinations and export products). Another way in which exporters can differ is by the destination they serve. The theoretical motivation for expecting firms to differ by destination comes from the Melitz model (Melitz, 2003). When the costs of exporting to different countries vary, their Melitz cut-off differs (Melitz, 2003). For example, South African firms that only export to countries within SACU would have the lowest cut-off as there are ostensibly no barriers to export, so their premiums are expected to be low. Therefore, one would expect different firms to select into the different regions. The destination dummy ($Dest_dummy_{it}$) is added to equation 1, to determine if the export premiums differ between firms exporting to SACU only, to Africa only or to the international market.

$$\ln(X)_{it} = \alpha + \beta_1 Exp_{it} + \beta_2 Exp_{it} * Dest_dummy_{it} + \beta_3 lkl_{it} + \beta_4 Industry_{it} + \beta_5 year_{it} + u_{it} \quad (3)$$

As explained in equation 2, the product and destination composition of exporters can affect export the premium. Subsequently the coefficient measuring the export premium (β_2) in equation 3 can be biased by omitted controls for number of products and number of

¹³ As the total number of firms declined in 2014 (due to data availability, see Table 2.1) all regressions were estimated with and without including 2014 (see Tables A7-A10 in the Appendix for regression results excluding 2014).

destinations. For example firms exporting to Africa can export fewer products and to fewer destinations, than firms serving the international market. Therefore, controls for both the number of products ($No.prod_{it}$) and number of destinations ($No.dest_{it}$) are added to equation 3 to form equation 4.

$$\ln(X)_{it} = \alpha + \beta_1 Exp_{it} + \beta_2 Exp_{it} * Dest_dummy_{it} + \beta_3 No.dest_{it} + \beta_4 No.prod_{it} + \beta_5 lkl_{it} + \beta_6 Industry_{it} + \beta_7 year_{it} + u_{it} \quad (4)$$

The heterogeneity of exporters in terms of the number of products they export, the number of destinations they export to, and the type of destination they export to have been explored in equations 2 to 4. The theory also suggests that exporters can differ in terms of their dynamics (firms that *enter* the export market, *continue* to export, or *exit* the export market). There are two hypotheses on firm starting to export, namely self-selection and learning-by-exporting. Self-selection suggests that firms are more productive than non-exporting firms even prior to entry into the export market (Melitz, 2003). Secondly, learning by exporting suggests that exporters become more productive as they participation in the export markets (due to the participation resulting in knowledge- and technology-spillovers from international competitors and buyers, Clerides, Lach, & Tybout, 1998). The panel dimension of the data used in this article makes it possible to gain new insights in terms of firm dynamics. To observe the difference in the exporter premium between firms who *enter*, *exit* or *continue* in the export market a dynamics dummy ($Dyna_dummy$) is added to equation 1 to form equation 5.

$$\ln(X)_{it} = \alpha + \beta_1 Exp_{it} + \beta_2 Exp_{it} * Dyna_dummy_{it} + \beta_3 lkl_{it} + \beta_4 Industry_{it} + \beta_5 year_{it} + u_{it} \quad (5)$$

Following the sequence of equations 1, 2, 3 and 4 controls for both the number of products ($No.prod_{it}$) and number of destinations ($No.dest_{it}$) are added to equation 5 (to form equation 6). This will determine if the export premium in equation 5 is robust to the inclusion of number of products and destinations.

$$\ln(X)_{it} = \alpha + \beta_1 Exp_{it} + \beta_2 Exp_{it} * Dyna_dummy_{it} + \beta_3 No.dest_{it} + \beta_4 No.prod_{it} + \beta_5 lkl_{it} + \beta_6 Industry_{it} + \beta_7 year_{it} + u_{it} \quad (6)$$

The final level of exploring the heterogeneity of exporters is to considering both the type of export destination (as in equations 2 and 3) and dynamics (as in equations 4 and 5) simultaneously. A new destination-dynamic dummy ($Dest_dyna_dummy_{it}$) is created (and added to equation 1 to form equation 7) which indicates if a firm falls into one of six categories (namely; *Continue (International)*, *Continue (Africa only)*, *Enter (International)*, *Enter (Africa only)*, *Exit (International)* or *Exit (Africa only)*).

$$\ln(X)_{it} = \alpha + \beta_1 \text{Exp}_{it} + \beta_2 \text{Exp}_{it} * \text{Dest_dyna_dummy}_{it} + \beta_3 \text{kl}_{it} + \beta_4 \text{Industry}_{it} + \beta_5 \text{year}_{it} + u_{it} \quad (7)$$

Equation 8 adds to equation 7 by once again taking the number of products (No.prod_{it}) and number of destinations (No.dest_{it}) into account. This will indicate if the export premium in equation 7 is robust to the inclusion of number of products and destinations.

$$\ln(X)_{it} = \alpha + \beta_1 \text{Exp}_{it} + \beta_2 \text{Exp}_{it} * \text{Dest_dyna_dummy}_{it} + \beta_3 \text{No.dest}_{it} + \beta_4 \text{No.prod}_{it} + \beta_5 \text{kl}_{it} + \beta_6 \text{Industry}_{it} + \beta_7 \text{year}_{it} + u_{it} \quad (8)$$

Sections 2.4.3.2 to 2.4.3.5 present the results of estimating equations 1 to 8 by showing the export premium (in terms of the number of employees and wages) with taking exporter heterogeneity (in terms of the number of products exported, the number of destinations served, the type of destinations exported to and the export dynamics of the firm) into account.

2.4.3.2 Results on the employment premium and wage premium of exporters

Table 2.4 presents the results of estimation equations 1 and 2. The first three columns establish if there the presence of the export premium in terms of number of employees (column 1), wages per person (column 2) and total wages paid by a firm (column 3). The results are in accordance with the literature in that exporters are larger (in terms of number of employees)¹⁴ and pay more (per person and in total)¹⁵ than non-exporting firms. The limitation this specifications (equation 1 presented in columns 1 to 3) is it assumes a common premium across all exporters whereas theory suggests a heterogeneous effect.

To determine if there is heterogeneity in the exporter premium across exporters (in terms of the number of products exported and number of destinations served) equation 2 is estimated (see columns 4 to 6). The results show that in terms of number of employees and wages, the number of destinations served and number of products exported matter. The export premium (relative to non-traders) is higher for firms that export to more destinations and more products. As Table 2.4 (column 4) reports, there is a stronger marginal effect to adding one destination (7% more in terms of number of employees), than adding one product (0.44% more in terms of number of employees). For example, when standardising the variable, the

¹⁴ As found by Bernard and Wagner (1997) and Brambilla *et al.* (2015).

¹⁵ As shown by Bernard and Jensen (1997), Isgut (2001), Schank *et al.* (2007), Fafchamps (2007), Verhoogen (2008), Brambilla *et al.* (2010), Amiti and Davis (2011); Bustos (2011); Aw *et al.* (2011), Baumgarten (2013) and Brambilla *et al.* (2015).

number of potential products (over 4000) far exceeds the potential number of destinations (200-250).

Table 2-4: Employment and wage premium of exporters

	No. of employees	Wages per person	Total wages	No. of employees	Wages per person	Total wages ¹⁶
	(1)	(2)	(3)	(4)	(5)	(6)
Export dummy	1.434*** (0.0127)	0.410*** (0.00897)	0.685*** (0.00905)	0.737*** (0.0161)	0.231*** (0.0116)	0.383*** (0.0112)
Number of destinations				0.0677*** (0.00135)	0.0154*** (0.000975)	0.0297*** (0.000942)
Number of products				0.00435*** (0.000177)	0.00172*** (0.000127)	0.00263*** (0.000122)
lkl	-0.0123*** (0.00135)	0.0583*** (0.000959)	0.0560*** (0.000923)	-0.0166*** (0.00132)	0.0572*** (0.000957)	0.0538*** (0.000916)
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	130 654	128 189	128 189	130 654	128 189	128 189

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

Source: Authors' own calculations, for results excluding 2014 see Table A7.

Table 2.5 adds onto Table 2.4 by exploring the influence of the number of products and destinations (with squared terms) on the export premium (estimating equations 2). Similar to Table 2.4, Table 2.5 shows that the number of products and destinations have a significant influence on the employment premium (number of employees) of exporting firms (column 1) and how much they are paid (columns 2 and 3).

The number of destinations served is responsible for a large part of the effect (is highly correlated) on employment levels and wage (columns 4 to 5). Wage (columns 2 and 3) is positively and significantly related to the number of destinations at an increasing rate (there is no turning point in this relationship). With employment (column 1), the relationship with the number of destinations is also expanding at an increasing rate (results switch between a quadratic and linear function). For example, the movement from serving one to two destinations has a 1% increase in the number of employees in a firm and a 2% increase in the wages per person. Whereas the movement from ten to 11 destinations has a 32% increase in the number of employees and a 16% increase in the wages per person.

Even though the effect of the number of products on employment and wages is smaller than that of the number of destinations, there is an exponential relationship. The relationship appears to be a quadratic relationship, but the turning points is close to zero (very small), which would suggest that there is an exponential relationship.

¹⁶ Total wages refer to total labour cost.

The fact that the number of products exported and the number of destinations served is highly correlated with employment levels and wage, suggests similarities with the literature in that multi-product and multi-destination exporters usually pay higher wages and employ more workers (Bernard *et al.*, 2009; Matthee *et al.*, 2016b). This is consistent with theoretical prediction in that more productive firms, which enjoy product scope and scale, have higher export premiums.

Table 2-5: Employment and wage premium: number of products and destinations

	No. of employees (1)	Wages per person (2)	Total wages (3)
Export dummy	-0.219*** (0.0379)	0.0911*** (0.0274)	0.0454* (0.0262)
Number of destinations	-0.0129*** (0.00384)	0.00812*** (0.00278)	0.00577** (0.00266)
Number of destinations^2	0.00793*** (0.00723)	0.00413*** (0.00522)	0.00584*** (0.00499)
Number of products	0.549*** (0.0272)	0.0348* (0.0197)	0.149*** (0.0188)
Number of products ^2	-0.000126 (0.000412)	-0.000466 (0.000297)	-0.000507* (0.000284)
lkl	-0.0163*** (0.00132)	0.0573*** (0.000957)	0.0539*** (0.000915)
Year control	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes
Firm size control			Yes
Observations	130 654	128 189	128 189

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively).

Source: Authors' own calculations, for results excluding 2014 see Table A8.

Another way in which exporters can differ is by the destination they serve. Section 2.4.3.3 provides more depth on the relationship between employment and wage premium of exporters serving different destinations.

2.4.3.3 Results on the employment and wage premium of exporters serving different destinations

This section focuses on two questions. Firstly, does the exporter premium found in table 2.5 differ according to whether the firm exports to *SACU* only, rest of *Africa* only or *internationally*? Secondly, is this premium robust to the inclusion of controls for number of products and destinations? To answer these questions equation 3 (see columns 1 to 3) and equations 4 (see columns 4 to 6) are estimated respectively.

The results in Table 2.6 firstly indicate that destination matters¹⁷ (see columns 1 to 3), as an exporter exporting only to *African* countries is smaller than *international* exporters (who export both to African and non-African countries). When differentiating between firms exporting within *Africa*, there is a small, but significant¹⁸ difference between firms exporting only to *SACU* versus firms exporting to the rest of *Africa* (for example Nigeria). Therefore, there is a hierarchy in both size (number of employees) and wages for *international* countries, *African* countries and *SACU* countries as an export destination. The results are in concordance with the literature suggesting that exports to high income countries require higher worker skill levels, which in turn implies higher wages (Brambilla *et al.*, 2012; Brambilla & Porto; 2016).

As shown in the prior regressions (tables 2.4 and 2.5), the product and destination composition of exporters affects the premium. It is possible that firms exporting to *Africa* export fewer products and to fewer destinations, and will have a lower export premium in the specification of equation 3 (purely from this composition effect). Therefore, by estimating equation 4 one can observe whether the *SACU*, *Africa* or *International* premiums still remain significant. From columns 4 to 6 it is clear that the premiums do remain significant, this suggests that exporting to *Africa* or *SACU* only has an additional (negative) association with the export premiums. One possible explanation for this is the fact that destination entry costs are lower (e.g. via the SADC/SACU trade agreements) such that lower productivity (as proxied by employment size and wage) firms are able to enter into those markets, but not the international markets.

Interestingly, column 5 shows that the lower wage premium for *Africa* only (relative to *international*, as captured by the coefficient on the exporter dummy) is eliminated once the number of products and destinations is accounted for. The marginal (negative) effect of exporting to *SACU* only is also reduced substantially (but not eliminated). A substantial portion (but not all) of the relatively low employment and wage premium for *SACU* only firms (columns 1 to 3) can therefore be explained by the number of products and number of destinations of these firms. The question that arises is why would the wage premium for *SACU* only firms be lower than for international and *Africa* only firms? One possible explanation is that South Africa is part of *SACU* and all *SACU* countries (except Botswana) are members of the Common Monetary Area. Theoretically, *SACU* should be equivalent to an enlarged domestic economy. The fact that still is an employment and wage premium

¹⁷ As seen in Alcalá and Hernández (2010), Serti *et al.* (2010), Rankin and Schöer (2013), Matthee *et al.* (2016b).

¹⁸ See t-test in Table A6 in the Appendix.

(relative to domestic firms) suggests that the SACU market is not fully integrated and that barriers to exporting to these regions still apply.

Table 2-6: Employment and wage premium: exporters within and outside Africa and SACU

	No. of employee s (1)	Wages per person (2)	Total wages (3)	No. of employees (4)	Wages per person (5)	Total wages (6)
Export dummy	1.434*** (0.0127)	0.410*** (0.00897)	0.685*** (0.00905)	0.737*** (0.0161)	0.231*** (0.0116)	0.383*** (0.0112)
Africa only (excluding SACU)	-0.518*** (0.0174)	-0.0864*** (0.0124)	-0.185*** (0.0119)	-0.135*** (0.0183)	0.00663 (0.0132)	-0.0207* (0.0126)
SACU only	-0.727*** (0.0195)	-0.281*** (0.0138)	-0.420*** (0.0133)	-0.174*** (0.0209)	-0.141*** (0.0151)	-0.176*** (0.0144)
lkl	-0.0123*** (0.00135)	0.0583*** (0.000959)	0.0560*** (0.000923)	-0.0166*** (0.00132)	0.0572*** (0.000957)	0.0538*** (0.000916)
No. dest & prod control	No	No	No	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	130 654	128 189	128 189	130 654	128 189	128 189

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively).

Source: Authors' own calculations, for results excluding 2014 see Table A7.

From the literature it is clear that there is not only heterogeneity within exporters in terms of the type of destination they serve, but also in their dynamic status (Amador & Opromolla, 2010). Section 2.4.3.4 continues to illustrate the difference in the employment levels and wages of firms *entering*, *exiting* or *continuing* in the export market.

2.4.3.4 Results on the employment and wage premium of exporters with different exporter dynamics

This section looks at whether the export premiums differ according to the dynamic status of the firms (by estimating equation 5). Furthermore, it determines if the premiums are robust to the inclusion of controls for number of products and destinations (by estimating equation 6).

Table 2.7 illustrates the employment levels and wages of exporters with different export dynamics relative to non-exports (i.e. the results of estimating equation 5, presented in columns 1 to 3). The results corroborate with the literature (Amador & Opromolla, 2010) in that firms that *enter* and *exit* are smaller (in terms of the number of employees) and pay less (per person column 2, as well as overall column 3) than the *continuing* firms.

The results from columns 4 to 6 confirm show that the premiums (from columns 1 to 3) are robust to the inclusion of controls for number of products and destinations (i.e. estimating equation 6). Interestingly, when comparing columns 2 and 5, the wage per person in column

5 is 3.08% higher for *entering* firms than *continuing* firms. Without the control, the *continuing* firms pay 3.9% higher wage per person (see column 2). From this, one can deduce that firms *entering* the exporting market export fewer products (on average 16 versus 25) to fewer destinations (on average 4 versus 6) than *continuing* firms. Therefore, as firms *continue* to export, they grow in terms of the number of products exported and destinations served. By comparing columns 1 and 4 one can see the number of employees before and after controlling for number of products and destinations. In column 4 (showing the employment premium with number of product and destination controls) there still seems to be a lower premium for firms that enter and exit (but not between the two) compared to continuing firms. This suggests that there are additional unexplained characteristics of these firms associated with the employment premium.

Table 2-7: Employment and wage premium: exporter dynamics (enter, exit, and continue)

	No. of employees (1)	Wages per person (2)	Total wages (3)	No. of employees (4)	Wages per person (5)	Total wages (6)
Continue	1.239*** (0.011)	0.353*** (0.0078)	0.564*** (0.00799)	0.735*** (0.0127)	0.198*** (0.00916)	0.340*** (0.00895)
Enter	0.759*** (0.0157)	0.325*** (0.0111)	0.453*** (0.0109)	0.428*** (0.0159)	0.223*** (0.0115)	0.306*** (0.0111)
Exit	0.539*** (0.0301)	0.204*** (0.0212)	0.295*** (0.0206)	0.419*** (0.0294)	0.168*** (0.0212)	0.249*** (0.0204)
lkl	-0.00651*** (0.00147)	0.0574*** (0.00104)	0.0564*** (0.00101)	-0.0133*** (0.00143)	0.0554*** (0.00104)	0.0528*** (0.001)
No. dest & prod control	No	No	No	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	108 546	106 680	106 680	108 546	106 680	106 680

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations, for results excluding 2014 see Table A9.

Expanding on Table 2.7, Table 2.8 (and Figure 2.2) adds destination categories to the exporter dynamic to form six new destination-dynamic categories. The results are discussed in the following section (section 2.4.3.5).

2.4.3.5 Results on the employment and wage premium of exporters with different exporter dynamics serving different destinations

In order to observe if export premiums differ according to the dynamic status of firms with different export destinations, equation 7 is estimated and presented in table 2.8, columns 1 to 3. Furthermore table 2.8 columns 4 to 6 indicate whether the premium is robust to the inclusion of controls for number of products and destinations.

From Table 2.8 and Figure 2.2,¹⁹ it is clear that, when considering the difference between domestic-oriented firms and those who *enter*, *exit*, or *continue* in the export market, the destination exported to when they *enter*, *exit*, or *continue* does matter. The results, linked with destinations, show differences between exporters exporting to the *international* market and those exporting only to the *African* market.

In terms of size (number of employees), firms *continuing* to export in the *international* market are the largest, followed by firms *entering* the *international* market, firms *continuing* in the *African* market, *entering Africa*, *exiting Africa* and *exiting* the *international* market. Overall, when comparing the *international* type firms with the *Africa only* type firms in terms of firm size, wage per employee and total labour (total wages) cost, the *international* type firms show superior characteristics to the *Africa only* type firms (for “*continue*” compare blue and purple, “*enter*” maroon and light blue and “*exit*” green and orange). This is in line with the earlier results of Table 2.6 in that *international* exporters are larger and pay more (alluding to the hierarchy that exists when export destinations are further away). There does seem to be some sort of threshold, that firms on average need to be larger (relative to non-exporters) to *enter* the export market, but that *entrants* may grow over time (since they are smaller than *continuous* exporters). An alternative explanation is that, in the past, firms were larger when they *entered* exporting, but recent entrants are, for some reason, smaller. Disentangling these explanations requires following these firms over time.

When comparing the wages per employee, it is clear that wages do not seem to grow with exporting. The wage per employee of firms *entering* the export market (maroon and light blue bar) is already high, when comparing it to continuing firms (dark blue and purple bar) (this is true for *African* as well as *international* firms). This suggests that firms that *enter* are relatively large (compared to a non-exporter) when they enter the export market. If the difference in size between *entrants* and *continuous* exporters can be interpreted as employment growth, then, because average wages are the same, *entrants* are adding similar workers to what they had working there previously (i.e. the distribution of wages does not change, it is just becoming bigger). The fact that entering firms already pay higher wages (relative to non-exporters) is in line with the results found by Isgut (2001), that show that, even before a firm starts exporting, they display superior characteristics. Furthermore, the point that growth, once firms enter into exporting, is driven through employment changes and not wage changes can suggest that productivity does not improve – i.e. there is no learning by exporting.

¹⁹ Figure 2.2 is a representation of the interaction result of Table 2.7 (based on log estimations) columns 1-3, where a general picture of the average of each type of firm is displayed.

Finally, total wages is a combination of (a product of) the number of employees and wages per person. This is illustrated by Figure 2.2 when one compares the first two sets of bars (number of employees and wages per person) with the third set of bars (total wages)

Table 2-8: Employment and wage premium: non-exporters versus exporters (exporting to African and non-African countries)

	No. of employees (1)	Wages per person (2)	Total wages (3)	No. of employees (4)	Wages per person (5)	Total wages (6)
Continue (International)	1.591*** (0.0155)	0.460*** (0.011)	2.049*** (0.0167)	0.850*** (0.0193)	0.239*** (0.0139)	1.080*** (0.0206)
Continue (Africa only)	0.965*** (0.0139)	0.269*** (0.00989)	1.234*** (0.015)	0.694*** (0.0143)	0.184*** (0.0103)	0.875*** (0.0152)
Enter (International)	1.117*** (0.0252)	0.451*** (0.0179)	1.563*** (0.0271)	0.563*** (0.0263)	0.286*** (0.019)	0.840*** (0.028)
Enter (Africa only)	0.567*** (0.019)	0.257*** (0.0135)	0.821*** (0.0205)	0.383*** (0.0189)	0.200*** (0.0136)	0.579*** (0.0201)
Exit (International)	0.520*** (0.0536)	0.268*** (0.0381)	0.780*** (0.0577)	0.384*** (0.0526)	0.229*** (0.038)	0.604*** (0.0561)
Exit (Africa only)	0.551*** (0.0358)	0.177*** (0.0253)	0.725*** (0.0384)	0.446*** (0.0351)	0.146*** (0.0253)	0.587*** (0.0373)
lkl	-0.00912*** (0.00146)	0.0566*** (0.00104)	0.0478*** (0.00158)	-0.0136*** (0.00143)	0.0553*** (0.00104)	0.0419*** (0.00154)
No. dest & prod control	No	No	No	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	108 546	106 680	106 680	108 546	106 680	106 680

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

Source: Authors' own calculations, for results excluding 2014 see Table A10.

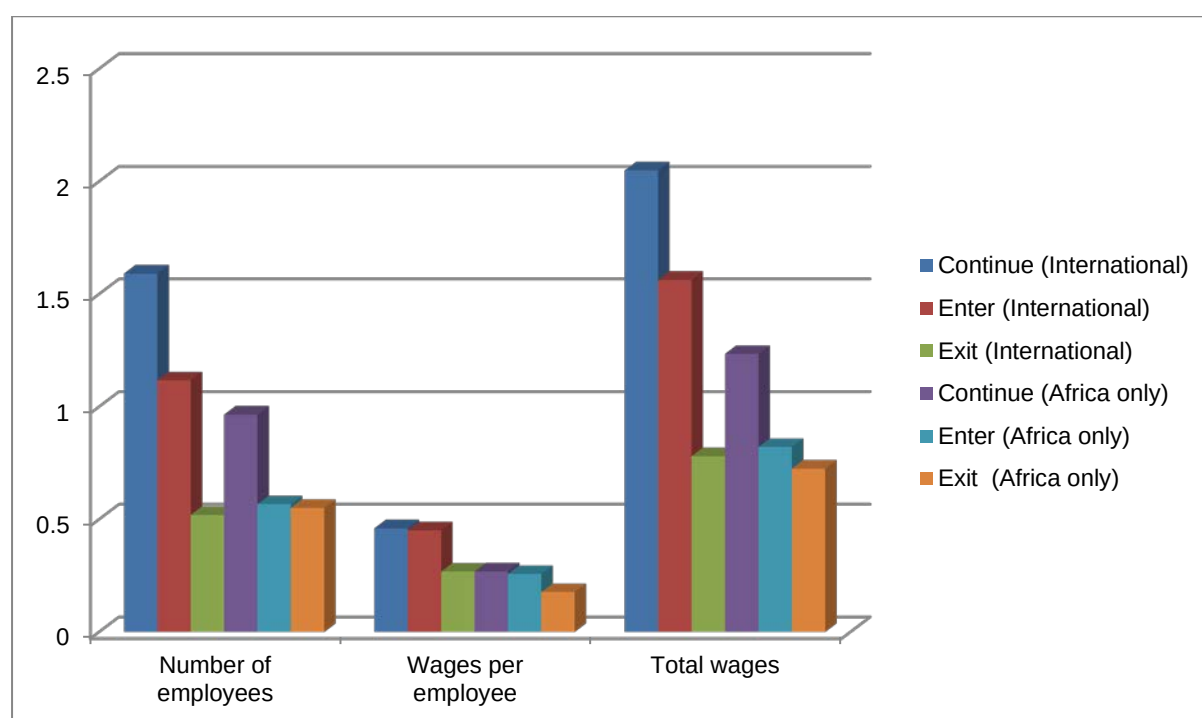


Figure 2-2: Employment and wage premium: non-exporters versus exporters (exporting to African and non-African countries)

Note: Premium relative to non-exporters

Source: Authors' own calculations

As mentioned in the discussion of Table 2.8 and Figure 2.2, when comparing the number of employees of firms *entering* the export market (maroon and light blue bars) to those who are already exporting (*continue* blue and purple bars), these firms differ in terms of size. One possible explanation for the size difference is that *entrants* may grow their number of employees over time (as they become “*continuous*”). Section 2.4.4 expands on this by focusing on the employment growth of exporters - not only does it explain growth in employment, but it also distinguishes between different the types of employees being added.

2.4.4 Regressions on employment growth

2.4.4.1 The estimation strategy to determine employment growth

Growth in the employment of exporters can be obtained by exporters who *enter* the export market (extensive margin) or exporters who *continue* exporting (intensive margin). This section considers the employment growth of exporters (relative to non-exporters), the extensive and intensive margins of this growth and differentiates between different destination categories as well as the types of employees. In order to measure the employment growth, this article follows Biscourp and Kramarz (2007:34) by using a simple first-difference regression:

$$\Delta E_i = \alpha + \beta_1 \text{Exporter}_i + \beta_2 \Delta \ln l_i + \beta_3 \text{No. dest}_i + \beta_4 \text{No. prod}_i + \beta_5 \text{Industry}_i + u_i \quad (9)$$

In equation 9, ΔE_i is the growth in employment over the sample period 2010-2013²⁰. The growth is calculated by taking the logged number of employees in 2013 minus the logged number of employees in 2010²¹. This growth is firstly measured for all employees in a firm (overall). In order to differentiate between the employment growth of different types of workers, the growth in the number of employees above and below 30 years of age and employees earning above and below R6 500 per month is also measured²².

The “*Exporter_i*” is a dummy variable indicating the export status of a firm. The export status can vary between a non-exporter and an exporter exporting to either *Africa* or the *international* market. Furthermore, the export status also includes firm dynamics (*enter*, *exit* or *continue*). A *continuing* exporter is defined as one that exported in all four years (2010-

²⁰ In order to calculate employment growth without short-term fluctuations the period (2010–2013) were used. Due to the fact that 2014 had less observations in the data it was excluded from these regressions

²¹ To deal with the zero or missing values from firms that exit and enter, a value of “1” was added to all number of employees (in order to avoid the $\ln(0)$ problem).

²² Due to the fact that there are no variables on education, skills and experience of workers, this study used age (above and below 30) and income (earning above and below R6500) as indication of skills and experience.

2013), *entrants* are firms that did not export in 2010, but exported in 2013, whereas *exit* are firms that did export in 2010, but not in 2013. Finally, the equation includes a number of control variables, namely growth in capital (ΔIkl), number of destinations exported to by a firm (No. dest_i), the number of products exported by a firm (No. prod_i) and the industry in which it operates (Industry_i).

The results of the estimation of equation 9 are presented in Tables 2.9 to 2.11. These tables not only provide the growth in overall employment, but also decompose the growth into different types of jobs (employment growth of workers aged above and below 30 and workers earning above or below R6 500 per month). These decomposition values (age 30, R 6 500) are derived from SARS' definition of "youth employment" (SARS, 2017). In their Employment Tax Incentive (ETI) to boost youth employment, SARS provides tax benefits for firms employing workers between the ages of 18 and 29, earning less than R6000 per month²³.

2.4.4.2 Results on employment growth

Table 2.9 provides an overall picture of the employment growth of exporters and *Africa only* exporters relative to non-exporters. From column 1, it is clear that, even though *international* exporters are growing employment faster than *Africa only* exporters, both of these exporting groups grow employment faster than non-exporters. This is in line with the literature that suggests that exporters show faster growth in the number of workers they employ (relative to non-exporters) (Bernard & Jensen, 1999; Rankin, 2005; Turco & Maggioni, 2013). For *international* exporters, the growth in employment of workers above 30 years of age is almost 10 percentage points higher than for those below 30 years (columns 2 and 3). This suggests that exporters grow employment by employing more experienced workers (if age is used as an indication of experience). *Africa only* exporters also show higher growth (at a slower rate) in employment of people above 30 (8.6%), than below 30 (4.1%). The growth in employment of people earning more than R6 500 per month is 35 percentage points higher than people earning below R6 500 per month, which confirms that, when exporters grow employment, they employ more skilled/higher qualified workers (if income is used as an indication for skills/qualification). For *African only* exporters, column 5 also shows growth in employment of people earning above R6 500, but the growth in employment of people earning below R6 500 per month is not significantly more than non-exporters.

²³ This study focused on workers earning above and below R6500 per month, to abstain from miscalculating the marginal workers (earning just below or just above R6000 per month).

The higher growth in employment of more experienced (if age is used as an indication of experience) and higher skilled/qualified (if income is used as an indication for skills/qualification) workers is in accordance with what is found in the literature. Turco and Maggioni (2013) as well Bernard and Jensen (1997) show a link between export expansion and the demand for higher skilled workers. It is also important to note that, even though the growth in employment is skewed towards older, higher skilled workers, the growth in employment of younger lower skilled workers is still higher than non-exporters. This suggests that exporters (relative to non-exporters) also grow jobs for younger lower skilled workers (even though not as fast as those for older, higher skilled workers).

Table 2-9: Employment growth: exporters exporting to African and non-African countries

	Δ No. of employees (1)	Δ below age of 30 (2)	Δ above age of 30 (3)	Δ below R6 500 pm (4)	Δ above R6 500 pm (5)
Export dummy	0.212*** (0.0301)	0.157*** (0.0288)	0.251*** (0.0297)	0.0583* (0.0322)	0.408*** (0.0265)
Africa only	-0.143*** (0.0312)	-0.116*** (0.0298)	-0.165*** (0.0308)	-0.0440 (0.0334)	-0.196*** (0.0275)
Δ lkl	0.150*** (0.00111)	0.102*** (0.00106)	0.143*** (0.00109)	0.136*** (0.00119)	0.0958*** (0.000974)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	31 961	31 961	31 961	31 961	31 961

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively).

Source: Authors' own calculations.

Table 2.10 illustrates the types of jobs (young/old or low/high paid) which are added or lost by exporters who *enter* the export market (extensive margin) or who *continue* exporting (intensive margin). Firms that *entered* the export market (extensive margin) between 2010 and 2013 show the largest growth in total employment (58%). These firms have higher growth in the employment of more experienced (column 2 versus 3) and higher skilled (column 4 versus column 5) workers. When a firm *exits* the export market, their employment growth is negative relative to non-exporting firms. This could be due to these firms not only exiting the export market, but also exiting the domestic market (closing down). Interestingly, the decrease in employment of workers earning below R6 500 pm is the largest (42.5%). Overall, the *continuing* firms (intensive margin) seem to grow their employment a bit slower (5%) than non-exporting firms. Possible reasons for this slower growth could be that these *continuing* export firms already have “enough” workers and do not need to add (grow) more, or the capital intensity in these firms are increasing (rather than labour intensity). It is also important to note that, when comparing columns 4 and 5, relative to non-exporting firms, *continuing* exporters seem to show lower growth in unskilled jobs (negative employment growth of 13% for workers earning below R6500 per month) and faster growth in skilled jobs

(positive employment growth of 18.5% for workers earning above R6500 per month). Similar results were obtained by Biscourp and Kramarz (2007), as they showed that the continued exporting firms “destroy” unskilled production jobs and created more skilled production jobs in the French manufacturing industry.

The slower growth in overall employment of *continuing* firms (5% slower than non-exporters in column 1) may also be influenced by the destination served. Table 2.11 therefore combines exporter dynamics with destination served.

Table 2-10: Employment growth: exporter dynamics

	Δ No. of employees (1)	Δ below age of 30 (2)	Δ above age of 30 (3)	Δ below R6 500 pm (4)	Δ above R6 500 pm (5)
Continue	-0.0531** (0.0292)	-0.0123** (0.0282)	-0.0051*** (0.0287)	-0.131*** (0.0316)	0.185*** (0.0255)
Exit ²⁴	-0.385*** (0.0210)	-0.208** (0.0203)	-0.335*** (0.0207)	-0.425*** (0.0228)	-0.12205*** (0.0184)
Enter	0.579*** (0.0431)	0.365*** (0.0416)	0.575*** (0.0424)	0.334*** (0.0467)	0.739*** (0.0377)
Δ lkl	0.148*** (0.00112)	0.102*** (0.00109)	0.141*** (0.00111)	0.135*** (0.00122)	0.094*** (0.000983)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	31 961	31 961	31 961	31 961	31 961

Note: ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.

Source: Authors' own calculations.

When distinguishing between the destination (*Africa* or *international*) of the intensive margin (*continuing* firms), *international* firms have a 4% (column 1) higher growth than non-exporting firms. Firms *continuing* to export to the *African* market show negative employment growth relative to non-exporters, as do the *exiting* firms (in column 1). It is the firms *entering* the *international* market that have the largest growth in employment, followed by firms *entering* the *African only* market.²⁵

It is interesting to note that, even after distinguishing between *continuing* firms serving different destinations (*Africa* or *international*), there is still (as seen in Table 2.10) a slower growth rate in the number of jobs earning below R6 500 pm and a higher growth rate in the number of jobs earning above R6 500 pm for both *International* and *African* exporters. This confirms that, relative to non-exporters, *continuous* exporters grow “unskilled jobs” (earning

²⁴ The number of destinations and product controls for “exit firms” is accounted for by using the previous year’s (lagged) value of the number of destinations and products.

²⁵ Due to data availability, the estimations were only for the period 2010-2013. The short-term year-on-year estimations’ results were inconsistent (most probably due to occasional exporters). Therefore, a recommendation for future studies is to estimate the growth for longer periods and different sub-periods.

below R6 500 pm) at a slower rate and grow “skilled jobs” (earning above R6 500 pm) at a faster rate.

Table 2-11: Employment growth: exporter dynamics (to African and non-African countries)

	Δ No. of employees (1)	Δ below age of 30 (2)	Δ above age of 30 (3)	Δ below R6 500 pm (4)	Δ above R6 500 pm (5)
Continue (International)	0.0397* (0.0348)	0.0592* (0.0333)	0.110*** (0.0343)	-0.0856** (0.0373)	0.304*** (0.0306)
Continue (Africa only)	-0.146*** (0.0264)	-0.0838*** (0.0252)	-0.120*** (0.0260)	-0.176*** (0.0283)	0.0649*** (0.0232)
Exit (International)	-0.287*** (0.103)	-0.0825 (0.0989)	-0.234** (0.102)	-0.384*** (0.111)	-0.0221 (0.0910)
Exit (Africa only)	-0.483*** (0.0667)	-0.333*** (0.0639)	-0.436*** (0.0658)	-0.466*** (0.0715)	-0.222*** (0.0588)
Enter (International)	0.426*** (0.0425)	0.276*** (0.0407)	0.416*** (0.0420)	0.224*** (0.0456)	0.547*** (0.0374)
Enter (Africa only)	0.305*** (0.0298)	0.177*** (0.0285)	0.318*** (0.0294)	0.220*** (0.0320)	0.384*** (0.0263)
Δ Ikl	0.147*** (0.00112)	0.100*** (0.00107)	0.140*** (0.00110)	0.133*** (0.00120)	0.0939*** (0.000985)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	31 961	31 961	31 961	31 961	31 961

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively).

Source: Authors' own calculations.

2.5 Conclusion

Exports are generally associated with higher economic growth, productivity and employment levels, which is why policymakers often turn to exports as a means to stimulate economic growth and reduce unemployment. Through the NDP, South African policymakers also identified exports as a way to transform the economy and create sustainable expansion for job creation, but the South African literature on the linkages between exporting, employment and wages is limited, especially on firm-level.

In this article, the aim was three-fold. Firstly, to investigate manufacturing exporters using newly available administrative data and second, to broaden the literature to understand more about the employment premium, wage premium of South African exporters relative to non-exporters as well as within exporters (considering export destination, exporter dynamics, number of products exported and number of destinations served). Thirdly, to investigate employment growth (change in the number of employees) in South African exporting firms by distinguishing between different types of employees.

From the results, it is evident that South African manufacturing exporters employ more workers (employment premium) and pay higher wages (wage premium) than non-exporters -

they create more and better jobs. Within exporters, the employment premium and wage premium are affected by exporter status as well as destination served, number of products exported and number of destinations exported to.

Destination matters. Only 41% of South African exporting firms export to the international market, but these firms contribute to 89% of total export value. There is a hierarchy in both size (number of employees) and wages for *international* countries, *African* countries, and *SACU* countries as an export destination (while controlling for capital, industry and year). Not only does the destination matter, but also the number of destinations served as well as the number of products exported. There is a higher marginal effect (on employment levels and wage) to adding one destination than to adding one product.

When comparing the wages per employee between exporters with different export dynamics, it is clear that wages do not seem to grow with exporting. Firms that *enter* exporting already pay higher wages and have average wages which are similar to firms that are already exporting/the *continuous* firms (this is true for *African* as well as *international* firms). In terms of size (number of employees/ employment premium), firms *continuing* to export in the *international* market are the largest, followed by firms *entering* the *international* market, firms *continuing* in the *African* market, *entering Africa*, *exiting Africa* and *exiting* the *international* market. Therefore, there does seem to be some sort of threshold that firms, on average, need to be larger (relative to non-exporters) to *enter* the export market but that *entrants* may grow over time (since they are smaller than *continuous* exporters in terms of number of employees).

The growth in employment can occur through the intensive (continuous exporters) or extensive (entering exporters) margins. The largest growth in employment is through the extensive margin, where firms who *entered* the export market between 2010 and 2013 showed the fastest growth in employment. At the intensive margin, relative to non-exporters, *continuous* exporters grow “unskilled jobs” (earning below R6 500 pm) at a slower rate and grow “skilled jobs” (earning above R6 500 pm) at a faster rate. *International* exporters grow employment faster than firms exporting to *Africa only* and firms serving the domestic market (non-exporters). Overall, exporters (relative to non-exporters) show faster growth in the employment of all types of workers (earning above and below R6 500 pm as well as being older and younger than 30 years of age). However, the growth in jobs is skewed towards higher skilled (earning above R6 500 pm), more experience (older than 30years) workers.

By using firm-level data on the population of manufacturing firms in South Africa, this article shows that exporting firms do have an employment and wage premium relative to non-

exporting firms. For a possible solution to South Africa's high unemployment, it is not sufficient to simply drive employment creation by increasing exports because of the heterogeneous nature of exporters. Enhancing exporters' competitiveness in the *international* market would contribute most to employment creation, as the results show that firms exporting to the *international* market employ the most workers and pay the highest wages. Whereas, firms exporting only to *African* countries or only to *SACU* countries, have less of an employment and wage premium (relative to non-exporters).

However, when exporting firms grow their number of employees (especially as they *enter* the export market), they tend to show higher growth in the employment of older (more experienced) and higher earning (higher skilled or qualified) workers. This poses a challenge in that although employment growth is created (for all types of workers), the growth is skewed towards a certain type of employee. Therefore, even though export growth can create some jobs for young, low-skilled workers, it is unlikely to have an especially large multiplier effect on the unemployment rate of un-skilled (or low-skilled) workers, nor on the high percentage of youth unemployment. These results in fact underscore the skills mismatch (especially among the youth) that is pertinent within the South African labour market.

This article has two limitations. Firstly, it worked on the average wages of exporting firms, where the findings of a wage premium may disguise the fact that exporting firms may only pay more at certain parts of the wage distribution. Therefore, further research should consider the within firm wage distribution of exporters (relative to non-exporters), which is taken into consideration in the next article in Chapter 3. Secondly, the dataset used in this article (specifically the IRP5 data) did not have specific variables on worker's education, skills and experience. A recommendation for future studies is to do a qualitative analysis on the specific characteristics of the types of individuals, who are employed by exporters.

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2.7 Appendices

Table A-1: Number of firms per sector/ industry (Classification according to ISIC 4 code)

Classification	2010	2011	2012	2013	2014
Agriculture, forestry and fishing	4 539	5 399	5 443	5 927	5 246
Mining and quarrying	621	745	808	1 342	1 198
Manufacturing	29 916	32 429	32 013	35 373	30 249
Electricity, gas, steam and aircon supply	722	816	843	1 012	878
Water supply, sewerage, waste and remediation activities	131	157	165	203	176
Construction	10 958	11 295	10 821	11 204	9 653
Wholesale and retail	29 719	31 471	29 273	25 735	21 948
Transport and storage	5 878	6 372	6 333	6 783	5 839
Accommodation and food service	5 484	5 857	5 717	5 862	5 023
Information and communication	1 558	1 707	1 705	1 956	1 733
Financial and insurance activities	23 038	25 857	23 776	16 102	13 794
Real estate activities	5 275	5 694	5 561	5 707	5 320
Professional, scientific and technical activities	7 111	7 642	7 717	8 448	7 606
Admin and support services	2 544	2 697	2 548	2 460	2 113
Education	1 765	2 155	2 253	2 438	2 116
Human health and social work	2 882	3 160	3 215	3 757	3 409
Arts, entertainment and recreation	1 358	1 482	1 457	1 563	1 360
Other service act	2 179	2 331	2 381	2 789	2 411
Activities of extra-territorial organization	6 512	7 112	7 257	8 801	7 581
TOTAL	142 190	154 378	149 286	147 462	127 653

Source: Authors' own calculations.

Table A-2: Company Income Tax (CIT) data cleaning

IT and ITR14 forms	In May of 2013 the IT form changed to the ITR14. The major difference between these two forms is the level of detail. The ITR14 form distinguishes between the size of a firm and goes into more detail for medium to large firms. The problem is that with the transition from the IT14 to the ITR14, some firms completed the IT14 and others completed the ITR14, therefore these two forms were collapsed have a panel of data from 2010–2014.
Employee expenses including directors	Due to the differences in the IT and ITR14 forms, the most suitable variable to use as an indicator of wage per firm were 'employee expenses including directors' as it is available in both the IT and ITR14).

Source: Authors' illustration.

Table A-3: IRP5 data cleaning

Keep individual	From the IRP5 data, only workers/employees was used in this article, therefore from the variable "nature of person" only "Individuals" were kept.
Periods worked	Some of the data on the "period employed from" and "period employed to" has "invalid periods" reported, this was corrected: 1. For instance 1910 instead of 2010 2. End date 27 February instead of 28 February 3. End date before start date 4. End date in the month before year end and then start again a few days after the start of the year.
Multiple job spells	There are individuals with "multiple job spells", therefore 1 individual working multiple jobs at the same firm. When adding the number of days of each job spell 3% adds to more than 365 days (which is impossible). For this 3% of jobs the average of the worker's multiple job spells at the firm we taken.
Duplicate certificates	Each job is assigned a certificate number; duplicate certificates were dropped to avoid double counting.
Age 15–64	There were individuals found to be 90 years of age. This study kept to the South African labour force definition and kept workers of the age 15-64.
Income	There are various ways to calculate income, we used the Gross remuneration (by adding three variables named: "GROSSNTAXABLEINCOMEAMNT GROSSRETFUNDINCOMEAMNT GROSSNRETFUNDINCOMEAMNT").

Source: Authors' illustration.

