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Exporting and the wage premium: The case of South African manufacturing firms

Carli Bezuidenhout[1] | **Marianne Matthee**[2] | **Neil Rankin**[3]

[1]School of Economic Sciences and TRADE Research Entity, North-West University, Potchefstroom, South Africa

[2]Gordon Institute of Business Science, University of Pretoria, Pretoria, South Africa

[3]Department of Economics, Stellenbosch University, Stellenbosch, South Africa

Correspondence
Carli Bezuidenhout, North-West University, Potchefstroom, South Africa.
Email: carli.bezuidenhout@nwu.ac.za

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Abstract

There is much literature to support the view that exporters (both developed and developing countries) pay higher wages than nonexporters. While this so-called export wage premium has also been found to be prevalent in South Africa, it has not been thoroughly researched, with studies to date having relied on cross-sectional sample data rather than on the population of firms and workers. Using a newly constructed employer–employee matched panel data set on South African manufacturing firms, the study examined the factors contributing to the export wage premium in these firms—from firm, individual, and job characteristics (both observable and unobservable) to firms' distribution of wages and export destinations (e.g., SACU-only [Firms exporting only to Southern African Customs Union countries], Africa-only [Firms exporting only to African countries], or international [Firms exporting to both African and non-African countries]). One of the key findings was that the export wage premium is not about being labeled 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. Policymakers should therefore be aware that simply expanding the pool of exporters will not necessarily give momentum to the export wage premium phenomenon. Rather, policy measures should be aimed at increasing firm-level productivity.

KEYWORDS
employer–employee data, South African manufacturing exporters, wage premium

JEL CLASSIFICATION
F10; F16

1 | INTRODUCTION

Exporters are known to pay higher wages than nonexporters (Bernard & Jensen, 1999). There is ample evidence of this in both developed and developing countries (Alvarez & López, 2005; Bernard & Jensen, 2004; Bernard et al., 2007; Hahn, 2005). Africa is no different. For example, Van Biesebroeck (2005) studied the effect of export status on productivity in a range of manufacturing firms in nine sub-Saharan African countries and found that exporters paid on average 40% more than nonexporters. The so-called export wage premium is also in evidence in South Africa, as revealed in two studies by Matthee et al. (2016) and Edwards et al. (2016), respectively.

The question should be asked: why do exporting firms pay higher wages? There could be a number of reasons. First, exporting firms have different observable firm characteristics from nonexporting firms (e.g., firm size, capital intensity, and output per worker) (see Bernard & Jensen, 1997; Bernard & Wagner, 1997; Greenaway & Yu, 2004). Second, the observable individual characteristics of the workforce (e.g., age and length of tenure) in exporting firms might differ from those in nonexporting firms (Klein et al., 2013; Munch & Skaksen, 2008; Schank et al., 2007). Third, the export wage premium might be due to unobservable firm and individual characteristics (e.g., Fafchamps, 2009; Munch & Skaksen, 2008; Schank et al., 2007). Finally, the distribution of wages and the higher (on average) wages paid by exporting firms might disguise the fact that exporting firms pay more at certain parts of the wage distribution, according to where in the wage distribution it matters most (Fu & Wu, 2013; Koenker & Hallock, 2001).

Limited research has been conducted on the export wage premium in South Africa. The phenomenon was examined in a study by Rankin and Schöer (2013) using employer–employee matched data. However, the study was limited to cross-sectional survey data. Furthermore, while the authors found evidence of an export wage premium (even after controlling for firm and individual characteristics), the premium differed by export destination. Among the findings were that the wages of firms exporting to the regional market of SADC (Southern African Development Community) were lower than those of firms producing domestically, whereas the wages of firms exporting outside the region were higher than those of both regional exporters and domestic producers.

This article helps to fill the gap in the literature by using newly available administrative data to study the export wage premium among manufacturing exporters in South Africa. A panel data set was constructed by merging three sets of administrative records collected by SARS (South African Revenue Service), namely employee income tax data (IRP5 or PAYE), company income tax (CIT) return data (ITR and ITR14), and customs transaction data. This new employer–employee matched panel data set on South African manufacturing firms allows one to control not only for observable (and unobservable) firm characteristics but also for observable (and unobservable) individual and job characteristics (which constitutes a unique firm–individual match). The article examines whether the export wage premium is due to observable or unobservable firm characteristics, individual or job characteristics, distribution of wages, or actual exporting activities (the firm's export status).