Table A-4: Customs data cleaning

Duplicate transactions	Duplicated transactions (exact same trader id, tariff code (HS6-digit level), country of destination (market), country of origin (SA), customs value of the transaction, statistical value and month) were found in the customs data. The first 20 transactions were kept and the rest was dropped (3% of data). The reason for these duplicates seems to be that as the products wait at the border the paperwork needs to be resubmitted due to an exchange rate or date change.
Country of destination and country of origin	Dropped the transactions where: Country of destination states 'Origin Of The Goods Is Unknown' Country of origin is not 'South Africa' (kept 93% of data).
Merge	When merging the customs data onto the conjunction table 87% of the firms matched.

Source: Authors' illustration.

Aligning periods of the three datasets (CIT, IRP5 and customs)

The CIT data is reported per firm's "financial year". Each firm has their own financial year end (89% of firms' financial year ends on February). The IRP5 is reported according to South African "tax year" (for example February 2010 to March 2011) and the customs transactions data is captured per month according to the "calendar year" (January to December). In order to align the dates (let all data align to the IRP5 reporting period: February to March), the customs data (reported on a monthly basis) was matched onto the IRP5 "tax year" running from February to March. With the CIT data, the 89% of firms whose financial year end on February were kept as is, the remaining 11% of firms whose financial year ends after September (3.28%) were moved to the next "tax year".

Table A-5: Financial year end of firms in our panel (from the CIT data)

	Number of firms	% of firms
January	3 941	0.27%
February	1 281 245	88.96%
March	34 944	2.43%
April	10 447	0.73%
May	6 219	0.43%
June	38 391	2.67%
July	6 148	0.43%
August	11 903	0.83%
September	9 764	0.68%
October	4 397	0.31%
November	3 829	0.27%
December	29 096	2.02%

Source: Authors' own calculations.

Table A-6: T-test on firms exporting only to SACU versus firms exporting to the rest of Africa excluding SACU

Two-sample t-test with unequal variances						
Group	Obs	Mean	Std Err	Std Dev	[95% Conf Interval]	
Africa xs	11 554	11.89434	0.008739	0.939327	11.87721	11.91147
SACU only	8 076	11.65059	0.010879	0.977644	11.62927	11.67192
combined	19 630	11.79406	0.006872	0.962754	11.78059	11.80753
diff		0.243748	0.013954		0.216397	0.2711

diff = mean(1) - mean(2)		t = 17.4679	
Ho: diff = 0		Satterthwaite's degrees of freedom = 16930.9	
Ha: diff < 0		Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 1.0000		Pr(T > t) = 0.0000	Pr(T > t) = 0.0000
Source: Authors' own calculations.			

From the t-test, if one compares the means, there is a 0.2437484 difference in the mean (with a standard deviation of 0.216397) income per person of firms exporting to *African* market only and the *SACU only* firms. The standard error of the mean is 0.013954. The t-value is 17.4679, with 16930.9 degrees of freedom. The statistical significance (Ha: diff != 0) is less than 0.05, therefore there is a statistically significant difference between the wage per person of an *Africa_only* and *SACU_only* firm.

Table A-7: Employment and wage premium: exporters within and outside Africa and SACU (excluding 2014)

	No. of employees (1)	Wages per person (2)	Total wages (3)	No. of employees (4)	Wages per person (5)	Total wages (6)
Export dummy	1.498*** (0.0143)	0.328*** (0.0100)	0.626*** (0.0101)	0.771*** (0.0182)	0.191*** (0.0130)	0.356*** (0.0125)
Africa only (excluding SACU)	-0.559*** (0.0198)	-0.0278** (0.0139)	-0.139*** (0.0133)	-0.160*** (0.0207)	0.0387*** (0.0148)	0.00502 (0.0141)
SACU only	-0.756*** (0.0220)	-0.202*** (0.0153)	-0.352*** (0.0148)	-0.181*** (0.0236)	-0.0987*** (0.0168)	-0.136*** (0.0160)
Number of destinations				0.0724*** (0.00154)	0.0105*** (0.00110)	0.0264*** (0.00106)
Number of products				0.00435*** (0.000203)	0.00171*** (0.000145)	0.00265*** (0.000138)
Lkl	-0.0112*** (0.00152)	0.0544*** (0.00107)	0.0523*** (0.00102)	-0.0154*** (0.00149)	0.0536*** (0.00107)	0.0504*** (0.00102)
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	103 359	101 249	101 249	103 359	101 249	101 249

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

Source: Authors' own calculations, for results including 2014 see Table 2.4

Table A-8: Employment and wage premium: number of products and destinations (excluding 2014)

	No. of employees (1)	Wages per person (2)	Total wages (3)
Export dummy	-0.203*** (0.0429)	0.111*** (0.0306)	0.0682** (0.0291)
Africa only (excluding SACU)	-0.287*** (0.0378)	0.140*** (0.0270)	0.0786*** (0.0257)
SACU only	-0.122*** (0.0322)	0.0159 (0.0230)	-0.00927 (0.0219)
Number of destinations	-0.0114*** (0.00440)	0.00899*** (0.00315)	0.00685** (0.00300)
Number of destinations^2	0.570*** (0.0310)	-0.00552 (0.0221)	0.117*** (0.0211)
Number of products	-7.04e-05 (0.000477)	-0.000436 (0.000340)	-0.000463 (0.000323)
Number of products ^2	0.0772***	0.0404***	0.0575***

	No. of employees (1)	Wages per person (2)	Total wages (3)
lkl	(0.00827) -0.0152*** (0.00149)	(0.00589) 0.0537*** (0.00107)	(0.00560) 0.0506*** (0.00102)
Year control	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes
Firm size control			Yes
Observations	103 359	101 249	101 249

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

Source: Authors' own calculations, for results including 2014 see Table 2.5

Table A-9: Employment and wage premium: exporter dynamics (enter, exit and continue) (excluding 2014)

	No. of employees (1)	Wages per person (2)	Total wages (3)	No. of employees (4)	Wages per person (5)	Total wages (6)
Continue	1.290*** (0.013)	0.290*** (0.009)	0.515*** (0.00922)	0.756*** (0.0149)	0.168*** (0.0105)	0.318*** (0.0103)
Enter	0.528*** (0.0365)	0.187*** (0.0252)	0.277*** (0.0244)	0.399*** (0.0355)	0.159*** (0.0251)	0.237*** (0.0241)
Exit	0.848*** (0.0174)	0.318*** (0.0121)	0.466*** (0.0118)	0.473*** (0.0178)	0.233*** (0.0126)	0.327*** (0.0122)
Lkl	-0.00380** (0.00171)	0.0518*** (0.00119)	0.0513*** (0.00115)	-0.0107*** (0.00166)	0.0504*** (0.00119)	0.0484*** (0.00114)
No. dest & prod control	No	No	No	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	81 251	79 740	79 740	81 251	79 740	79 740

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

Source: Authors' own calculations, for results including 2014 see Table 2.6

Table A-10: Employment and wage premium: non-exporters versus exporters (exporting to African and non-African countries) (excluding 2014)

	No. of employees (1)	Wages per person (2)	Total wages (3)	No. of employees (4)	Wages per person (5)	Total wages (6)
Continue International	1.678*** (0.0183)	0.346*** (0.0128)	2.022*** (0.0195)	0.901*** (0.0225)	0.170*** (0.0160)	1.062*** (0.0238)
Continue Africa only	0.987*** (0.0165)	0.246*** (0.0115)	1.235*** (0.0175)	0.702*** (0.0168)	0.174*** (0.0119)	0.875*** (0.0177)
Enter International	1.239*** (0.0276)	0.433*** (0.0192)	1.668*** (0.0294)	0.618*** (0.0291)	0.293*** (0.0207)	0.904*** (0.0307)
Enter Africa only	0.628*** (0.0213)	0.253*** (0.0148)	0.880*** (0.0227)	0.428*** (0.0211)	0.203*** (0.0150)	0.629*** (0.0223)
Exit International	0.522*** (0.0651)	0.182*** (0.0453)	0.691*** (0.0693)	0.376*** (0.0638)	0.152*** (0.0453)	0.513*** (0.0673)
Exit Africa only	0.533*** (0.0433)	0.189*** (0.0300)	0.716*** (0.0459)	0.423*** (0.0424)	0.164*** (0.0300)	0.580*** (0.0446)
lkl	-0.00649*** (0.00170)	0.0513*** (0.00119)	0.0455*** (0.00182)	-0.0110*** (0.00166)	0.0503*** (0.00119)	0.0399*** (0.00176)
No. dest & prod control	No	No	No	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm size control			Yes			Yes
Observations	81 251	79 740	79 740	81 251	79 740	79 740

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

Source: Authors' own calculations, for results including 2014 see Table 2.7

CHAPTER 3: THE WAGE DISTRIBUTION AND INEQUALITY OF SOUTH AFRICAN MANUFACTURING EXPORTERS

3.1 Introduction

Wage inequality literature has investigated many possible sources of the differential in wages of workers. A recent study by Card *et al.* (2016) considered the effects of worker and firm heterogeneity on wage inequality and found that the heterogeneity in the productivity of firms affected the distribution of firm-specific wage premiums. The wage differential between exporting and non-exporting firms has also been shown to be one of the sources of the increase in wage inequality within countries (Krugman, 2008). Moreover, this gap (between the wages of exporters and non-exporters) has been widening as global trade expanded (Klein *et al.*, 2013). This implies that the wage inequality between exporters and non-exporters grows as international trade increases. This link between wage inequality and trade liberalisation has been found in developed and developing countries alike (Goldberg & Pavcnik, 2007).

In a developing country context, South Africa's reintegration into the world economy and trade liberalisation process since the 1990s (Edwards, 2001) constitute an interesting case study, as they have taken place during a period in which income inequality²⁶ has been steadily increasing - so much so that South Africa is one of the world's most consistently unequal countries, with an income Gini coefficient ranging between 0.66 and 0.7 (World Bank, 2017). Given international evidence as shown above, this article investigates how South Africa's participation in the global market (more specifically export participation) affects the wage distribution within the manufacturing sector.

From the results in chapter 2 and the South African literature (see for example Matthee *et al.*, 2016 and Edwards *et al.*, 2016), it is clear that South African manufacturing exporters' behaviour is similar to the stylised findings in the international literature (i.e. exporting firms employ more people and pay higher wages than non-exporters). However, only limited work has been done on how these higher wages are distributed within the manufacturing exporting firms relative to non-exporting firms (e.g. do all employees earn a wage premium or only some of them?) and how this wage differential contributes to wage inequality.

²⁶ It is important to note that *wage inequality* is not a synonym for *income inequality*, but van der Berg (2011) decomposed *income inequality* in South Africa by income source and found *wage income* to be the primary component in *income inequality*.

The international trade literature reveals that wage inequality is usually studied in terms of the skills premium (which relates to the wages of skilled and unskilled labour being higher in an exporting firm than in a non-exporting firm) (Bernard & Jensen, 1997; Brambilla et al., 2012; Klein et al., 2013). The firm-level data used in this study does not contain variables on education or skills level. However, the data allowed for the calculation of the average wage within a firm at the 5th, 25th, 50th, 75th and 95th percentiles (i.e. the within-firm wage distribution). Therefore, instead of comparing the average or median wages of exporting versus non-exporting firms, one can compare how wages are distributed within an exporting firm relative to a non-exporting firm. Wage inequality can therefore be illustrated through this within-firm wage distribution, where a more unequal distribution of wages throughout the percentiles shows higher wage inequality.

Therefore, the article contributes to the limited literature by firstly disentangling the wage differentials between non-exporters and exporters as well as within exporters (which includes a consideration of exporter dynamics and destinations served). In short, it studies within-firm wage distributions and wage inequality. There are only a limited number of international studies that have considered the within-firm wage distribution phenomenon (see for example Frias *et al.* (2009) and Bernini *et al.* (2015)). Secondly, the article examines possible sources of wage inequality by analysing firm characteristics, the type of product exported and the type of destination served.

The article uses of detailed longitudinal tax administrative data (made available by the South African Revenue Service) to do a precise evaluation of the link between a firm's export status, its within-firm wage distribution and wage inequality. A panel dataset from on the population of firms 2010-2014 was created by linking three sets of administrative data, namely the company's income tax data (CIT), employee data (IRP5) and customs data. The level of aggregation of this population panel dataset enables one to firstly determine the distribution of wages within a firm (as the IRP5 data was available on employer-employee level). Secondly, the availability of transaction level data, allowed for the control for the type of product being exported and type of destination being exported to. Thirdly, the population data makes it possible to control for number of products exported and number of destinations exported to. Finally, the panel dimension of the data made it possible to determine the "exporter dynamics". The results are threefold.

The first set of results shows that, when considering the wage differential between non-exporting and exporting firms (serving different destinations) there is an export wage premium. Moreover, the wage differential is larger as an exporter exports to destinations that

are further away - i.e. exporting only to *SACU* countries²⁷, followed by only exporting to *African* countries²⁸ and finally exporting to *international* countries²⁹. This hierarchy appears to be across the distribution (from the 5th to the 95th percentiles) and it is larger at the upper tail (see Figure 3.3). Therefore, the higher wages paid by exporters are more dispersed. This clearly shows a form of wage inequality within exporting firms. Therefore, exporters (specifically *international* exporters) seem to pay higher wages (and thus provide better jobs). However, there is a higher degree of wage inequality within these firms.

The second set of results pertains to the investigation of the potential explanations for this apparent wage inequality and considers the effect of firm characteristics, in particular capital per worker, firm size (number of employees) and labour productivity (output per worker). When controlling for capital per worker only, the results show an export premium across the wage distribution. This premium increases in magnitude towards the upper tail of the distribution. Exporters, relative to non-exporters, pay much higher wages at the upper tail (75th and 95th percentiles) than at the lower tail (5th and 95th percentiles). The premium is also larger when exporting to the *international* market and the distribution shape is relatively similar for *continuing* and *entering* exporters. However, when adding controls for firm size (number of employees) and labour productivity (output per worker), the wage premium does not increase in magnitude with earnings (as illustrated by Figure 3.6). This may suggest that the wage inequality is driven by the distribution of firm size and labour productivity within exporters compared to non-exporters. This means that a lot of the observed wage inequality is because larger, more productive firms are more likely to be exporters.

Finally, before controlling for firm size and labour productivity, there appears to be a wide dispersion of wages within exporters (particularly within *international* exporters). However, most of that dispersion (particularly amongst continuing exporters) is explained by the labour productivity and size of these firms. This suggests that there is a large degree of dispersion of these variables (number of employees and output per worker) for these firm groups (relative to non-exporters). Therefore, the third set of results considers the characteristics of the destination economy (proxied by GDP per capita) and quality of exports (proxied by the price of the manufactured export product) as possible explanations of the remaining, albeit lower, levels of wage inequality. However, the findings show little evidence that the results are driven by these two factors. This might suggest that the remaining wage inequality could be related to either the process of exporting or being in the export market. Another possible

²⁷ SACU is a customs union between Botswana, Lesotho, Namibia, Swaziland, and South Africa.

²⁸ These firms who only export to *African* countries exclude the firms that export to *SACU only*.

²⁹ Firms exporting to *international* countries are those who export to both African and non-African countries.

explanation is that the wage inequality is attributable to a specific type of firm (employing a specific type of person with sought-after skills) which had this (unequal) wage distribution even before it started to export.

The remaining sections in the paper are as follows: section 3.2 provides a literature overview on wage distribution and inequality of exporters; section 3.3 presents the empirical analysis which includes the data, descriptive statistics, estimation strategies and results; and section 3.4 concludes³⁰.

3.2 Literature overview on wage distribution and inequality of exporters

3.2.1 Theoretical literature overview

The theoretical link between exports and wages, more specifically differences in wages, originated in the Heckscher–Ohlin theory. This theory states that a country should specialise in the export of goods for which it has abundant factors of production (Stopler & Samuelson, 1941). This implies that developed countries should specialise in exporting skill-intensive (and or capital-intensive) goods, whereas developing countries should specialise in exporting low-skill intensive (and or labour-intensive) manufactured export goods. Therefore, this theory predicts that, as trade increases (with trade liberalisation), developed countries' demand for skilled labour is higher (relative to unskilled labour), which causes the wages of skilled labour to be higher and results in a rise in inequality (Stolper–Samuelson theorem) (Stopler & Samuelson, 1941). For developing countries, the theory predicts the opposite, i.e. the demand will shift towards unskilled labour, which will result in less wage inequality between skilled and unskilled workers (Stopler & Samuelson, 1941).

Empirical evidence, however does not support this theoretical foundation, as it has been shown that many developing countries (with abundant unskilled labour) have experienced an increase in wage inequality with trade liberalisation (Goldberg & Pavcnik, 2007). This has prompted economists to revisit the assumptions underpinning the Heckscher–Ohlin theory. According to the strict assumptions of the Heckscher–Ohlin theory, markets are frictionless, firms and workers are homogeneous, and workers can move freely within a country. By using the theoretical framework of Melitz (2003), new theoretical models incorporate the heterogeneity of firms and workers and provide new mechanisms for trade to affect wage inequality (for example, Egger & Kreickemeier, 2009; Helpman *et al.*, 2010; Amiti & Davis 2012).

³⁰ As stated in Chapter 1, part of this chapter was incorporated into the UNU-WIDER working paper titled “Labour demand and the distribution of wages in South African manufacturing exporters” (Matthee, Rankin & Bezuidenhout, 2017).

Egger and Kreickemeier (2009) and Amiti and Davis (2012) use the heterogeneous firm trade model of Melitz (2003) and add labour market imperfections, namely the “fair wage mechanism” (which is closely related to that of Grossman and Helpman (2007)). The fair wage mechanism suggests that a worker should perceive their wages as fair. This perception depends on the economic success of their firm (for example, a worker in a more productive firm perceive a higher wage to be fair). Therefore, because exporting firms are more productive (than non-exporting firms), the “equilibrium” wages of their employees are higher (Egger & Kreickemeier, 2009).

Another new theoretical model, created by Helpman *et al.* (2010:35), also considers exporter heterogeneity. The authors argue that the wages and employment levels of firms are power functions of firm productivity. By introducing the concepts of searching and matching frictions as well as heterogeneity of worker ability, they argue that workers who are currently employed can bargain for a share of the profits. The reasoning behind this is that new workers are not perfect substitutes for current workers; therefore, there is a hiring cost associated with new workers. Furthermore, it is the more productive firms (usually exporters) that screen workers more intensively and choose workers with the highest average ability. These “higher ability” workers are paid a wage premium, because they are more costly to replace. With trade liberalisation, the more productive firms will export, which means they will select more workers with higher average ability and pay them higher wages (than non-exporting firms).

The new theoretical models show that the “fair wage mechanism” and “searching and matching friction” are all possible mechanisms through which trade can affect wages and induce wage inequality. The next section examines the empirical literature on this link between trade and wage inequality.

3.2.2 Empirical literature overview

The wage differential between exporting and non-exporting firms is one of the sources of the increase in wage inequality within countries (Krugman, 2008). Moreover, this gap (between the wages of exporters and non-exporters) widens as global trade expands (Klein *et al.*, 2013). This implies that the wage inequality between exporters and non-exporters grows as international trade increases. The link between (the rising) wage dispersion and trade has been examined in numerous countries, for example Germany (Baumgarten, 2013; Klein *et al.*, 2013), the United States (Bernard & Jensen, 1997), Mexico (Verhoogen, 2008; Frias *et al.*, 2009) China (Fu & Wu, 2013) and France (Bernini *et al.*, 2015).

Baumgarten (2013) studied the role of manufacturing exporting firms in terms of the rising wage dispersion both within and between skill groups in Germany from 1996 to 2007. He found that, over time, the wage gap between exporters and non-exporters affected total wage inequality through two channels. Firstly, when exporting firms expanded or new firms started to export, the share of employment in exporting firms changed. Secondly, when there was an increase in internationalisation, the wage gap itself could grow. Baumgarten's (2013) results showed that the growth in wage inequality was mostly due to the large increase in the exporter wage gap (which was conditional on workers' skill level). On the other hand, the increase in the number of employees of exporters (i.e. their share in total employment) contributed to a decrease in wage dispersion. The net effect of the two channels was therefore a moderate increase in wage inequality.

An earlier study by Bernard and Jensen (1997) also investigated the increase in wage inequality among exporting and non-exporting firms. They found that a large part of the rise in wage inequality in the US manufacturing sector (in the 1980's) was due to exporting firms' increased demand for skilled labour. Therefore, relative to non-exporting firms, exporting firms needed to pay these "skilled workers" higher wages (which is also known as a "skills premium"). Similar to Bernard and Jensen (1997), Klein *et al.* (2013) also considered the skills set of workers. They used German manufacturing employer-employee level data to compare the wages of different skills groups employed by exporters. Wage inequality was evident between skilled and unskilled workers as well as within different levels of skills. They found that significant export wage dispersion existed among highly skilled workers (earning a 'wage premium') and low-skilled workers (earning a 'wage discount'). Moreover, 30% of wage inequality (within and between skills groups) could be ascribed to exporting. In a similar study on Mexico, Verhoogen (2008) found that the devaluation of the peso (during the peso crisis of 1994) led to within-industry wage dispersion. Moreover, the more productive exporting firms in Mexico were able to withstand the crisis and increased their exports, both in terms of quality and wages, while the less productive firms were not able to do so, which resulted in a within-industry wage dispersion.

It is important to consider not only the difference in the average wages of firms (using OLS regressions), but also the wage differences at different quantiles/percentiles of the wage distribution (by using either quantile regressions or OLS regressions at different percentiles). As stated by Fu & Wu (2013:185), "if more talented and high-ability workers would tend to be hired by exporting firms, the average wage of exporting firms would be driven up and the export wage premia would be overestimated". Recently, the availability of more detailed data has allowed for the consideration of the wage differential (across the wage distribution) on

both a firm-level (i.e. the firm's distribution of wages - see Frias *et al.* (2009) and Bernini *et al.* (2015)) and a job-level (i.e. the overall wage distribution in a sector - see Fu & Wu (2013)).

Two noteworthy studies by Frias *et al.* (2009) and Bernini *et al.* (2015) focused on the within-firm wage distribution (firm-level) of exporters versus non-exporters. Frias *et al.* (2009) investigated the within-firm wage distribution of Mexican firms from 1985 to 2005. Their results showed that there was no export wage premium at either the lower end of the wage distribution (the 10th percentile) or the top quartile. However, in between these two distribution percentiles, the wage effects of exporting increased with earnings. Bernini *et al.* (2015) studied French firms' within-firm wage distribution by combining three datasets into a longitudinal dataset covering the period 2000 to 2012 in respect of 1.16 million firms of which 138 thousand were exporters. In contrast to Frias *et al.* (2009), their results showed a wage premium right across the distribution (from the 10th to the 90th percentiles). This premium seemed to increase towards the top end of the distribution. Furthermore, they showed that this premium increased with the export intensity of the firm.

Bernini *et al.* (2015) considered not only the firm-level distribution of wages (to compare firms), but also the job-level (employee-level) distribution of wages in order to study the distribution of wages for all employees. They found that, across the wage distribution, the wages of those working in exporting firms were predominantly higher than those working in non-exporting firms. Fu and Wu (2012) also considered the overall wage distribution (at the job level) of the Chinese manufacturing sector in 2004. They found an export wage premium (specifically among firms defined as state-owned enterprises originating from OECD countries) across the entire wage distribution. This wage premium seemed to decrease as one moved from the lower tail to the upper tail of the distribution (while controlling for firm characteristics (e.g. labour productivity, size, age and capital intensity), female share of total employees, workers with graduate degrees/college degrees/ high-school certificates, industry and province).

Even though workers in exporting firms earn higher wages (across the distribution), this is not to say that all exporting firms are the same (and pay the same premium). Exporters themselves are heterogeneous in nature. This can be seen in terms of the location of the firm (Fu & Wu, 2013), productivity levels (Bas, 2012; Bernard *et al.*, 2009), number of products exported, number of destinations served (Bernard *et al.*, 2009), type of destination served and product quality (Verhoogen, 2008; Brambilla *et al.*, 2012; Brambilla & Porto, 2016).

Exporter heterogeneity in terms of firms' location influences the wages they pay. In their study on Chinese manufacturing exporters, Fu and Wu (2013) showed that the wages of Chinese exporters differed depending on the firms' location. Firms that were situated along the coast paid higher wages than those that were located inland. Exporters are also heterogeneous in terms of their level of productivity. A plant level study on the productivity of Chilean manufacturing exporters revealed a difference between the upper range exporters and lower range exporters within the productivity distribution (Bas, 2012). The exporters in the upper range used high technology and were more skill-intensive, and therefore paid higher wages than the lower range exporters. Another study considering the productivity levels of exporters (specifically US manufacturing exporters), showed that the more productive firms (that paid higher wages) were the ones that exported multiple products (i.e. they were multi-product exporters) to multiple destinations (multi-destination exporters) (Bernard *et al.*, 2009). Furthermore, the more products exported and destinations served, the higher the wage and employment levels were (Bernard *et al.*, 2009).

It is not only the number of destinations that influences an exporting firm's wages, but also the "type" of destination. There is a link between the type of destination country (high, middle or low income), the product quality required, the type of worker who can manufacture it (and the worker's wages) (Verhoogen, 2008; Brambilla *et al.*, 2012; Brambilla & Porto, 2016). Verhoogen (2008) studied Mexican manufacturing exporters by using the Annual Industrial Survey data for the periods 1993-2001 and 1984-2001. His results showed that when firms exported to high income countries, their products needed a quality upgrade, which required more skilled workers. In a similar vein, in a study conducted by Brambilla *et al.* (2012) there was a so-called "skills-bias" in export destinations for Argentinian manufacturers. This "skills-bias" was evident in the fact that exports to high income countries (relative to middle-income countries or their domestic market), necessitated higher worker skills levels, which in-turn implied higher wages (Brambilla *et al.*, 2012). A more recent study by Brambilla and Porto (2016) confirmed this. In their study of 82 countries they showed that high-income countries demanded higher quality goods (and firms exporting to these destinations subsequently paid higher wages).

In summary, the international literature shows that the wage differential between exporting and non-exporting firms contributes to the increase in wage inequality within countries. Yet not all exporting firms pay the same wage premium, as exporting firms are heterogeneous. The following section focuses on the South African literature on the wage differential between exporting and non-exporting firms.

3.2.3 South African literature overview

The South African literature on the within-firm wage distribution of exporting and non-exporting firms is very limited. However, the literature does reveal a wage differential between exporting and non-exporting firms (Rankin 2001; Rankin, 2013; Rankin & Schoër, 2013; Edwards *et al.*, 2016; Matthee *et al.*, 2016). This wage differential seems to vary by type of exporter.

By using newly available administrative data on South African manufacturing firms, Edwards *et al.* (2016) identified a wage premium among exporters. They further distinguished between the wages of three types of trader, namely exporter only, importer only and two-way trader. They showed that the wage premium was the highest for two-way traders, followed by importers only and then exporters only.

By using the same data as Edwards *et al.* (2016), Matthee *et al.* (2016) confirmed the export wage premium in South Africa, showing that exporters paid 31% higher wages than non-exporters (even after controlling for firm size). They further distinguished between different types of exporters in terms of the number of products they exported (multiple-product versus single-product exporters), the number of destinations they served (multiple-destination versus single-destination exporters) and the market they served (Africa or non-Africa). Their results showed that multiple-destination exporters paid higher wages than single-destination exporters. The same was true for multiple-product exporters (paying higher wages than single-product exporters). Furthermore, they showed that exporting firms serving only the African market, paid higher wages than domestic firms, but it was the exporters serving both African and non-African countries that had the highest export wage premium (Matthee *et al.*, 2016).

In a similar vein, Rankin (2001), Rankin (2013) and Rankin and Schoër (2013) classified South African exporters into two groups, namely those who serve regional (lower-income) markets and those who serve international (high-income) markets. Rankin (2001) showed that firms exporting to countries outside of the SADC region pay the highest wages. In a later study, Rankin (2013) confirmed these findings by also grouping South African exporters into two markets served, namely those who export to high-income markets (Europe and North America) and those who export to lower-income markets (Africa). The firms exporting to high-income markets pay higher wages than those exporting to lower-income markets (which pay even less than non-exporters). Another study by Rankin and Schoër (2013) related this phenomenon to product quality and worker quality. Moreover, the high-income

destinations require higher quality products, which are manufactured by more skilled (high-quality) workers who are paid a skills premium (Rankin & Schoër, 2013).

The link between trade and skills was also investigated by Edwards (2001). He found that trade liberalisation had resulted in a skills bias. Edwards (2001) analysed the impact of trade and structural change on employment in South Africa from 1984 to 1997. Even though the study was not on a firm-level, the results showed that technological change had brought about a rise in demand for high-skilled employment and a decrease in the demand for “elementary skilled employment” (Edwards (2001:54). Furthermore, Edwards (2001) showed that there was also a skills bias in the manufacturing export sector. Therefore, growth in trade will more likely create skilled jobs which are paid a skills premium, adding to wage inequality.

Even though South African exporters are heterogeneous in terms of the number of products they export, the number of destinations they serve and the type of destination they serve, it is clear that these exporting firms pay higher wages. However, limited research has been conducted on how these higher wages are distributed within the exporting firm (do all employees earn a wage premium or only some of them?) and on how the wage gap contributes to wage inequality. This article therefore set out to evaluate the link between export participation and the within-firm wage distribution.

3.3 Empirical analysis

3.3.1 Data

The availability of detailed longitudinal administrative data in the international literature has recently cleared the way for a more precise evaluation to be done of the link between wages (more specifically the within-firm wage distribution) and export status (Bernini, 2015). This article made use of South African tax administrative data (from the South African Revenue Service/SARS) with a view to investigating the link between a firm’s export status, wage distribution and wage inequality. In order to do this, a panel dataset was created by linking three sets of data, namely the company income tax data (CIT), employee data (IRP5) and customs data.

The first dataset, i.e. the company income tax data (CIT data), contained the balance sheets and income statements of firms. From the CIT, the following variables describing firm characteristics were obtained: property, plant and equipment (which measure capital intensity), gross income (which measures sales/ output) and the profit code classifier or main industry code (which identifies the sector in which a firm operates). The profit code classifier

was condensed to the four-digit ISIC classification used by SARS to select the firms in the manufacturing sector (ISIC 4 classification: codes 1010 – 1033). For an illustration of the number of firms per sector in the dataset, see Table A1 in the Appendix). It is important to note that the form that firms use to complete their income tax return changed in May 2013. The IT14 was replaced by the ITR14 (for differences, see Table A2 in the Appendix). With the transition from the IT14 to the ITR14, it became evident that some firms completed the IT14 and others completed the ITR14; therefore, these two forms were merged to form a panel of data.

The second dataset used in this article, i.e the IRP5 data, contained the IRP5 certificates of employees completed by/on their behalf by their employers. Hence, the data is reported per job (a unique employer (firm) – employee (individual) combination). The IRP5 contains information on the period that an individual worked in a specific job (in days), their income and their birth date. The raw IRP5 data was adjusted to remove duplicate certificates, multiple job spells and invalid periods worked (see Table A3 in the Appendix). Two variables were created from the IRP5 data, namely the number of employees per firm and the within-firm distribution of wages. Firstly, the weighted number of employees per firm was created by calculating the length of employment (in days) for each worker within a year, arriving at a total within the firm and dividing by 365. The aim was essentially to generate the stock of worker inputs into production per firm for the whole year. Secondly, the within-firm distribution of wages was created in two steps. Step one involved generating the weighted monthly wages per worker by taking the income and dividing it by the number of days worked (to get the daily wage equivalent), and then multiplying this by 30 to get the monthly equivalent of wages. Step two involved taking the weighted monthly wages per person for each firm measuring the distribution of wages within the firm (i.e. measuring the average wage in the firm at the 5th, 25th, 50th, 75th and 95th percentiles).

The third and final dataset used in the article, i.e. the customs transaction data, reported the export transactions of South African firms on a monthly basis. From this database, the following variables were obtained: trader id (firm identifier), tariff code (product code on HS6-digit level), country of destination (market), country of origin (South Africa), customs value of the transaction (South African Rand) and the statistical value (number of units). Two adjustments were made to the raw customs data. Firstly, duplicate transactions (see Table A4 in the Appendix) were removed and secondly, only exporters trading more than ZAR10 000 per year were kept in the dataset (which, however, still covered 99 per cent of export data). In the empirical analysis (section 3.3.3.1 and section 3.3.3.2) of this article, the customs data was utilised on two different levels (on firm-level and on transaction level). As

section 3.3.3.1 focuses on the wage distribution within a firm, the customs data was used to create the following firm-level variables: dummy variables to indicate if a firm was an exporter (or not); the destination to which it exported (SACU³¹ only, *Africa only* or *international*); exporter dynamics (if a firm *entered*³², *exited*³³ or *continued*³⁴ in the export market); the *number of products* (on HS6-digit level) a firm exported and the *number of destinations* served. Section 3.3.3.2 considers possible sources of wage inequality (namely the type of product exported and destination served) and therefore uses transaction level data, which allows one to control for the type of product being exported (HS6-digit product code), its price³⁵ and the GDP per capita³⁶ of the destination country.

To create a panel containing all three datasets, a conjunction Table (provided by SARS) was used to link the various datasets through different firm identifiers. As all three datasets worked on different reporting years/periods, the dates of the datasets were aligned (see Table A5 in the Appendix). After these adjustments were made, the panel dataset on South African manufacturing firms, spanning the period 2010 to 2014, was completed.

3.3.2 Descriptive statistics on manufacturing exporters and their characteristics

An overview of the data is provided in the form of an illustration of the average number of firms in the manufacturing sector from 2010 to 2014 and these firms' export status. From Figure 3.1, it is clear that, on average, 21% of all manufacturing firms export. These exporters are heterogeneous in the markets they serve, as 5% of these firms export only to SACU, 7% export only to other *African* countries (i.e. excluding SACU exporters) and 9% export to *international* markets (these firms export to both African and non-African countries).

³¹ SACU is a customs union between Botswana, Lesotho, Namibia, Swaziland, and South Africa.

³² Entering firms are defined as firms that did not export in t-1, but exported in t.

³³ Exiting firms are firms that exported in t-1, but not in year t.

³⁴ Continuing firms are firms that exported both in year t-1 and t.

³⁵ The product price was calculated in two steps. Step one involved taking the customs value per transaction and dividing by its statistical quantity (to get the HS6_price). Step two, involved determining the difference between the HS6_price and the average price of all products with the same HS6 code (this provides the price as a measure of the deviation from the average price per product).

³⁶ The GDP per capita was obtained from the World Bank (2016).

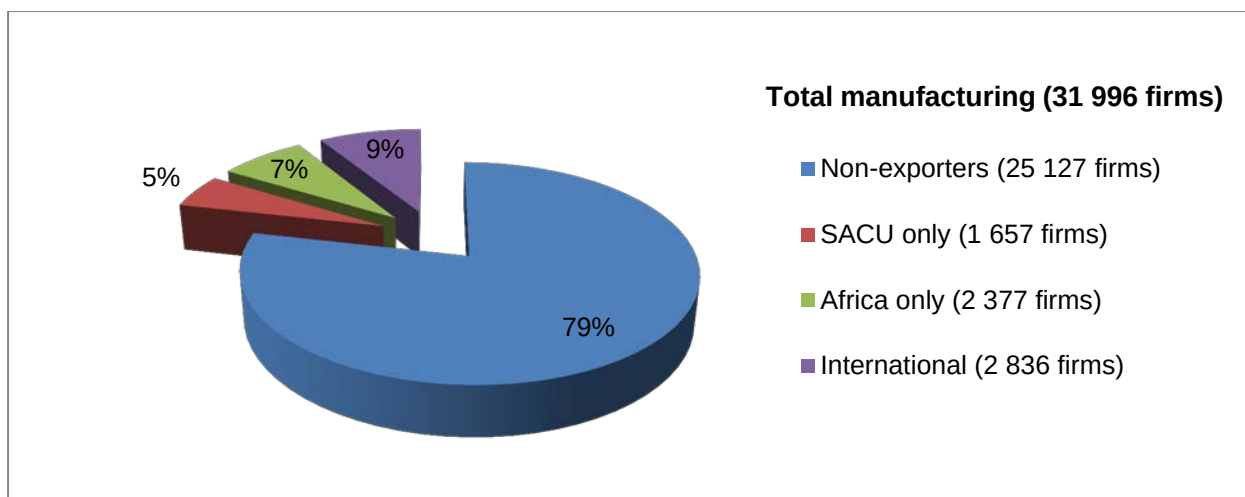


Figure 3-1: The average number of manufacturing non-exporters and exporters (serving different destinations) from 2010-2014

Source: Authors' own calculations.

Exporters differ not only in terms of the markets they serve, but also in terms of their export dynamics. (i.e. a firm can *enter* into, *continue* in or *exit* the export market). Figure 3.2 illustrates the average number of manufacturing exporters in each export dynamic group per export destination. It is clear that, on average, 64% of firms *continue*³⁷ (see the blue wedges) to export year on year. Furthermore, an average of 29% of firms *enter*³⁸ (see the maroon wedges) into the export market each year and only 7% *exit*³⁹ (see the green wedges). It is interesting to note that, across all the dynamic groups, the number of firms exporting only to *African* countries only is larger than the number of firms exporting to the *international* market (exporting to both African and non-African countries). A possible reason for the larger number of firms in the African market is the size, competitiveness and proportion of output exported by these firms (i.e. there are large numbers of small, less competitive firms exporting a small proportion of their output to Africa). Moreover, the literature suggests that a large share of South African firms export, but only a few firms specialise in exporting (the top 5% South African exporters export 85% of the total export value) (Naughtin & Rankin, 2014). The firms exporting to Africa most likely form part of the remaining firms that only export a small amount of their output and are no more productive than domestic firms (Rankin, 2001). Table 3.1 confirms that it is the smaller firms (in terms of number of employees) that export to the *African* market only (relative to the firms exporting to the *international* market). This suggests that the threshold for entering the *Africa only* market is lower, and consequently a larger number of (smaller) firms are able to enter and remain in this market.

³⁷ Continuing exporters are defined as firms that export both in year t-1 and t.

³⁸ Entrants are defined as firms that did not export in t-1, but export in t

³⁹ Exiting firms are firms that exported in t-1, but not in t, (the percentage is based on the number of exporters in previous period)

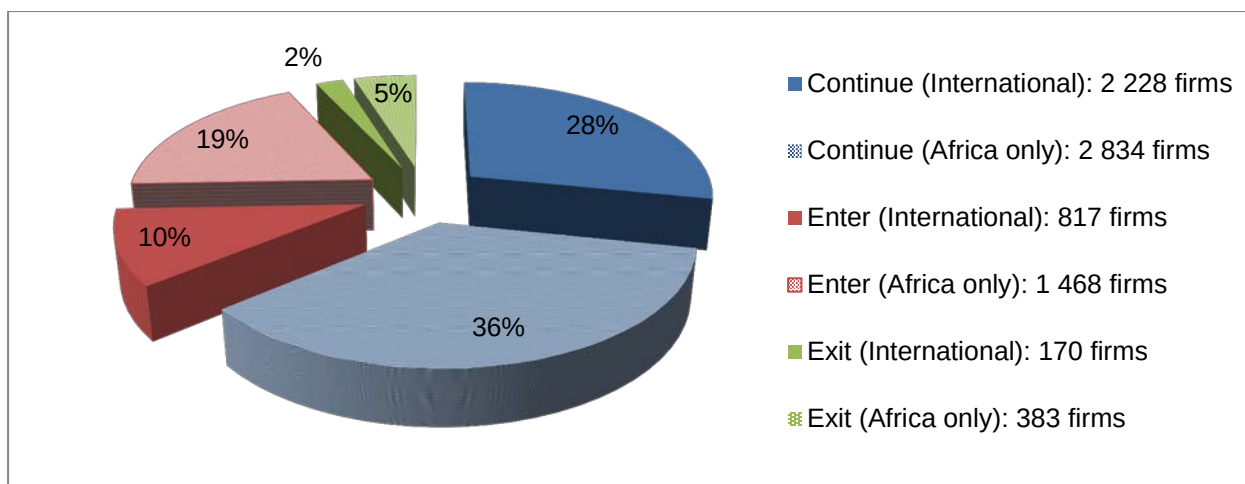


Figure 3-2: Exporter dynamics per destination (average number of firms from 2010-2014)

Source: Authors' own calculations.

Table 3.1 provides more detail on the characteristics (number of employees, capital per worker and output per worker) of firms *entering*, *continuing* in or *exiting* the *international* or *African* markets. Relative to non-exporters and *African* exporters, *continuing* and *entering international* exporters are larger (in terms of number of employees and capital per worker) and more productive (in terms of output per worker). Even though smaller than *international* exporters, all (*continuing*, *entering* or *exiting*) *African* exporters have a larger number of employees, more capital per worker and larger output per worker than non-exporting firms.

Table 3-1: Characteristics of different firms (serving domestic, African and non-African countries)

	Number of employees	Capital per worker	Output per worker
Non-exporters	7	22 677	545 235
International exporters	22	47 379	995 415
<i>Continue</i>	32	55 492	1 185 082
<i>Enter</i>	22	48 397	1 050 613
<i>Exit</i>	11	38 249	750 550
African exporters	15	30 585	880713
<i>Continue</i>	19	32 426	962 327
<i>Enter</i>	14	32 072	920 840
<i>Exit</i>	12	27 257	758 971

Note: These are the median figures for these six groups for 2010–14.

Source: Authors' own calculations

It is also important to take note of the wages (per person) paid to workers in the different types of exporting firms, as well as to consider the within-firm wage distribution (i.e. consider the average monthly wages (per person) paid at the 5th, 25th, 50th, 75th and 95th percentiles of a firm's wage distribution). Figure 3.3 provides a visual representation of the within-firm

wage⁴⁰ distribution. From Figure 3.3, it is clear that the average wages from the 5th to 95th percentiles increase the further away the markets that these exporters serve are (first serving the domestic market, followed by exporting to *SACU* countries only, then exporting to *African* countries only and finally also exporting to *international* markets). The hierarchy appears to be across all parts of the distribution and is larger at the top end. This, together with the increase in the inter quartile range (at the right-hand side of the graph), suggest that the wage inequality within firms increases the further away the market served, is.

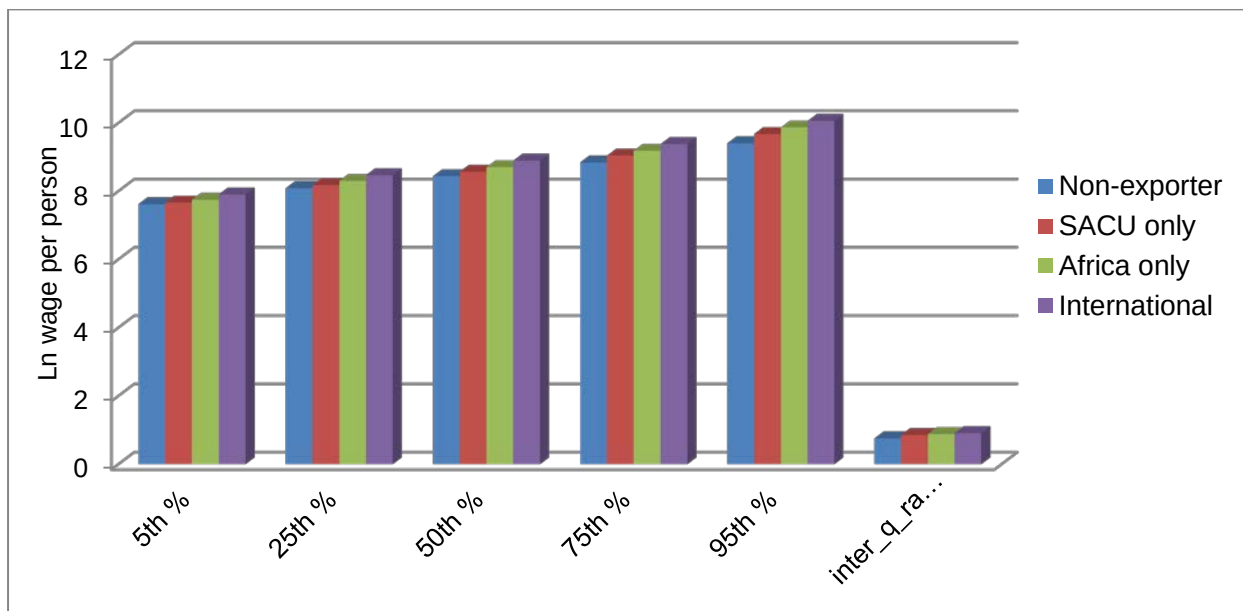


Figure 3-3: Wage distribution: non-exporters versus exporters (serving African and non-African countries) average from 2010-2014

Source: Authors' own calculations.

In summary, an average of 21% of manufacturing firms export. These exporters serve one of two markets (they either export to *Africa only* or also export *internationally*). Even though there is some churning in the export market, 64% of firms continue to export from one year to the next. Exporters are heterogeneous in terms of the markets they serve and in their export dynamics. For example, it is the *international* exporter that is larger (when considering the number of employees and capital per worker), more productive (in terms of output per worker) and pays the highest wages (across the within-firm wage distribution). The next section analyses the wage distribution within these heterogeneous firms and investigates possible sources of wage inequality.

⁴⁰ The wage distribution is the average figure (Ln wage per person) per quantile for descriptive purposes.

3.3.3 Regressions on within-firm wage distribution and possible sources of wage inequality

From figure 3.3, it is apparent that there is a wage differential and wage inequality between firms that serve different markets (first serving the domestic market, followed by exporting to SACU countries only, then exporting to *African* countries only, and finally also exporting to *international* markets). However, as Figure 3.3 simply represents wage levels, the observed inequality should be investigated further by means of regressions with various control variables. To this end, section 3.3.3.1 considers the within-firm wage distribution to which different controls (in terms of firm characteristics) are added with a view to shedding light on the possible sources of the wage differential and wage inequality. Section 3.3.3.2 then further examines the wage inequality by considering the characteristics of the destination economy (proxied by GDP per capita) and quality of exports (proxied by the price of the manufactured export product) as other possible explanations for the wage inequality.

3.3.3.1 Within-firm wage distribution and inequality

3.3.3.1.1 Estimation strategy: Within-firm wage distribution and inequality

The wage differential and wage inequality between exporters (serving different destinations) and non-exporters observed in Figure 3.3 could be due to exporters just being different types of firms (for example, larger and more capital intensive firms serving different industries). One way to compare “like-for-like” is to estimate regression with control variables. Consequently, to examine the within-firm wage distribution of exporters (with different dynamics and destinations) relative to non-exporters (with control variables), this article followed the methodology of Bernard and Jensen (1995) in measuring the export premia (in terms of monthly wages). This was done by estimating regressions of the general form:

$$\ln(X)_{it} = \alpha + \beta_1 \text{Export}_{it} + \beta_2 \text{No. dest}_{it} + \beta_3 \text{No. prod}_{it} + \beta_4 \text{lkl}_{it} + \beta_5 \text{Industry}_{it} + \beta_6 \text{year}_{it} + u_{it} \quad (1)$$

In equation 1, $\ln(X)_{it}$ is the logarithm of monthly wages earned by workers at each percentile of the firm's wage distribution (5th percentile, 25th percentile, 75th percentile, and 95th percentile) as well as the standard deviation and inter quartile range of these wages per firm. The “*Exporter_i*” is a dummy variable indicating the export status of a firm. The export status can vary between a non-exporter and an exporter exporting to *Africa*, *SACU* or the *international* market, therefore the export dummy has interactions with *Africa* and *SACU* dummies. Furthermore, export status is also interacted with firm dynamics (*enter*, *exit* or

continue). The number of destinations ($No.dest_{it}$) to which a firm exports and the number of products ($No.prod_{it}$) it exports are also accounted for (in the case of non-exporting firms this variable is simply a zero). Capital per worker (lkl_{it}) is also included in the equation. Equation 1 further adds two control dummies. The first is for the industry ($Industry_{it}$) in which the firm operates in (classified according to the 4-digit ISIC code) and the second is for the years (2010 - 2014) in the panel ($year_{it}$). Finally, the export premia (of the wages) are represented by (β_{it}) as well as the error term (μ_{it}).

Even though equation 1 takes into account the capital per worker (lkl_{it}) in a firm, other firm characteristics could influence the wages that a firm pays to workers in different parts of its wage distribution. Equation 2 expands on the model (equation 1) by adding firm characteristics that measure firm size and labour productivity.

$$\ln(X)_{it} = \alpha + \beta_1 Export_{it} + \beta_2 No.dest_{it} + \beta_3 No.prod_{it} + \beta_4 lkl_{it} + \beta_5 ll_{it} + \beta_6 lyl_{it} + \beta_7 Industry_{it} + \beta_8 year_{it} + u_{it} \quad (2)$$

In equation 2 (ll_{it}) is the *ln* number of employees which measures firm size, whereas (lyl_{it}) is the *ln* output per worker which serves as a measure of labour productivity. By adding these two controls, is possible to determine the impact of firm size and labour productivity on wages (and the wage distribution in a firm) when equations 1 and 2 are compared.

3.3.3.1.2 Results: Within-firm wage distribution and inequality

Wage distribution of exporters within and outside of Africa

Table 3.2 shows the distribution of wages between exporting firms serving different destinations relative to non-exporters (by estimating equation 1, i.e. controlling for the number of destinations, number of products, capital per worker, industry and year). Right across the distribution (from the 5th to the 95th percentiles) there is a hierarchy in the wage premium for firms as the further away the destination is located (i.e. *SACU only* exporters' wages are lower than *Africa only* exporters' wages, which are in turn lower than *international* exporters' wages). For example, at the 25th percentile the wage premium for SACU only exporters is 9.23% lower than that for Africa only exporters, which is in turn 6.8% lower than that for international exporters. Therefore, a job at an *international* firm pays higher wages, but what about the wage inequality in these firms?

The wage inequality can be seen by considering the standard deviation and interquartile range in the last two columns of Table 3.2. It is clear that (similar to the wage premium) the standard deviation and interquartile range also increase as the export destination becomes

more distant. Therefore, a job at an *international* firm pays better (are better jobs), but there is higher wage inequality within these firms.

When considering the number of products a firm exports and the number of destinations to which they export, it is clear that both the number of destinations and the number of products are more significant and have a bigger quantitative effect as one moves from the lower tail to the upper tail of the distribution (from the 5th to the 95th percentiles). For example, exporting to one more destination increases the 95th percentile (2.0%) by more than it increases the 5th percentile (0.6%). It is also important to note that, with destinations, the wage effect of adding a destination is the largest at the 95th percentile while, with products, the wage effect is almost equal at each percentile. One of the arguments put forward in the literature as to why exporters pay more is that they need more sophisticated management. For example, they may be exporting, multiple products to multiple destinations which is a complex process that requires quality upgrade, and the enhancements of operational services and skills. Exporters therefore need more sophisticated staff on the factory floor, but also greater management or technical expertise found in higher skilled workers (which are seen at the upper tail of the distribution) (Brambilla *et al.*, 2015).

Table 3-2: Wage distribution: firms serving domestic, African and non-African countries

	5 th %	25 th %	50 th %	75 th %	95 th %	Std dev	Int q_r
International	0.155*** (0.0147)	0.208*** (0.0104)	0.256*** (0.00943)	0.331*** (0.00992)	0.535*** (0.0111)	0.0656*** (0.00537)	0.135*** (0.00815)
Africa only	0.104*** (0.0129)	0.151*** (0.00912)	0.200*** (0.00824)	0.286*** (0.00867)	0.495*** (0.00967)	0.0584*** (0.00471)	0.123*** (0.00712)
SACU only	0.0233 (0.0145)	0.0684*** (0.0103)	0.0888*** (0.00931)	0.140*** (0.00979)	0.304*** (0.0109)	0.0357*** (0.00532)	0.0715*** (0.00804)
No. of dest	0.00588*** (0.00123)	0.0136*** (0.000872)	0.0135*** (0.000789)	0.0147*** (0.000830)	0.0204*** (0.000926)	0.00259*** (0.000446)	0.00111 (0.000681)
No. of prod	7.68e-05 (0.000161)	0.000527** (0.000114)	0.000856** (0.000103)	0.00119*** (0.000109)	0.00130*** (0.000121)	0.000398** (5.85e-05)	0.000665** (8.92e-05)
lkl	0.0273*** (0.00121)	0.0251*** (0.000855)	0.0257*** (0.000773)	0.0280*** (0.000813)	0.0292*** (0.000907)	0.00366*** (0.000459)	0.00288*** (0.000668)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	130 640	130 640	130 640	130 640	130 640	122 868	130 640
R-squared	0.038	0.092	0.143	0.163	0.156	0.015	0.023

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

Source: Authors' own calculations.

Figure 3.4 provides an illustration of the estimation of both equation 1 (also see Table 3.2 above) and equation 2 (see Table B1 in the Appendix). Therefore, Figure 4 plots the coefficient of the wage premium from the regressions on a line graph, to illustrate the wage distribution within a firm. The difference between the two equations is that equation 1 (represented by the solid lines) only controls for capital intensity (capital per worker), whereas equation 2 (represented by the dotted lines) also controls for firm size (in terms of

number of employees) and labour productivity (in terms of output per worker). The solid blue, red and green lines (results of equation 1) show the within-firm wage distribution of *international*, *African* and *SACU* exporters relative to non-exporters. Here, the export wage premium is very clear. This observed premium also increases in magnitude towards the upper tail (75th and 95th percentiles) of the within-firm wage distribution (which indicates wage inequality). When more firm characteristics are added (by estimating equation 2), the distribution changes shape (which is represented by the dotted lines). Essentially, this shows that the wage inequality observed from the solid lines is mostly due to firm characteristics (i.e. different types of firms export *internationally* compared to those that export regionally).

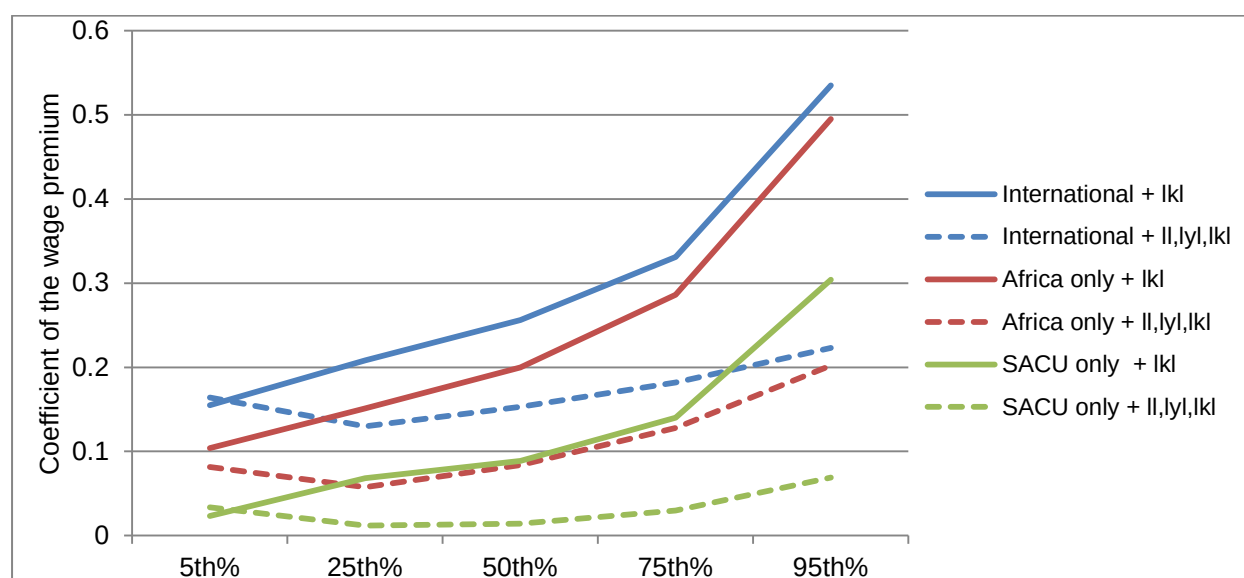


Figure 3-4: Distribution of the coefficients of the wage premium: firms serving domestic, African and non-African countries, with different controls

Note: Premium relative to non-exporters.

Source: Authors' own calculations (see Tables 3.2 above and B1 in the Appendix).

As seen in the descriptive statistics, exporters do not only differ in terms of the markets that they serve, but also in terms of their export dynamics. (i.e. a firm can *enter*, *continue* or *exit* the export market). Tables 3.3, 3.4 and Figure 3.5 focus on the wage distribution between exporters with different dynamics.

Wage distribution of exporters with different dynamics

Comparing firms that *enter* into the export market with those that *continue* to export or *exit* the export market provides an indication of what happens to an exporting firm's wage distribution over time. Tables 3.3 and 3.4 present the results of estimating equation 1 (with and without controls for the number of products and destinations). When controlling for the number of products and the number of destinations, Table 3.4 shows that the distribution of wages within a firm is higher for *entering* firms than for *continuing* firms (from the 5th to the 75th percentile). Without the control (see Table 3.3), the *continuing* firm's wage distribution is

Table 3-3: Wage distribution: exporters' dynamics (enter, exit and continue) without product and destination control

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	int_q_r
Continue	0.0802*** (0.00358)	0.141*** (0.00974)	0.249*** (0.00694)	0.296*** (0.00626)	0.387*** (0.00660)	0.642*** (0.00738)	0.137*** (0.00545)
Exit	0.0569*** (0.00978)	0.0829*** (0.0266)	0.151*** (0.0189)	0.197*** (0.0171)	0.272*** (0.0180)	0.387*** (0.0201)	0.120*** (0.0149)
Enter	0.0724*** (0.00510)	0.138*** (0.0138)	0.240*** (0.00985)	0.293*** (0.00888)	0.374*** (0.00937)	0.538*** (0.0105)	0.135*** (0.00774)
lkl	0.00426*** (0.000494)	0.0268*** (0.00129)	0.0261*** (0.000922)	0.0272*** (0.000832)	0.0301*** (0.000877)	0.0328*** (0.000980)	0.00400*** (0.000725)
Constant	4.625*** (0.00673)	5.893*** (0.0180)	6.357*** (0.0128)	6.631*** (0.0115)	6.994*** (0.0121)	0.740*** (0.0135)	0.688*** (0.01197)
No. dest & prod control	No	No	No	No	No	No	No
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	130 640	130 640	130 640	130 640	130 640	122 868	130 640
R-squared	0.013	0.035	0.089	0.138	0.160	0.152	0.021

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table 3-4: Wage distribution: exporters' dynamics (enter, exit and continue) with product and destination control

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	int_q_r
Continue	0.0852*** (0.0115)	0.138*** (0.00810)	0.174*** (0.00733)	0.248*** (0.00771)	0.469*** (0.00860)	0.0538*** (0.00418)	0.110*** (0.00633)
Exit	0.0823*** (0.0269)	0.150*** (0.0190)	0.197*** (0.0172)	0.272*** (0.0181)	0.388*** (0.0202)	0.0574*** (0.00984)	0.121*** (0.0148)
Enter	0.101*** (0.0123)	0.147*** (0.00868)	0.192*** (0.00785)	0.264*** (0.00825)	0.427*** (0.00920)	0.0567*** (0.00450)	0.117*** (0.00677)
No. of dest	0.00916*** (0.00112)	0.0171*** (0.000796)	0.0176*** (0.000719)	0.0190*** (0.000757)	0.0249*** (0.000844)	0.00292*** (0.000406)	0.00191*** (0.000621)
No. of prod	5.39e-05 (0.000161)	0.000496** (0.000114)	0.000832** (0.000103)	0.00118*** (0.000108)	0.00127*** (0.000121)	0.000406** (5.83e-05)	0.000681** (8.90e-05)
lkl	0.0274*** (0.00121)	0.0252*** (0.000855)	0.0258*** (0.000773)	0.0281*** (0.000813)	0.0293*** (0.000907)	0.00364*** (0.000459)	0.00286*** (0.000667)
Constant	6.893*** (0.0180)	7.357*** (0.0128)	7.631*** (0.0115)	7.994*** (0.0121)	8.740*** (0.0135)	0.625*** (0.00673)	0.637*** (0.00997)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	130 640	130 640	130 640	130 640	130 640	122 868	130 640
R-squared	0.038	0.092	0.142	0.163	0.156	0.015	0.024

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

higher (wider). Therefore, as firms *continue* exporting, they grow in terms of the number of products exported and destinations served. Table 3.4 also shows that when a firm *enters* the export market, the bottom 5th percentile, on average, earns 1.7% more than continuing firms (exporting the same number of products to the same number of destinations). However, when a firm *enters* the export market, the top 95th percentile on average earns 6.5% less than continuing firms. Therefore, relative to *entering* firms, *continuing* firms pay more as one moves to the upper tail of the distribution. There is however, not a big difference between

entering and *continuing* firms. Overall, Tables 3.3 and 3.4 suggest that actually prior to, or within the first year of entry, firms already pay higher wages and have higher wage inequality right through the distribution.

Figure 3.5 provides a graphical illustration of estimating equations 1 and 2 (also see Tables 3.2 above and B2 in the Appendix) for firms with different exporter dynamics. Equation 1 (represented by the solid lines) only controls for one firm characteristic, namely capital intensity (capital per worker), whereas equation 2 also controls for firm size (in terms of number of employees) and labour productivity (in terms of output per worker). From the results of equation 1 (represented by the solid lines) in Figure 3.5, it is clear that, relative to non-exporters, the wage premium for firms in the export market increases in magnitude towards the top end of the distribution. However, when controlling for more firm characteristics (estimating equation 2), the distribution changes shape and the large wage inequality at the 75th and 95th percentiles drops (see dotted lines). Therefore, the observed wage inequality can mostly be explained by firm characteristics (i.e. firm size and worker productivity).

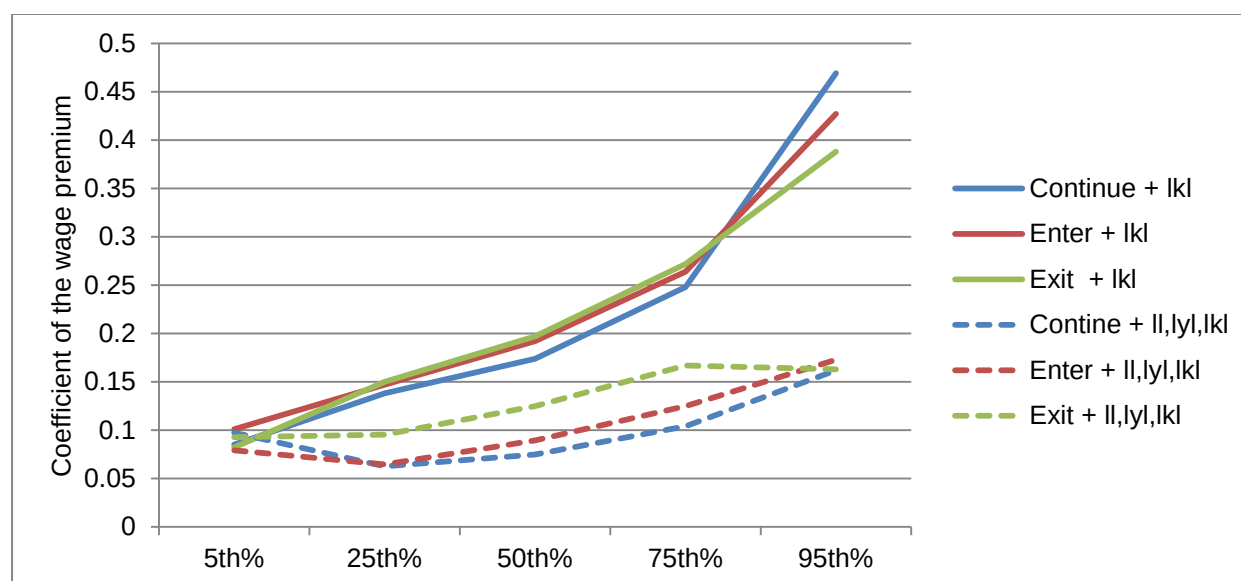


Figure 3-5: Distribution of the coefficients of the wage premium: exporter dynamics (enter, exit and continue), with different controls

Note: Premium relative to non-exporters.

Source: Authors' own calculations (see Tables 3.3 above and B2 in the Appendix).

Tables 3.3, 3.4 and Figure 3.5 illustrate how the wage distribution differs between exporters with different dynamics (*enter*, *exit* or *continue*). The next point to consider is the destination/market that these exporters *enter*, *continue* in or *exit*. Figures 3.6 and 3.7 add destination categories, showing the wage distribution of exporters that *enter*, *continue* in or *exit* from different destinations (using different controls).

Wage distribution and inequality of exporters with different dynamics (to African and non-African countries)

Figure 3.6 combines the exporter dynamics with the destination served. Similar to Figures 3.4 and 3.5, this figure is a visual representation of estimation equations 1 and 2 (which the regression results of Tables B3 and B4, respectively). The difference between the equations is that equation 1 only controls for one type of firm characteristic (namely capital per worker), whereas equation 2 controls for two more firm characteristics (namely firm size and worker productivity). The results of equation 1 are presented as the full bars (upper and lower end of each bar) and equation 2's results are presented as the lower (darker coloured) end of each bar.

Overall, from the results of equation 1 and 2, there is a clear export premium across the wage distribution. When distinguishing between exports to *African* and *international* markets, the premium is larger for exporters serving *international* market. This is true across all export dynamic groups (for *continuing* exporters, compare blue and purple; firms *entering* the export market compare maroon and light blue; and for *exiting* exporters, compare green and orange). Furthermore, the shape of the distribution of *continuing* and *entering* exporters is relatively similar.

The results of equation 1 (represented by each full bar) show that there is an export premium across the wage distribution. Relative to non-exporters, higher wages are paid by exporters throughout the distribution. This premium increases in magnitude towards the top end of the distribution. Exporters, relative to non-exporters, pay much higher wages at the top end than at the bottom end.

In Figure 3.6, the darker coloured, lower end of each bar represents the premium when firm characteristics (number of employees and output per worker) are controlled for, while the lighter coloured, upper end is the additional premium without the controls. Overall, this indicates that the wage inequality is driven by the distribution of firm size (measured by the number of employees) and labour productivity (which is output per worker) within exporters compared to non-exporters (see Table 3.1), with much of the observed wage inequality being because larger, more productive firms are more likely to be exporters.

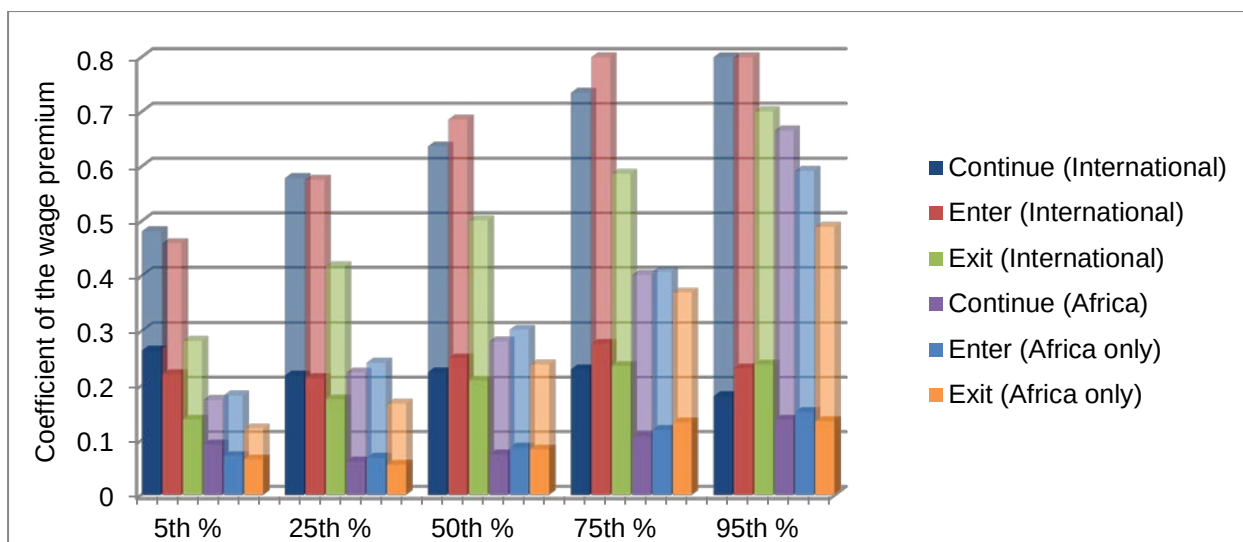


Figure 3-6: Distribution of the coefficients of the wage premium: exporter dynamics (to African and non-African countries)

Note: Premium relative to non-exporters—the lower end of each bar is the premium when adding controls for firm characteristics (number of employees and output per worker).

Source: Authors' own calculations (see Tables B3 and B4 in the Appendix).

In addition to Figure 3.6, Figure 3.7 shows the standard deviation of each of these groups before (estimating equation 1 - see bars on the left-hand side) and after (estimating equation 2 - see bars on the right-hand side) controls for firm size and labour productivity are added. On the left-hand side, it is evident that there is a wide dispersion of wages within exporters (particularly within *international* exporters). However, almost all that dispersion (particularly within *continuing* exporters) is explained by labour productivity and the size of these firms (see bars on the right-hand side). This suggests that there is a large degree of dispersion of these variables (namely number of employees and output per worker) for these firm groups (represented by each bar) relative to non-exporters.

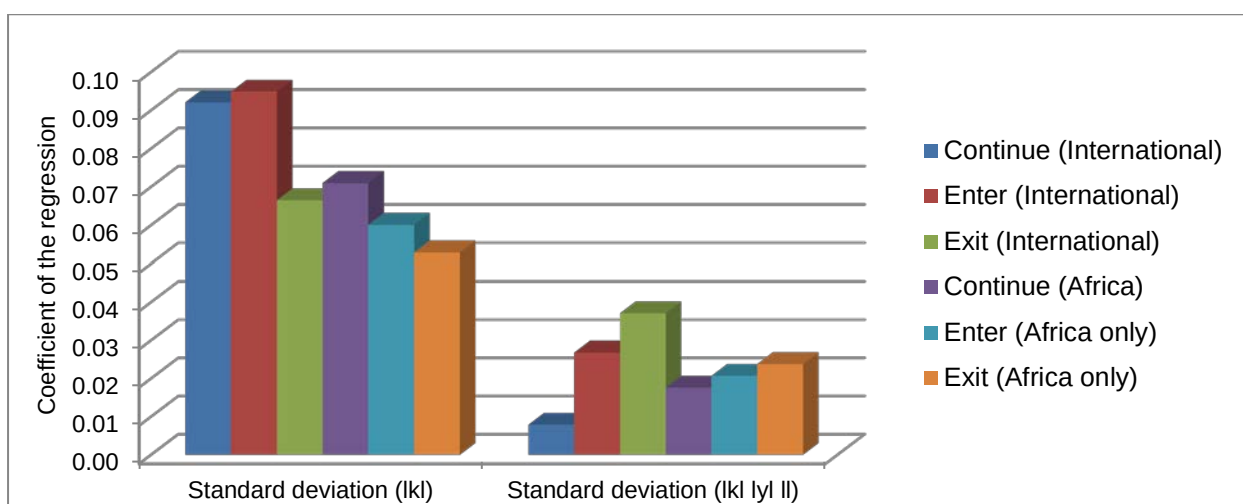


Figure 3-7: Wage inequality in terms of exporter status

Note: Premium relative to non-exporters.

Source: Authors' own calculations (see Tables B3 and B4 in the Appendix).

Even though the standard deviation (Figure 3.7) is substantially smaller after controlling for firm size and output per worker, there is still a difference in the within-firm wage distribution of exporters relative to non-exporters, as well as within exporters. From the literature it is clear that skills do have an influence on wage inequality. As there are no variables available on skills, an indirect way to take skills into account is by considering the GDP of the destination country and the quality of the product. Verhoogen (2008), Brambilla *et al.*, 2012, Brambilla and Porto (2016), as well as Rankin and Schoer (2013) allude to the fact that the type of product (high-quality versus low-quality) exported or the type of destination (high or low income per capita) exported to could influence workers' wages. This is due to higher quality goods being manufactured by more skilled workers who get paid a skills premium (Brambilla & Porto, 2016; Rankin & Schoer, 2013). Also, high-income countries have been shown to demand higher quality goods, and firms exporting to these destinations subsequently pay higher wages (Brambilla & Porto, 2016). These factors could therefore influence the wage distribution and therefore wage inequality between exporters and non-exporters (as well as within exporters). Section 3.3.3.2 investigates these factors as possible sources of wage inequality.

3.3.3.2 Possible sources of wage inequality

3.3.3.2.1 Estimation strategy: Possible sources of wage inequality

To be able to consider the impact of the type of export product and destination on within-firm wage distribution, the transaction-level customs data is used - as it reports on the product being exported (HS-6 digit), the export price and the country of destination. The panel data (dated from 2010-2014) used in this section was constructed by using the customs transaction data as the base and merging firm characteristics (obtained from the CIT and IRP5 datasets) onto it (see section 3.3.1 for more detail on the data). The starting point for this analysis is estimating the following regression of the general form:

$$\ln(X)_{ijk,t} = \alpha + \beta_1 \text{Exporter}_{ijk,t} + \beta_2 \text{No. dest}_{ijk,t} + \beta_3 \text{No. prod}_{ijk,t} + \beta_4 \text{Industry}_{ijk,t} + \beta_5 \text{firm}_{jk,t} + \beta_6 \text{year}_{ijk,t} + u_{ijk,t} \quad (3)$$

Where:

$X_{ijk,t}$ – within-firm distribution of monthly wages (measured at the 5th, 25th, 50th, 75th and 95th percentiles)

$\text{Exporter}_{ijk,t}$ – dummy variable of export status (SACU, Africa, international, enter, continue)

$No.dest_{ijk,t}$ – control dummy (number of destinations exported to by firm)

$No.prod_{ijk,t}$ – control dummy (number of products exported by firm)

$Industry_{ijk,t}$ – control dummy (4-digit ISIC classification) to account for heterogeneity

$firm_{jk,t}$ – control for firm characteristics (ln capital per worker, ln number of employees, ln output per worker)

$year_{ijk}$ – control dummy for the years 2010 - 2014

By estimating equation 3, a base (reference point) of the wage distribution/inequality is provided as this regression does not control for type of destination or type of product. In order to test whether product quality (measured in terms of product price) affects the distribution of wages within a firm a control variable $price_{ik,t}$ is added to equation 3 to form equation 4. The product price was calculated in two steps. Step one, involved taking the customs value per transaction and dividing this by its statistical quantity (to get the HS6_price). Step two, involved determining the difference between the HS6_price and the average price of all products with the same HS6 code (this provides the price as a measure of the deviation from the average price per product).

$$\ln(X)_{ijk,t} = \alpha + \beta_1 Exporter_{ijk,t} + \beta_2 No.dest_{ijk,t} + \beta_3 No.prod_{ijk,t} + \beta_4 Industry_{ijk,t} + \beta_5 firm_{jk,t} + \beta_6 year_{ijk} + \beta_7 price_{ik,t} + u_{ijk,t} \quad (4)$$

Not only could the product quality influence wage, but Brambilla and Porto (2016) show that wages for exporters are higher if a firm exports to high-income countries. This is due to the quality of the products demanded being higher. Therefore one can test if the distribution of the wages flattens as one controls for destination GDP. Equation 5 adds GDP per capita of the destination country to equation 3.

$$\ln(X)_{ijk,t} = \alpha + \beta_1 Exporter_{ijk,t} + \beta_2 No.dest_{ijk,t} + \beta_3 No.prod_{ijk,t} + \beta_4 Industry_{ijk,t} + \beta_5 firm_{jk,t} + \beta_6 year_{ijk} + \beta_7 GDP_{ij,t} + u_{ijk,t} \quad (5)$$

The final step in the analysis combines equations 4 and 5 with product fixed effects (at HS-6 digit level) to test whether the within-firm wage distribution changes shape after all explanatory variables (GDP, price and product fixed effects) have been included. Equation 6 therefore isolates the residual premium at each part of the distribution (from the 5th to the 95th percentile).

$$\ln(X)_{ijk,t} = \alpha + \beta_1 \text{Exporter}_{ijk,t} + \beta_2 \text{No. dest}_{ijk,t} + \beta_3 \text{No. prod}_{ijk,t} + \beta_4 \text{Industry}_{ijk,t} + \beta_5 \text{firm}_{jk,t} + \beta_6 \text{year}_{ijk} + \beta_7 \text{price}_{ik,t} + \beta_8 \text{GDP}_{ij,t} + \text{prod fe} + u_{ijk,t} \quad (6)$$

The results of estimating equation 3 to 6 are presented in the following section (section 3.3.2.3.1). Figure 3.6 shows that wage inequality is higher among *international* exporters than within *African* exporters and the same is true for *entering* versus *continuing* exporters. Figure 8 represent the distributions to *African* and non-African countries (also see Tables B5–B11), Figure 9 represents exporter dynamics (also see Tables B12–B18) and Figure 10 represents a combination of destinations and dynamics (also see Tables B19–B25).

3.3.2.2 Results: Possible sources of wage inequality

Wage inequality of firms exporting to African and non-African countries

Figure 3.8 provides an illustration of the within-firm wage distribution of the coefficients of the wage premium for *African* exporters relative to *international* exporters (the base). Similar to Figure 3.4, Figure 3.8 shows that *international* firms (the base) have higher wage premia across the distribution. Furthermore, each line in Figure 3.8 represents equations 3 to 6. Firstly, the blue line (*Africa only*) illustrates the results of estimating equation 3 without any type of product or destination controls. This provides a base (reference point) for the wage distribution/inequality.

When estimating equation 4 (adding product price, represented by the maroon line) the distribution shifts down (shifts in the mean) but does not change shape. Therefore, the wage inequality does not seem to be due to product quality. By estimating equation 5 (adding GDP per capita of the destination country, represented by the green line), the distribution also shows a slight downward shift but does not flatten out (does not change shape). Thus, the destination country does not seem to influence the wage distribution. Finally, when adding product-fixed effects in combination with type of product and destination controls (estimating equation 6), the distribution's shape stays similar. Thus, the wage inequality is not due to a specific product type, or within-product type. For example, the fact that an exporter pays higher wages or has an unequal distribution of wages is not due to a specific product (e.g. car) being exported. Hence, the observed wage inequality has little to do with the destination country (high or low income per capita), the quality of the product (high-quality versus low-quality product) or the type of product being exported.

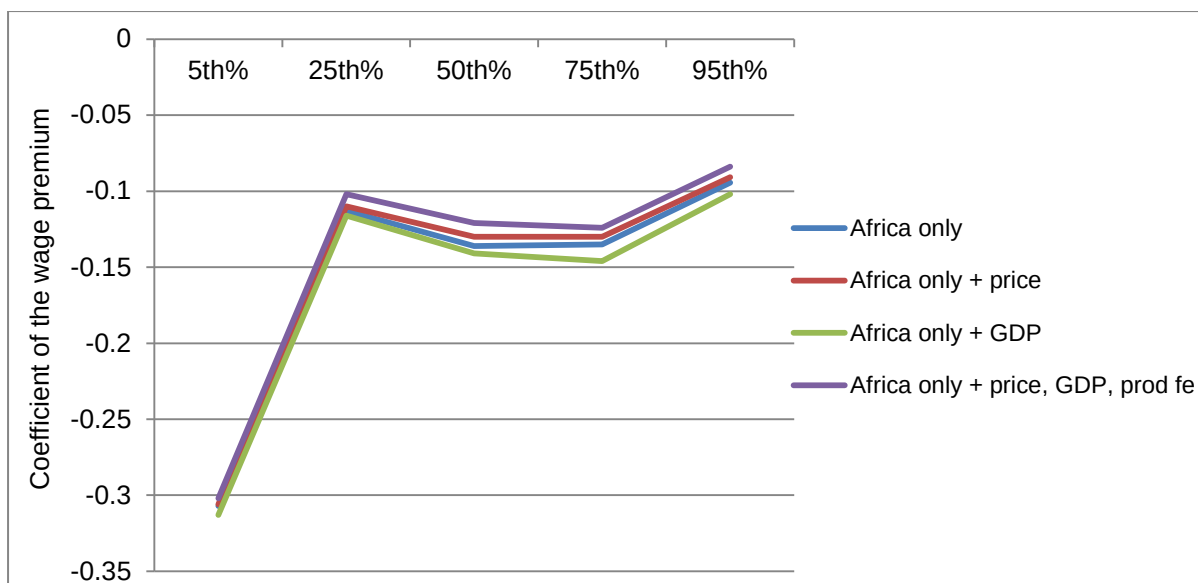


Figure 3-8: Distribution of the coefficients of the wage premium (inequality): firms exporting to African and non-African countries

Note: Relative to international firms

Source: Authors' own calculations (see Tables B5– B11).

Not only is the wage inequality higher among *international* exporters, but Figure 3.6 shows that firms entering the export market have higher wage inequality than those continuing in the export market. The next section considers the wage inequality of exporters with different dynamics. It also investigates if the unequal distribution of wages changes shape when controls for product quality, GDP and fixed effects are added (i.e. estimating equations 3 to 6).

Wage inequality of exporters with different dynamics

Figure 3.9 shows the wage distribution of *entering* firms relative to continuing firms⁴¹. Similar to Figure 3.5, Figure 3.9 demonstrates that there is a wage premium for firms *entering* the export market. As in Figure 3.8 above, the distribution does not change when adding a control for product price (estimating equation 4), a GDP control (estimating equation 5) and/or product-fixed effects (estimating equation 6). This confirms that, with *entrants*, wage inequality is not caused by the type of product or destination.

⁴¹ There are no *exiting* firms because they do not trade and therefore would not be included in the customs transaction data.

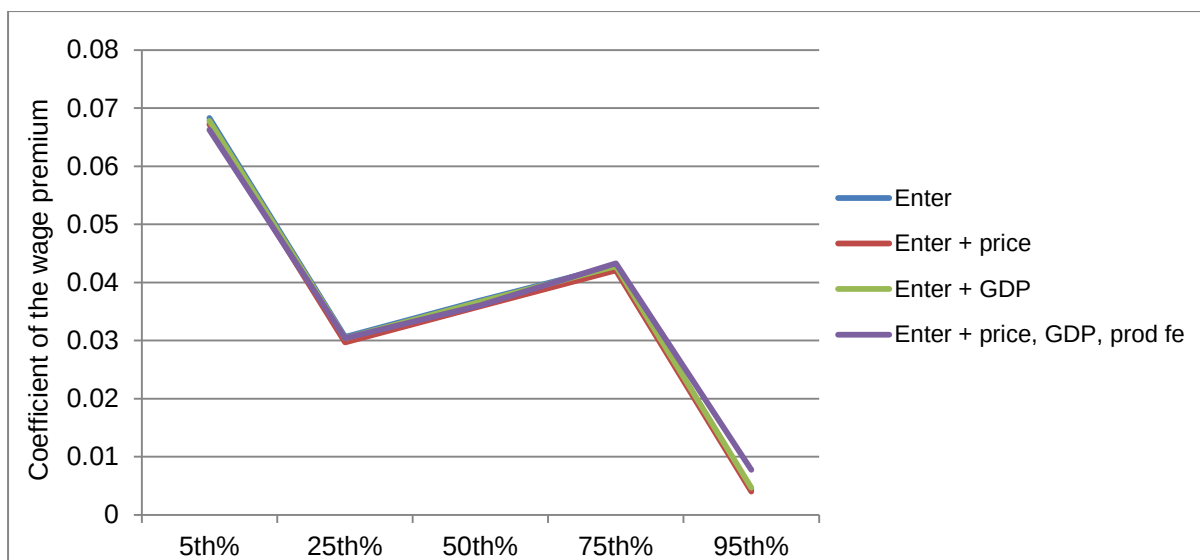


Figure 3-9: Distribution of the coefficients of the wage premium (inequality): exporter dynamics

Note: Relative to continuing firms

Source: Authors' own calculations (see Tables B12– B18).

From Figures 3.8 and 3.9 it is clear that the wage inequality is higher within *international* exporters (who form the base) than within *African* exporters, with and the same being true for *entering* versus *continuing* exporters. The next section combines these two figures by considering the wage inequality of firms that *enter* and *continue* to export to *African* and non-African countries.

Wage inequality of exporters with different dynamics (to African and non-African countries)

Figure 3.10 shows the wage distribution of firms *entering* the *international* market, *entering* the *African* market and *continuing* in the *African* market relative to firms *continuing* in the *international* market. This figure confirms two of the findings from Figure 3.6. Firstly that, relative to firms *continuing* in the *international* market (the base), *continuing* (see green lines) or *entering* (see maroon lines) firms in *Africa* do not have a wage premium, but firms *entering* the *international* market do (see blue lines). The within-firm wage distribution of *entering* (*Africa only*) and *continuing* (*Africa only*) exporters are very similar.

Secondly, Figure 3.10 adds to Figure 3.6 by considering if the type of product (high-quality versus low-quality product) exported or the type of destination (high or low income per capita) exported to could have an effect on the within-firm wage distribution. The results show that the within-firm wage distributions of firms *entering* the international market (illustrated by the four solid blue lines) relative to continuing international firms (the base), do not change shape (flatten out) as product control (equation 4), destination GDP

control(equation 5), or product-fixed effects (equation 6) are added. Therefore, the wage inequality seems to have little to do with the destination country, the quality of the product or the type of product. It might suggest that it has something to do with the process of exporting or simply being in the export market (a firm's export status). Another possible explanation is that the remaining wage inequality is due to a specific type of firm which has this (unequal) wage distribution even before it starts to participate in the export market.

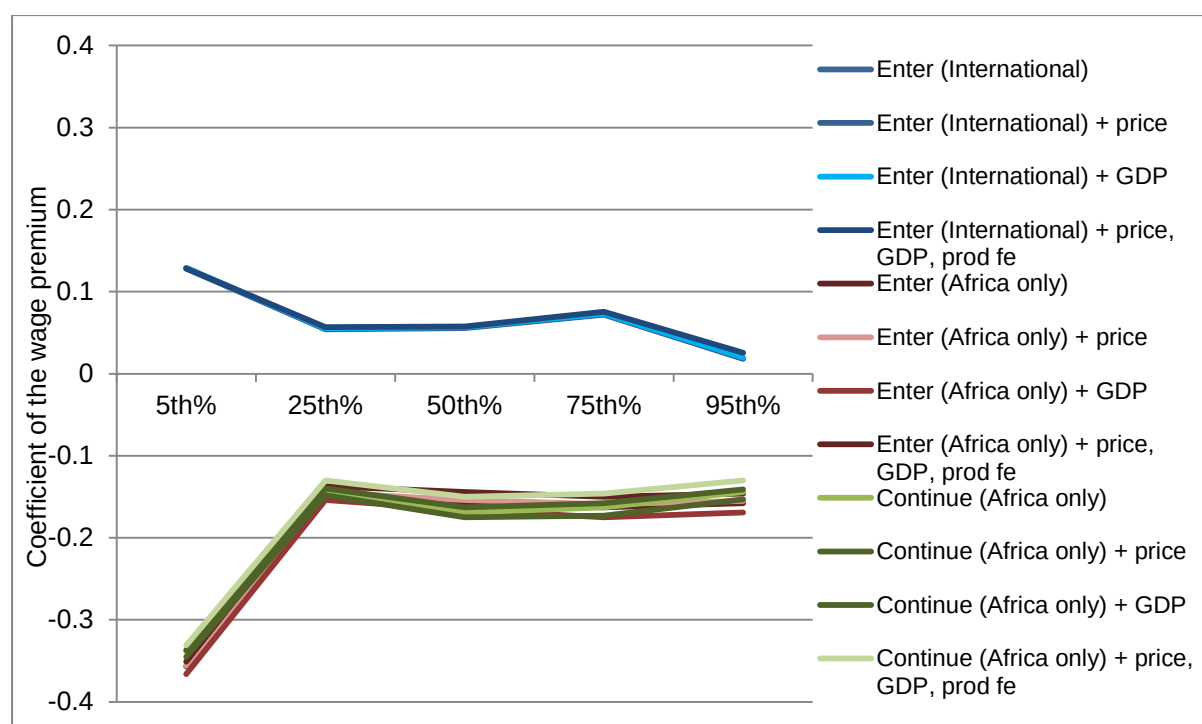


Figure 3-10: Distribution of the coefficients of the wage premium (inequality): exporter dynamics (to African and non-African countries)

Note: Relative to continue international firms

Source: Authors' own calculations (see Tables B19– B25).

3.4 Conclusion

South Africa is one of the most consistently unequal countries in the world, with one of the highest income Gini coefficients (measuring income inequality). The international literature finds the uneven distribution of wages between exporters and non-exporters to be one of the sources of wage inequality (which is the primary source of income inequality). From the South African empirical literature (and Chapter 2), it is clear that unequal wages is evident in the South African manufacturing sector, due to a wage differential that exists between exporters and non-exporters (i.e. exporters pay higher wages than non-exporters). However, there is limited work on how these higher wages are distributed within the exporting firms (do all employees earn a wage premium or only some of them?) as well as on how the wage gap contributes to wage inequality.

Wage inequality is usually studied in terms of the skills premium. The longitudinal tax administrative firm-level data used in this article did not contain variables on education or skills level. However, the data allowed for the calculation of the average wage in a firm at the 5th, 25th, 50th, 75th and 95th percentiles (i.e. the within-firm wage distribution). Therefore, instead of comparing the average or median wages of exporting versus non-exporting firms, the paper compared how the wages within an exporting firm, relative to a non-exporting firm, are distributed. Inequality was therefore illustrated through the within-firm wage distribution, where a more unequal distribution of wages throughout the percentiles showed higher wage inequality.

The aim of this paper was therefore to more fully understand the wage differences both between non-exporters and exporters and within exporters (by considering exporter dynamics and destinations served). In short, it investigated within-firm wage distribution and inequality among South African manufacturing firms. The results showed that, right across the within-firm wage distribution (from the 5th to the 95th percentiles), there is a hierarchy in the wage premium for firms the further away the destination is located (i.e. *SACU only* exporters' wages are lower than *Africa only* exporters' wages, which are in turn lower than *International* exporters' wages). This wage premium increases in magnitude towards the upper tail (75th and 95th percentiles) of the within-firm wage distribution (which illustrates wage inequality). Therefore, exporters (specifically *international* exporters) seem to pay higher wages (and thus provide better jobs), although there is a higher degree of wage inequality within these firms.

To arrive at the potential explanations for this apparent wage inequality, the article considered the effect of firm characteristics (capital per worker, firm size and labour productivity). When firm size and labour productivity are controlled for, the wage distribution changes shape. This suggests that the wage inequality is largely driven by the size (number of employees) and labour productivity (output per worker) of exporters relative to non-exporters. Most of the observed wage inequality is because larger, more productive firms are more likely to be exporters.

Even though the observed wage inequality is substantially smaller after controlling for firm size and output per worker, there is still a difference in the within-firm wage distribution of exporters relative to non-exporters, as well as within exporters. From the literature it emerged that there are two other possible sources of wage inequality – which relate to the skills levels required to manufacture goods – namely the characteristics of the destination economy (proxied by GDP per capita) and the quality of exports (proxied by price relative to

the average price). When the characteristics of the destination economy (proxied by GDP per capita) and the quality of exports (proxied by price relative to the average price) are controlled for, the results show little evidence of wage inequality being driven by these. Therefore, the observed wage inequality has little to do with either the destination country (high or low income per capita), the quality of the product (high-quality versus low-quality product) or the type of product being exported. Another possible explanation is that the remaining wage inequality is due to a specific type of firm (employing a specific type of person) that has this (unequal) wage distribution even before it enters the export market. In such a case it is most likely that the exporting firm is willing (and able) to pay a premium for a specific skill or skill-set which is scarce but very valuable to the industry in question (e.g. highly effective marketers, technology experts or CEOs).

Even though this article considers firm-level characteristics (capital per worker, firm size and labour productivity) as well as export transaction-level characteristics (destination GDP per capita, product type and quality) as possible explanations for the wage gap between exporters and non-exporters, it could still be overestimating the so-called “export wage premium” as it does not take into account individual (worker) characteristics. Therefore, further research should consider the individual characteristics by using an employer-employee linked dataset. This is taken into consideration in the next article in Chapter 4.

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3.6 Appendices

Table B-1: Wage distribution: firms serving domestic, African and non-African markets, with different controls (see Figure 3.4)

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	inter_q_range
International	0.164*** (0.0143)	0.130*** (0.0101)	0.153*** (0.00891)	0.182*** (0.00933)	0.223*** (0.0101)	0.0268*** (0.00540)	0.0703*** (0.00818)
Africa only (excluding SACU)	0.0814*** (0.0125)	0.0576*** (0.00883)	0.0837*** (0.00780)	0.128*** (0.00817)	0.202*** (0.00881)	0.0163*** (0.00474)	0.0518*** (0.00716)
SACU only	0.0336** (0.0140)	0.0120 (0.00989)	0.0142 (0.00874)	0.0298*** (0.00915)	0.0691*** (0.00986)	0.00419 (0.00532)	0.0178** (0.00802)
Number of destinations	0.0111*** (0.00119)	0.0106*** (0.000842)	0.00887*** (0.000744)	0.00645*** (0.000779)	-0.00279*** (0.000840)	-0.000689 (0.000448)	-0.00417*** (0.000683)
Number of products	3.51e-05 (0.000155)	-2.40e-05 (0.000109)	0.000158 (9.65e-05)	0.000215** (0.000101)	-0.000636*** (0.000109)	0.000129** (5.82e-05)	0.000239*** (8.86e-05)
lkl	0.00248** (0.00119)	0.00310*** (0.000841)	0.00120 (0.000743)	0.00120 (0.000778)	0.00538*** (0.000839)	0.000379 (0.000468)	-0.00191*** (0.000682)
ll	-0.138*** (0.00253)	-0.0152*** (0.00178)	0.00153 (0.00157)	0.0460*** (0.00165)	0.264*** (0.00178)	0.0392*** (0.00104)	0.0613*** (0.00144)
lyl	0.238*** (0.00309)	0.229*** (0.00218)	0.259*** (0.00193)	0.291*** (0.00202)	0.298*** (0.00217)	0.0391*** (0.00122)	0.0621*** (0.00177)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.306*** (0.0441)	4.559*** (0.0311)	4.429*** (0.0274)	4.269*** (0.0287)	4.368*** (0.0310)	0.0399** (0.0172)	-0.290*** (0.0252)
Observations	129 720	129 720	129 720	129 720	129 720	122 110	129 720
R-squared	0.121	0.173	0.256	0.281	0.324	0.031	0.041

Note: *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-2: Wage distribution: exporter dynamics (enter, exit, and continue), with different controls see Figure 3.5)

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	inter_q_range
Continue	0.0975*** (0.0112)	0.0627*** (0.00791)	0.0750*** (0.00699)	0.104*** (0.00732)	0.162*** (0.00789)	0.0128*** (0.00424)	0.0411*** (0.00642)
Exit	0.0927*** (0.0257)	0.0956*** (0.0181)	0.125*** (0.0160)	0.167*** (0.0168)	0.163*** (0.0181)	0.0280*** (0.00977)	0.0711*** (0.0147)
Enter	0.0793*** (0.0119)	0.0647*** (0.00839)	0.0895*** (0.00741)	0.125*** (0.00776)	0.173*** (0.00836)	0.0227*** (0.00452)	0.0601*** (0.00680)
lkl	0.00261** (0.00119)	0.00322*** (0.000841)	0.00132* (0.000743)	0.00130* (0.000778)	0.00544*** (0.000839)	0.000371 (0.000468)	-0.00192*** (0.000682)
ll	-0.138*** (0.00253)	-0.0153*** (0.00178)	0.00144 (0.00158)	0.0458*** (0.00165)	0.264*** (0.00178)	0.0391*** (0.00104)	0.0611*** (0.00145)

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	inter_q_range
lyl	0.238*** (0.00310)	0.229*** (0.00218)	0.258*** (0.00193)	0.291*** (0.00202)	0.298*** (0.00218)	0.0391*** (0.00122)	0.0620*** (0.00177)
Number of des	0.0146*** (0.00109)	0.0139*** (0.000772)	0.0126*** (0.000682)	0.0102*** (0.000714)	0.000457 (0.000769)	-0.000544 (0.000410)	-0.00365*** (0.000626)
Number of prod	-2.60e-05 (0.000155)	-7.01e-05 (0.000109)	0.000121 (9.63e-05)	0.000195* (0.000101)	0.000634*** (0.000109)	0.000142** (5.81e-05)	0.000265*** (8.84e-05)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.309*** (0.0442)	4.560*** (0.0311)	4.430*** (0.0275)	4.270*** (0.0288)	4.369*** (0.0310)	0.0396** (0.0172)	-0.290*** (0.0252)
Observations	129,720	129,720	129,720	129,720	129,720	122,110	129,720
R-squared	0.121	0.173	0.255	0.281	0.324	0.031	0.041

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

Source: Authors' own calculations.

Table B-3: Wage distribution: exporter dynamics (to African and non-African countries) (see Figures 3.6 and 3.7)

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	inter_q_range
Continue (International)	0.214*** (0.0139)	0.357*** (0.00983)	0.410*** (0.00890)	0.503*** (0.00937)	0.790*** (0.0105)	0.0928*** (0.00504)	0.146*** (0.00767)
Continue (Africa only)	0.0795*** (0.0125)	0.162*** (0.00886)	0.205*** (0.00801)	0.294*** (0.00843)	0.529*** (0.00941)	0.0717*** (0.00456)	0.133*** (0.00691)
Exit (International)	0.143*** (0.0481)	0.241*** (0.0341)	0.291*** (0.0309)	0.351*** (0.0325)	0.463*** (0.0363)	0.0668*** (0.0177)	0.110*** (0.0266)
Exit (Africa only)	0.0556* (0.0321)	0.111*** (0.0228)	0.155*** (0.0206)	0.237*** (0.0217)	0.356*** (0.0242)	0.0534*** (0.0118)	0.126*** (0.0178)
Enter (International)	0.197*** (0.0182)	0.314*** (0.0129)	0.381*** (0.0116)	0.483*** (0.0123)	0.691*** (0.0137)	0.0951*** (0.00664)	0.169*** (0.0100)
Enter (Africa only)	0.102*** (0.0142)	0.167*** (0.0101)	0.211*** (0.00913)	0.284*** (0.00961)	0.460*** (0.0107)	0.0631*** (0.00523)	0.117*** (0.00787)
lkl	0.0277*** (0.00121)	0.0259*** (0.000855)	0.0266*** (0.000774)	0.0289*** (0.000814)	0.0304*** (0.000909)	0.00387*** (0.000458)	0.00303*** (0.000667)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.891*** (0.0180)	7.351*** (0.0128)	7.625*** (0.0116)	7.986*** (0.0122)	8.730*** (0.0136)	0.623*** (0.00673)	0.635*** (0.00997)
Observations	130 640	130 640	130 640	130 640	130 640	122 868	130 640
R-squared	0.038	0.089	0.139	0.158	0.150	0.014	0.023

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

Source: Authors' own calculations.

Table B-4: Wage distribution: exporter dynamics (to African and non-African countries) (see Figures 3.6 and 3.7)

	5 th %	25 th %	50 th %	75 th %	95 th %	Std_dev	interrange
Continue (International)	0.269*** (0.0141)	0.221*** (0.00997)	0.227*** (0.00881)	0.230*** (0.00922)	0.177*** (0.00994)	0.00721 (0.00533)	0.00841 (0.00808)
Continue (Africa only)	0.0947*** (0.0123)	0.0620*** (0.00871)	0.0752*** (0.00769)	0.106*** (0.00805)	0.135*** (0.00868)	0.0175*** (0.00466)	0.0443*** (0.00706)
Exit (International)	0.140*** (0.0461)	0.175*** (0.0325)	0.209*** (0.0287)	0.236*** (0.0301)	0.237*** (0.0324)	0.0371** (0.0175)	0.0602** (0.0263)
Exit (Africa only)	0.0666** (0.0307)	0.0555** (0.0217)	0.0832*** (0.0191)	0.132*** (0.0200)	0.133*** (0.0216)	0.0238** (0.0117)	0.0769*** (0.0176)
Enter (International)	0.219*** (0.0178)	0.195*** (0.0125)	0.226*** (0.0111)	0.257*** (0.0116)	0.215*** (0.0125)	0.0279*** (0.00673)	0.0614*** (0.0102)
Enter (Africa only)	0.0769*** (0.0138)	0.0624*** (0.00976)	0.0813*** (0.00862)	0.108*** (0.00902)	0.140*** (0.00973)	0.0194*** (0.00526)	0.0455*** (0.00791)
lkl	0.00274** (0.00119)	0.00336*** (0.000841)	0.00140* (0.000743)	0.00133* (0.000778)	0.00533*** (0.000838)	0.000349 (0.000468)	-0.00203*** (0.000682)
ll	-0.133*** (0.00247)	-0.0105*** (0.00174)	0.00604*** (0.00154)	0.0496*** (0.00161)	0.261*** (0.00174)	0.0393*** (0.00102)	0.0601*** (0.00141)
lyl	0.242*** (0.00306)	0.233*** (0.00216)	0.262*** (0.00191)	0.294*** (0.00200)	0.295*** (0.00215)	0.0393*** (0.00120)	0.0614*** (0.00175)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.242*** (0.0435)	4.498*** (0.0307)	4.368*** (0.0271)	4.218*** (0.0284)	4.407*** (0.0306)	0.0361** (0.0170)	-0.279*** (0.0249)
Observations	129,720	129,720	129,720	129,720	129,720	122,110	129,720
R-squared	0.120	0.172	0.255	0.281	0.324	0.031	0.041

Note: Premium relative to international exporters. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B5 to B25 are the regressions to test if wage inequality is caused by the type of product (high-quality versus low-quality products) exported, or by the type of destination (high or low income per capita) exported to. Therefore, we first ran a regression without any controls to see the wage distribution/inequality (B5, B12, B19), then added price (product quality), control (B6, B13, B20), GDP control (B7, B14, B21), product-fixed effects (B8, B15, B22), combination of price product and fixed effects (B9, B16, B23), combination of GDP and fixed effects (B10, B17, B24) and finally a regression which controls for price, GDP and fixed effects (B11, B18, B25). Tables B5– B11 look at the distributions of firms exporting to African and non-African countries (Figure 3.8), Tables B12–B18 focus on exporter dynamics (Figure 3.9) and Tables B19–B25 present a combination of destination and dynamics (Figure 3.10).

Table B-5: Wage distribution (inequality): firms exporting to African and non-African countries controlling for firm characteristics (regression without price or GDP control) (see Figure 3.8)

	Std_dev	5th %	25th %	50th %	75th %	95th %	inter_q_range
Africa only (excluding SACU)	0.0699*** (0.00105)	-0.307*** (0.00321)	-0.113*** (0.00153)	-0.136*** (0.00141)	-0.135*** (0.00142)	-0.0944*** (0.00150)	-0.0218*** (0.00124)
SACU only	0.0784*** (0.00167)	-0.511*** (0.00507)	-0.251*** (0.00242)	-0.269*** (0.00223)	-0.314*** (0.00224)	-0.345*** (0.00237)	-0.0631*** (0.00196)
lkl	0.00128*** (0.000212)	-0.00856*** (0.000641)	0.00128*** (0.000306)	-0.00662*** (0.000281)	-0.00815*** (0.000283)	-0.00670*** (0.000300)	-0.00943*** (0.000248)
ll	0.0304*** (0.000312)	-0.0495*** (0.000933)	0.0145*** (0.000445)	0.0254*** (0.000410)	0.0297*** (0.000412)	0.109*** (0.000436)	0.0152*** (0.000361)
lyl	0.0235*** (0.000428)	0.228*** (0.00130)	0.241*** (0.000618)	0.298*** (0.000569)	0.311*** (0.000572)	0.290*** (0.000606)	0.0700*** (0.000502)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1 001 637	1 011 554	1 011 554	1 011 554	1 011 554	1 011 554	1 011 554

Note: Premium relative to international exporters. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-6: Wage distribution (inequality): firms exporting to African and non-African countries controlling for firm characteristics (regression with control variable for price) (see Figure 3.8)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Africa only (excluding SACU)	0.0707*** (0.00106)	-0.306*** (0.00322)	-0.110*** (0.00153)	-0.130*** (0.00141)	-0.130*** (0.00142)	-0.0909*** (0.00150)	-0.0206*** (0.00125)
SACU only	0.0790*** (0.00168)	-0.510*** (0.00508)	-0.248*** (0.00242)	-0.265*** (0.00222)	-0.310*** (0.00224)	-0.343*** (0.00237)	-0.0623*** (0.00197)
Dev_price	0.00235*** (0.000215)	0.00587*** (0.000655)	0.0148*** (0.000312)	0.0209*** (0.000287)	0.0199*** (0.000289)	0.0139*** (0.000306)	0.00505*** (0.000254)
lkl	0.00137*** (0.000212)	-0.00866*** (0.000642)	0.00142*** (0.000306)	-0.00638*** (0.000281)	-0.00791*** (0.000283)	-0.00654*** (0.000300)	-0.00933*** (0.000248)
ll	0.0304*** (0.000313)	-0.0488*** (0.000935)	0.0154*** (0.000446)	0.0266*** (0.000409)	0.0308*** (0.000412)	0.109*** (0.000437)	0.0154*** (0.000362)
lyl	0.0234*** (0.000429)	0.229*** (0.00130)	0.241*** (0.000618)	0.298*** (0.000568)	0.311*** (0.000572)	0.290*** (0.000606)	0.0702*** (0.000502)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	999 808	1 009 707	1 009 707	1 009 707	1 009 707	1 009 707	1 009 707

Note: Premium relative to international exporters. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-7: Wage distribution (inequality): firms exporting to African and non-African countries Africa controlling for firm characteristics (regression with GDP control) (see Figure 3.8)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Africa only (excluding SACU)	0.0669*** (0.00107)	-0.313*** (0.00327)	-0.116*** (0.00156)	-0.141*** (0.00144)	-0.146*** (0.00145)	-0.102*** (0.00153)	-0.0300*** (0.00127)
SACU only	0.0790*** (0.00168)	-0.511*** (0.00507)	-0.251*** (0.00243)	-0.268*** (0.00223)	-0.313*** (0.00224)	-0.344*** (0.00237)	-0.0621*** (0.00197)
IGDP	-0.00453*** (0.000298)	-0.00568*** (0.000907)	-0.00374*** (0.000434)	-0.00797*** (0.000399)	-0.0150*** (0.000401)	-0.0105*** (0.000424)	-0.0113*** (0.000352)
lkl	0.00129*** (0.000212)	-0.00843*** (0.000641)	0.00126*** (0.000307)	-0.00664*** (0.000282)	-0.00808*** (0.000284)	-0.00660*** (0.000300)	-0.00934*** (0.000249)
ll	0.0303*** (0.000313)	-0.0494*** (0.000935)	0.0145*** (0.000447)	0.0253*** (0.000411)	0.0295*** (0.000413)	0.108*** (0.000437)	0.0151*** (0.000363)
lyl	0.0229*** (0.000431)	0.228*** (0.00130)	0.240*** (0.000623)	0.297*** (0.000573)	0.309*** (0.000576)	0.289*** (0.000609)	0.0689*** (0.000506)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	995 526	1 005 400	1 005 400	1 005 400	1 005 400	1 005 400	1 005 400

Note: Premium relative to international exporters. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-8: Wage distribution (inequality): firms exporting to African and non-African countries controlling for firm characteristics (regression with product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Africa only (excluding SACU)	0.0711*** (0.00106)	-0.303*** (0.00323)	-0.109*** (0.00153)	-0.127*** (0.00140)	-0.125*** (0.00140)	-0.0851*** (0.00149)	-0.0168*** (0.00125)
SACU only	0.0791*** (0.00169)	-0.497*** (0.00509)	-0.240*** (0.00241)	-0.253*** (0.00220)	-0.295*** (0.00220)	-0.326*** (0.00235)	-0.0552*** (0.00198)
lkl	0.000890*** (0.000212)	-0.00693*** (0.000641)	0.00207*** (0.000303)	-0.00549*** (0.000277)	-0.00669*** (0.000277)	-0.00594*** (0.000296)	-0.00876*** (0.000249)
ll	0.0304*** (0.000320)	-0.0457*** (0.000955)	0.0169*** (0.000452)	0.0286*** (0.000413)	0.0341*** (0.000413)	0.114*** (0.000441)	0.0172*** (0.000370)
lyl	0.0233*** (0.000440)	0.228*** (0.00133)	0.239*** (0.000628)	0.296*** (0.000574)	0.309*** (0.000574)	0.291*** (0.000613)	0.0699*** (0.000515)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1 001 637	1 011 554	1 011 554	1 011 554	1 011 554	1 011 554	1 011 554

Note: Premium relative to international exporters. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-9: Wage distribution (inequality): firms exporting to African and non-African countries controlling for firm characteristics (regression with price and product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Africa only (excluding SACU)	0.0724*** (0.00107)	-0.300*** (0.00324)	-0.102*** (0.00153)	-0.118*** (0.00139)	-0.116*** (0.00139)	-0.0785*** (0.00149)	-0.0145*** (0.00126)
SACU only	0.0802*** (0.00169)	-0.495*** (0.00510)	-0.234*** (0.00241)	-0.245*** (0.00219)	-0.287*** (0.00220)	-0.321*** (0.00235)	-0.0533*** (0.00198)
Dev_price	0.00376*** (0.000224)	0.0108*** (0.000682)	0.0230*** (0.000322)	0.0314*** (0.000293)	0.0314*** (0.000293)	0.0235*** (0.000314)	0.00839*** (0.000264)
lkl	0.00102*** (0.000212)	-0.00690*** (0.000642)	0.00245*** (0.000303)	-0.00494*** (0.000276)	-0.00613*** (0.000276)	-0.00553*** (0.000296)	-0.00858*** (0.000249)
ll	0.0305*** (0.000321)	-0.0447*** (0.000957)	0.0185*** (0.000452)	0.0307*** (0.000411)	0.0362*** (0.000412)	0.116*** (0.000441)	0.0177*** (0.000371)
lyl	0.0233*** (0.000440)	0.228*** (0.00133)	0.239*** (0.000627)	0.296*** (0.000571)	0.309*** (0.000572)	0.291*** (0.000612)	0.0701*** (0.000515)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	999 808	1 009 707	1 009 707	1 009 707	1 009 707	1 009 707	1 009 707

Note: Premium relative to international exporters. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-10: Wage distribution (inequality): firms exporting to African and non-African countries controlling for firm characteristics (regression with GDP and product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Africa only (excluding SACU)	0.0682*** (0.00108)	-0.305*** (0.00328)	-0.109*** (0.00155)	-0.130*** (0.00142)	-0.133*** (0.00142)	-0.0903*** (0.00152)	-0.0239*** (0.00127)
SACU only	0.0797*** (0.00169)	-0.497*** (0.00510)	-0.240*** (0.00242)	-0.252*** (0.00221)	-0.294*** (0.00221)	-0.326*** (0.00236)	-0.0536*** (0.00198)
IGDP	-0.00457*** (0.000303)	-0.00261*** (0.000920)	-0.000649 (0.000437)	-0.00545*** (0.000398)	-0.0117*** (0.000398)	-0.00757*** (0.000425)	-0.0111*** (0.000358)
lkl	0.000930*** (0.000212)	-0.00693*** (0.000642)	0.00204*** (0.000304)	-0.00553*** (0.000278)	-0.00667*** (0.000278)	-0.00585*** (0.000297)	-0.00870*** (0.000249)
ll	0.0303*** (0.000321)	-0.0457*** (0.000956)	0.0169*** (0.000454)	0.0286*** (0.000414)	0.0342*** (0.000414)	0.114*** (0.000442)	0.0173*** (0.000372)
lyl	0.0229*** (0.000441)	0.228*** (0.00133)	0.239*** (0.000632)	0.296*** (0.000577)	0.308*** (0.000577)	0.290*** (0.000616)	0.0691*** (0.000518)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	995 526	1 005 400	1 005 400	1 005 400	1 005 400	1 005 400	1 005 400

Note: Premium relative to international exporters. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$ (Is significant at the 1% level, 5% level and 10% level respectively.)

Table B-11: Wage distribution (inequality): firms exporting to African and non-African countries controlling for firm characteristics (regression with price, GDP and product-fixed effects) (see Figure 3.8)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Africa only (excluding SACU)	0.0695*** (0.00108)	-0.302*** (0.00329)	-0.102*** (0.00155)	-0.121*** (0.00141)	-0.124*** (0.00141)	-0.0838*** (0.00152)	-0.0217*** (0.00128)
SACU only	0.0808*** (0.00169)	-0.495*** (0.00511)	-0.234*** (0.00242)	-0.244*** (0.00220)	-0.286*** (0.00220)	-0.320*** (0.00236)	-0.0516*** (0.00199)
IGDP	-0.00461*** (0.000303)	-0.00270*** (0.000921)	-0.000910** (0.000436)	-0.00581*** (0.000396)	-0.0121*** (0.000396)	-0.00782*** (0.000425)	-0.0112*** (0.000358)
Dev_price	0.00377*** (0.000225)	0.0107*** (0.000683)	0.0230*** (0.000323)	0.0314*** (0.000294)	0.0314*** (0.000294)	0.0234*** (0.000315)	0.00842*** (0.000265)
lkl	0.00106*** (0.000213)	-0.00690*** (0.000642)	0.00241*** (0.000304)	-0.00498*** (0.000276)	-0.00611*** (0.000277)	-0.00545*** (0.000296)	-0.00852*** (0.000250)
ll	0.0304*** (0.000321)	-0.0446*** (0.000959)	0.0185*** (0.000454)	0.0307*** (0.000413)	0.0363*** (0.000413)	0.116*** (0.000442)	0.0178*** (0.000372)
lyl	0.0229*** (0.000442)	0.228*** (0.00133)	0.238*** (0.000631)	0.296*** (0.000574)	0.308*** (0.000574)	0.290*** (0.000615)	0.0693*** (0.000518)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	993737	1 003 593	1 003 593	1 003 593	1 003 593	1 003 593	1 003 593

Note: Premium relative to international exporters. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-12: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression without price or GDP control) (see Figure 3.9)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Enter	-0.0140*** (0.00112)	0.0683*** (0.00342)	0.0306*** (0.00160)	0.0369*** (0.00150)	0.0429*** (0.00151)	0.00431*** (0.00159)	0.0123*** (0.00127)
lkl	0.00192*** (0.000225)	-0.0118*** (0.000683)	-0.00158*** (0.000319)	-0.00898*** (0.000299)	-0.00972*** (0.000301)	-0.00936*** (0.000317)	-0.00813*** (0.000253)
ll	0.0237*** (0.000326)	-0.0159*** (0.000977)	0.0289*** (0.000455)	0.0409*** (0.000428)	0.0466*** (0.000430)	0.122*** (0.000453)	0.0177*** (0.000361)
lyl	0.0205*** (0.000450)	0.250*** (0.00137)	0.248*** (0.000637)	0.311*** (0.000598)	0.327*** (0.000602)	0.310*** (0.000633)	0.0787*** (0.000505)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	906 199	914 614	914 614	914 614	914 614	914 614	914 614

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-13: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression with control variable for price) (see Figure 3.9)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Enter	-0.0137*** (0.00113)	0.0672*** (0.00343)	0.0297*** (0.00160)	0.0359*** (0.00150)	0.0421*** (0.00151)	0.00398** (0.00159)	0.0125*** (0.00127)
Dev_price	0.000954*** (0.000231)	0.0118*** (0.000706)	0.0177*** (0.000328)	0.0236*** (0.000308)	0.0225*** (0.000310)	0.0158*** (0.000327)	0.00484*** (0.000261)
lkl	0.00197*** (0.000225)	-0.0117*** (0.000684)	-0.00139*** (0.000318)	-0.00871*** (0.000299)	-0.00946*** (0.000300)	-0.00921*** (0.000317)	-0.00807*** (0.000253)
ll	0.0236*** (0.000327)	-0.0152*** (0.000978)	0.0295*** (0.000455)	0.0418*** (0.000427)	0.0475*** (0.000429)	0.123*** (0.000453)	0.0179*** (0.000361)
lyl	0.0204*** (0.000451)	0.250*** (0.00137)	0.248*** (0.000637)	0.310*** (0.000597)	0.326*** (0.000601)	0.310*** (0.000633)	0.0788*** (0.000506)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	904,805	913,205	913,205	913,205	913,205	913,205	913,205

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations

Table B-14: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression with GDP control) (see Figure 3.9)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Enter	-0.0137*** (0.00113)	0.0678*** (0.00343)	0.0304*** (0.00160)	0.0367*** (0.00150)	0.0428*** (0.00151)	0.00469*** (0.00159)	0.0124*** (0.00127)
GDP	-0.00679*** (0.000314)	0.00248*** (0.000958)	-0.00184*** (0.000448)	-0.00425*** (0.000420)	-0.0119*** (0.000422)	-0.0109*** (0.000444)	-0.0101*** (0.000355)
Lkl	0.00199*** (0.000225)	-0.0117*** (0.000684)	-0.00160*** (0.000320)	-0.00899*** (0.000300)	-0.00959*** (0.000301)	-0.00917*** (0.000317)	-0.00799*** (0.000253)
ll	0.0236*** (0.000327)	-0.0156*** (0.000978)	0.0290*** (0.000457)	0.0410*** (0.000429)	0.0469*** (0.000431)	0.122*** (0.000454)	0.0180*** (0.000362)
lyl	0.0197*** (0.000452)	0.250*** (0.00137)	0.248*** (0.000641)	0.310*** (0.000602)	0.326*** (0.000605)	0.309*** (0.000636)	0.0780*** (0.000508)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	900 599	908 973	908 973	908 973	908 973	908 973	908 973

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-15: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression with product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Enter	-0.0129*** (0.00112)	0.0677*** (0.00339)	0.0316*** (0.00157)	0.0374*** (0.00146)	0.0445*** (0.00146)	0.00792*** (0.00155)	0.0128*** (0.00126)
lkl	0.00144*** (0.000225)	-0.00982*** (0.000682)	-0.000631** (0.000315)	-0.00780*** (0.000294)	-0.00832*** (0.000294)	-0.00864*** (0.000313)	-0.00769*** (0.000253)
ll	0.0229*** (0.000333)	-0.00949*** (0.000992)	0.0326*** (0.000458)	0.0450*** (0.000427)	0.0519*** (0.000427)	0.129*** (0.000455)	0.0193*** (0.000368)
lyl	0.0198*** (0.000460)	0.250*** (0.00139)	0.245*** (0.000642)	0.308*** (0.000599)	0.323*** (0.000600)	0.310*** (0.000638)	0.0786*** (0.000517)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	906 199	914 614	914 614	914 614	914 614	914 614	914 614

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-16: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression with price and product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Enter	-0.0126*** (0.00112)	0.0665*** (0.00340)	0.0305*** (0.00156)	0.0362*** (0.00145)	0.0435*** (0.00145)	0.00746*** (0.00155)	0.0130*** (0.00126)
Dev_price	0.00188*** (0.000241)	0.0193*** (0.000735)	0.0279*** (0.000338)	0.0361*** (0.000314)	0.0357*** (0.000314)	0.0267*** (0.000336)	0.00781*** (0.000273)
lkl	0.00151*** (0.000226)	-0.00960*** (0.000683)	-0.000168 (0.000314)	-0.00719*** (0.000292)	-0.00772*** (0.000292)	-0.00822*** (0.000312)	-0.00755*** (0.000253)
ll	0.0229*** (0.000333)	-0.00833*** (0.000994)	0.0338*** (0.000457)	0.0466*** (0.000425)	0.0535*** (0.000425)	0.130*** (0.000454)	0.0197*** (0.000369)
lyl	0.0198*** (0.000461)	0.250*** (0.00139)	0.244*** (0.000641)	0.307*** (0.000596)	0.323*** (0.000596)	0.309*** (0.000637)	0.0787*** (0.000517)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	904 805	913 205	913 205	913 205	913 205	913 205	913 205

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-17: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression with GDP and product-fixed effects)

	Std_dev	5th %	25th %	50th %	75th %	95th %	inter_q_range
Enter	-0.0127*** (0.00112)	0.0675*** (0.00340)	0.0315*** (0.00157)	0.0372*** (0.00147)	0.0443*** (0.00147)	0.00818*** (0.00156)	0.0128*** (0.00126)
IGDP	-0.00636*** (0.000319)	0.00316*** (0.000972)	0.000126 (0.000450)	-0.00306*** (0.000419)	-0.0101*** (0.000419)	-0.00911*** (0.000446)	-0.0102*** (0.000361)
lkl	0.00153*** (0.000226)	-0.00986*** (0.000683)	-0.000656** (0.000316)	-0.00781*** (0.000294)	-0.00823*** (0.000295)	-0.00848*** (0.000313)	-0.00758*** (0.000254)
ll	0.0230*** (0.000333)	-0.00938*** (0.000994)	0.0326*** (0.000460)	0.0451*** (0.000429)	0.0522*** (0.000429)	0.129*** (0.000456)	0.0196*** (0.000370)
lyl	0.0194*** (0.000461)	0.250*** (0.00140)	0.245*** (0.000646)	0.307*** (0.000602)	0.323*** (0.000602)	0.309*** (0.000640)	0.0781*** (0.000519)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	900 599	908 973	908 973	908 973	908 973	908 973	908 973

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-18: Wage distribution (inequality): exporter dynamics controlling for firm characteristics (regression with price, GDP and product-fixed effects) (see Figure 3.9)

	Std_dev	5th %	25th %	50th %	75th %	95th %	inter_q_range
Enter	-0.0125*** (0.00112)	0.0663*** (0.00340)	0.0304*** (0.00157)	0.0361*** (0.00146)	0.0433*** (0.00146)	0.00774*** (0.00155)	0.0130*** (0.00126)
IGDP	-0.00640*** (0.000319)	0.00282*** (0.000973)	-0.000440 (0.000448)	-0.00378*** (0.000416)	-0.0108*** (0.000417)	-0.00961*** (0.000445)	-0.0103*** (0.000361)
Dev_price	0.00191*** (0.000242)	0.0193*** (0.000736)	0.0279*** (0.000339)	0.0362*** (0.000315)	0.0358*** (0.000315)	0.0267*** (0.000336)	0.00789*** (0.000274)
lkl	0.00160*** (0.000226)	-0.00963*** (0.000683)	-0.000186 (0.000315)	-0.00719*** (0.000293)	-0.00762*** (0.000293)	-0.00805*** (0.000312)	-0.00744*** (0.000254)
ll	0.0230*** (0.000334)	-0.00821*** (0.000996)	0.0339*** (0.000459)	0.0468*** (0.000426)	0.0538*** (0.000427)	0.130*** (0.000455)	0.0200*** (0.000370)
lyl	0.0193*** (0.000462)	0.250*** (0.00140)	0.244*** (0.000644)	0.307*** (0.000598)	0.322*** (0.000599)	0.309*** (0.000639)	0.0782*** (0.000520)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	899 245	907 604	907 604	907 604	907 604	907 604	907 604

Note: Premium relative to continuing firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Table B-19: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression without price or GDP control) (see Figure 3.10)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0706*** (0.00118)	-0.338*** (0.00359)	-0.144*** (0.00167)	-0.169*** (0.00157)	-0.163*** (0.00158)	-0.144*** (0.00167)	-0.0194*** (0.00134)
Enter (International)	-0.0299*** (0.00141)	0.129*** (0.00430)	0.0551*** (0.00201)	0.0565*** (0.00188)	0.0724*** (0.00189)	0.0185*** (0.00200)	0.0173*** (0.00160)
Enter (Africa only)	0.0802*** (0.00179)	-0.357*** (0.00543)	-0.148*** (0.00253)	-0.159*** (0.00237)	-0.163*** (0.00239)	-0.158*** (0.00252)	-0.0146*** (0.00202)
lkl	0.00202*** (0.000224)	-0.0122*** (0.000678)	-0.00176*** (0.000317)	-0.00920*** (0.000297)	-0.00992*** (0.000298)	-0.00955*** (0.000315)	-0.00815*** (0.000253)
ll	0.0297*** (0.000335)	-0.0442*** (0.00100)	0.0169*** (0.000467)	0.0273*** (0.000438)	0.0329*** (0.000440)	0.111*** (0.000465)	0.0160*** (0.000372)
lyl	0.0256*** (0.000454)	0.227*** (0.00137)	0.238*** (0.000641)	0.299*** (0.000600)	0.316*** (0.000603)	0.300*** (0.000637)	0.0773*** (0.000511)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	906 199	914 614	914 614	914 614	914 614	914 614	914 614

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-20: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression with control variable for price) (see Figure 3.10)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0714*** (0.00118)	-0.337*** (0.00359)	-0.140*** (0.00168)	-0.163*** (0.00157)	-0.158*** (0.00158)	-0.141*** (0.00167)	-0.0184*** (0.00134)
Enter (International)	-0.0295*** (0.00142)	0.128*** (0.00431)	0.0541*** (0.00201)	0.0556*** (0.00188)	0.0719*** (0.00189)	0.0183*** (0.00200)	0.0177*** (0.00160)
Enter (Africa only)	0.0809*** (0.00180)	-0.356*** (0.00543)	-0.145*** (0.00253)	-0.154*** (0.00237)	-0.159*** (0.00238)	-0.155*** (0.00252)	-0.0136*** (0.00202)
Dev_price	0.00182*** (0.000231)	0.00775*** (0.000701)	0.0160*** (0.000327)	0.0217*** (0.000306)	0.0206*** (0.000308)	0.0142*** (0.000325)	0.00461*** (0.000261)
lkl	0.00208*** (0.000225)	-0.0122*** (0.000679)	-0.00158*** (0.000317)	-0.00894*** (0.000296)	-0.00967*** (0.000298)	-0.00941*** (0.000315)	-0.00809*** (0.000253)
ll	0.0297*** (0.000336)	-0.0436*** (0.00100)	0.0178*** (0.000467)	0.0286*** (0.000437)	0.0341*** (0.000440)	0.112*** (0.000465)	0.0163*** (0.000373)
lyl	0.0255*** (0.000455)	0.227*** (0.00137)	0.238*** (0.000640)	0.299*** (0.000599)	0.316*** (0.000602)	0.301*** (0.000637)	0.0775*** (0.000511)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	904 805	913 205	913 205	913 205	913 205	913 205	913 205

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Table B-21: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression with GDP control) (see Figure 3.10)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0692*** (0.00119)	-0.345*** (0.00362)	-0.148*** (0.00169)	-0.175*** (0.00158)	-0.173*** (0.00159)	-0.153*** (0.00168)	-0.0250*** (0.00135)
Enter (International)	-0.0292*** (0.00142)	0.129*** (0.00432)	0.0553*** (0.00202)	0.0568*** (0.00189)	0.0733*** (0.00190)	0.0198*** (0.00201)	0.0180*** (0.00161)
Enter (Africa only)	0.0784*** (0.00180)	-0.366*** (0.00545)	-0.154*** (0.00255)	-0.166*** (0.00239)	-0.175*** (0.00240)	-0.169*** (0.00253)	-0.0209*** (0.00203)
IGDP	-0.00364*** (0.000316)	-0.0132*** (0.000960)	-0.00852*** (0.000449)	-0.0119*** (0.000421)	-0.0198*** (0.000422)	-0.0175*** (0.000446)	-0.0113*** (0.000358)
lkl	0.00204*** (0.000225)	-0.0119*** (0.000679)	-0.00167*** (0.000318)	-0.00909*** (0.000297)	-0.00967*** (0.000299)	-0.00926*** (0.000315)	-0.00800*** (0.000253)
ll	0.0295*** (0.000336)	-0.0443*** (0.00100)	0.0167*** (0.000469)	0.0271*** (0.000439)	0.0325*** (0.000441)	0.110*** (0.000465)	0.0158*** (0.000374)
lyl	0.0251*** (0.000457)	0.225*** (0.00138)	0.237*** (0.000646)	0.298*** (0.000604)	0.313*** (0.000607)	0.298*** (0.000641)	0.0761*** (0.000515)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	900 599	908 973	908 973	908 973	908 973	908 973	908 973

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-22: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression with product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0718*** (0.00119)	-0.329*** (0.00360)	-0.135*** (0.00167)	-0.156*** (0.00155)	-0.149*** (0.00155)	-0.130*** (0.00165)	-0.0141*** (0.00135)
Enter (International)	-0.0277*** (0.00141)	0.128*** (0.00427)	0.0575*** (0.00197)	0.0582*** (0.00184)	0.0757*** (0.00184)	0.0246*** (0.00196)	0.0182*** (0.00160)
Enter (Africa only)	0.0807*** (0.00179)	-0.349*** (0.00541)	-0.141*** (0.00250)	-0.148*** (0.00232)	-0.150*** (0.00233)	-0.145*** (0.00248)	-0.00947*** (0.00202)
lkl	0.00152*** (0.000225)	-0.0101*** (0.000678)	-0.000753** (0.000313)	-0.00795*** (0.000291)	-0.00845*** (0.000292)	-0.00877*** (0.000311)	-0.00770*** (0.000253)
ll	0.0294*** (0.000343)	-0.0393*** (0.00102)	0.0203*** (0.000472)	0.0313*** (0.000439)	0.0382*** (0.000439)	0.117*** (0.000469)	0.0179*** (0.000381)
lyl	0.0255*** (0.000465)	0.224*** (0.00140)	0.234*** (0.000648)	0.296*** (0.000603)	0.312*** (0.000603)	0.300*** (0.000644)	0.0774*** (0.000524)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Observations	906 199	914 614	914 614	914 614	914 614	914 614	914 614

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-23: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression with price and product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0730*** (0.00119)	-0.326*** (0.00361)	-0.127*** (0.00166)	-0.146*** (0.00154)	-0.139*** (0.00155)	-0.123*** (0.00165)	-0.0120*** (0.00135)
Enter (International)	-0.0274*** (0.00141)	0.127*** (0.00428)	0.0565*** (0.00197)	0.0574*** (0.00183)	0.0752*** (0.00183)	0.0245*** (0.00196)	0.0187*** (0.00160)
Enter (Africa only)	0.0817*** (0.00179)	-0.346*** (0.00541)	-0.134*** (0.00249)	-0.139*** (0.00231)	-0.141*** (0.00232)	-0.139*** (0.00248)	-0.00755*** (0.00202)
Dev_price	0.00300*** (0.000241)	0.0144*** (0.000732)	0.0260*** (0.000337)	0.0339*** (0.000313)	0.0336*** (0.000313)	0.0248*** (0.000335)	0.00760*** (0.000273)
lkl	0.00161*** (0.000225)	-0.00997*** (0.000678)	-0.000308 (0.000312)	-0.00736*** (0.000290)	-0.00787*** (0.000290)	-0.00837*** (0.000310)	-0.00756*** (0.000253)
ll	0.0295*** (0.000343)	-0.0380*** (0.00102)	0.0221*** (0.000471)	0.0337*** (0.000437)	0.0405*** (0.000438)	0.119*** (0.000468)	0.0184*** (0.000382)
lyl	0.0255*** (0.000466)	0.225*** (0.00140)	0.234*** (0.000646)	0.296*** (0.000600)	0.312*** (0.000600)	0.300*** (0.000643)	0.0776*** (0.000524)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	904 805	913 205	913 205	913 205	913 205	913 205	913 205

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-24: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression with GDP and product-fixed effects)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0702*** (0.00120)	-0.334*** (0.00363)	-0.138*** (0.00168)	-0.160*** (0.00156)	-0.156*** (0.00156)	-0.137*** (0.00167)	-0.0189*** (0.00136)
Enter (International)	-0.0273*** (0.00141)	0.129*** (0.00429)	0.0575*** (0.00198)	0.0582*** (0.00185)	0.0762*** (0.00185)	0.0256*** (0.00197)	0.0187*** (0.00160)
Enter (Africa only)	0.0788*** (0.00180)	-0.354*** (0.00542)	-0.143*** (0.00251)	-0.152*** (0.00234)	-0.158*** (0.00234)	-0.153*** (0.00249)	-0.0149*** (0.00203)
Dev_price	-0.00367*** (0.000321)	-0.00982*** (0.000973)	-0.00524*** (0.000450)	-0.00909*** (0.000419)	-0.0162*** (0.000419)	-0.0142*** (0.000447)	-0.0110*** (0.000364)
lkl	0.00157***	-0.00998***	-0.000706**	-0.00789***	-0.00829***	-0.00854***	-0.00758***

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
II	(0.000225) 0.0293***	(0.000678) -0.0392***	(0.000314) 0.0203***	(0.000292) 0.0312***	(0.000292) 0.0380***	(0.000311) 0.117***	(0.000254) 0.0178***
lyl	(0.000343) 0.0252***	(0.00102) 0.223***	(0.000474) 0.234***	(0.000440) 0.295***	(0.000440) 0.310***	(0.000470) 0.298***	(0.000383) 0.0765***
	(0.000467)	(0.00141)	(0.000652)	(0.000606)	(0.000606)	(0.000647)	(0.000527)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	900 599	908 973	908 973	908 973	908 973	908 973	908 973

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

Table B-25: Wage distribution (inequality): exporter dynamics (to African and non-African countries) controlling for firm characteristics (regression with price, GDP and product-fixed effects) (see Figure 3.10)

	Std_dev	5 th %	25 th %	50 th %	75 th %	95 th %	inter_q_range
Continue (Africa only)	0.0714*** (0.00120)	-0.331*** (0.00364)	-0.130*** (0.00168)	-0.150*** (0.00156)	-0.146*** (0.00156)	-0.130*** (0.00167)	-0.0167*** (0.00136)
Enter (International)	-0.0270*** (0.00141)	0.128*** (0.00429)	0.0566*** (0.00198)	0.0575*** (0.00184)	0.0757*** (0.00184)	0.0255*** (0.00197)	0.0192*** (0.00161)
Enter (Africa only)	0.0798*** (0.00180)	-0.351*** (0.00543)	-0.137*** (0.00251)	-0.144*** (0.00232)	-0.150*** (0.00233)	-0.146*** (0.00249)	-0.0129*** (0.00203)
IGDP	-0.00369*** (0.000321)	-0.00993*** (0.000973)	-0.00550*** (0.000449)	-0.00942*** (0.000416)	-0.0166*** (0.000416)	-0.0145*** (0.000446)	-0.0111*** (0.000364)
Dev_price	0.00299*** (0.000241)	0.0143*** (0.000733)	0.0260*** (0.000338)	0.0340*** (0.000313)	0.0336*** (0.000314)	0.0248*** (0.000336)	0.00762*** (0.000274)
lkl	0.00165*** (0.000225)	-0.00983*** (0.000679)	-0.000258 (0.000313)	-0.00729*** (0.000290)	-0.00770*** (0.000291)	-0.00814*** (0.000311)	-0.00744*** (0.000254)
II	0.0294*** (0.000344)	-0.0380*** (0.00102)	0.0221*** (0.000473)	0.0336*** (0.000439)	0.0403*** (0.000439)	0.119*** (0.000469)	0.0183*** (0.000383)
lyl	0.0252*** (0.000468)	0.223*** (0.00141)	0.234*** (0.000650)	0.295*** (0.000603)	0.310*** (0.000603)	0.298*** (0.000646)	0.0767*** (0.000527)
No. dest & prod control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fe (HS6)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	899 245	907 604	907 604	907 604	907 604	907 604	907 604

Note: Premium relative to continue international firms. ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively.)

Source: Authors' own calculations.

CHAPTER 4: EXPORTING AND WAGE PREMIUM: THE CASE OF SOUTH AFRICAN MANUFACTURING FIRMS

4.1 Introduction

Exporters are known to pay higher wages than non-exporters (Bernard & Jensen, 1999). Ample evidence shows that this is true for both developed and developing countries (Bernard & Jensen, 2004; Bernard *et al.*, 2007; Alvarez & Lopez 2005; Hahn 2005). In Africa, the evidence is no different, as shown by Van Biesebroeck (2005). He studied the effect of export status on productivity for a panel of manufacturing firms in nine African countries and found exporters to pay on average 40% more than non-exporters in sub-Saharan Africa. Recent evidence in South Africa has concurred with this export wage premium literature as two studies by Matthee *et al.* (2016) and Edwards *et al.* (2016) have confirmed that this export wage premium does indeed also exist in South Africa.

The question that arises is why do the exporting firms pay higher wages? The export wage premium may be due to different reasons. Firstly, exporting firms have different observable firm characteristics than non-exporting firms (see for example, Bernard & Jensen, 1997; Bernard & Wagner, 1997; Greenaway & Yu, 2004). Secondly, the observable individual characteristics of the workforce of exporting firms could be different than non-exporting firms (e.g. Schank *et al.*, 2007; Munch & Skaksen, 2008; Klein *et al.*, 2013). Thirdly, the export wage premium could be due to unobservable firm and individual characteristics (e.g. Schank *et al.*, 2007; Munch & Skaksen, 2008; Fafchamps, 2009). Finally, it could be a result of the distribution of wages in an exporting firm and higher wages on average in exporting firms may disguise the fact that exporting firms may pay more at certain parts of the wage distribution (i.e. considering where in the wage distribution it matters most working in an exporting firm (Fu & Wu, 2012; Koenker & Hallock, 2001)).

The literature focused on explaining that the export wage premium in a developing country like South African is limited. A study by Rankin and Schöer (2013) used employer-employee matched data and examined the South African export wage premium. This study was however limited to cross-sectional survey data. The authors found evidence of an export wage premium (even after controlling for firm and individual characteristics), but this premium differed by destination. The wages of exporters exporting to the regional market (SADC) are lower than those of firms producing domestically, whereas wages of firms exporting outside of the region are higher than those of both regional exporters and domestic producers.

This article contributes to the limited South African literature by using newly made available administrative data to study the export wage premium. The panel dataset is constructed by merging three sets of tax administrative records, namely employee income tax (IRP5 or PAYE), company income tax records (ITR and ITR14) and customs data. This new employer-employee matched panel dataset on South African manufacturing firms allows one to not only control for observable (and unobservable) firm characteristics, but also for observable (and unobservable) individual and job (a unique firm-individual match) characteristics. Furthermore, the panel dimension of the data made it possible to determine the “exporter dynamics” and the population dimension of the data made it possible to control for number of products exported and number of destinations exported to.

Therefore, this article examined whether the export wage premium came from observable or unobservable firm, individual or job characteristics, the distribution of wages or if it was due to exporting activities (export status) itself. It further contributes by also considering other dynamics that can add to the wage premium by taking into account the influence of different export destinations (regional versus *international*), job dynamics (*enter*, *exit*, *continue* or *sporadic* jobs) as well as quantile regressions (with fixed effects) (which is a novel application of employer-employee datasets on exporting firms). By considering the job dynamics, one can see how wages differ between workers entering, continuing or exiting a job in an exporting and non-exporting firm. The quantile regressions provide an illustration of the wage premium at different parts of the wage distribution and this indicates how the observed export wage premium is distributed (this contributes to the international literature on exporting firms).

The main findings firstly show that much of the observed wage premium paid by exporters is explained by observable firm and individual characteristics. This premium decreases from 54.03% to 5.27% when controlling for observable firm (size, capital intensity and output per worker) and individual characteristics (age, age squared and length of tenure). Secondly, the distribution of wages shows that the export wage premium is evident across the entire earnings distribution (from the 5th to the 95th percentiles). Thirdly, when taking export destinations into account, it is clear that the wage premium of working within a firm serving the *international* market (exporting both to African and non-African countries) is the highest and relatively constant throughout the wage distribution (from the 5th to the 95th percentile). *Africa only* exporters (a firm exporting only to *African* countries - excluding *SACU only* exporters) exhibit an export premium at the upper and lower tail of the distribution, but not at the 50th percentile. Furthermore, *SACU only* exporters (firms only exporting to *SACU*

countries) do not have a wage premium, in fact, these firms seem to pay lower wages than non-exporters.

Finally, when adding destinations (*Africa only* and *international*) to the job dynamic groups (*enter*, *exit*, *continue* and *sporadic* jobs), an export wage premium still exists (after controlling for observable firm and individual characteristics). It is only when firm-, individual- and job- specific unobservable characteristics (firm-, individual- and job-fixed effects) are controlled for that this export wage premium effectively disappears. Therefore, the difference that is seen in the wage premium of being an *international* exporter is not about being labelled an exporter (just having the status of being an exporter). It is rather due to the “type of firm” (unobservable firm characteristics) exporters are, the “type of workers” (unobservable individual characteristics) they employ and the “type of jobs” (unobservable job characteristics) they create. Moreover, the export wage premium is not about a firm’s export status, it is rather about the inherent characteristics of a firm. In other words, a firm that is going to become an exporter creates a certain type of job in which a certain type of worker is hired and this worker is paid a premium.

The outline of this article is as follows: section 2 follows with a literature review on the export wage premium found in firm-level studies with a specific focus on employer-employee matched datasets. The empirical analysis (section 3) starts with a description of the data (section 3.1) followed by descriptive statistics on exporters and monthly wages (section 3.2). The estimation strategy as well as the regression results are in sections 3.3 and 3.4 respectively. A conclusion is provided in section 4.

4.2 Literature review

Exporting and the impact of exports on a country’s economy has sparked research interest from as early as 1955 (North, 1955). In the 1990s, Bernard and Jensen carried this topic forward with a series of firm-level studies on the difference between exporters and non-exporters. In essence, they found exporting firms to have superior characteristics to non-exporting firms (Bernard & Jensen, 1999). Another noteworthy study by Bernard and Jensen (1995) used newly made available data (the Census Bureau’s Longitudinal Research Database (LRD)) to study the manufacturing industry of the United States on plant-level. They proved that exporters provided better, higher paying jobs - the average wages of exporters were 14% higher than their non-exporting counterparts. This wage premium remained (between 7% and 11%) even when plant size, age, ownership and capital intensity were controlled for. Further studies by Bernard and Jensen (2004) and Bernard *et al.* (2007) emphasised this so-called “exporter premia”. They stated that exporters were larger, more

capital-intensive, more productive and more skill-intensive than non-exporters and paid higher wages. It can be surmised from all these studies that exporters have a wage premium.

The firm-level studies of Bernard and Jensen (1995; 1999; 2004) and Bernard *et al.* (2004) inspired a literature focusing specifically on the export wage premium. For example, see studies on Germany (Bernard & Wagner, 1997; Arnold & Hussinger, 2005), Taiwan (Liu *et al.*, 1999), the United Kingdom (Greenaway and Yu, 2004), Chile (Alvarez & López, 2005), Korea (Hahn, 2005), sub-Saharan Africa (Van Biesebroeck, 2005), Spain (Fariñas & Martín-Marcos, 2007) and five European countries (Egger *et al.*, 2013). Most papers studying the export wage premium used firm-level (plant-level) data which allowed one to control for observable (and sometimes unobservable) firm characteristics. For example, Van Biesebroeck (2005), Bernard and Wagner (1997), Liu *et al.*, (1999) and Hahn (2005) controlled for firm size, capital intensity, firm age, location, industry and other firm-specific characteristics. In general, these studies found evidence of an export wage premium. This suggests that the observed export wage premium is not due to the firm just being larger, more capital-intensive and more experienced, but is also the result of something else.

Critics argue that this export wage premium is overestimated due to the fact that they do not control for the individual characteristics of workers (Klein *et al.*, 2013; Schank *et al.*, 2007; Munch & Skaksen, 2008). The reasoning behind the critique is that exporters are more likely to employ different types of workers than non-exporters. These workers may be “better” in that they have more skills, experience and higher levels of education which make them more productive. To be able to include individual characteristics requires employee-employer matched data, which Breau and Rigby (2006:298) called “a non-trivial task”⁴². An employee-employer dataset requires information about the individual worker linked to detailed data about the firm they work in.

4.2.1 Employer-employee level studies

Schank *et al.*'s (2004) paper was one of the first to take up this challenging task. They used an employer-employee combined data set (the dataset matches the employment statistics of the German Federal Labour Services with plant-level data from the IAB Establishment Panel) for Germany to calculate the export wage premium, taking into account individual

⁴² For the United States, there were no variables in the Census Bureau that directly matched workers to firms, therefore Breau and Rigby (2006) had to construct their own employer-employee data set from three different sources (namely the Census Bureau's LRD, Standard Statistical Establishment List (SSEL) and the Decennial Household Census).

characteristics. Their results showed that the export wage premium disappeared after controlling for individual characteristics. In a similar vein, Breau and Rigby (2006) linked worker characteristics (from the Decennial Household Census) to the manufacturing firm data (from the Longitudinal Research Database) for manufacturing firms in Los Angeles from 1990 and 2000. They also found no evidence of an export wage premium for workers with similar characteristics after controlling for individual specific characteristics (such as age, education, gender, race and nationality). Similar results were arrived at by Heyman *et al.* (2007), when using employer-employee match data set on the entire Swedish private sector, as the wage premium of foreign owned firms (relative to domestically-owned firms) faded when controlling for individual and firm heterogeneity. Therefore, they did not find that foreign firms paid higher wages for identical workers.

Schank *et al.* (2007) analysed the same data set as Schank *et al.* (2004), but additionally differentiated between different types of workers (blue-collar versus white-collar) within exporting and non-exporting plants. Their results showed that blue-collar workers in an exporting plant (with a 60% export to sales ratio) earned 1.8% more than blue collar workers in a non-exporting plant. For white-collar workers, this export wage premium was 0.9%. A paper by Munch and Skaksen (2008) on the export wage premium in Denmark also used employer-employee matched data (this is a FIDA dataset, which was based on administrative registers from 1999-2002) and distinguished between different kinds of workers (based on skill intensity) and different export intensity levels (ratio of exports to output). Their results indicated that firms with high export intensities did have an export wage premium. This premium was even higher when these firms had higher skilled workers (Munch & Skaksen, 2008). Fafchamps (2009) investigated the export wage premium for Morocco using survey data (on manufacturing firms) from September to December 2000. By interacting export status with worker education in a fixed effects regression, he considered the possible education wage premium within exporting firms. Even though the results indicated that exporters employed more educated workers, it did not show that they paid these educated workers more (than non-exporters). On the other hand, when he added skills (which were defined differently from education), an export wage premium was found for skilled production workers.

Fafchamps (2009) further found firm characteristics to have a larger impact on the wage premium than individual characteristics. This could be seen in the fact that there was an export wage premium when controlling for individual characteristics, namely education, experience, gender, length of tenure and vocational training. But this premium lessened (even disappeared) when controlling for firm capital and labour (firm characteristics). Breau

and Brow (2011) investigated if exporters and foreign-controlled establishments paid a wage premium relative to non-exporters and domestic-controlled establishments in the Canadian manufacturing industry. By using employer-employee data created from two micro data sources (1999 Annual Survey of Manufactures and 2001 census) their results suggested that there was an export (14%) and foreign-controlled (30%) wage premium. This premium decreased (but still held) as more and more firm (plant size, capital intensity and multi-unit firm status) and individual (age, years of schooling, gender and nationality) characteristics were controlled for. In accordance with Fafchamps (2009), Breau and Brow (2011) observed firm characteristics to have a larger effect on the wage premium than individual characteristics.

The employer-employee matched data had also been used to explore export dynamics of firms, workers and jobs (firm-workers spells as labelled by Martins and Opromolla (2009)). By adding firm-fixed effects, individual-fixed effects and job-fixed effects to the estimations of the export wage premium, some studies were able to see what happened to a firm's (and individual's) wages when they entered the export market (Schank *et al.*, 2007; Fafchamps, 2009; Martins & Opromolla, 2009). The average wages of a firm seemed to increase as they entered the export market. Whereas an individual's wages did not increase (or increased by less than 0.01 log points) as they entered an exporting firm or if the firm where they were employed start to export (Schank *et al.*, 2007; Fafchamps, 2009; Martins & Opromolla, 2009). By using employer-employee matched panel data Schank *et al.* (2010) contributed to the literature by tracking German firms over time. They found that the exporter-wage premium had already existed in the years before a firm entered the export market. This suggested that the wage premium was not caused by exporting itself, but it was explained by the type of firm (more productive, better paying) who self-selected into exporting.

It is not only the individual and firm characteristics that influence the export wage premium, but also the destination of exports. A Spanish paper distinguished between the wages of the firms in the local market versus those selling to national, European Union and the rest of the world markets. They proved that the export premium increased with the remoteness of the market as well as with employee education (after controlling for individual and firm characteristics (Alcalá & Hernández, 2010)). The destination's remoteness and or classification seemed to have an impact on wages. There was a significant difference between the productivity and wages of firms exporting to low income destinations (LID) and high income destinations (HID) (Turco & Maggioni, 2013; De Loecker, 2007; Park *et al.*, 2010; Shevtsova, 2012). Firms exporting to HID paid higher average wages than low income destinations (Brambilla *et al.*, 2012). This agrees with the hypothesis of Verhoogen (2008)

and Brambilla *et al.* (2012), which suggested that an export destination influenced the product quality. This in turn influences the worker quality and ultimately wages. Sutton (2007) linked the relationship between labour cost and quality, by arguing that the higher the labour cost in a country, the higher the quality of the product should be (in order to still be internationally competitive). Higher quality products in turn require improved technology, which goes hand in hand with higher educated workers.

To summarise, the export wage premium can be overestimated when only considering firm characteristics and not taking into account individual characteristics. Employer-employee matched datasets make it possible to control for firm and individual observable (and unobservable) characteristics. By using job-level data with fixed effects export dynamics can be explored. Studies have found that the average wage of firms increases as they enter the export market, but when workers enter into the export market they see no wage increase. Even though some studies indicate that firm characteristics have a larger effect on the wage premium than individual characteristics, both firm and individual characteristics do influence the export wage premium. The export wage premium varies between different types of workers (blue-collar versus white-collar and skilled versus unskilled), different types of export intensities, different export destinations and product qualities.

4.2.2 South African literature

In the South African context, the firm-level studies confirmed that South African exporting firms have superior characteristics to non-exporting firms (Rankin 2001; Edwards *et al.*, 2008; Naudé *et al.*, 2010; Matthee & Krugell, 2012; Rankin, 2013; Naughtin & Rankin, 2014). Among other characteristics, exporters are found to pay a wage premium (Rankin 2001; Edwards *et al.*, 2008; Rankin, 2013). There are, however, two main limitations to these studies. Firstly, they rely on samples rather than the population of firms and workers and thus the results may be influenced by sampling procedures. Secondly, they are on the firm-level which does not take worker characteristics into account. Three papers by Matthee *et al.*, (2016), Edwards *et al.*, (2016) and Rankin and Schöer (2013) partly addressed these limitations.

A project with the aim of understanding the factors underpinning the expansion of high productivity firms in South Africa was launched by the United Nations University, World Institute for Development Economics Research (UNU-WIDER) in collaboration with National Treasury and South African Revenue services (SARS). This project made it possible for researchers to have first-time insight into the exporter dynamics of South African firms by using newly made available tax administrative data (Matthee *et al.*, 2016; Edwards *et al.*,

2016). Following Bernard *et al.*'s (1995) approach on identifying the "export premia" on firm-level data, both studies showed exporters (and two-way traders) to be larger, more productive and better paying than non-exporters. More specifically, Matthee *et al.* (2016) found that firms exporting multiple products to multiple destinations were the ones with the highest export wage premium. Edwards *et al.* (2016) grouped South African trading firms into three clusters, namely those who only exported, those who only imported and two-way traders. The export wage premium was the highest for two-way traders, followed by importers only, then exporters only. Although the specific export wage premium was not the main focus of these studies, both of them verified that a wage premium existed. As these two studies were done on firm-level (as opposed to employer-employee level), the export wage premium could be overestimated, as it did not control for individual characteristics (as suggested by Schank *et al.* (2007), Munch & Skaksen (2008), as well as Klein *et al.* (2013)).

Rankin and Schöer (2013) is the only South African study that used an employer-employee matched data to investigate the export wage premium. They examined the influence of the export destination on wages using the World Bank's Investment Climate Assessment Survey conducted in 2004 (this is a cross sectional dataset). They found an export wage premium, even after controlling for firm (firm size and productivity measures) and individual (age and education) characteristics, but this premium differed by destination. According to these authors, South Africa has two distinct export markets, namely a regional market and an *international* market. The wages of exporters exporting to the regional market are lower than firms producing domestically, whereas wages of firms exporting outside of the region are higher than both regional exporters and domestic producers. Therefore, there is an export wage premium and a skills premium amongst South African firms. Their results confirm the hypothesis of Verhoogen (2008) and Brambilla *et al.* (2012). Even though insightful, this paper was limited to a cross-sectional survey data from 2004.

This article contributes to the South African literature as it uses an employer-employee matched data panel on the population of South African manufacturing firms and their workers. This panel allows one to investigate whether the export wage premium comes from observable or unobservable firm, individual or job (a unique individual and firm combination) characteristics, the distribution of wages or if it is due to exporting activities (export status) itself. It further contributes by considering other dynamics that can be added to the wage premium by taking into account the influence of different export destinations (regional versus *international*), job dynamics (*enter*, *exit*, *continue* or *sporadic* jobs) as well as quantile regressions with fixed effects.

4.3 Empirical analysis

4.3.1 Data

This article made use of newly made available tax administrative data to conduct a firm, individual- and job-level analysis. The data is made available by South African Revenue Service (SARS) and forms part of a project launched by National Treasury in collaboration with UNU-WIDER. There are three main sources of tax administrative data. Firstly, the job level tax form (IRP5 certificates) completed by employers on behalf of their employees, secondly, the customs data of all export transactions of South Africa and finally the income tax returns submitted by corporate firms (CIT). In order to construct an employer-employee matched dataset, the CIT and customs data (employer data) are merged onto the IRP5 (employee) data. The merging was made possible by using a conjunction table (linking the firms' identifiers from each data set) provided by SARS. The three datasets work on different reporting years, therefore, the dates were aligned⁴³ to arrive at a panel dataset from 2010 to 2014.

The IRP5 certificates provide information about a worker on a job-level (a job is defined as a unique individual and firm match). The raw IRP5 data was adjusted to remove duplicate certificates, multiple job spells and invalid periods worked (see Table C1 the Appendix). The IRP5 certificates include information on the number of days an individual worked in a specific job (start and end date), their income earned (in South African Rand value) and their birthdate (from which their age can be determined). As the number of days worked differ between jobs, the monthly wages variable is calculated by taking the income and dividing it by the number of days worked (to get the daily wage equivalent). This is then multiplied by 30, to get the monthly equivalent wages. Even though the final panel dataset is from 2010-2014, the tenure of each job was calculated by using the IRP5 data from 2008 to 2014.⁴⁴ To create a measure of firm size, the number of employees per firm was calculated by using a full-time equivalent over each year (i.e. number of days worked across all workers in a firm/365).

⁴³ The CIT data is reported per firm's "financial year", each firm has their own financial year end (89% of firms' financial year ends on February). The IRP5 is reported according to South African "tax year" (for example February 2010 to March 2011) and the customs transactions data is captured per month according to the "calendar year" (January to December). In order to align the dates (let all data align to the IRP5 reporting period: February to March), the customs data (reported on a monthly basis) were matched it onto the IRP5 "tax year" running from February to March. With the CIT data, the 89% of firms whose financial year end on February were kept as is, the remaining 11% of firms whose financial year ends after September (3.28%) were moved to the next "tax year".

⁴⁴ This study has limited data on individual characteristics. Only a worker's age and length of tenure is available from the IRP5. There is no data on the skill-level, education or gender of workers.

The customs transaction data includes information about the trader (firms), the product exported (on HS6-level), the export destination country, the value of the transaction (in South African Rand) as well as its statistical value (number of units). The raw customs data was cleaned by removing duplicate transactions and excluding small and sporadic exporters trading less than R10 000 (this still includes 99% of the export data). In order to link the customs transaction data to the IRP5 data, it was merged onto firm-level. The reason for this is that the only link between these two datasets is the conjunction table provided by SARS, which links firm's identifiers from each data set (the IRP5, customs and CIT). From the customs data, a variable is created that indicates the export destination group a firm serves. An exporter can be in one of three destination groups, namely *SACU only* (firms exporting only to South African Customs Union countries), *Africa only* (firms exporting only to African countries) and *international* (firms exporting both African and non-African countries).

The income tax returns submitted by corporate firms (CIT) include each firm's yearly income statements and balance sheets. From these financial statements, the *Property Plant and Equipment* line item is used to measure capital intensity, the *Employee Expenses* line item is used to determine labour cost and *Sales* line item is used to measure output. The main industry code (profit code classifier) of each firm is used to identify the sector in which they operate. The profit code classifier is condensed to the four-digit ISIC classification used by SARS to select the firms in the manufacturing sector (ISIC 4 classification: codes 1010 – 1033).

The final panel therefore includes employee-employer matched data from 2010-2014 for all manufacturing firms in South Africa who submitted both their tax returns (CIT) and IRP5 forms.

4.3.2 Descriptive statistics on exporters and monthly wages

Figure 4.1 illustrates that, on aggregate, more jobs⁴⁵ are provided by exporting firms (than non-exporting firms). To be more specific, it is the exporters exporting *internationally* (to both African and non-African countries) that provide the most jobs within the manufacturing sector.

⁴⁵ These "jobs" are job-incidence and not full-year-equivalent jobs per firm (i.e. the jobs have not been "weighted" per firm).

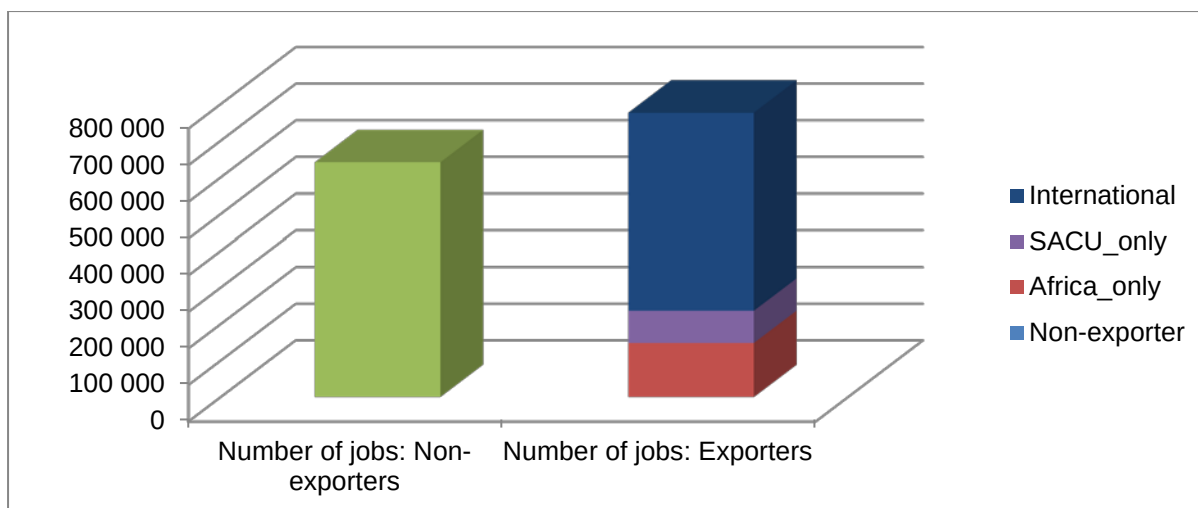


Figure 4-1: Number of jobs: exporters versus non-exporters (average 2010-2014)
Source: Authors' own calculations

The wage distribution of jobs in the South African manufacturing sector (Figure 4.2) provides an illustration of what type of job pays the most (i.e. how the destination a firm serves influences the monthly wages of a worker⁴⁶). Rankin and Schöer (2013) found that, on average, wages of South African exporters exporting to the regional market (SADC) were lower than those of non-exporting firms. Furthermore, they showed that the average wages of firms exporting outside of the region were higher than both regional exporters and domestic producers (Rankin & Schöer, 2013).

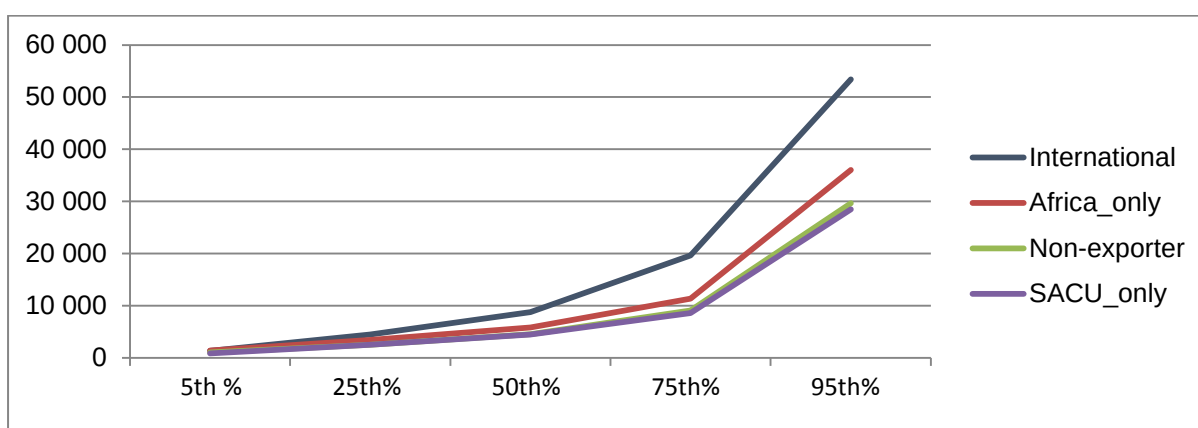


Figure 4-2: Wage distribution (average Rand amount 2010-2014) per export destination

Note: These are absolute figures of monthly wages (levels) with no control variables.

Source: Authors' own calculations

The data in this article shows similar results, as the average wage of firms exporting to the *international* market is the highest, followed by those exporting only to *Africa* and thereafter firms serving either *SACU only* or the domestic market. At the 5th percentile of the wage

⁴⁶ This is calculated on the individual-job level (not on aggregate-firm-level).

distribution, the difference between the monthly wages earned by being employed at an exporting firm (serving either the *international*, *Africa only*, or *SACU only* market) or a non-exporting firm is small. As one moves to the upper tail of the distribution, there is a larger difference in the monthly wages in firms serving different destinations. A job at a firm that exports to the *international* market pays the most, followed by one exporting to *Africa only*. A firm that is either a non-exporter, or only exports to *SACU*, pays the lowest wages.

Figure 4.3 illustrates the number of jobs⁴⁷ per job dynamic group exporting to different destinations. A job is defined as a unique worker-firm combination. There are four job dynamics groups. Firstly, the *continue job* is when a person stays in a job for three consecutive years (from year t-1 to year t+1); secondly, the *enter_continue job* is a job that did not exist in year t-1, but entered in year t and continues to year t+1; *exit job* is a job that exists in year t-1 and year t, but not in t+1; *enter_exit job* is a sporadic job that only exists for one year (year t). From the four job dynamic groups, the highest number of jobs fall in the *continue job* category followed by *exiting* (which may include individuals retiring from their jobs). Jobs that are only kept for one year (*enter_exit*) are the smallest group. Throughout all the job dynamic groups, exporters have a higher number of jobs than non-exporters.

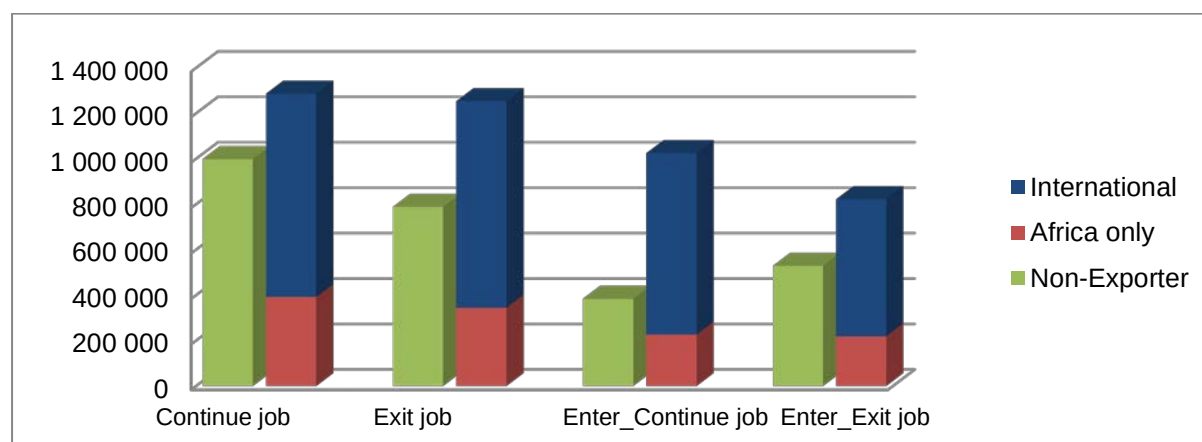


Figure 4-3: Number of jobs: Job dynamic groups per destination (average 2010-2013⁴⁸)

Source: Authors' own calculations

It is also important to consider the wage distribution of exporters versus non-exporters for the different job dynamic groups. From Figure 4.4, it is once again evident that a job at an exporting firm pays more than one in a non-exporting firm (this is true across all dynamic groups). A person staying in the same job (*continue*), earns more than those who enter a job and continue to work the following year (*enter_continue*). The sporadic jobs (*enter_exit*) are

⁴⁷ These jobs refer to job incidence, and are not weighted.

⁴⁸ The IRP5 data is available from 2008-2014, because the job dynamics calculation requires three consecutive year it can only be determined for 2010-2013.

the ones that get paid the least. The difference in wages between these groups becomes larger as one moves to the upper tail of the distribution (comparing the 5th and 95th percentiles).

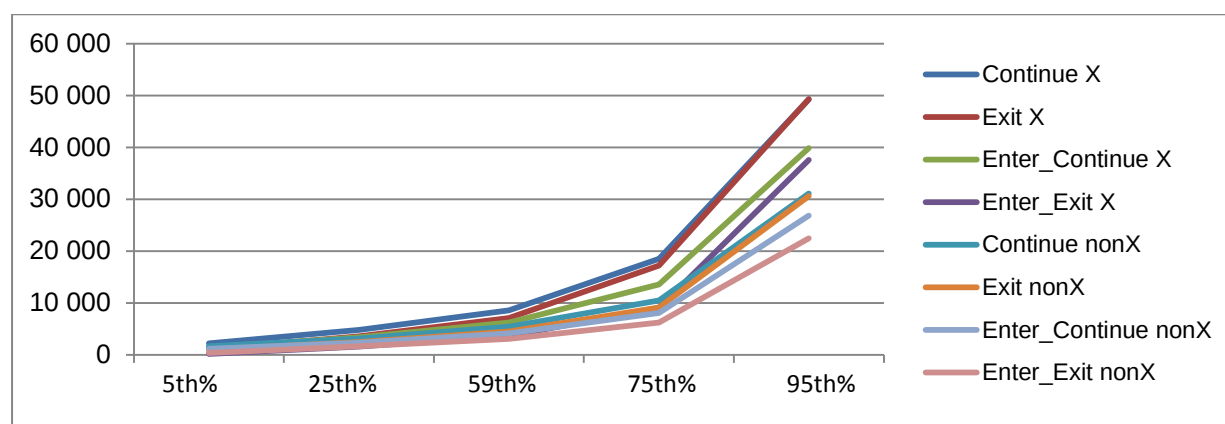


Figure 4-4: Wage distribution (average Rand amount 2010-2013): Job dynamic groups per destination

Note: These are absolute figures of monthly wages (levels) with no control variables.

Source: Authors' own calculations

Figures 4.5 to 4.8 present the kernel densities of wages for the different destinations and job dynamic groups. In a way, this can be seen as a combination of Figure 4.1-4.4, as it combines the monthly wages and the number of jobs by showing the distribution of wages for the different groups.

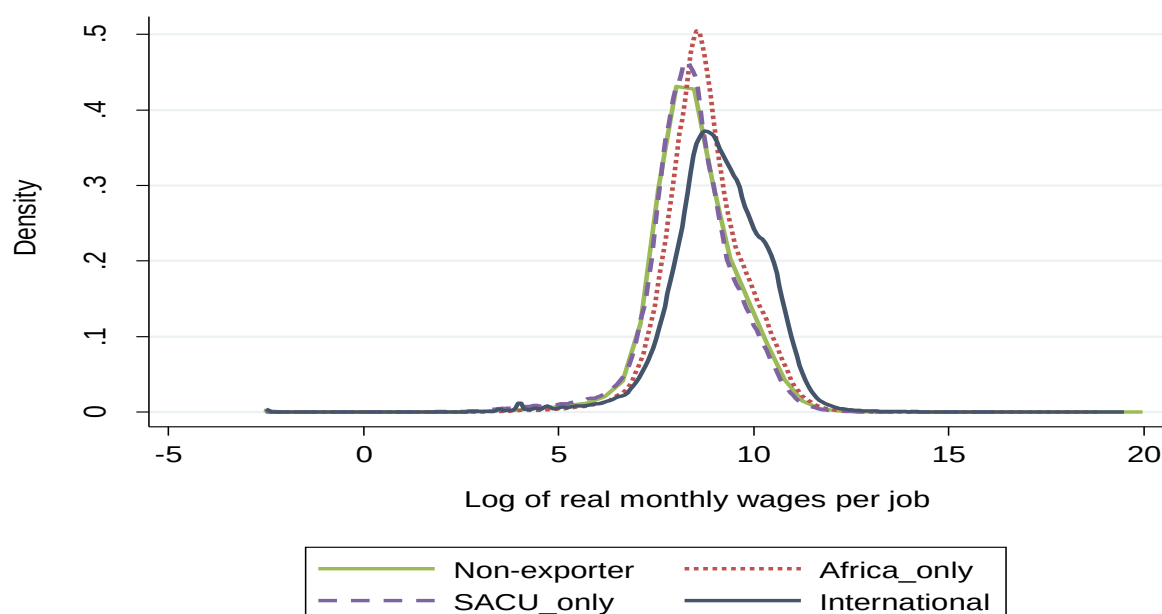


Figure 4-5: Kernel density: exporters versus non-exporters per export destination

Source: Authors' own calculations

From Figure 4.5, it is clear that the shapes of the kernel densities for non-exporters and *SACU only* exporters are very similar. Relative to these two, the *Africa only* kernel density is slightly more to the right, with a small bulge. The distribution of wages for *international* exporters is more to the right of the distribution of wages for *Africa only* indicating that they earn higher wages.

Comparing the difference between exporters (solid lines) and non-exporters (dotted lines) in Figure 4.6, one can see that, for all job dynamic categories, the exporter's distribution is more to the right (they earn higher wages). Within the four different job dynamic groups, the *continued job* (red) and *exit job* (purple) groups have higher wages (are more to the right). It can be argued that these are the workers with more experience. On the other hand, the sporadic jobs (*enter_exit*: green) and *enter and continue* (blue) distributions are more to the left. The sporadic jobs at an exporting firm's distribution (green solid line) are different from the rest of the job dynamic groups, which indicates a small group earning low wages.

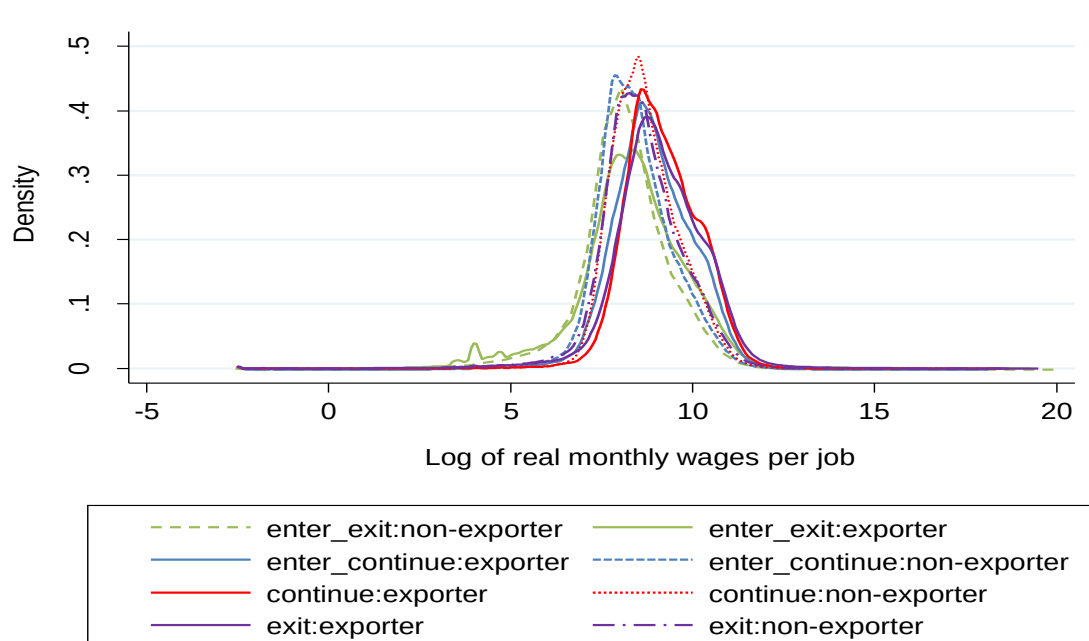


Figure 4-6: Kernel density: Job dynamic groups of exporters and non-exporters
Source: Authors' own calculations

Figures 4.7 and 4.8 present the kernel densities of the job dynamic groups (as in Figure 4.6) and also distinguish between the different export destinations. Figure 4.7 compares non-exporters to *Africa only* exporters, whereas Figure 4.8 compares the *Africa only* exporters to *international* exporters.

Comparing *enter and continue Africa* (solid blue line) to *enter and continue* non-exporter (dotted blue line) in Figure 4.7, the *African only* exporter's distribution is more to the right

(indicating higher wages). The same is true for the *continue*, (red) *enter and exit* (green). It is only the *exit Africa* group that earns lower wages than non-exporters.

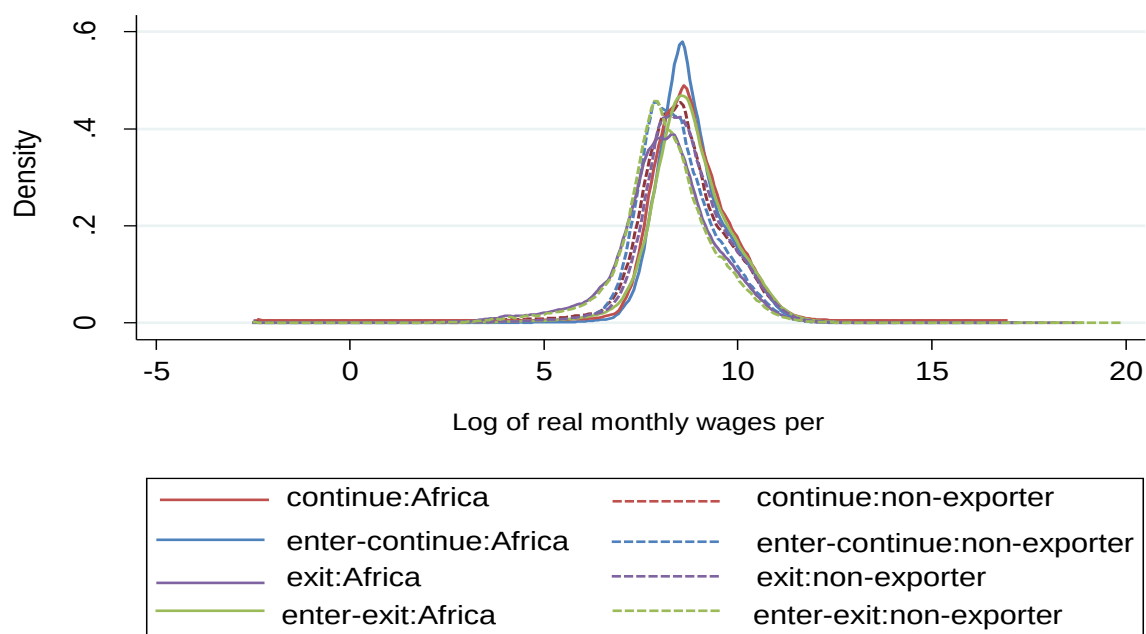


Figure 4-7: Kernel density: Job dynamic groups of Africa only exporters and non-exporters

Source: Authors' own calculations

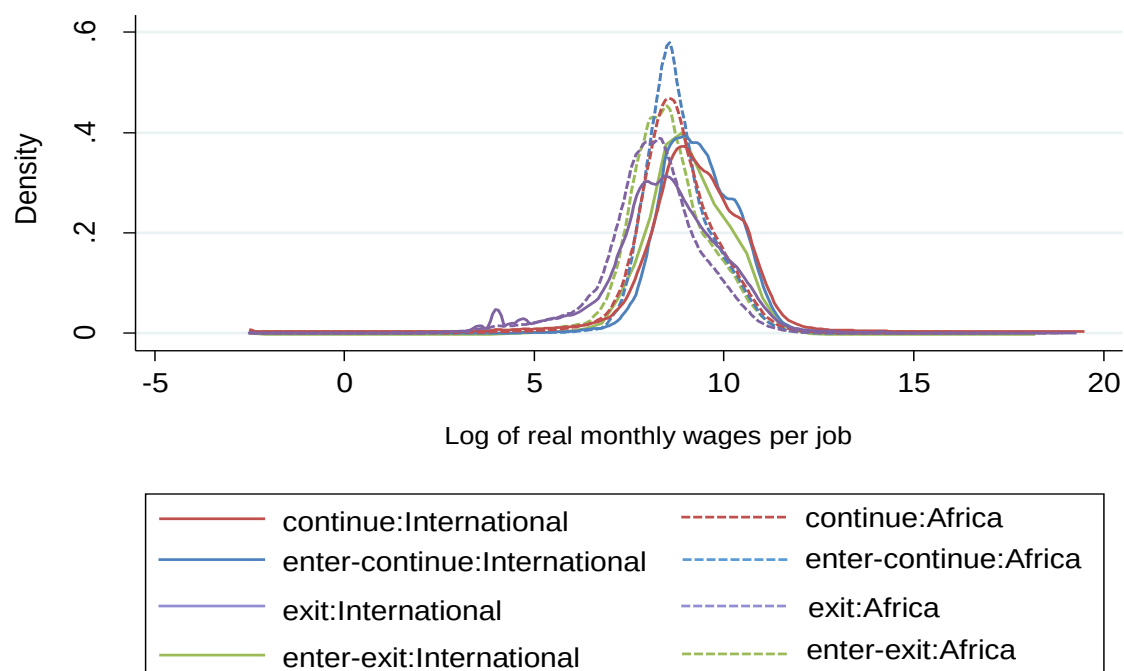


Figure 4-8: Kernel density: Job dynamic groups of Africa only exporters and international exporters

Source: Authors' own calculations

Form Figure 4.8, the *international* (solid lines) job dynamics groups are distributed more to the right, whereas the *African only* exporters (dotted lines) are all more to the left. This indicates that, in all the different job dynamic categories, *international* exporters pay higher wages than *African only* exporters.

From the descriptive statistics on exporters and monthly wages, it is clear that exporters provide more jobs and pay higher monthly wages. To be more specific, the exporters serving the *international* market pays the highest wages, followed by those who export only to the *African* market. When considering the wage distribution, the difference in wages between these destinations is small at the 5th percentile of the earnings distribution, but increases as one moves to the upper tail of the distribution (the 95th percentile). There is also a difference in wages between the job dynamic groups. A person staying in the same job (*continue*) earns more than those who enter a job and continue to work the following year (*enter_continue*). The sporadic jobs (*enter_exit*) are the ones that get paid the least.

4.3.3 Estimation strategy

The descriptive statistics and literature confirm that exporting firms pay higher average wages. The question that arises is why do these firms pay higher wages? The export wage premium can be due to different reasons, for example, observable firm and individual characteristics. The starting point of this analysis is estimating a standard Mincerian earnings function using control variables (that controls for observable individual and firm characteristics).

$$\ln(X)_{ijt} = \alpha + \beta_1 \text{Exporter}_{jt} + \beta_2 \text{individual}_{ijt} + \beta_3 \text{firm}_{jt} + \beta_4 \text{Industry}_{ij} + \beta_5 \text{year}_{ijt} + u_{ijt} \quad (1)$$

Where:

X_{ijt} – real monthly wages per job -a unique individual and firm combination- (for worker i , in firm j , at time t)

Exporter_{jt} – dummy variable indicating export status (exporter=1 and non-exporter=0)

Individual_{ijt} – observable individual characteristics (age, age-squared and tenure)⁴⁹

Firm_{jt} – logarithm observable firm characteristics, namely firm size: number of workers (ll), capital per worker (lkl) and output per worker (lyl).

⁴⁹ The age, age-squared and tenure variables have been entered as levels (i.e. not as logarithms)

$Industry_{ij}$ – control dummy (4 digit ISIC classification) to account for industry heterogeneity and industry-fixed effects.

$year_{ijt}$ – control dummy for the years

β_1 – export premia

μ_{ijt} - Error term

Even though the Mincerian earnings function (equation 1) above controls for observable individual (age, age squared, tenure) and firm (size, capital and labour productivity) characteristics, there could also be other variables that drive this wage differential (export wage premium). One way to control for unobservable factors is to make use of fixed effects. Since the data is on job-level (a unique individual and firm combination), it allows for fixed effect controls on a firm-level. Following the work of Schank *et al.* (2007), Munch and Skaksen (2008) and Fafchamps (2009), v_j is added to the model (equation 1) to control for firm-fixed effects.

$$\ln(X)_{ijt} = \alpha + \beta_1 Exporter_{jt} + \beta_2 individual_{ijt} + \beta_3 firm_{jt} + \beta_4 Industry_i + \beta_5 year_{ijt} + v_j + u_{ijt} \quad (2)$$

As the firm-fixed (in equation 2) controls for all observable and unobservable firm characteristics, the export coefficient is identified by firms switching in and out of exporting. Even though equation 2 controls for observable and unobservable firm characteristics, it does not control for unobservable individual characteristics. Therefore, by following Fafchamps (2009), equation 3 adds individual-fixed effects (z_{ij}) to the model (equation 1).

$$\ln(X)_{ijt} = \alpha + \beta_1 Exporter_{jt} + \beta_2 individual_{ijt} + \beta_3 firm_{jt} + \beta_4 Industry_i + \beta_5 year_{ijt} + z_{ij} + u_{ijt} \quad (3)$$

With individual-fixed effects (equation 3), the export coefficient is identified by either one of two possible occurrences. Firstly, if a worker switches jobs from a non-exporting firm to an exporting firm (or vice versa) and secondly, if a worker stays in the same job, but the firm they work for switches into or out of exporting. Since the data is on job-level, one can also use job-fixed effects which control for all observable and unobservable job characteristics. Therefore, the export coefficient is identified by a worker staying in a job and the firm they work for starts, or stops, exporting. Following Martins and Opromolla (2009), job-fixed effects (n_{ij}) are added to the model (equation 1) to form equation 4.

$$\ln(X)_{ijt} = \alpha + \beta_1 Exporter_{jt} + \beta_2 individual_{ijt} + \beta_3 firm_{jt} + \beta_4 Industry_i + \beta_5 year_{ijt} + n_{ij} + u_{ijt} \quad (4)$$

Job-fixed effects measure the difference in wages within a job (a unique individual and firm combination), when a firm becomes an exporting firm. From equations 1 to 4, the model becomes more and more restrictive, but gives insight into what drives the export wage premium and firm dynamics.

This article considered another possible approach to study the export wage premium by examining it at various parts of the wage distribution. The advantages of using quantile regressions rather than the OLS method were summarised by Koenker and Hallock (2001). OLS regression results are less robust to outliers than quantile regressions. Quantile regressions give parameter estimates at different quantiles, whereas OLS provides it at the mean. With quantile regressions, the whole sample of data is used, with observations closer to each quantile weighted more. By using quantile regressions, equation 1 is firstly estimated to see the export wage premium at the 5th, 25th, 50th, 75th and 95th percentiles of the wage distribution. Secondly, a more econometric challenging task is to combine the quantile regressions with fixed effects (equations 2-4). Usually, when combining quantile regressions with fixed effects in a panel data study, the data estimators include an additive fixed effect which splits the disturbance term and assumes the parameters do not vary based on the fixed effect. To overcome this, the quantile regression estimator for panel data (QRPD) developed by David Powell, which allows the parameters to vary based on a non-additive disturbance term is used (see Powell (2016) for an in-depth explanation on this).

4.3.4 Regression results

4.3.4.1 Mincerian earnings function with fixed effects

4.3.4.1.1 Export wage premium

Table 4.1 shows the first set of results estimating equation 1 (see column 1-4), equation 2 (column 5), equation 3 (column 6) and equation 4 (column 7). Column 1 shows the wage premium (of 54.03 %⁵⁰) for jobs in exporting firms (relative to non-exporting firm) in South Africa's manufacturing sector (controlling for year and industry). When adding individual characteristics (age, age squared and tenure) in column two, the wage differential drops to 43.19%. Therefore, 10.84 percentage points of the wage premium can be explained by individual characteristics. This result strongly points to the presence of selection effects in driving the export premium. Once firm characteristics are controlled for (column 3) (this includes firm size (ll), capital intensity (lkl) and output per worker (lyl)), the wage differential

⁵⁰ The regression estimates the impact on $\ln(\text{wage})$, therefore the percentage is calculated as follows: $\text{exponent}(\text{beta}) - 1$.

drops by 43.07 percentage points to 10.96% (compare columns 1 and 3). Therefore, a large part of a person's monthly wage can be explained by the characteristics of the firm they work in. Fafchamps (2009) and Breau and Brow (2011) also found firm characteristics to have a larger impact on the export wage premium than individual characteristics.

In column 5, firm-fixed effects are added. The export coefficient is identified by firms that change their export status. The wage differential seen in columns 1 to 4 has disappeared (-1.24%). Therefore, when a firm enters the export market, the average wages of its workers fall. One explanation for this could be a change in the composition of the workforce (i.e. adding more lower paid workers). This decrease in average wages of a firm is in contrast with the findings of Schank *et al.* (2007), Fafchamps (2009) and Martins and Opromolla (2009) who found the average wages of a firm to increase as they entered the export market.

Column 6 reports results when adding individual-fixed effects (equation 3). This regression compares identical workers in two consecutive years. The small export coefficient (2.56%)⁵¹ is identified by two possible scenarios. Firstly, workers moving from non-exporting to exporting firms (switching into different jobs/firms) and secondly, if a worker stays in a job and the firm switches into, or out of, exporting. From column 5 (firm-fixed effects), it is clear that, when a firm switches into exporting, its average wages fall, but from a worker's perspective (column 6), when they enter a job at an exporting firm, they earn a wage premium compared to what they would earn if they worked in a non-exporting firm. Interestingly, a similar study on Morocco found no wage premium when an individual switched into a job at an exporting firm (Fafchamps, 2009).

Job-fixed effects (equation 4) are added in column 7. By comparing identical jobs in two consecutive years, the identification of the export coefficient (using job-fixed effects) is when a worker stays in the same job and their firm becomes an exporting firm, or leaves exporting. Thus, the export coefficient of 1.44% (column 7) indicates that, if worker is employed in the same job and the firm starts exporting, the worker's wages increase by 1.44%. The firm-fixed effects (column 5) show that a firm's average wages falls when they switch into exporting, but within a job (job-fixed effects), wages rise. Therefore, when a firm starts to export, its average wages decrease, but the continued jobs in that firm earn more. This suggests that the jobs that are added by these firms earn relatively lower wages (than the firms' current workforce).

⁵¹ A significant limitation of the analysis is that so few individual characteristics (e.g. gender, education) are available. The importance of these are revealed in the low premiums estimated once individual fixed effects are included.

Table 4-1: Export wage premium

	Monthly income (wages)						
	(1)	(2)	(3)	(4)	(5) Firm fe	(6) Indiv fe	(7) Job fe
Exporter	0.432*** (0.000863)	0.359*** (0.000822)	0.104*** (0.00103)	0.0514*** (0.000977)	-0.0125*** (0.00232)	0.0253*** (0.00108)	0.0143*** (0.00118)
Age		-0.111*** (0.000494)		-0.103*** (0.000495)	-0.0876*** (0.000452)		-0.114*** (0.0104)
Agesqr		1.650*** (0.00612)		1.528*** (0.00613)	1.299*** (0.00561)		1.705*** (0.0152)
Tenure		0.125*** (0.000299)		0.121*** (0.000296)	0.130*** (0.000319)	0.0311*** (0.000372)	0.0311*** (0.00138)
Ln (no. of workers)			0.0541*** (0.000241)	0.0535*** (0.000228)	0.0421*** (0.00170)	0.0206*** (0.000384)	0.0387*** (0.000877)
Ln (capital/worker)			0.0235*** (0.000206)	0.0194*** (0.000195)	0.00381*** (0.000454)	0.00786*** (0.000216)	0.00338*** (0.000230)
Ln (output/worker)			0.295*** (0.000430)	0.280*** (0.000408)	0.0757*** (0.00156)	0.0603*** (0.000520)	0.0510*** (0.000793)
Year control	Yes	Yes	Yes	Yes		Yes	Yes
Industry controls	Yes	Yes	Yes	Yes		Yes	Yes
Observations	7,088,642	7,088,642	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730
R-squared	0.144	0.233	0.235	0.313	0.100	0.097	0.119
Number of: Firms/ID/job					49,462	2,679,640	3,011,765

Note: Premium relative to non-exporters *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

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

Source: Authors' own calculations

4.3.4.1.2 Export wage premium (to African and non-African countries)

Table 4.2 distinguishes between the different destinations of exporting and segregates the export wage differential (seen in Table 1) between *international*, *Africa only* and *SACU only* exporters. In column 1 there is a substantial difference between *SACU only*, *Africa only* and *international* exporters. A worker at a firm exporting to *SACU* earns less or equal to one working at a domestic-orientated firm (columns 1-4). Working at a firm exporting to *Africa only* pays a bit more than a non-exporting firm. The highest wage premium is earned at a firm exporting to the *international* market (relative to non-exporting firms).

After adding firm-fixed effects (column 5), the differences in the wage premium between the destinations fall substantially. With firm-fixed effects the export coefficient is identified by firms that switch into exporting (to different destinations)⁵². The decrease in average wages of a firm that enters the export market, shown in Table 4.1 (column 5), can now be better explained. It is the workers in firms entering *SACU only* and *Africa only* whose average

⁵² A recommendation for future research is to capture the effect on the wage premium when a firm changes export status in terms of shifting from an "Africa only" exporter to a "International exporter".

wages fall (-0.32% and -0.05% respectively). The average wages of workers in a firm entering the *international* market increase somewhat (0.05%). A possible reason for this can be that *SACU only* firms add lower paying jobs (i.e. adding jobs that earn relatively less than what the average worker in that firm earns) when selecting into the export market (-0.32%). Whereas firms switching into the *international* and *African* export markets are expanding their workforce by adding workers that earn relatively similar wages to the average within the firm (0.05% more for *international* and 0.05% less for *Africa*).

Table 4-2: Export wage premium (to African and non-African countries)

Monthly income (wages)							
	(1)	(2)	(3)	(4)	(5) Firm fe	(6) Indiv fe	(7) Job fe
International	0.551*** (0.000942)	0.466*** (0.000899)	0.182*** (0.00119)	0.116*** (0.00114)	0.00548** (0.00279)	0.0389*** (0.00127)	0.0169*** (0.00141)
Africa only (excluding SACU)	0.252*** (0.00144)	0.208*** (0.00137)	0.0705*** (0.00148)	0.0338*** (0.00140)	-0.00555** (0.00276)	0.0226*** (0.00134)	0.00841*** (0.00139)
SACU only	0.0437*** (0.00180)	-0.000763 (0.00170)	-0.0729*** (0.00182)	-0.108*** (0.00172)	-0.0320*** (0.00285)	0.00544*** (0.00149)	0.00169*** (0.00145)
age		-0.111*** (0.000491)		-0.103*** (0.000494)	-0.0875*** (0.000452)	-0.174*** (0.0124)	-0.114*** (0.0104)
agesqr		1.643*** (0.00609)		1.525*** (0.00613)	1.299*** (0.00561)	2.354*** (0.0167)	1.705*** (0.0152)
tenure		0.122*** (0.000297)		0.120*** (0.000296)	0.130*** (0.000319)	0.0359*** (0.000373)	0.0311*** (0.00138)
Ln (no. of workers)			0.0447*** (0.000251)	0.0458*** (0.000238)	0.0417*** (0.00170)	0.0175*** (0.000389)	0.0388*** (0.000877)
Ln (capital/worker)			0.0204*** (0.000207)	0.0168*** (0.000196)	0.00386*** (0.000455)	0.00804*** (0.000215)	0.00347*** (0.000230)
Ln (output/worker)			0.288*** (0.000432)	0.274*** (0.000410)	0.0753*** (0.00156)	0.0592*** (0.000521)	0.0509*** (0.000793)
Year control	Yes	Yes	Yes	Yes		Yes	Yes
Industry controls	Yes	Yes	Yes	Yes		Yes	Yes
Observations	7,088,642	7,088,642	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730
R-squared	0.156	0.243	0.238	0.315	0.100	0.102	0.119
No. Firms/ID/job					49,462	2,679,640	3,011,765

Note: Premium relative to non-exporters ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively); Source: Authors' own calculations

The individual-fixed effects (column 6) regression compares identical workers in two consecutive years. Therefore, the export coefficients (per destination) are identified by workers either moving from a non-exporting firm to an exporting firm or staying in the same job and their firm becomes an exporter. In column 6, the individual-fixed effects show an increase in wages (relative to non-exporters), but there is a hierarchy in the export coefficients as a firm exports further away (*SACU only*, *Africa only* and *international*).

In column 7, the job-fixed effects indicate the same hierarchy (as in column 6). But here the small export coefficient (per destination) is identified by a worker staying in the same job and the firm which they are employed in switching into exporting (i.e. the firm starts to export to a certain destination).

4.3.4.1.3 Wage premium: Job dynamic groups of exporters and non-exporters

Table 4.3 adds the job dynamic groups to see the wage differential between *enter*, *exit*, *continue* and *sporadic* jobs in a firm that exports or one that does not export (relative to *sporadic* job in a non-exporting firm - the base). The enter-exit non-exporter (*enter_exit nonX*) is the base category for the wage premium estimates in this table. Once again, it is clear that, across all job dynamic groups, an exporting firm pays more than a non-exporting firm. For example, compare a *continued* job in an exporting firm (*continue X*) to a *continued* job in a non-exporting firm (*continue nonX*). From column 4 (controlling for individual and firm characteristics), it can be seen that workers who stay in the same job (*continuing*) earn the highest wage, followed by those who *enter* a job and stay in that job the following year (*enter_continue*). This is true when comparing *continuing* and *enter_continue* workers in exporters or non-exporters. Exiting a job after having the job for more than a year (*exit*) pays relatively more than being in a sporadic job (entering a job and exit the following year “*enter_exit*”). Interestingly, in column 1, the *exit* jobs have a relatively high wage premium, but when adding individual characteristics (age, age squared and tenure) in columns 2 and 4, this premium drops. One possible explanation could be that the *exit* jobs include workers who retire (older aged workers with a long length of tenure).

In column 5, the firm-fixed effects regression results indicate that a *continuous* job in an exporting firm (*continue X*) pays 37.2% more than a *sporadic* job in a non-exporting firm (*enter_exit non-exporter, the base*). While a *continuous* job in a non-exporting firm (*continue nonX*) pays 34.7% more than a *sporadic* job in a non-exporting firm (the base). There is a small difference of 2.5% between a *continuous* job in an exporting and non-exporting firm. On the other hand, if a worker *enters and continue* a job in a non-exporting (*enter_continue nonX*) they will earn 0.9% more than they would have in an exporting firm (32.8% for *enter_continue nonX* minus 31.9% for *enter_continue X*). Therefore, within a *continuous* job, as a firm enters exporting, there is a wage increase for the worker. If a worker joins a firm as they begin to export (*enter_continue*), their wage is slightly lower (0.9%) than what it would have been in the same firm when it was not exporting.

Table 4-3: Wage premium: Job dynamic groups of exporters and non-exporters
Monthly income (wages)

	(1)	(2)	(3)	(4)	(5) Firm fe	(6) Indiv fe	(7) Job fe
continue X	1.028*** -0.00175	0.629*** -0.002	0.647*** -0.00193	0.273*** -0.00215	0.316*** -0.00336	0.258*** -0.00243	0.0969*** -0.00471
continue nonX	0.635*** -0.00187	0.260*** -0.00209	0.521*** -0.00196	0.162*** -0.00216	0.298*** -0.0023	0.241*** -0.00238	0.0902*** -0.00461
enter_continue X	0.779*** -0.00196	0.680*** -0.0019	0.345*** -0.00213	0.269*** -0.00206	0.277*** -0.00336	0.250*** -0.00242	0.0944*** -0.00473
enter_continue nonX	0.369*** -0.00203	0.309*** -0.00196	0.262*** -0.00213	0.210*** -0.00206	0.284*** -0.00214	0.210*** -0.00232	0.0712*** -0.00459
exit X	0.820*** -0.00211	0.476*** -0.00227	0.456*** -0.00227	0.136*** -0.0024	0.205*** -0.00352	0.228*** -0.00253	0.0871*** -0.00475
exit nonX	0.419*** -0.00212	0.114*** -0.00224	0.349*** -0.00225	0.0566*** -0.00236	0.149*** -0.00237	0.162*** -0.00243	0.0301*** -0.0046
enter_exit X	0.146*** -0.00227	0.138*** -0.00219	-0.229*** -0.0024	-0.221*** -0.00232	-0.135*** -0.00354	-0.0240*** -0.00285	0.0479*** -0.00631
Age		-0.098*** (0.000551)		-0.0902*** (0.000556)	-0.0762*** (0.000507)		-0.107*** (0.0266)
Agesqr		1.483*** (0.00683)		1.359*** (0.00689)	1.154*** (0.00630)		1.629*** (0.0201)
Tenure		0.112*** (0.000520)		0.113*** (0.000517)	0.111*** (0.000515)	0.0296*** (0.000591)	0.0384*** (0.00205)
Ln (no. of workers)			0.0517*** (0.000267)	0.0516*** (0.000258)	-0.0121*** (0.00227)	0.0102*** (0.000488)	0.0320*** (0.00116)
Ln (capital/worker)			0.0235*** (0.000223)	0.0210*** (0.000216)	0.00172*** (0.000564)	0.00730*** (0.000259)	0.00177*** (0.000278)
Ln (output/worker)			0.304*** (0.000493)	0.292*** (0.000477)	0.0964*** (0.00186)	0.0650*** (0.000677)	0.0465*** (0.000915)
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	7.405*** (0.00208)	2.207*** (0.0208)	3.008*** (0.00644)	-1.559*** (0.0217)	2.783*** (0.0392)	7.266*** (0.00993)	1.818* (0.957)
Observations	5,627,284	5,627,284	4,924,533	4,924,533	4,924,533	4,924,533	4,924,533
R-squared	0.191	0.247	0.279	0.327	0.111	0.092	0.106
Number of: Firms/ID/job					45,250	2,367,577	2,599,827

Note: Premium relative to enter_exit non-exporter ***p<0.01 **p<0.05 *p<0.1

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

Source: Authors' own calculations

When controlling for individual (column 6) and job (column 7) fixed effects, the coefficients are identified by workers either moving from a non-exporting firm to an exporting firm or staying in the same job and their firm becomes an exporter. From an individual point of view, when a worker switches (columns 6 and 7) into a firm entering into exporting, they earn slightly more than non-exporters (28.4% versus 23.4% in column 6 or 9.9% versus 7.4% in column 7). Consequently, one can see that the individual is obtaining a "better paying job".

To summarise, an important question from the South African firm-level literature is to investigate the type of jobs created by exporters when they enter the export market (Edwards & Lawrence, 2012). Table 4.3 shows that, from a firm's point of view (column 5), when entering the export market, they add "lower paying" jobs relative to their own job spectrum. However, from the workers' (column 6) point of view, when they *enter* a job at a firm entering the export market they are obtaining "better paying jobs" (than they would have if they were *entering* a job at a non-exporting firm⁵³).

4.3.4.1.4 Wage premium: Job dynamic groups of exporters exporting to African and non-African countries

Figure 4.9 adds destinations (*Africa* and *international*) to the job dynamics groups discussed in the previous table (Table 4.3). The blue bars indicate each job dynamic group's export wage premium controlling for observable firm and individual characteristics (see Table C2 column 4 in the Appendix). The maroon bars show the wage premium after controlling for unobservable firm characteristics by using firm-fixed effects (see Table A2 column 5). The green and purple bars indicate the wage premium controlling for unobservable individual (using individual-fixed effects) and job characteristics (using job-fixed effects) respectively.

Comparing the three *continue* job dynamic groups (*continue international* exporter "*continue Int_X*"; *continue African* exporter "*continue Afr_X*" and *continue non-exporter* "*continue non_X*"), there is quite a large wage differential between these groups (blue bars). For example, there is a 23-percentage point difference between the average wages of a *continued* worker in a non-exporting firm (0.19) versus an *international* exporting firm (0.42). When firm-specific unobservable characteristics are controlled for (as illustrated by the maroon bars that indicate firm-fixed effects), those differences effectively disappear. The wage premium for *continue Int_X*; *continue Afr_X* and *continue non_X* is 0.39, 0.36 and 0.35 respectively. This suggests that almost all of the observed wage premium can be explained by the type of firm a person works in. The same trend can be seen when controlling for unobservable individual characteristics (green bars: individual-fixed effects). The wage premium lowers to 0.30, 0.29 and 0.27 for *continue Int_X*; *continue Afr_X* and *continue non_X* respectively. This implies that these high paying *international* exporters are hiring certain types of individuals. Controlling for job-fixed effects (illustrated by the purple bars)

⁵³ In this article, there is data on job spells for four years 2010-2013 (see footnote 7), and the job dynamic definitions is based on a three-year period (year t-1, year t and year t+1 – see definitions section 4.3.2). Therefore, a job (that started in 2010 and did not exist in 2009) can be classified as *enter_continuous* job in the first set of three years and then *continuous* for the second set of three years.

delivers the same results. Therefore, the observed large wage differentials are not due to a firm becoming an exporter and suddenly paying higher wages. It is rather due to the unobservable characteristics of exporting firms and the unobservable characteristics of the workers they employ, that result in higher paying jobs.

A similar pattern (to the three *continue* groups) is seen when comparing the three *enter and continue* job dynamic groups in firms serving different markets (*international* market (*enter_continue Int_X*); *Africa only* (*enter_continue Afr_X*); and the domestic market (*enter_continue non_X*). Again, there is a large wage differential (comparing the blue bars), but when adding firm- (maroon bars) and individual-fixed (green bars) effects, the difference between the three groups is considerably smaller. As soon as one controls for unobservable characteristics of a firm (using firm-fixed effects) and unobservable characteristics of the individual (using individual-fixed effects), the large wage differential disappears. Thus, it is not the export status of a firm that determines the wage differential, but rather the unobservable firm and individual characteristics.

Therefore, the difference that is seen in the premium of being an *international* exporter is not about being labelled an exporter. It is rather because of the “type of firm” (unobservable firm characteristics) exporters are, the “type of workers” (unobservable individual characteristics) they employ and the “type of jobs” (unobservable job characteristics) they create.

An example can help to illustrate this point. Consider the skillset of a worker with a person with a post-graduate degree. A post-graduate degree is valuable regardless of where one works. The firm is going to pay a “post-graduate degree-premium”. The type of firm that hires a person with a post-graduate degree is going to pay a premium for a post-graduate qualification regardless of what type of firm they are (exporter or not). But exporters are more likely to hire higher-skilled workers, which is the reason for seeing these differentials, because exporting firms hire higher earning (higher skilled) individuals. This is particularly the case for *international* exporters, because they are hiring workers at the top of the wage distribution. Therefore, the wage premium can be ascribed to the type of firm exporters are and the types of workers they employ (a firm which is going to become an exporter, hires a certain type of worker and pays them a premium).

It is important to note that, once firm-fixed effects (the type of firm they are) are controlled for, the wages are similar (it does not seem to matter what their export behaviour or destination is). However, the type of firm could in effect determine if a firm is an exporter or not (i.e. it could be the firms with superior characteristics who select into exporting). There is an endogeneity issue in this analysis that cannot be disentangled. This endogeneity comes

from the unobservable firm characteristics that possibly make a firm the type of firm that exports.

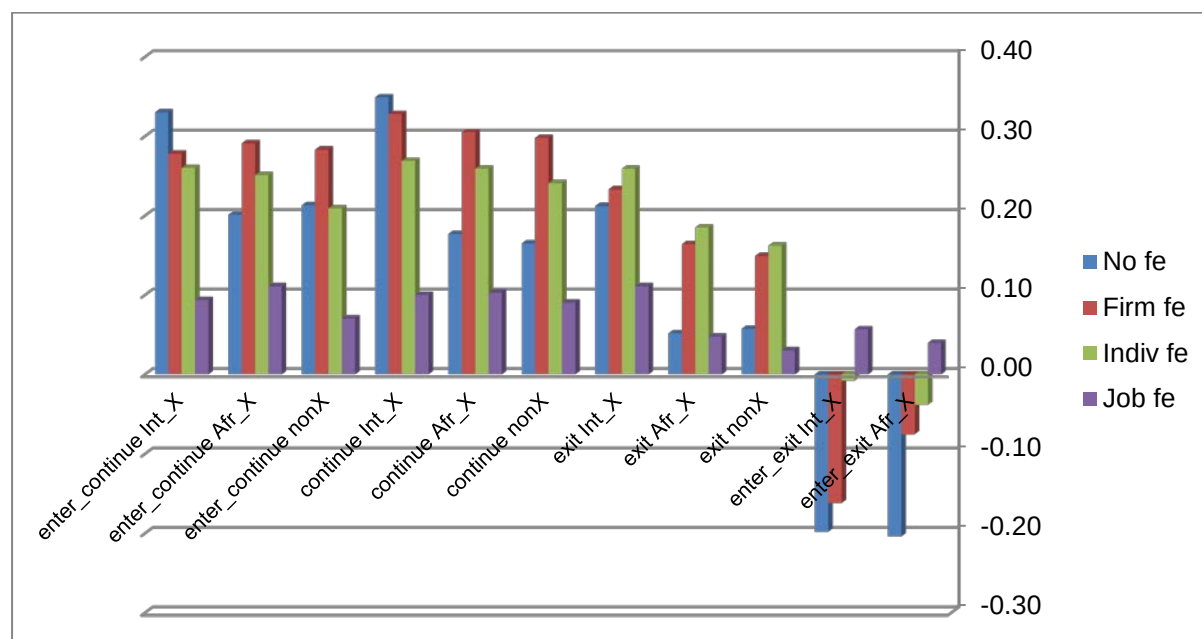


Figure 4-9: Wage premium: Job dynamic groups of exporters exporting to African and non-African countries

Note: Premium relative to enter_exit non-exporter; Source: Authors' own calculations see Table C2

Thus far, this article considered the export wage premium by using OLS regressions to compare the average wages of exporters (serving different destinations) to non-exporters and by also considering different job dynamics. Another perspective to consider is how the wage premium is dispersed over the wage distribution (from the 5th to the 95th percentiles). Hence, by examining the wage distribution, one can see at which income percentile the export wage premium is the highest. Section 3.4.2 continues to estimate equations 1 to 4 (similar to section 3.4.1), by using quantile regressions to illustrate the wage premium over the wage distribution.

4.3.4.2 Quantile regressions

4.3.4.2.1 Distribution of the export wage premium

Figure 4.10 presents a graphic illustration of the export premium (while controlling observable individual and firm characteristics as well as industry and year) from the normal OLS regression (Table 4.1, column 4) relative to the quantile regression (see Table C2 in the Appendix). The OLS regression minimises the sum of squared residuals. Therefore, it provides the impact (premium) at the mean (Fu & Wu, 2012). From the quantile regression, the impact (premium) at each quantile of the wage distribution is evident. The results of the

quantile regressions are reported at the following five percentiles: 5th, 25th, 50th, 75th, and 95th. When considering the quantile regression results, the highest export wage premium is for workers either at the lower tail or at the upper tail of the wage distribution. It is also interesting to note that, across the distribution, from the lowest to the highest quantile, there is a certain premium level in working in an exporting firm (while controlling for observable firm and individual characteristics). A worker at the bottom of the wage distribution (5th percentile), working in an exporting firm will still be paid 5% more than when working in a non-exporting firm with similar observable characteristics.

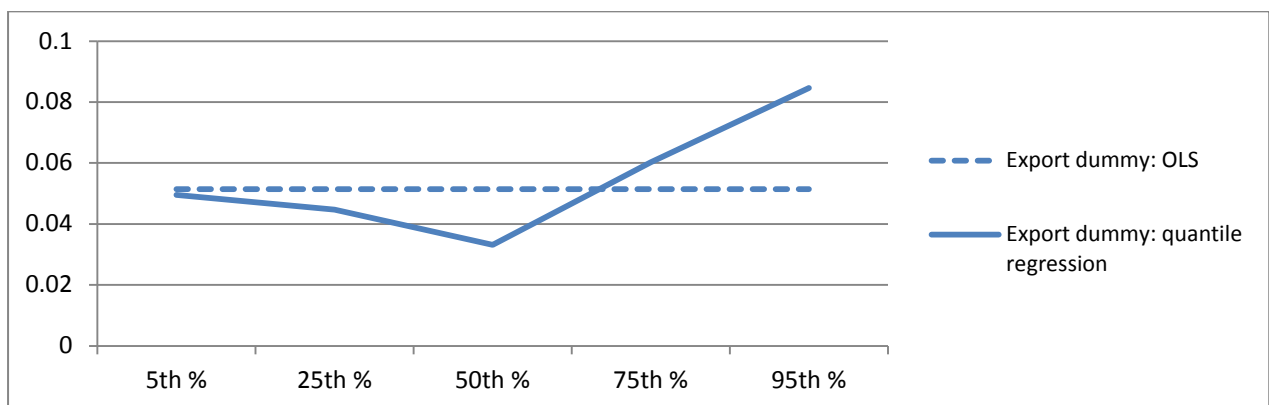


Figure 4-10: Distribution of the export wage premium

Note: Premium relative to non-exporters (controlling for observable individual and firm characteristics as well as industry and year); Source: Authors' own calculations see Table C3 in the Appendix

4.3.4.2.2 Distribution of wage premium per export destination

Figure 4.10 is for exporters in general, but the South African firm-level literature shows that the wage premium differs between the regional and *international* markets (Rankin & Schöer, 2013). By distinguishing between the different export destinations (Figure 4.11 and Table A4), it is clear that the wage premium of working in an *international* firm is fairly constant throughout the distribution (but still the highest premium). The wages paid by *African only* and *SACU only* exporters are driving the U-shape that is seen in Figure 4.10. Relative to non-exporters, there is no wage premium in working for a *SACU only* exporter (they pay lower wages than non-exporters). Working at an *Africa only* exporter there is an export premium at the upper and lower tail of the distribution, but not at the 50th percentile. Alcalá & Hernández (2010) also found that the export premium increased with the remoteness of the market for Spanish firms.

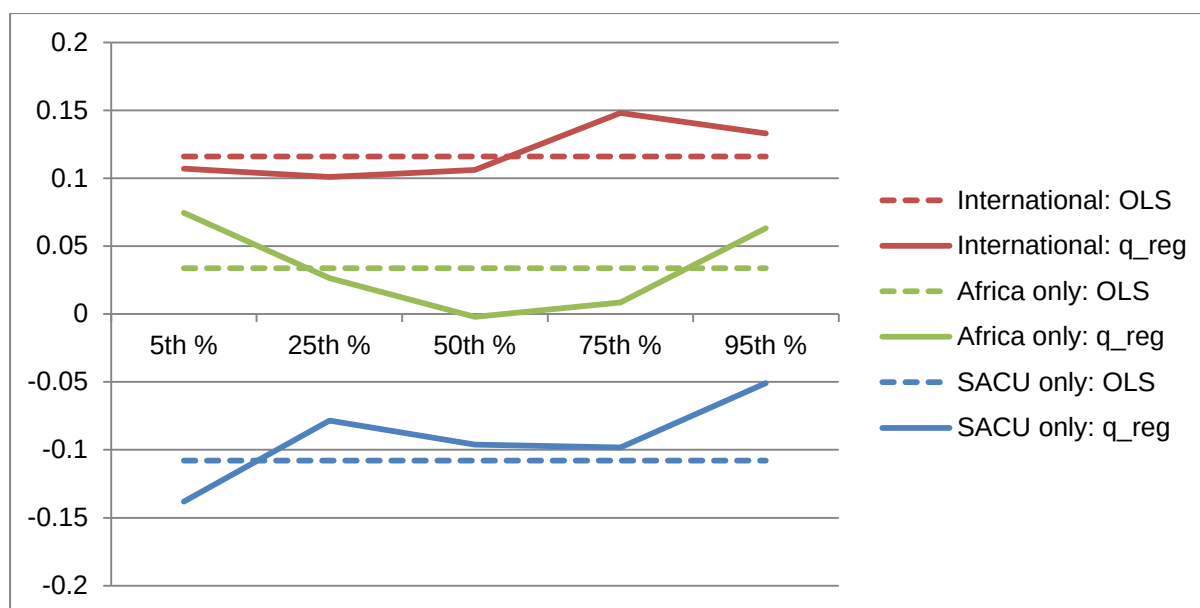


Figure 4-11: Distribution of wage premium per export destination

Note: Premium relative to non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

Source: Authors' own calculations see Table C4 in the Appendix

4.3.4.2.3 Distribution of wage premium: Job dynamic groups of exporters and non-exporters

By distinguishing between the different job dynamic groups (Figure 4.12 and Table A5), one can see the distribution of the wage differential between *enter*, *exit*, *continue* and *sporadic* jobs in an exporting and non-exporting firm. When comparing a job at an exporting firm (blue lines) to one at a non-exporting firm (green lines) for each of the job dynamic groups, it is evident that exporters earn a premium to non-exporters, with the exception of sporadic exporters (*enter_exit X*) which is a very small pool of jobs (see kernel density Figure 4.6). Relative to *continuous* non-exporters (the base), *continuous* exporters have a positive wage premia which remain relatively stable (around 10% difference) across the quantiles. *Enter* and *continue* exporters and non-exporters (blue and green dashed lines) also have a relatively similar shape. As mentioned earlier, one explanation can be that the *exit* job category most likely consists of workers with more experience, who retire (classified as a job that exists in year $t-1$ and year t , but not in $t+1$). This can possibly explain the shape of the *exit* job category, having no wage premium relative to *continued* non-exporters (the base) at the lower tail of the distribution, but showing a wage premium at the upper tail of the distribution. The sporadic (*enter_exit*) jobs at a non-exporting firm do not have a wage premium (relative to *continued* job at a non-exporter) at any percentile of the wage distribution. A sporadic job at an exporting firm, however displays a small premium at the 95th percentile, but this is a small pool of jobs (see the kernel density in Figure 4.6).

When comparing Figure 4.12 (the regression results) to Figure 4.4 (levels of wage distribution) it is clear that, once observable individual (age, age squared, tenure) and firm characteristics (size, capital intensity and labour productivity) are controlled for, the large wage differential at the 95th percentile flattens out. This suggests that it is a certain type of firm (large, capital intensive and labour productive) hiring workers at the top end (high income, more experienced workers). As Fu and Wu (2012: 185) stated, “more talented and high-ability workers tend to be hired by exporting firms”.

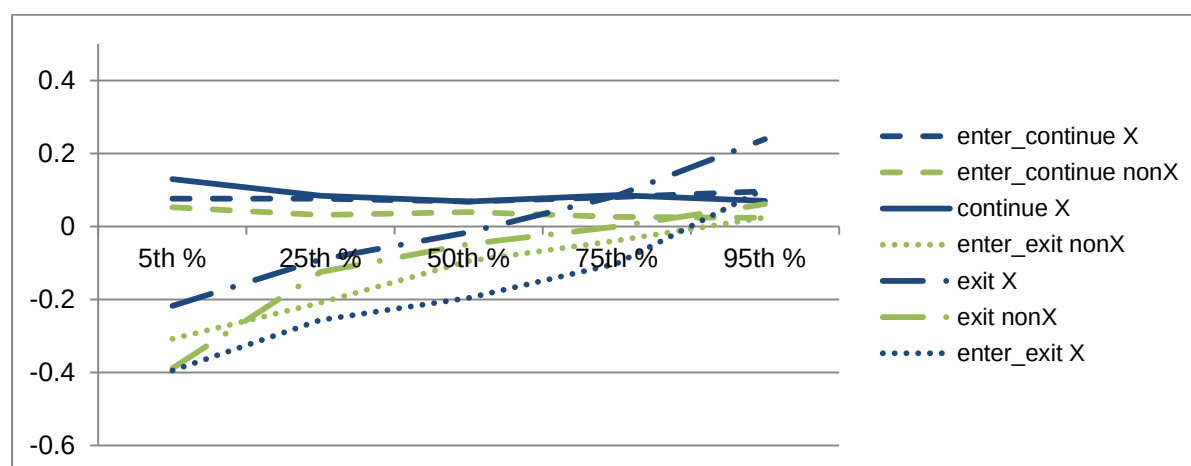


Figure 4-12: Distribution of wage premium: Job dynamic groups of exporters and non-exporters

Note: Premium relative to continue non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

Source: Authors' own calculations see Table C5 in the Appendix

4.3.4.2.4 Distribution of wage premium: Job dynamic groups of exporters exporting to African and non-African countries

Figures 4.13 and 4.14 elaborate on Figure 4.12, by distinguishing between jobs at firms exporting to the *international* market or to *Africa only*. Figure 4.13 displays the wage distributions of the *continue* and *enter and continue* job dynamics groups, whereas Figure 4.14 focuses on the *exit* and *enter_exit* job dynamic groups.

From Figure 4.13 (and Table A6), it is clear that a *continuous* job at an *international* exporting firm (solid maroon line) has a wage premium relative to *continuous* non-exporters (the base). This premium remains stable across the quantiles ranging between 10% and 20%. A *continued* job at an *Africa only* exporter pays relatively the same wages as a *continued* job at a non-exporting firm (solid blue line versus the base). The same differences are seen when comparing *enter and continue jobs* (dashed lines) at an *international* exporter (dashed maroon line) to one at an *African only* exporter (blue dashed line) or non-exporter

(green dashed line) (i.e. the *international* exporter pays the highest premium, whereas the wage premium of working at an *African only* exporter or non-exporter is relatively equal).

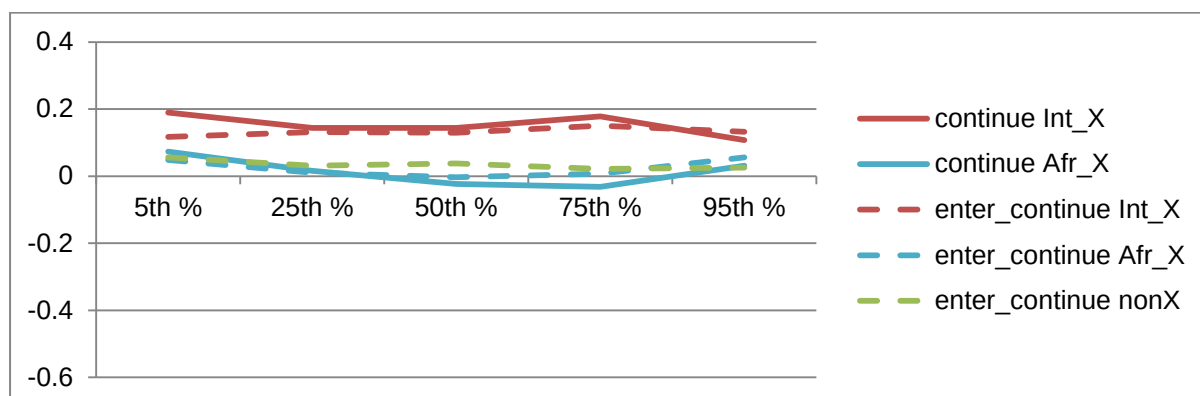


Figure 4-13: Distribution of wage premium: continuing firms exporting to African and non-African countries

Note: Premium relative to continue non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

Source: Authors' own calculations see Table C6 in the Appendix

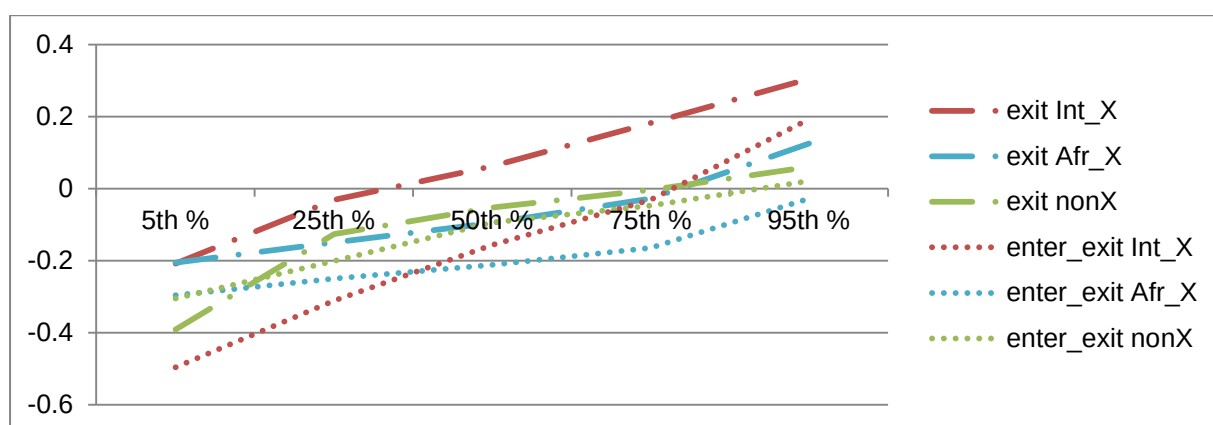


Figure 4-14: Distribution of wage premium: exiting firms exporting to African and non-African countries

Note: Premium relative to continue non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

Source: Authors' own calculations see Table C6 in the Appendix

From Figure 4.14 it is clear that a worker who *exits* a job at a firm serving the *international* market (*exit Int X*) earns a wage premium (relative to a *continued* job at a non-exporter) from the 50th percentile up to 95th percentile. When considering the kernel densities of these job dynamic groups in Figure 4.8, it shows that there is a small number of jobs in the *exit Int_X* job dynamic group. A possible explanation for the high wage of an *exit* job is that these jobs could consist of workers with more experience, who retire (classified as a job that exists in year $t-1$ and year t , but not in $t+1$). Relative to a *continued* job at a non-exporting firm (the base), there is no wage premium for any of the other job dynamics groups (*exit Afr_X*; *exit nonX*; *enter_exit Int_X*; *enter_exit Afr_X*; *enter_exit nonX*) at the 5th, 25th, 59th or 75th percentiles. It is only at the 95th percentile where sporadic *international* exporters (*enter_exit*

Int X), *exit African* exporters (*exit Afr_X*) and non-exporter (*exit nonX*) show a small wage premium.

Figures 4.10 to 4.14 show the export wage distribution by estimating equation 1 for different destinations and job dynamics groups, while controlling for observable firm and individual characteristics. The next set of results is from the estimations of equations 2, 3 and 4, which add firm-, individual- and job-fixed effects.

4.3.4.2.5 *Distribution of export wage premium with fixed effects*

In Figure 4.15, the top graph presents the OLS regression (blue dotted line), quantile regression (maroon line) from Table 4.1 and Figure 4.10 controlling for observable individual and firm characteristics. This serves as a reference for the individual- (light blue), firm (green) and job- (purple) fixed effects.⁵⁴ The bottom graph of Figure 4.15 adds the 95% confidence interval (calculated by using the standard errors). It is important to note that at the 5th percentile the all fixed effects (individual, firm and job) is insignificant and for job-fixed effects, the 75th percentile is also insignificant. For firm-fixed effects, only the top of the distribution (75th and 95th percentiles) is significant. This is consistent with what the results of this study have indicated up to this point, i.e. that most of the wage premium can be explained by the characteristics of the firm.

The green line in the top graph of Figure 4.15 (and Table A7) illustrates firm-fixed effects. Firm-fixed effects show whether wages vary when a firm changes their export status from one period to the next (switching in and out of exports). Since the coefficients at the 75th and 95th percentiles are significant (see Table A7), it indicates that, when a firm starts to export, their workers at the top end of the distribution earn a wage premium of around six to eight percent.

The individual (blue) and job-fixed effects (purple) are quite similar in shape across the wage distribution. Both regressions' (individual and job-fixed effects) export coefficient is identified by a worker staying in a job and their firm starts exporting. The individual-fixed effects' coefficient additionally is identified by a worker moving between two jobs, from a non-exporting to an exporting firm (it appears as though there are relatively fewer individuals who

⁵⁴ As quantile regressions with fixed effects are computationally heavy on such a large data set, the random sample generation tool in Stata was used to select a 20% random sample of the data. This random sample (20%) of workers was followed over the period under investigation (final panel). The fixed effect regressions were estimated for three different groups of 20% samples. The result of figures 4.15 - 4.18 are those of seed 2.7, which is the group whose results had the smallest deviation from the full sample (comparing the first line of code). All samples showed similar results.

switch jobs). One can expect the wage premium to be larger at the upper tail of the distribution and to fall as more and more controls are added. But even after controlling for observable firm and individual characteristics as well as unobservable individual and job characteristics, there is still a 4% premium at the 95th percentile. Therefore, when a firm starts to export, their workers' wages increase and the highest increase in wages is at the upper tail of the distribution.

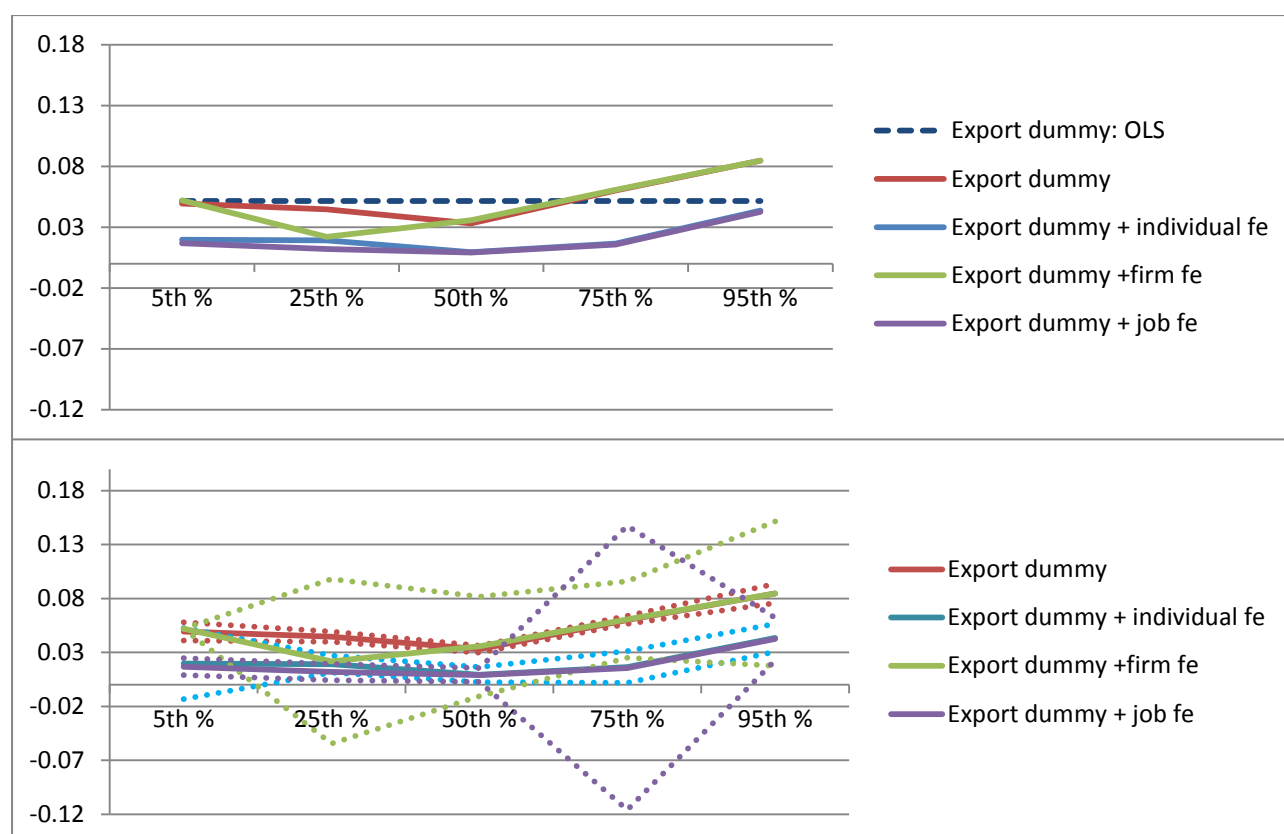


Figure 4-15: Distribution of export wage premium with fixed effects (bottom graph also display the 95% confidence interval)

Note: Premium relative to non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

Source: Authors' own calculations see Table C7 in the Appendix

4.3.4.2.6 Distribution of wage premium per export destination (with fixed effects)

Figure 4.16 expands on Figure 4.15 by dividing the exporters into three groups according to the destination they serve (*international*, *Africa only*, *SACU only*). Table A8 indicates the significance of these results when adding firm-, (equation 2), individual- (equation 3) and job-fixed effects (equation 4). When adding firm-fixed effects, there is no significance for *SACU only* exporters and only the upper tail of the distribution is significant for *Africa only* and *international* exporters. With individual-fixed effects, only some of the percentiles have significant variables for *international* (25th, 50th, 95th), *Africa only* (95th percentile) and *SACU only* (5th, 25th and 95th) exporting firms. The same is true with job-fixed effects, where only

the 25th 50th and 95th percentiles are significant for *international* exporters, for *Africa only* exporters only the 50th and 95th percentiles are significant and the 25th and 75th percentiles for *SACU only* exporters (see Table A8).

Similar to Figure 4.11, Figure 4.16 indicates that the export destination of a firm does influence the wage premium and its distribution. There is a hierarchy in the wage premium as a firm exports further away (*SACU only*: green lines, *Africa only*: maroon lines and *internationally*: blue lines). Relative to non-exporters (the base), there is no wage premium for *SACU only* exporters (green lines). They actually pay lower wages than non-exporters. At the 95th percentile, the individual- and firm-fixed effects seem to have a small premium (relative to non-exporters) but this is not significant. For *international* exporters (blue lines) there appears to be an export wage premium relative to non-exporters throughout the wage distribution.

When adding firm-fixed effects (where the export coefficient is identified by firms switching in and out of exporting), the wage premiums at the 75th and 95th percentiles are 14.8% and 13.3% respectively. This indicates that, when a firm starts to export to the *international* market, their workers at the top end of the distribution earn a wage premium of around 13%-15%. For firms starting to export to *Africa only* (maroon dotted lines), their workers at the 95th percentile earn a wage premium of 6%.

By adding individual fixed effects, the export coefficient is identified by workers who either start working at an exporting firm or workers who stay in the same job and their firms starts exporting. The wage premium with individual-fixed effects is 2.6%, 2.7% and 6.9% for workers at the 25th, 50th and 95th percentiles in a firm serving the *international* market. Therefore, these individuals are obtaining “better paying jobs” (relative to what they would have if they were *entering* a job at a non-exporting firm). For workers switching into a firm that serves *Africa only*, it is only at the 95th percentile where they will earn wage premium of 4%.

The export coefficient of adding job-fixed effects is identified by workers who stay in the same job and their firm starts to export. From Figure 4.16 and Table A8, there seems to be significant results for workers in firms switching into the *international* market at the 25th, 50th and 95th percentiles of 2.5%, 2.7% and 6.8% respectively. Workers at the 50th and 95th percentiles in firms that start to export to *Africa only* will see an increase in their wages of 0.9% and 2.8% respectively.

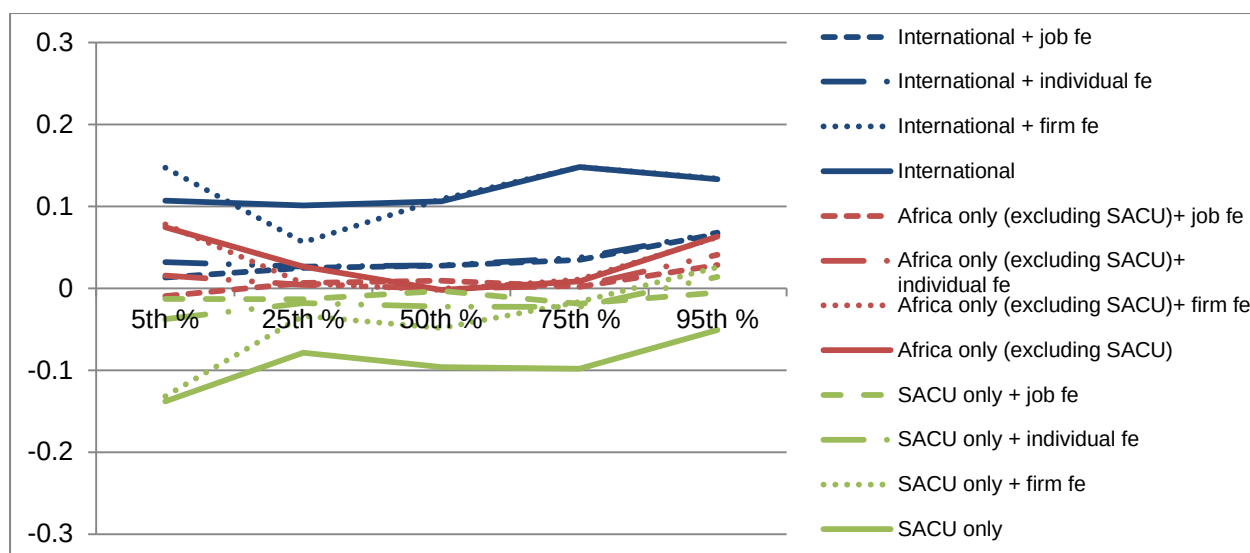


Figure 4-16: Distribution of wage premium per export destination (with fixed effect)

Note: Premium relative to non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

Source: Authors' own calculations see Table C8 in the Appendix

4.3.4.2.7 Distribution of wage premium: Job dynamic groups of exporters exporting to African and non-African countries (with fixed effects)

Figures 4.17 and 4.18 are at the most detailed level of analysis, splitting the data into job-dynamics groups while distinguishing between non-exporters and exporters (Figure 4.17) as well as non-exporters and exporters exporting to *Africa* and *international* market respectively (Figure 4.18).

Each row of graphs is for a different dynamic group (*enter_continue*, *continue*, *enter_exit* and *exit*). The graphs on the left-hand side show the wage premium controlling for observable individual and firm characteristics (see Tables A4 and A5). The graphs on the right-hand side display the distribution with individual- and job⁵⁵-fixed effects (controlling for unobservable characteristics- see Tables A8 and A9)⁵⁶.

Overall, the job-dynamic groups on the left-hand side of Figures 4.17 and 4.18 display similar trends. For example, relative to the *continue* non-exporters (base), the *enter* and *continue* exporters do have a premium that is fairly constant throughout the distribution. The same is true for the *continue* exporter group (second row), except for a small bump at the 5th percentile. The sporadic (*enter_exit*) jobs group show an upward trend with no wage

⁵⁵ For simplicity of the graphs firm-fixed effects (which show insignificant coefficients) are not included, the results are in Table A8 and A9.

⁵⁶ It is important to note that not all the coefficients are statistically significant (see Table A8 and A9 in the Appendix).

premium relative to *continue* non-exporters, except at the 95th percentile where a small premium is displayed. These are sporadic jobs with not much efficacy for the labour industry (this is also a dynamic group with the smallest pool of jobs, see the kernel density in Figure 4.6).

Figures 4.17 and 4.18 indicate the effect of adding fixed effects (control for the unobservables), in other words the difference between the graphs on both the left- and right-hand side. For example, in Figure 4.18, the graph on the top left side displays the wage premium of jobs that *enter and continue* in exporting and non-exporting firms (relative to the base (*continued job* in a non-exporting firm)). One can clearly see the export wage premium. However, once the individual- and job-fixed effects are added (top right graph), the premium almost disappears (all the lines are grouped around zero).

Figure 4.18, shows similar trends as Figure 4.17, but when distinguishing between different types of exporters (*Africa only* and *international*), one can clearly see the hierarchy in the wage premium as a firm exports further away (*international*, *Africa*, non-exporter). When adding fixed effects (left side graphs), this hierarchy fades, as there is little difference between these groups.

These two figures resonate the fact that the difference in monthly wages paid by exporters and non-exporters (the export wage premium) decreases once individual- and job-fixed effects are controlled for. Therefore, the wage premium observed in *international* exporting firms (relative to non-exporters) is not due to the firm just being labelled an *international* exporter (the export status), but rather about the “type of firm” (unobservable firm characteristics) they are, the “type of workers” (unobservable individual characteristics) they employ and the “type of jobs” (unobservable job characteristics) they create. These findings are in accordance with Schank *et al.* (2010) who also found that the export wage premium was not caused by export activities (export status). They identified the export wage premium to already be in a firm in the year(s) before they entered the export market, and that the wage premium did not increase in the subsequent years (after becoming an exporter). Therefore, they argued that the higher wages observed in exporting firms were not caused by export activities, but it can rather be ascribed to more productive, better paying firms who selected themselves into exporting (Schank *et al.*, 2010).

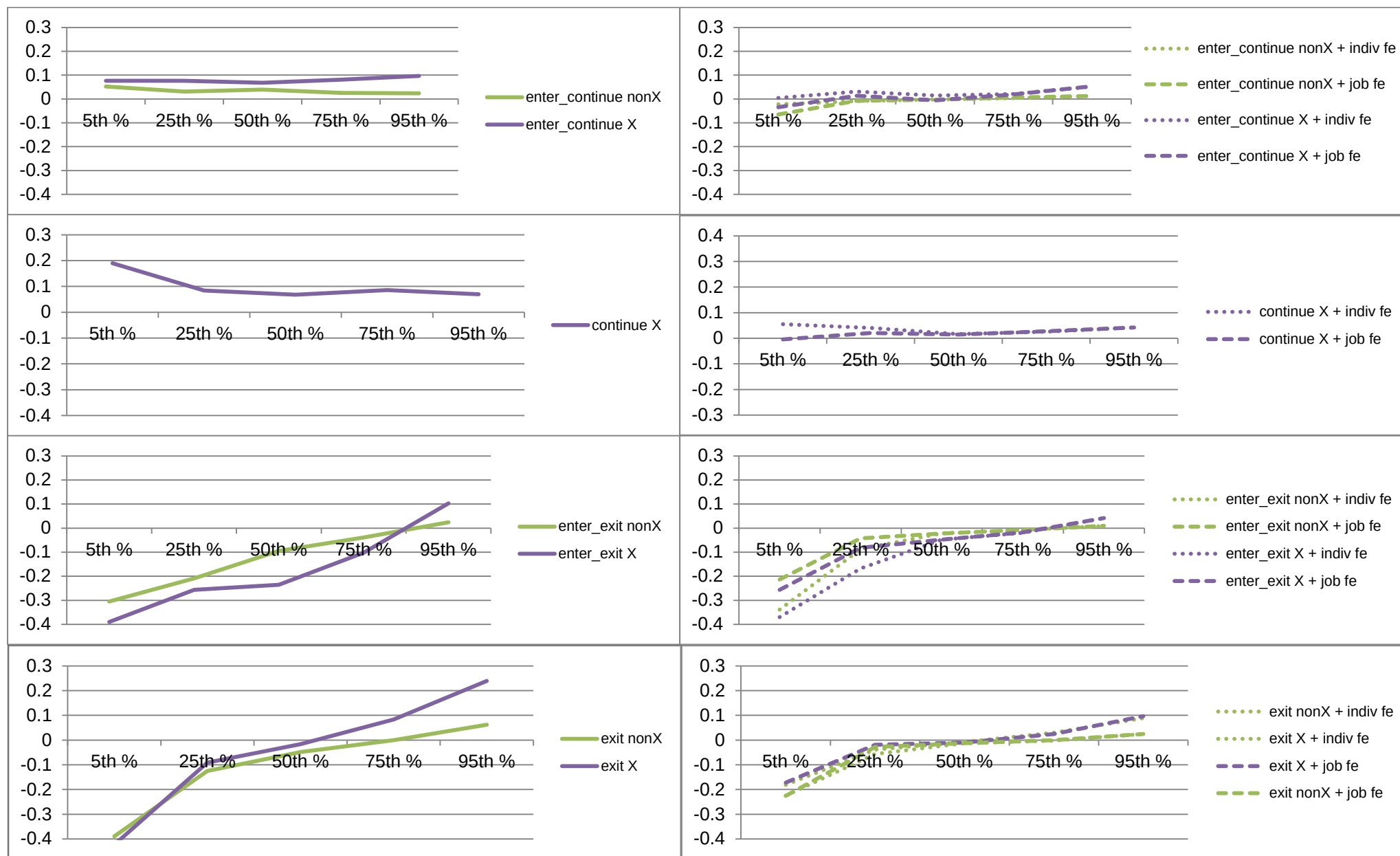


Figure 4-17: Distribution of wage premium: Job dynamic groups of exporters and non-exporters

Source: Authors' own calculations see Table C9 in the Appendix; Note: Premium relative to non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

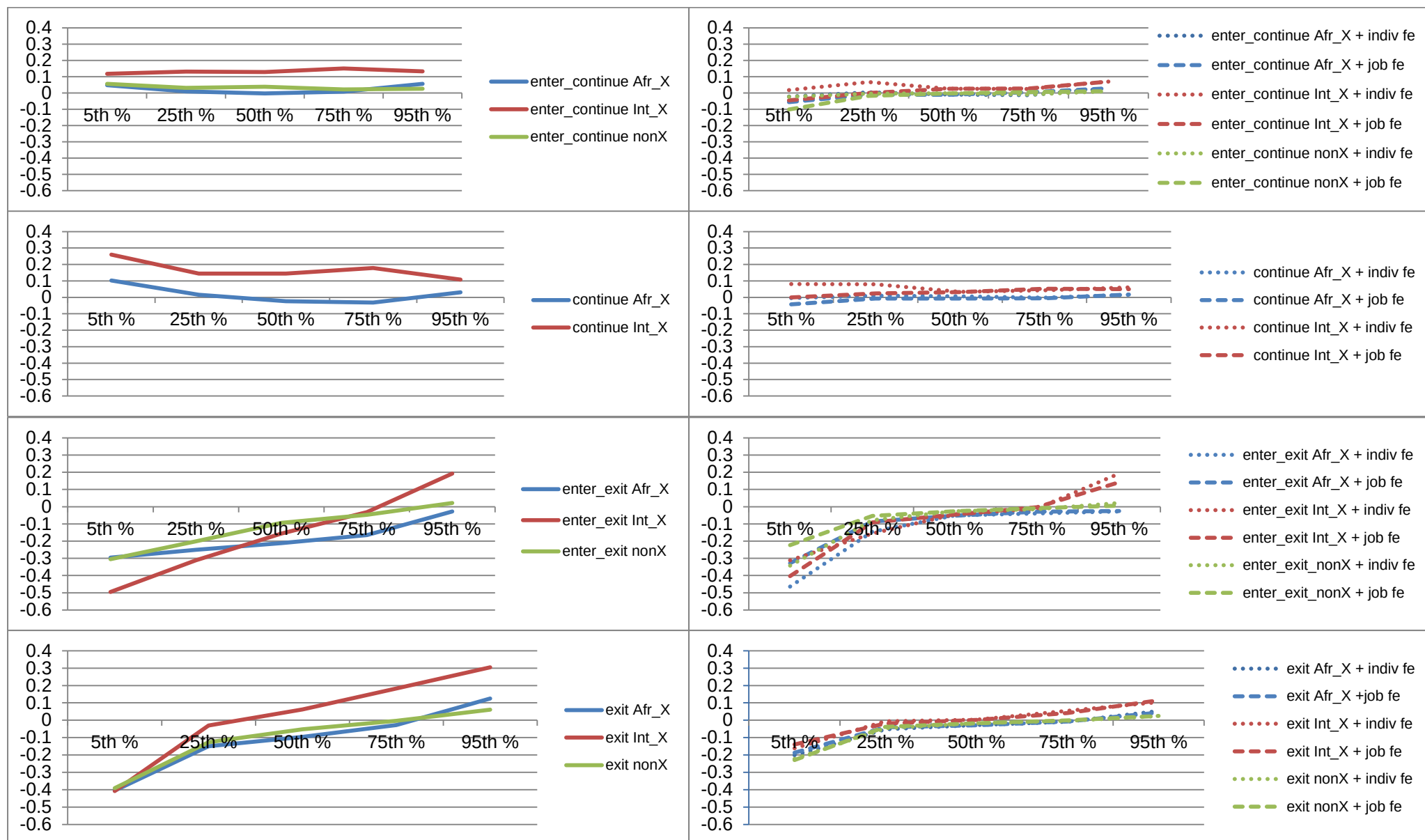


Figure 4-18: Distribution of wage premium: Job dynamic groups of exporters exporting to African and non-African countries

Source: Authors' own calculations see Table C10 in the Appendix; Note: Premium relative to continue non-exporters (controlling for observable individual and firm characteristics as well as industry and year)

4.4 Conclusion

In accordance to the literature on exporting firms' characteristics (in developed and developing countries), South African exporters are found to pay higher average wages than non-exporters. Studies on the export wage premium in South Africa have, however, been limited to either panel or cross-sectional sample data (where results may be influenced by sampling procedures) or to firm-level data (which does not allow one to control for individual characteristics). By using a newly constructed employer-employee matched panel dataset on South African manufacturing firms, this study examined whether the export wage premium is due to observable or unobservable firm, individual or job characteristics, the distribution of wages or if it is due to exporting activities (export status) itself. It further contributes by considering other dynamics that can add to the wage premium by taking the influence of different export destinations (regional versus *international*), job dynamics (*enter*, *exit*, *continue* or *sporadic* jobs) as well as quantile regressions with fixed effects into account (which is a novel application of employer-employee datasets on exporting firms).

The results show that there is a 54.03% wage premium for workers in exporting firms in the South African manufacturing industry (when year and industry are controlled for). Around 10.84% of this can be explained by individual characteristics (namely age, age squared and length of tenure) and 43.07% of the wage premium are due to specific firm characteristics (firm size, capital intensity and output per worker). Therefore, the export wage premium decreases from 54.03% to 5.27% once observable firm and individual characteristics are controlled for.

By estimating regressions with firm, individual and job-fixed effects, the change in average wages of firms and individuals can be identified as they start, or stop exporting (switch into or out of exporting). The estimates indicate that, when a firm starts to export to *SACU*, they add relatively lower paying jobs (i.e. adding jobs that earn relatively less than what the average worker in that firm earns). Firms switching into the *international* and *African* export markets are expanding their workforce by adding workers that earn relatively similar wages to the average within the firm (0.05% more for *international* and 0.05% less for *Africa*). When workers switch jobs and start working in an exporting firm, they earn a wage premium compared to what they would earn in a non-exporting firm. However, there is a hierarchy in the export coefficients as a firm exports further away (*SACU only*, *Africa only* and *international*). For workers staying in the same job and their firm starts to export, there is an increase in their wages. Therefore, from a firm's point of view, when entering the export market, they add "similar or lower paying" jobs (relative to the firm's average wages),

therefore these firms are adding relatively “similar or lower paid” workers. But for the workers starting to work at an exporting firm (relative to a non-exporting firm), it means obtaining “better paying jobs” (than they would have if they were starting to work a job at a non-exporting firm). Individuals staying in the same job as their firms starts to export also see an increase in their wages.

While considering the distribution of wages, the highest export wage premium is for workers either at the lower tail or at the upper tail of the wage distribution. It is also interesting to note that, across the distribution, from the lowest to the highest quantile, there is a certain premium level in working in an exporting firm (while controlling for observable firm and individual characteristics). When taking export destinations into account, it is clear that the wage premium of working in a firm serving the *international* market is the highest and fairly constant throughout the distribution (from the 5th to the 95th percentile). Working at an *Africa only* exporter, there is an export premium at the upper and lower tail of the distribution, but not at the 50th percentile. Furthermore, there is no wage premium in working for a *SACU only* exporter (they pay lower wages than non-exporters).

The export wage premium can also be examined by distinguishing between four job dynamic groups (*enter*, *exit*, *continue* and *sporadic* jobs). The results show that, across all job dynamic groups, an exporting firm pays more than a non-exporting firm. Furthermore, it can be seen that workers staying in the same job (*continuing*) earn the highest wage, followed by those who *enter* a job and stay in that job the following year (*enter_continue*). *Exiting* a job after having the job longer than a year (*exit*) pays relatively more than being in a sporadic job (entering a job and exiting the following year “*enter_exit*”).

After adding destinations (*Africa* and *international*) to the job dynamics groups, there is still an export wage premium (after controlling for observable firm and individual characteristics) between these groups. It is only when firm-, individual- and job-specific unobservable characteristics (firm, individual and job-fixed effects) are controlled for, that this wage premium effectively disappears. Therefore, the difference that is seen in the wage premium of being an *international* exporter, is not about being labelled an exporter. It is however because of the “type of firm” (unobservable firm characteristics) exporters are, the “type of workers” (unobservable individual characteristics) they employ and the “type of jobs” (unobservable job characteristics) they create. On the other hand, the “type of firm” (unobservable firm characteristics) could in effect determine if a firm is an exporter or not (i.e. it could be the firms with superior characteristics who select into exporting). There is an endogeneity issue in this analysis that cannot be disentangled. This endogeneity comes

from the unobservable firm characteristics that possibly make a firm the type of firm that export.

From a policy perspective, it is clear that just creating exporters (changing a firm's export status) is not going to suddenly create an export wage premium. Rather, it is about changing the unobservable firm characteristics of a firm to create the "type of firm" that is most likely to be or become an exporter. A typical "type of firm" that is most likely to become an exporter is usually larger and more productive. The results may be indicative that these firms tend to employ "better" workers who have more skills, experience and higher levels of education which makes them more productive. Policy makers should therefore focus on policies that increase firm-level productivity. One channel through which productivity increases is through investment and the new technology associated with it. Another is to tie wages to productivity. A third is to reduce input costs, through for example access to imported products and a fourth would be to encourage more competitive local markets. Furthermore, skills development needs to be at the core of the policy making process as it is a leading contributor to productivity improvement and export proficiency – and better paying and more sustainable jobs. To improve education and skills development in the country policies should be aimed at driving high-quality teaching and learning by building capacity and accountability in schools and other education/training institutions (OECD, 2016), reducing government red tape in the education and training sectors to encourage greater participation by providers and quicker and better results; and providing greater (including financial) incentive to firms to engage in staff training and development. Another policy imperative should be to open up the education/training sector to more foreign participation, and promoting the regional exchange of expertise and cross-recognition of qualifications to encourage a more mobile workforce in southern Africa.

This article showed the export premium is due to the selection of specific types of workers into specific jobs (and firms). As the literature confirms, exporters are usually more capital intensive, they are bigger and their workers are higher skilled individuals who earn higher wages. A significant limitation of the analysis is that so few individual characteristics (e.g. gender, education or skills) are available in the panel dataset utilised in this article. The importance of these is revealed in the low premiums estimated once individual fixed effects are included. A potential next avenue of research is to conduct a qualitative analysis on the specific characteristics of the types of individuals who are employed by exporters. For example obtain information on the individual's gender, race and various indications of skills such as education level, occupation level, type of job (production versus non-production) and on the job training obtained.

4.5 Reference list

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4.6 Appendices

Table C1: IRP5 data cleaning

Keep individual	From the IRP5 data, only workers/employees was used in this article, therefore from the variable “nature of person” only “Individuals” were kept.
Periods worked	Some of the data on the “period employed from” and “period employed to” has “invalid periods” reported, this was corrected: 1. For instance 1910 instead of 2010 2. End date 27 February instead of 28 February 3. End date before start date 4. End date in the month before year end and then start again a few days after the start of the year.
Multiple job spells	There are individuals with “multiple job spells”, therefore 1 individual working multiple jobs at the same firm. When adding the number of days of each job spell 3% adds to more than 365 days (which is impossible). For this 3% of jobs the average of the worker’s multiple job spells at the firm we taken.
Duplicate certificates	Each job is assigned a certificate number; duplicate certificates were dropped to avoid double counting.
Age 15-64	There were individuals found to be 90 years of age. This study kept to the South African labour force definition and kept workers of the age 15-64.
Income	There are various ways to calculate income, we used the Gross remuneration (by adding three variables named: “GROSSNTAXABLEINCOMEAMNT GROSSRETFUNDINCOMEAMNT GROSSNRETFUNDINCOMEAMNT”).

Table C2: Wage premium: Job dynamic groups of exporters exporting to African and non-African countries (see Figure 4.9)

Monthly income (wages)							
	(1)	(2)	(3)	(4)	(5) Firm fe	(6) Indiv fe	(7) Job fe
enter_continue Int_X	0.885*** (0.00212)	0.778*** (0.00205)	0.417*** (0.00233)	0.330*** (0.00226)	0.278*** (0.00386)	0.260*** (0.00256)	0.0937*** (0.00483)
enter_continue Afr_X	0.526*** (0.00274)	0.451*** (0.00265)	0.260*** (0.00283)	0.201*** (0.00273)	0.291*** (0.00384)	0.251*** (0.00271)	0.111*** (0.00484)
enter_continue nonX	0.369*** (0.00202)	0.309*** (0.00195)	0.265*** (0.00212)	0.213*** (0.00205)	0.283*** (0.00214)	0.209*** (0.00233)	0.0705*** (0.00459)
continue Int_X	1.139*** (0.00184)	0.741*** (0.00207)	0.725*** (0.00209)	0.349*** (0.00228)	0.328*** (0.00381)	0.269*** (0.00255)	0.100*** (0.00479)
continue Afr_X	0.765***	0.379***	0.549***	0.177***	0.305***	0.259***	0.103***

Monthly income (wages)							
	(1)	(2)	(3)	(4)	(5) Firm fe	(6) Indiv fe	(7) Job fe
continue nonX	(0.00228) 0.633***	(0.00244) 0.264***	(0.00234) 0.523***	(0.00250) 0.165***	(0.00357) 0.298***	(0.00258) 0.241***	(0.00475) 0.0903***
exit Int_X	(0.00186) 0.941***	(0.00207) 0.589***	(0.00196) 0.546***	(0.00216) 0.212***	(0.00230) 0.233***	(0.00239) 0.259***	(0.00461) 0.111***
exit Afr_X	(0.00235) 0.583***	(0.00249) 0.270***	(0.00255) 0.349***	(0.00267) 0.0517***	(0.00404) 0.164***	(0.00270) 0.185***	(0.00486) 0.0475***
exit nonX	(0.00301) 0.418***	(0.00306) 0.117***	(0.00313) 0.348***	(0.00317) 0.0575***	(0.00402) 0.149***	(0.00284) 0.162***	(0.00487) 0.0303***
enter_exit Int_X	(0.00211) 0.230***	(0.00223) 0.214***	(0.00225) -0.198***	(0.00236) -0.198***	(0.00237) -0.162***	(0.00244) -0.00772**	(0.00460) 0.0567***
enter_exit Afr_X	(0.00263) 0.00941***	(0.00254) 0.0122***	(0.00279) -0.219***	(0.00270) -0.204***	(0.00413) -0.0754***	(0.00329) -0.0382***	(0.00736) 0.0396***
age	(0.00314)	(0.00303) -0.0981***	(0.00325)	(0.00314) -0.0902***	(0.00418) -0.0762***	(0.00372)	(0.00784) -0.109***
agesqr		(0.000548) 1.481***		(0.000556) 1.358***	(0.000507) 1.154***		(0.0266) 1.647***
tenure		(0.00680) 0.110***		(0.00689) 0.112***	(0.00630) 0.111***		(0.0201) 0.0398***
Ln (no. of workers)			(0.000517) 0.0431***	(0.000517) 0.0439***	(0.000515) -0.0135***	(0.000591) 0.00847***	(0.00205) 0.0314***
Ln (capital/worker)			(0.000279) 0.0204***	(0.000270) 0.0183***	(0.00227) 0.00176***	(0.000496) 0.00695***	(0.00116) 0.00146***
Ln (output/worker)			(0.000225) 0.299***	(0.000217) 0.288***	(0.000565) 0.0962***	(0.000259) 0.0639***	(0.000278) 0.0454***
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
firm fe					Yes		
Indiv fe						Yes	
job fe							Yes
Constant	7.410*** (0.00207)	2.225*** (0.0207)	3.145*** (0.00657)	-1.434*** (0.0217)	2.788*** (0.0392)	7.291*** (0.00999)	1.787* (0.956)

Note: Premium relative to enter_exit non-exporter ***p<0.01 **p<0.05 *p<0.1

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

Source: Authors' own calculations

Table C3: Distribution of the export wage premium (see Figure 4.10)

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
Export dummy	0.0495*** (0.00432)	0.0447*** (0.00239)	0.0331*** (0.00165)	0.0602*** (0.00185)	0.0846*** (0.00456)
age	-0.124*** (0.00381)	-0.0606*** (0.00101)	-0.0606*** (0.000776)	-0.0984*** (0.000801)	-0.197*** (0.00237)
agesqr	1.685*** (0.0476)	0.927*** (0.0126)	0.970*** (0.00972)	1.527*** (0.00975)	2.887*** (0.0299)
tenure	0.240*** (0.00170)	0.123*** (0.000599)	0.0962*** (0.000654)	0.0735*** (0.000834)	0.0445*** (0.00117)
Ln (no. of workers)	0.0227***	0.0694***	0.0722***	0.0685***	0.0679***

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
Ln (capital/worker)	(0.00213) 0.0523***	(0.000496) 0.0227***	(0.000392) 0.0119***	(0.000605) 0.00463***	(0.000848) 0.00298***
Ln (output/worker)	(0.00127) 0.214***	(0.000415) 0.240***	(0.000412) 0.282***	(0.000441) 0.322***	(0.000899) 0.266***
Year control	(0.00171) Yes	(0.00103) Yes	(0.00115) Yes	(0.00119) Yes	(0.00214) Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488

Note: Premium relative to non-exporters ***p<0.01 **p<0.05 *p<0.1

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

Source: Authors' own calculations

Table C4: Distribution of wage premium per export destination (see Figure 4.11)

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
International	0.107*** (0.00619)	0.101*** (0.00209)	0.106*** (0.00225)	0.148*** (0.00343)	0.133*** (0.00504)
Africa only (excluding SACU)	0.0745*** (0.00771)	0.0264*** (0.00278)	-0.00196 (0.00269)	0.00859** (0.00388)	0.0631*** (0.00684)
SACU only	-0.138*** (0.0139)	-0.0785*** (0.00292)	-0.0961*** (0.00349)	-0.0982*** (0.00486)	-0.0509*** (0.00894)
age	-0.123*** (0.00365)	-0.0607*** (0.00107)	-0.0601*** (0.000901)	-0.0983*** (0.00147)	-0.197*** (0.00229)
agesqr	1.679*** (0.0451)	0.928*** (0.0132)	0.964*** (0.0112)	1.525*** (0.0180)	2.888*** (0.0281)
tenure	0.240*** (0.00142)	0.122*** (0.000590)	0.0952*** (0.000635)	0.0721*** (0.000927)	0.0443*** (0.00125)
Ln (no. of workers)	0.0161*** (0.00157)	0.0627*** (0.000432)	0.0637*** (0.000270)	0.0582*** (0.000811)	0.0622*** (0.000891)
Ln (capital/worker)	0.0499*** (0.00136)	0.0202*** (0.000526)	0.00941*** (0.000427)	0.00222*** (0.000505)	0.000758 (0.000721)
Ln (output/worker)	0.208*** (0.00281)	0.235*** (0.000921)	0.274*** (0.000966)	0.314*** (0.00149)	0.263*** (0.00253)
Year control	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488

Note: Premium relative to non-exporters ***p<0.01 **p<0.05 *p<0.1

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

Source: Authors' own calculations

Table C5: Distribution of wage premium: Job dynamic groups of exporters and non-exporters (see Figure 4.12)

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
enter_continue X	0.076*** (0.0138)	0.076*** (0.00525)	0.0683*** (0.00434)	0.0806*** (0.00641)	0.0963*** (0.0104)
enter_continue nonX	0.052*** (0.0164)	0.031*** (0.00523)	0.0393*** (0.00480)	0.0258*** (0.00386)	0.023884*** (0.00815)
continue X	0.13*** (0.0173)	0.084*** (0.00563)	0.0683*** (0.00434)	0.0856*** (0.00678)	0.0696*** (0.00766)

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
exit X	-0.218*** (0.0228)	-0.091*** (0.00679)	-0.0161*** (0.00602)	0.0836*** (0.00889)	0.2395*** (0.0116)
exit nonX	-0.389*** (0.0231)	-0.1249*** (0.00568)	-0.0481*** (0.00520)	-0.0003*** (0.00938)	0.0616*** (0.0109)
enter_exit X	-0.395*** (0.0339)	-0.256*** (0.00902)	-0.1957*** (0.00572)	-0.1021*** (0.00517)	0.103*** (0.0144)
enter_exit nonX	-0.308*** (0.0150)	-0.209*** (0.00615)	-0.0947*** (0.00496)	-0.0384*** (0.00671)	0.0245*** (0.00630)
age	-0.0700*** (0.00326)	-0.0467*** (0.00121)	-0.0531*** (0.00122)	-0.0947*** (0.00165)	-0.198*** (0.00244)
agesqr	0.983*** (0.0397)	0.745*** (0.0149)	0.872*** (0.0151)	1.478*** (0.0203)	2.890*** (0.0309)
tenure	0.174*** (0.00242)	0.116*** (0.000732)	0.0982*** (0.00122)	0.0732*** (0.00179)	0.0489*** (0.00152)
Ln (no. of workers)	0.0225*** (0.000937)	0.0674*** (0.000591)	0.0705*** (0.000542)	0.0687*** (0.000679)	0.0696*** (0.00102)
Ln (capital/worker)	0.0528*** (0.00145)	0.0277*** (0.000565)	0.0149*** (0.000433)	0.00621*** (0.000430)	0.00313*** (0.000783)
Ln (output/worker)	0.209*** (0.00235)	0.248*** (0.00141)	0.297*** (0.00137)	0.342*** (0.00172)	0.279*** (0.00269)
Year control	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	984,638	984,638	984,638	984,638	984,638

Note: Premium relative to continue non-exporters *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$
(Is significant at the 1% level, 5% level and 10% level respectively)

Source: Authors' own calculations

Table C6: Distribution of wage premium: firms exporting to African and non-African countries (see Figures 4.13 and 4.14)

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
enter_continue Int_X	0.117*** (0.0180)	0.131*** (0.00738)	0.1291*** (0.00672)	0.1502*** (0.00591)	0.1323*** (0.00893)
enter_continue Afr_X	0.048*** (0.0189)	0.01*** (0.00839)	-0.003*** (0.00767)	0.0077*** (0.00716)	0.0556*** (0.0117)
enter_continue nonX	0.056*** (0.0160)	0.031*** (0.00443)	0.0381*** (0.00451)	0.0218*** (0.00550)	0.02549*** (0.00922)
continue Int_X	0.19*** (0.0186)	0.144*** (0.00615)	0.1441*** (0.00568)	0.1782*** (0.00513)	0.1074*** (0.00899)
continue Afr_X	0.073*** (0.0180)	0.016*** (0.00624)	-0.0235*** (0.00595)	-0.0319*** (0.00677)	0.03124*** (0.0106)
exit Int_X	-0.208*** (0.0244)	-0.031*** (0.00673)	0.0621*** (0.00642)	0.1822*** (0.00753)	0.3043*** (0.0121)
exit Afr_X	-0.205*** (0.0211)	-0.1495*** (0.00666)	-0.09545*** (0.00664)	-0.0277*** (0.00965)	0.1253*** (0.0123)
exit nonX	-0.391*** (0.0217)	-0.126*** (0.00698)	-0.0523*** (0.00647)	-0.004*** (0.00553)	0.0605*** (0.0112)
enter_exit Int_X	-0.496*** (0.0643)	-0.311*** (0.0101)	-0.1562*** (0.00621)	-0.0315*** (0.00739)	0.1923*** (0.0136)
enter_exit Afr_X	-0.296***	-0.25***	-0.2119***	-0.1648***	-0.0277***

Monthly income (wages)					
	5 th %	25 th %	50 th %	75 th %	95 th %
enter_exit nonX	(0.0385) -0.305***	(0.0109) -0.201***	(0.00680) -0.094***	(0.00618) -0.0468***	(0.0149) 0.0213***
age	(0.0166) -0.0696***	(0.00542) -0.0466***	(0.00540) -0.0527***	(0.00483) -0.0947***	(0.00843) -0.197***
agesqr	(0.00433) 0.978***	(0.00150) 0.744***	(0.00153) 0.867***	(0.00161) 1.477***	(0.00213) 2.878***
tenure	(0.0533) 0.176***	(0.0185) 0.116***	(0.0186) 0.0976***	(0.0193) 0.0714***	(0.0263) 0.0491***
Ln (no. of workers)	(0.00174) 0.0165***	(0.000794) 0.0607***	(0.00103) 0.0624***	(0.00174) 0.0583***	(0.00246) 0.0642***
Ln (capital/worker)	(0.00149) 0.0518***	(0.000736) 0.0246***	(0.000543) 0.0123***	(0.000657) 0.00335***	(0.00107) 0.00134
Ln (output/worker)	(0.00126) 0.206***	(0.000665) 0.246***	(0.000597) 0.291***	(0.000655) 0.334***	(0.00101) 0.277***
Year control	(0.00226) Yes	(0.00133) Yes	(0.00120) Yes	(0.00109) Yes	(0.00269) Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Observations	984,638	984,638	984,638	984,638	984,638

Note: Premium relative to continue non-exporters *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

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

Source: Authors' own calculations

Table C7: Distribution of export wage premium with fixed effects (see Figure 4.15)

	Individual fe					firm fe					job fe				
	5th %	25th %	50th %	75th %	95th %	5th %	25th %	50th %	75th %	95th %	5th %	25th %	50th %	75th %	95th %
Export dummy	0.0197 (0.0168)	0.0192*** (0.00403)	0.00941*** (0.00353)	0.0166** (0.00754)	0.0435*** (0.00659)	0.0521 (0)	0.0219 (0.0389)	0.0356 (0.0236)	0.0606*** (0.0181)	0.0846** (0.0341)	0.0169 (0.206)	0.0120*** (0.00386)	0.00908*** (0.00325)	0.0157 (0.0671)	0.0425*** (0.0101)
age	-0.0442 (0.0281)	-0.0150*** (0.00418)	-0.0146*** (0.00487)	-0.0159 (0.298)	-0.0965*** (0.0171)	-0.138 (0.0886)	-0.0238* (0.0139)	-0.0599*** (0.00426)	-0.0999*** (0.0201)	-0.197*** (0.0343)	0.0135 (0.0180)	-0.0150* (0.00799)	-0.0149 (0.00988)	-0.0248 (1.203)	-0.0964*** (0.0284)
agesqr	0.446 (0.283)	0.391*** (0.0490)	0.553*** (0.0522)	0.667 (3.398)	1.922*** (0.171)	1.758 (1.197)	0.470*** (0.162)	0.962*** (0.0833)	1.526*** (0.251)	2.886*** (0.414)	0.0303 (0)	0.313*** (0.0623)	0.241*** (0.0744)	0.655 (14.77)	1.913*** (0.239)
tenure	0.0497*** (0.00754)	0.0304*** (0.00173)	0.0183*** (0.00142)	0.0125 (0.0253)	0.0240*** (0.00295)	0.218* (0.126)	0.129*** (0.00786)	0.0976*** (0.00395)	0.0809*** (0.00593)	0.0633*** (0.00712)	-0.0671 (0.0431)	0.0311*** (0.00614)	0.0225*** (0.00566)	0.0165 (0.312)	0.0245*** (0.00828)
Ln (no. of workers)	-0.00294 (0.00700)	0.0176*** (0.00249)	0.0296*** (0.00185)	0.0399*** (0.0117)	0.0543*** (0.00281)	9.867 (0)	0.581*** (0.157)	0.427** (0.173)	0.0718 (0.0684)	0.0690 (0.0872)	3.503*** (0.160)	0.0275*** (0.00415)	0.0234*** (0.00341)	0.0495 (0.438)	0.0842*** (0.00631)
Ln (capital/worker)	0.0208*** (0.00455)	0.00549*** (0.000766)	0.00569*** (0.000829)	0.00357 (0.00714)	0.000610 (0.00135)	0.0453 (0.0818)	0.00415 (0.0117)	0.0113 (0.0177)	3.64e-05 (0.00574)	0.00409 (0.0170)	0.0169 (0.0524)	0.00521*** (0.000793)	0.00292*** (0.000684)	0.000872 (0.0218)	0.000112 (0.00179)
Ln (output/worker)	0.106*** (0.00807)	0.0690*** (0.00276)	0.0705*** (0.00235)	0.0799*** (0.0295)	0.125*** (0.00384)	0.199 (0.147)	0.122 (0.138)	0.471*** (0.148)	0.319*** (0.109)	0.270*** (0.0849)	-0.00526 (0.0168)	0.0595*** (0.00530)	0.0693*** (0.00298)	0.0805 (0.507)	0.120*** (0.00610)
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488
Number of groups	535,471	535,471	535,471	535,471	535,471	40,496	40,496	40,496	40,496	40,496	601,550	601,550	601,550	601,550	601,550

Note: Premium relative to non-exporters *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

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

Source: Authors' own calculations

Table C8: Distribution of wage premium per export destination (with fixed effect) (see figure 4.16)

	Individual fe					firm fe					job fe				
	5 th %	25 th %	50 th %	75 th %	95 th %	5 th %	25 th %	50 th %	75 th %	95 th %	5 th %	25 th %	50 th %	75 th %	95 th %
International	0.0318 (0.0210)	0.0263*** (0.00483)	0.0278*** (0.00415)	0.0372 (0.0361)	0.0677*** (0.00770)	0.147 (0.794)	0.0562 (0.0355)	0.109 (3.707)	0.148*** (0.0240)	0.134*** (0.0251)	0.0131 (0.0326)	0.0250*** (0.00445)	0.0274*** (0.00362)	0.0345 (0.0532)	0.0664*** (0.0118)
Africa only (excluding SACU)	0.0156 (0.0194)	0.00405 (0.00465)	-0.000102 (0.00394)	0.00272 (0.00672)	0.0408*** (0.00929)	0.0780 (0)	0.00599 (0.0378)	-0.00205 (2.027)	0.0106 (0.0174)	0.0624*** (0.0213)	-0.00952 (0.0381)	0.00629 (0.00466)	0.00929*** (0.00360)	0.00183 (0.0223)	0.0283*** (0.00905)
SACU only	-0.0378* (0.0219)	-0.0182*** (0.00460)	-0.0226*** (0.00438)	-0.0230 (0.0194)	0.0138 (0.00946)	-0.132 (8.324)	-0.0337 (0.0503)	-0.0486 (4.260)	-0.0167 (0.0162)	0.0258 (0.0230)	-0.0131 (0.0428)	-0.0133*** (0.00461)	-0.00346 (0.00388)	-0.0190*** (0.00690)	-0.00505 (0.0115)
age	-0.0428 (0.0264)	-0.0150*** (0.00445)	-0.0146** (0.00636)	-0.0187 (0.536)	-0.0940*** (0.0180)	-0.136** (0.0688)	-0.0240* (0.0144)	-0.0599 (0.0450)	-0.100*** (0.0161)	-0.195*** (0.0158)	0.0119 (0.218)	-0.0150** (0.00641)	-0.0152** (0.00771)	-0.0243 (0.638)	-0.0956*** (0.0238)
agesqr	0.441* (0.265)	0.388*** (0.0499)	0.553*** (0.0658)	0.664 (5.880)	1.908*** (0.170)	1.742* (0.909)	0.468*** (0.165)	0.960 (0.723)	1.522*** (0.202)	2.875*** (0.189)	0.0269 (2.504)	0.349*** (0.0545)	0.240*** (0.0649)	0.653 (7.934)	1.908*** (0.205)
tenure	0.0505*** (0.00859)	0.0303*** (0.00173)	0.0175*** (0.00140)	0.0159 (0.0324)	0.0230*** (0.00300)	0.218 (0.196)	0.130*** (0.00777)	0.0965 (0.328)	0.0783*** (0.00531)	0.0580*** (0.00945)	-0.0688** (0.0314)	0.0290*** (0.00510)	0.0235*** (0.00431)	0.0181 (0.175)	0.0237*** (0.00672)
Ln (no. of workers)	-0.00298 (0.00725)	0.0160*** (0.00261)	0.0269*** (0.00188)	0.0354 (0.0255)	0.0518*** (0.00304)	9.502 (0)	0.580*** (0.175)	0.392 (10.29)	0.0593 (0.0494)	0.0638*** (0.0246)	0.0151 (0.0847)	0.0282*** (0.00436)	0.0223*** (0.00301)	0.0468 (0.238)	0.0802*** (0.00786)
Ln (capital/worker)	0.0189*** (0.00393)	0.00503*** (0.00074)	0.0051*** (0.00085)	0.00218 (0.00947)	0.00312** (0.00131)	0.0501 (1.774)	0.000867 (0.00804)	0.00888 (0.360)	-0.00085 (0.00449)	-0.00937* (0.00488)	0.0105 (0.0435)	0.0047*** (0.00066)	0.0026*** (0.00071)	0.00123 (0.0141)	-0.000270 (0.00170)
Ln (output/worker)	0.112*** (0.00794)	0.0679*** (0.00273)	0.0687*** (0.00239)	0.0788** (0.0326)	0.113*** (0.00343)	0.193 (0.231)	0.120 (0.115)	0.449 (10.23)	0.312*** (0.0786)	0.266*** (0.0587)	0.0879 (0.0655)	0.0581*** (0.00433)	0.0683*** (0.00269)	0.0785 (0.287)	0.115*** (0.00561)
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488
Number of groups	535,471	535,471	535,471	535,471	535,471	40,496	40,496	40,496	40,496	40,496	601,550	601,550	601,550	601,550	601,550

Note: Premium relative to non-exporters *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$

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

Source: Authors' own calculations

Table C9: Distribution of wage premium: Job dynamic groups of exporters and non-exporters (see figure 4.17)

	Individual fe					firm fe					job fe				
	5 th %	25 th %	50 th %	75 th %	95 th %	5 th %	25 th %	50 th %	75 th %	95 th %	5 th %	25 th %	50 th %	75 th %	95 th %
enter_continue X	0.004*** (0.0325)	0.031*** (0.00866)	0.0142*** (0.00792)	0.02065*** (0.00893)	0.05256*** (0.0127)	0.102 (1.366)	0.086 (1.562)	0.0497*** (0.0282)	0.0831** (0.0524)	0.1008 (0.0535)	-0.034 (0.126)	0.0138*** (0.0134)	-0.0063 (0.0113)	0.01931 (0.0197)	0.05282 (0.0399)
enter_continue nonX	-0.022*** (0.0276)	-0.0083*** (0.00814)	-0.0021** (0.00740)	0.00325 (0.00833)	0.01243 (0.0125)	0.07 (0)	0.026 (4.195)	0.0127*** (0.0117)	0.0098 (0.0418)	0.01998 (0.0526)	-0.065** (0.0611)	-0.0077*** (0.0128)	-0.0031* (0.0115)	0.00571 (0.0186)	0.01243 (0.0315)
continue X	0.055*** (0.0311)	0.04*** (0.00872)	0.0161*** (0.00783)	0.02585*** (0.00893)	0.04226*** (0.0125)	0.509 (1.461)	0.102 (1.628)	0.0607*** (0.0233)	0.0941*** (0.0424)	0.0796 (0.0530)	-0.004** (0.0823)	0.0205*** (0.0137)	0.0142*** (0.0122)	0.02751* (0.0192)	0.04222 (0.0397)
enter_exit nonX	-0.339*** (0.0283)	-0.087*** (0.00833)	-0.0209*** (0.00742)	-0.00785 (0.00835)	0.00906 (0.0126)	-0.586 (0)	-0.154 (0.566)	-0.0923*** (0.0188)	-0.0449 (0.0382)	0.0149 (0.0618)	-0.213** (0.107)	-0.0423*** (0.0129)	-0.0224* (0.0115)	-0.00719 (0.0186)	0.00982 (0.0328)
exit X	-0.181*** (0.0325)	-0.0389*** (0.00887)	-0.0076* (0.00787)	0.02975*** (0.00972)	0.08866*** (0.0121)	-0.248 (1.218)	-0.0577 (2.561)	-0.0429* (0.0296)	0.0293*** (0.0263)	0.1539*** (0.0281)	-0.1724 (0.0584)	-0.0191* (0.0121)	-0.0099 (0.0114)	0.02461 (0.0212)	0.09692** (0.0374)
exit nonX	-0.225*** (0.0302)	-0.0562*** (0.00844)	-0.01303 (0.00748)	-0.00188 (0.00923)	0.02486 (0.0128)	-0.295 (0.945)	-0.0913 (3.502)	-0.0635*** (0.0162)	-0.009*** (0.0126)	0.0638** (0.0243)	-0.2256 (0.0545)	-0.0275 (0.0114)	-0.01318 (0.0108)	-0.00015 (0.0206)	0.02462 (0.0298)
enter_exit X	-0.376*** (0.0524)	-0.168*** (0.0107)	-0.0476*** (0.00932)	-0.01975 (0.0102)	0.04166** (0.0137)	0.051 (0)	-0.316 (1.825)	-0.1993* (0.0268)	-0.0921 (0.0342)	0.0785* (0.0346)	-0.2567 (0.112)	-0.0818** (0.0175)	-0.048 (0.0186)	-0.01789 (0.0271)	0.04172 (0.0496)
age	-0.0392 (0.0402)	-0.0250*** (0.00407)	-0.0135*** (0.00486)	-0.0212** (0.00862)	-0.0981*** (0.0188)	-0.0860 (0.100)	-0.0497 (0.0457)	-0.0567*** (0.00572)	-0.0960*** (0.0182)	-0.197*** (0.0125)	-0.0251 (0.0616)	-0.0123* (0.00685)	-0.0127 (0.00911)	-0.0232* (0.0124)	-0.0984** (0.0428)
agesqr	0.582 (0.411)	0.396*** (0.0469)	0.479** (0.0523)	0.717*** (0.0894)	2.034*** (0.179)	1.141 (1.362)	0.792* (0.481)	0.898*** (0.0736)	1.477*** (0.227)	2.894*** (0.146)	0.290 (0.741)	0.375*** (0.0589)	0.225*** (0.0743)	0.644*** (0.117)	1.916*** (0.430)
tenure	0.0483*** (0.0119)	0.0541*** (0.00215)	0.0224*** (0.00156)	0.0126*** (0.00253)	0.0199*** (0.00257)	0.170 (0.157)	0.338 (0.385)	0.0918*** (0.00608)	0.0750*** (0.00662)	0.0572*** (0.0122)	0.0402** (0.0177)	0.0232*** (0.00536)	0.0236*** (0.00495)	0.0160** (0.00650)	0.0218*** (0.00587)
Ln (no. of workers)	0.0176* (0.00926)	0.0351*** (0.00230)	0.0278*** (0.00185)	0.0403*** (0.00193)	0.0553*** (0.00253)	8.144 (6.942)	5.067 (11.79)	0.188** (0.0831)	0.0683 (0.0648)	0.0698** (0.0291)	0.0215 (0.0257)	0.0183*** (0.00383)	0.0298*** (0.00341)	0.0378*** (0.00341)	0.0936*** (0.00800)
Ln (capital/worker)	0.0327*** (0.00495)	0.00422*** (0.000763)	0.00355*** (0.000804)	0.00419*** (0.000863)	0.000334 (0.00140)	0.0859 (0.504)	0.00467 (2.040)	0.00989 (0.00766)	0.00293 (0.00642)	0.00175 (0.00597)	0.0207*** (0.00786)	0.00597*** (0.000682)	0.00359*** (0.000704)	-7.20e-05 (0.000896)	0.000792 (0.00148)
Ln (output/worker)	0.119*** (0.00949)	0.123*** (0.00246)	0.0723*** (0.00223)	0.0797*** (0.00222)	0.118*** (0.00379)	0.266 (0.416)	3.764 (9.372)	0.288*** (0.0973)	0.324*** (0.0824)	0.268*** (0.0371)	0.0778*** (0.0131)	0.0627*** (0.00430)	0.0729*** (0.00269)	0.0810*** (0.00316)	0.133*** (0.00737)
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488
Number of groups	535,471	535,471	535,471	535,471	535,471	40,496	40,496	40,496	40,496	40,496	601,550	601,550	601,550	601,550	601,550

Note: Premium relative to continue non-exporters ***p<0.01 **p<0.05 *p<0.1

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

Source: Authors' own calculations

Table C10: Distribution of wage premium: Job dynamic groups of exporters exporting to African and non-African countries (see figure 4.18)

	Individual					firm fe					job fe				
	5 th %	25 th %	50 th %	75 th %	95 th %	5 th %	25 th %	50 th %	75 th %	95 th %	5 th %	25 th %	50 th %	75 th %	95 th %
enter continue Int X	0.017*** (0.0332)	0.067*** (0.0103)	0.0262*** (0.00844)	0.0238 (0.0985)	0.06986*** (0.0135)	0.143 (0)	0.142 (1.051)	0.1233 (0.514)	0.1654 (0.480)	0.13129*** (0.0371)	-0.046 (0.202)	0.0004*** (0.0124)	0.0253*** (0.0110)	0.02749 (0.122)	0.06895 (0.0500)
enter_continue Afr_X	-0.022*** (0.0310)	0.0036*** (0.0101)	-0.0098*** (0.00829)	-0.01458 (0.148)	0.02796 (0.0142)	0.061 (0)	0.019 (1.025)	-0.0202 (0.106)	0.0062 (0.224)	0.04729 (0.0295)	-0.057 (0.162)	-0.0111*** (0.0125)	-0.011 (0.0111)	0.00349 (0.0572)	0.02805 (0.0393)
enter continue nonX	-0.024*** (0.0280)	-0.0041*** (0.00916)	-0.0018*** (0.00740)	-0.01029 (0.130)	0.01061 (0.0132)	0.067 (0)	0.024 (1.131)	0.0183 (0.0940)	0.0139 (0.283)	0.01259 (0.0243)	-0.102 (0.223)	-0.0182*** (0.0118)	-0.0026*** (0.0106)	0.00529 (0.0411)	0.01074 (0.0301)
continue Int X	0.081*** (0.0316)	0.079*** (0.00990)	0.0331*** (0.00800)	0.0434 (0.378)	0.06076*** (0.0141)	0.435 (0)	0.175 (0.832)	0.1523 (0.446)	0.2014 (0.804)	0.11329*** (0.0291)	0 (0.180)	0.0245*** (0.0127)	0.0325*** (0.0113)	0.05219 (0.151)	0.05005 (0.0516)
continue Afr X	-0.004*** (0.0327)	0.0107*** (0.00983)	0.0057*** (0.00796)	-0.0023 (0.156)	0.01609 (0.0136)	0.093 (0)	0.032 (1.268)	-0.0364 (0.371)	-0.0297 (0.222)	0.02359 (0.0272)	-0.042 (0.203)	-0.0078*** (0.0123)	-0.0077*** (0.0115)	-0.00589 (0.0412)	0.01686 (0.0483)
enter exit nonX	-0.343*** (0.0292)	-0.079*** (0.00920)	-0.0262*** (0.00732)	-0.0151 (0.154)	0.00676 (0.0132)	-0.589 (0)	-0.153 (0.888)	-0.0857 (0.187)	-0.0416 (0.215)	0.00629 (0.0235)	-0.224 (0.215)	-0.0538*** (0.0119)	-0.0271*** (0.0107)	-0.00891 (0.0362)	0.00715 (0.0352)
exit Int X	-0.161*** (0.0335)	-0.0066*** (0.00843)	0.0024*** (0.00790)	0.0548 (0.327)	0.10396*** (0.0120)	-0.256 (0)	-0.008 (0.790)	0.0283 (1.162)	0.1184 (0.918)	0.19929*** (0.0289)	-0.1389 (0.184)	-0.0194*** (0.0123)	0.0014*** (0.0120)	0.04179 (0.162)	0.11415*** (0.0511)
exit Afr X	-0.201*** (0.0338)	-0.0521*** (0.00835)	-0.0273 (0.00795)	-0.00813 (0.139)	0.05276*** (0.0130)	-0.289 (0)	-0.099 (0.703)	-0.09188 (0.506)	-0.03959 (0.136)	0.07739*** (0.0297)	-0.1872 (0.133)	-0.0409 (0.0123)	-0.02848 (0.0123)	-0.00745 (0.0622)	0.04385 (0.0471)
exit nonX	-0.223*** (0.0317)	-0.0464*** (0.00765)	-0.01802 (0.00731)	-0.0039 (0.127)	0.02406 (0.0119)	-0.299 (0)	-0.0702 (0.591)	-0.054 (0.420)	-0.0106 (0.144)	0.05889*** (0.0246)	-0.22918 (0.181)	-0.0382 (0.0116)	-0.01783 (0.0109)	-0.00061 (0.0655)	0.02475 (0.0327)
enter exit Int X	-0.311*** (0.0785)	-0.1565*** (0.0138)	-0.0452*** (0.0115)	-0.01152 (0.119)	0.07496*** (0.0149)	0.465 (0)	-0.322 (0.803)	-0.1622 (0.923)	-0.0218 (0.139)	0.14129*** (0.0511)	-0.404*** (0.141)	-0.0913 (0.0228)	-0.0462 (0.0231)	-0.00344 (0.0870)	0.07575 (0.0676)
enter exit Afr X	-0.464*** (0.0624)	-0.1457*** (0.0126)	-0.0514*** (0.0118)	-0.0393 (0.0782)	-0.00824 (0.0171)	-1.025 (0)	-0.285 (0.938)	-0.1857 (0.0620)	-0.1235*** (0.0431)	-0.02521 (0.0297)	-0.328 (0.192)	-0.0859 (0.0208)	-0.0524 (0.0214)	-0.02901 (0.0522)	-0.00745 (0.0667)
age	-0.0421 (0.0364)	-0.0262*** (0.00420)	-0.0139** (0.00591)	-0.00983 (0.479)	-0.0964*** (0.0183)	-0.0869 (0)	-0.0517 (0.0553)	-0.0572*** (0.0101)	-0.0953 (0.117)	-0.197*** (0.0159)	-0.00895 (0.220)	-0.0120** (0.00547)	-0.0138 (0.0104)	-0.0227 (0.237)	-0.0974 (0.0699)
agesqr	0.589 (0.363)	0.397*** (0.0470)	0.498*** (0.0596)	0.646 (5.300)	1.990*** (0.176)	1.166 (0)	0.793 (0.789)	0.893*** (0.307)	1.476 (1.550)	2.886*** (0.194)	0.296 (2.400)	0.356*** (0.0512)	0.224*** (0.0861)	0.643 (2.965)	1.913*** (0.690)
tenure	0.0519*** (0.0138)	0.0549*** (0.00204)	0.0212*** (0.00162)	0.00717 (0.0910)	0.0207*** (0.00290)	0.154 (0)	0.347 (0.228)	0.0922 (0.145)	0.0725 (0.0573)	0.0540*** (0.0128)	-0.00116 (0.0488)	0.0269*** (0.00431)	0.0226*** (0.00589)	0.0158 (0.129)	0.0201*** (0.00467)
Ln(no. of workers)	0.0136 (0.00863)	0.0304*** (0.00232)	0.0231*** (0.00195)	0.0451 (0.0477)	0.0524*** (0.00268)	7.517 (0)	5.059 (4.955)	0.112 (0.0725)	0.0581 (0.302)	0.0644* (0.0369)	0.0317 (0.0267)	0.0167*** (0.00415)	0.0156*** (0.00314)	0.0356 (0.169)	0.0919*** (0.00729)
Ln (capital/worker)	0.0309*** (0.00449)	0.00444*** (0.000764)	0.00241*** (0.000798)	0.00719 (0.0151)	-0.000525 (0.00140)	0.129 (0)	-0.116 (0.266)	0.00638** (0.00295)	0.00123 (0.00568)	-0.000240 (0.00479)	0.0245 (0.0170)	0.00556*** (0.000665)	0.00217*** (0.000644)	0.000539 (0.00368)	-0.000993 (0.00163)
Ln (output/worker)	0.122*** (0.0101)	0.122*** (0.00258)	0.0700*** (0.00231)	0.0794*** (0.0235)	0.116*** (0.00367)	0.247 (0)	3.794 (4.138)	0.282** (0.118)	0.315 (0.315)	0.265*** (0.0538)	0.0719*** (0.0206)	0.0628*** (0.00430)	0.0703*** (0.00271)	0.0797 (0.0831)	0.131*** (0.0119)
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488	1,258,488
Number of groups	535,471	535,471	535,471	535,471	535,471	40,496	40,496	40,496	40,496	40,496	601,550	601,550	601,550	601,550	601,550

Note: Premium relative to enter_exit_non-exporters ***p<0.01 **p<0.05 *p<0.1 (Is significant at the 1% level, 5% level and 10% level respectively); Source: Authors' own calculation

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

South Africa is a developing country afflicted with economic malaise, among others high unemployment and inequality levels. Export-led growth has been advocated as a possible way to achieve economic growth and alleviate the dire economic conditions. However, to be able to optimise export-led growth, an aggregate-level view is not adequate enough, as policy makers need to understand firm-level behaviour. Until recently, the literature on South African exporting firms has been limited to sample surveys (using samples of limited size that are not representative of the broader population of firms). Although these studies provide a glimpse of South African exporting firm behaviour, there is a gap in the South African firm-level literature, which demands detailed, firm-level, panel data on the population of South African firms. This thesis set out to fill this gap by being one of the first to have used the newly made available administrative panel data containing data for the population of South African firms. This data allows for the application of novel approaches to investigate the behaviour of South African exporting firms (and workers) and their heterogeneous response to trade over time, which in turn can inform policy makers how to optimise export-led strategies (which are associated with economic growth and job-creation). This thesis was presented in the form of three independent articles, each addressing various interrelated aspects.

The first objective of the thesis was to contribute to the understanding of the relationship between exporting, labour demand and wages at a firm-level in South Africa. This objective was met in Chapter 2 (Article 1), which considered the employment premium and the wage premium of South African exporters relative to non-exporters, as well as within exporters. Chapter 2 (Article 1) also investigated employment growth in South African exporting firms by considering the growth in employment of different types of employees. The second objective aimed to investigate how the wage premium was distributed within the exporting firm. This objective was met in Chapter 3 (Article 2) which not only considered how the wage premium was distributed within the exporting firm, but also investigated how the wage differential contributed to the within-firm wage inequality and considered possible sources of wage inequality (namely firm characteristics, quality of the product exported and the type of destination served - see Chapter 3: Article 2). The results of Articles 1 and 2 showed that exporting firms paid higher wages than non-exporting firms. This led to the third and final objective, which was to examine why exporting firms paid higher wages (see Chapter 4, Article 3). Specifically, whether the export wage premium was due to observable or unobservable firm, individual or job characteristics, the distribution of wages or if it was due to exporting activities (export status) itself.

The results and findings of meeting each of the above-mentioned objectives are presented in the following section.

5.2 Summary of the results and conclusions of the study

Chapter 2 contained the first article, titled *The Employment premium and employment growth of South African manufacturing exporters*. By using a newly-made available longitudinal firm-level panel dataset on South African manufacturing firms from 2010 to 2014, this article set out to answer the first secondary research question: *What is the relationship between exporting, labour demand and wages at a firm-level in South Africa?*

In order to examine the employment and wage premium of exporting firms, the Bernard and Jensen (1995) methodology on the estimation of the export premia (using an OLS regression with control variables) was applied. From the results, it was evident that South African manufacturing exporters employed more workers (indicating an employment premium) and paid higher wages (indicating a wage premium) than non-exporters. This alluded to exporters creating more and better jobs. Within exporters, the employment premium and wage premium were affected by the destination served, number of products exported and number of destinations exported to. There was a hierarchy in both size (number of employees) and wages for exporters exporting to *international* countries (both to African and non-African countries), only *African* countries, and only *SACU* countries as an export destination (while controlling for capital, industry and year). This indicates that the export destination has an influence on the employment and wage premiums. Not only does the destination matter, but also the number of destinations served as well as the number of products exported. There is a higher marginal effect (on employment levels and wage) to adding one destination than to adding one product.

When considering exporter dynamics, the results showed that firms *entering* exporting already paid high wages (the average wage was similar to *continuous* exporting firms, which was true for *African* as well as *international* firms). In terms of size (number of employees/employment premium), firms *continuing* to export in the *international* market were the largest, followed by firms *entering* the *international* market, firms *continuing* in the *African* market, *entering Africa*, *exiting Africa* and *exiting* the *international* market. Therefore, firms seem to already be quite large (relative to non-exporters) when they enter the export market, but the entrants may grow over time (since they are smaller than *continuous* exporters).

The growth in employment can occur through the intensive margin (i.e. continuous or existing exporters) or the extensive margin (i.e. entering or new exporters). In Article 1, the growth in employment was measured by following Biscourp and Kramarz (2007:34) in estimating a first-difference regression over the period 2010 to 2013. The results showed that the largest growth

in employment appeared to be through the extensive margin, where new firms that had entered the export market between 2010 and 2013 experienced the fastest growth in employment. At the intensive margin, continuous exporters grew “unskilled jobs” (earning below R6500 pm) at a slower rate and grew “skilled jobs” (earning above R6500 pm) at a faster rate than non-exporters. *International* exporters grew employment faster than firms exporting to *Africa only* and firms only serving the domestic market (non-exporters). These results indicated that overall, exporters (relative to non-exporters) showed faster growth in employment of all types of workers (earning above and below R6 500 pm as well as being older and younger than 30 years of age). However, the growth in jobs was skewed towards higher skilled (earning above R6 500 pm), more experience (older than 30 years) workers.

In conclusion, for a possible solution to South Africa's high unemployment, it is not sufficient to simply drive employment creation by increasing exports because of the heterogeneous nature of exporters. Enhancing exporters' competitiveness in the *international* market would contribute most to employment creation, as the results showed that firms exporting to the *international* market employed the most workers and paid the highest wages, whereas, firms exporting only to *African* countries or only to *SACU* countries, had a positive, but smaller employment and wage premium (relative to non-exporters). Furthermore, exporting firms (relative to non-exporting firms) showed faster growth in their number of employees (especially as they *entered* the export market). Even though employment growth (for all types of employees) was higher for exporters, the growth was skewed towards a certain type of employee as they showed higher growth in the employment of older (more experienced) and higher earning (higher skilled or qualified) employees.

One of the limitations of Chapter 2 is that it used the average wages of exporting firms, where the findings of a wage premium might disguise the fact that exporting firms might only pay more at certain parts of the wage distribution. Therefore, a recommendation was made that further research should consider the within firm wage distribution of exporters (relative to non-exporters). This was done in Chapter 3.

Chapter 3 contains the second article, titled *The wage distribution and inequality of South African manufacturing exporters*. This article aimed to answer the set of second secondary research questions: *How is the wage premiums distributed within the exporting firms? And does the wage differential contribute to the wage inequality? What are the possible sources of wage inequality?*

Similar to Article 1, this article (Article 2) also utilised the newly-made available administrative firm-level panel dataset (from 2010-2014). Due to the detail level of this data (employer level data) the distribution of wages within a firm was determined by measuring the average wage in

a firm at the 5th, 25th, 50th, 75th and 95th percentiles. This was used in the empirical model similar to Bernard and Jensen (1995), where the export premia (in terms of these monthly wages) was estimated (with control variables).

The results of this article showed that, when considering the wage differential between non-exporting and exporting firms (serving different destinations), there was an export wage premium. Moreover, the wage differential was larger for exporters serving destinations that were located further away - i.e. the wage differential of firms exporting only to *SACU* countries was smaller than those exporting only to *African* countries, which in turn was lower than exporting to *international* countries). This hierarchy appeared to be across the distribution (showing that all employees earned a wage premium) and it was larger at the upper tail. Therefore, the higher wages paid by exporters were more dispersed. This clearly showed a form of wage inequality within exporting firms. Hence, exporters (specifically *international* exporters) seemed to pay higher wages (and thus provide better jobs) to all employees, however, there was a higher degree of wage inequality within these firms.

The article continued by investigating two potential explanations for this wage inequality, namely the effect of firm characteristics (in particular capital per worker, firm size and labour productivity) as well as the export transaction characteristics (more specifically the type destination economy and quality of export products).

Firstly, when considering the effect of different firm characteristics on wage inequality, the results showed that, when controlling for capital per worker only, the higher wages and the wage inequality persisted. However, when adding controls for firm size (number of employees) and labour productivity (output per worker), the wage premium did not increase in magnitude with earnings (the wage inequality seemed to be lower). This may suggest that the wage inequality was driven by the distribution of firm size and labour productivity within exporters compared to non-exporters. This implied that a lot of the observed wage inequality was because larger, more productive firms were more likely to be exporters.

Secondly, this article considered the export transaction characteristics, more specifically the type of destination economy (proxied by GDP per capita) and quality of export products (proxied by the price of the manufactured export product) as potential explanations for the wage inequality. In order to be able to measure this, transaction-level customs data was utilised - as it contained data on export products (on HS-6 digit), the export price and the destination country. The findings, however, showed little evidence that the wage inequality was driven by either the type of destination economy or the quality of export products.

In conclusion, this article did find that all employees (across the wage distribution) in an exporting firm earned a wage premium. This premium seemed to increase in magnitude towards the upper tail of the distribution, indicating that the wage differential did contribute to wage inequality. The article showed that much of the wage inequality could be explained by the size (number of employees) and labour productivity (output per worker) of a firm. This implied that a lot of the observed wage inequality was because larger, more productive firms were more likely to be exporters, whereas, little evidence existed that the wage inequality was driven by either the type of destination economy or the quality of export products. This might suggest that the remaining wage inequality could be related to either the process of exporting or simply being in the export market. Another possible explanation could be that the remaining wage inequality was due to a specific type of firm (employing a specific type of person) who had this (unequal) wage distribution even before they started to participate in the export market. A possible reason why this might be the case is that it is most likely that exporters are willing (or able) to pay a premium for some sort of specific skill which is scarce in the market but may be very valuable for these types of firms (for example very effective marketers, managers or CEOs).

Even though this article (Article 2) considered firm-level characteristics (capital per worker, firm size and labour productivity) as well as export transaction-level characteristics (destination GDP per capita, product type and quality) as possible explanations for the wage gap between exporters and non-exporters, it could still be overestimating the so-called “export wage premium” as it did not take into account individual (worker) characteristics. Therefore, a recommendation was made that further research should consider the individual characteristics when estimating the export wage premium. By using an employer-employee linked dataset, Chapter 4 was able to consider this.

Chapter 4 contains the third article, titled *Exporting and wage premium: The case of South African manufacturing firms*. By using a rich, newly constructed, employer-employee matched panel dataset on South African manufacturing firms from 2010 to 2014, this article set out to answer the final secondary research question: *Why do exporting firms pay higher wages?* Specifically, it considered whether the export wage premium could be explained by observable or unobservable firm, individual or job characteristics, the distribution of wages or if it was due to exporting activities (export status) itself.

Due to the fact that the panel dataset was on a job-level, it allowed for the investigation of the relationship between wages and firm, individual and job characteristics. In this article, a standard Mincerian earnings function with control variables was used to determine the impact of observable individual and firm characteristics on wages. In order to consider the impact of unobservable firm, individual and job characteristics, fixed effects regressions were estimated

(other studies also using fixed effects include Schank *et al.* (2007), Munch & Skaksen (2008), Fafchamps (2009) and Martins & Opromolla (2009)). This article also considered the distribution of the export wage premium by estimating quantile regressions (with controls for observable and unobservable firm, individual and job characteristics).

The results firstly showed that much of the observed wage premium paid by exporters was explained by observable firm and individual characteristics. The premium decreased from 54.03% to 5.27% when controlling for observable firm (size, capital intensity and output per worker) and individual characteristics (age, age squared and length of tenure). Secondly, the distribution of wages showed that the export wage premium was evident across the entire earnings distribution (from the 5th to the 95th percentiles). Thirdly, when taking export destinations into account, it was clear that the wage premium of working within a firm serving the *international* market (exporting to both African and non-African countries) was the highest and relatively constant throughout the wage distribution (from the 5th to the 95th percentile). *Africa only* exporters (a firm exporting only to African countries - excluding *SACU only* exporters) exhibited an export premium at the upper and lower tail of the distribution, but not at the 50th percentile. Furthermore, *SACU only* exporters (firms only exporting to SACU countries) did not have a wage premium. In fact, these firms seemed to pay lower wages than non-exporters.

Finally, when adding destinations (*Africa only* and *international*) to the job dynamic groups (*enter*, *exit*, *continue* and *sporadic* jobs), an export wage premium still existed (after controlling for observable firm and individual characteristics). It is only when firm- individual- and job-specific unobservable characteristics (firm, individual and job-fixed effects) were controlled for that this export wage premium effectively disappeared. Therefore, the difference that was seen in the wage premium of being an *international* exporter was not about being labelled an exporter (just having the status of being an exporter). Rather, it was due to the “type of firm” (unobservable firm characteristics) exporters were, the “type of workers” (unobservable individual characteristics) they employed and the “type of jobs” (unobservable job characteristics) they created.

In summary, the reason why exporting firms pay higher wages is not due to their export status or the distribution of their wages. It is rather due to a combination of observable as well as unobservable firm, individual and job characteristics. Moreover, it is about the inherent characteristics of a firm. In other words, a firm that is going to become an exporter creates a certain type of job in which a certain type of worker is hired and this worker is paid a premium.

From the results, it is clear that South African exporting firms are heterogeneous in their behaviour and response to trade over time. These findings contribute to the limited South

African firm-level literature. The following section presents the specific contributions of this thesis.

5.3 Contribution

The primary contribution of this study is threefold:

- Firstly, existing research on South African firms is based on samples of limited size that are not representative of the broader population of firms. This study contributes by being one of the first to have used the newly made available administrative data containing data for the population of South African firms (as opposed to relying on survey data). This data also allows for novel empirical analysis.
- Secondly, this study contributes to the limited South African as well as international literature on exporting firms' (and workers') behaviour by linking trade data with firm and employee characteristics.
- Thirdly, part of this study was incorporated into a UNU-WIDER working paper entitled "Labour demand and the distribution of wages in South African manufacturing exporters" (Matthee, Rankin & Bezuidenhout, 2017)."

The secondary contributions per article are as follows:

- Article 1 contributes to the literature by deepening the understanding of the employment premium and the wage premium of South African exporters relative to non-exporters as well as within exporters (considering export destination, exporter dynamics, number of products exported and number of destinations served). Furthermore, it is the first South African firm-level study to investigate employment growth (change in the number of employees) in South African exporting firms by considering the growth in employment of different types of employees.
- The second article contributes to the limited South African and international literature by disentangling the wage differentials between non-exporters and exporters as well as within exporters (which includes a consideration of exporter dynamics and destinations served). It investigated the within-firm wage distributions and wage inequality within-firms. Furthermore, it also examined possible sources of the wage inequality by analysing firm characteristics, the type of product exported as well as the type of destination served.
- Article 3 contributes to the South African and international literature by using an employer-employee matched dataset to investigate whether the export wage premium was due to

observable or unobservable firm, individual or job characteristics, the distribution of wages or if it was due to exporting activities (export status). It further contributes by also considering other dynamics that could add to the wage premium by taking the influence of different export destinations (regional versus *international*), job dynamics (*enter*, *exit*, *continue* or *sporadic* jobs) as well as quantile regressions (with fixed effects) into account (which is a novel application of employer-employee datasets on exporting firms).

5.4 Recommendations

5.4.1 Recommendations for further research

The recommendations in terms of the South African literature are twofold. Firstly, this study used the newly-made available longitudinal firm-level panel dataset on South African manufacturing firms. This is a very rich dataset that, with further exploration, could enhance the understanding of firm-level behaviour in numerous contexts. For example, investigating the labour dynamics of two-way traders and also firm participation in global value chains. The time period investigated in this thesis was still fairly short, and extending the panel would provide an even deeper understanding of the long-term dynamics within South African exporting firms.

Secondly, even though this thesis used a rich panel dataset on the population of firms and employees, one shortcoming or limitation resonating from all three articles is the fact that it is limited in terms of individual characteristics (having no education and skills variables). A potential next avenue of research is to conduct a qualitative analysis on the specific characteristics of the types of individuals who are employed by exporters in the manufacturing sector. For example obtain information on the individual's gender, race and various indications of skills such as education level, occupation level, type of job (production versus non-production) and on the job training obtained.

5.4.2 Recommendations to policy makers

From this thesis, there are three aspects on South African manufacturing exporting firms which policy makers should take into consideration.

Firstly, exporting firms are heterogeneous in nature. The first article (Chapter 2) showed that the employment premium and wage premium of exporting firms differ in terms of the market they serve (namely the *international* market, *Africa only* or *SACU only*). It is the firms serving the *international* market that employ the most workers and pay the highest wages. From the third article (Chapter 4), it is clear that for policy makers just to create exporters (or changing a firm's export status) is not going to suddenly create an export wage premium. Rather, the challenge is to change the characteristics of a firm, to create the "type of firm" that is most likely to be or

become an exporter (specifically an exporter serving the *international* market). A typical “type of firm” that is most likely to become an exporter is usually larger and more productive firms. Policy makers should therefore focus on policies that increase firm-level productivity. One channel through which productivity increases is through investment and the new technology associated with it. Another is to tie wages to productivity. A third is to reduce input costs, through for example access to imported products and a fourth would be to encourage more competitive local markets.

Secondly, Article 1 (Chapter 2) proved that the type of jobs exporting firms grow are for older (more experienced) and higher earning (higher skilled or qualified) workers. In accordance, Article 3 (Chapter 4) showed that exporters tend to employ “better” workers who have more skills, experience and higher levels of education which makes them more productive. This poses a challenge in that, although employment growth is created (for all types of workers), the growth is skewed towards a certain type of employee. Therefore, export growth is going to create some jobs for young, low-skilled workers, but it is unlikely to have an especially large multiplier effect on the unemployment rate of un-skilled (or low-skilled) workers, nor the high percentage of youth unemployment. These results in fact underscore the skills mismatch (especially among the youth) that is pertinent within the South African labour market.

Finally, to emphasise the fact skills mismatch, skills development needs to be at the core of the policy making process as it is a leading contributor to productivity improvement and export proficiency – and better paying and more sustainable jobs. To improve education and skills development in the country policies should be aimed at driving high-quality teaching and learning by building capacity and accountability in schools and other education/training institutions, reducing government red tape in the education and training sectors to encourage greater participation by providers and quicker and better results; and providing greater (including financial) incentive to firms to engage in staff training and development. Another policy imperative should be to open up the education/training sector to more foreign participation, and promoting the regional exchange of expertise and cross-recognition of qualifications to encourage a more mobile workforce in southern Africa.

Therefore, policy makers cannot just turn to increased exports as a solution to unemployment. They need to create policies in line with supporting a specific type of exporting firm (the firms that have the potential to become the larger more productive exporters) and try to address the skills shortage in order to match the demand for more skilled and experienced workers.