The article makes a further contribution by considering other dynamics that potentially add to the wage premium. It does this by considering the influence of different export destinations—that is, both regional (African-only) and *international* (both African and non-African) destinations—as well as quantile regressions. By showing the wage premium at different parts of the wage distribution, the quantile regressions illustrate how the observed export wage premium is distributed.

The rest of this article is structured as follows. Section 2 comprises a literature review on the export wage premium phenomenon in firm-level studies, with a specific focus on employer–employee matched data sets; Section 3 presents the empirical analysis, starting with a description of the data (Section 3.1) and then proceeding to descriptive statistics on exporters and monthly wages (Section 3.2), the estimation strategy (Section 3.3), and the regression results (Section 3.4); and Section 4 provides a number of conclusions.

2 | LITERATURE REVIEW

Exporting and the impact of exports on a country's economy have sparked considerable research interest, from as early as 1955 (North, 1955). In the 1990s, Bernard and Jensen took the theme forward with a series of firm-level studies on the differences between exporters and nonexporters (Bernard & Jensen, 1999, 2004; Bernard et al., 1995; 2007). They inspired a body of literature focusing specifically on the export wage premium. These include studies on Germany (Arnold & Hussinger, 2005; Bernard & Wagner, 1997), Taiwan (Liu et al., 1999), the United Kingdom (Greenaway & 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 studies on the export wage premium used firm-level (plant-level) data that allowed the researchers 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 showed evidence of an export wage premium. This suggests that the observed export wage premium is not just because a firm is larger, more capital intensive, and more experienced; it is also due to something else.

Critics argue that this export wage premium is overestimated because the individual characteristics of workers are not controlled for (Klein et al., 2013; Munch & Skaksen, 2008; Schank et al., 2007). The basis of this argument is that exporters are more likely to employ different types of workers from those employed by nonexporters. These workers may be "better" in that they have more skills and experience and higher levels of education, which make them more productive. To be able to include individual characteristics requires employer–employee matched data, which Breau and Rigby (2006, p. 298) called "a nontrivial task." As there were no variables in the Census Bureau of the United States that directly matched workers to firms, Breau and Rigby (2006) had to construct their own employer–employee data set from three different sources.

2.1 | Employer–employee level studies

The study by Schank et al. (2004) was one of the first to tackle the challenging task of relating individual workers to firms for analysis. They used an employer–employee combined data set (which matched 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, considering

individual characteristics. Their results showed that the export wage premium disappeared after controlling for individual characteristics.

Similarly, Breau and Rigby (2006) related worker characteristics (from the Decennial Household Census) to the manufacturing firm data (from the Longitudinal Research Database) for manufacturers in Los Angeles in 1990 and 2000. They, too, found no evidence of an export wage premium for workers with similar characteristics after controlling for specific individual characteristics (e.g., age, education, gender, race, and nationality). Similar results were obtained by Heyman et al. (2007) when using an employer–employee matched data set on the entire Swedish private sector because the wage premium of foreign-owned firms (relative to domestically owned firms) disappeared 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) analyzed the same data set as Schank et al. (2004) but also differentiated between different types of workers (blue-collar versus white-collar) in exporting and nonexporting firms. Their results showed that blue-collar workers in an exporting firm (with a 60% export-to-sales ratio) earned 1.8% more than blue-collar workers in a nonexporting firm. For white-collar workers, the export wage premium was 0.9%. A study by Munch and Skaksen (2008) on the export wage premium in Denmark also used employer–employee matched data (a FIDA data set that was based on administrative registers from 1999 to 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 a high level of export intensity did have an export wage premium, and this premium was even higher when export-intensive 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 possibility of an education wage premium in exporting firms. Even though the results indicated that exporters employed more educated workers, it did not show that they paid these educated workers more relative to nonexporters. On the contrary, when he added skills (which are not the same as education), an export wage premium was found among skilled production workers.

Fafchamps (2009) further determined that firm characteristics had a greater impact on the wage premium than individual characteristics. This was evidenced 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 declined (or even disappeared) when controlling for firm capital and labor (firm characteristics). Breau and Brown (2011) investigated whether exporters and foreign-controlled establishments in the Canadian manufacturing industry paid a wage premium relative to nonexporters and domestically controlled establishments. The results of the employer–employee data created from two micro data sources (the 1999 Annual Survey of Manufacturers and the 2001 census) suggested that there was an export wage premium (14%) and a foreign-controlled wage premium (30%). The premium declined (but still held) as more and more firm characteristics (plant size, capital intensity, and multiunit firm status) and individual characteristics (age, years of schooling, gender, and nationality) were controlled for. In line with the findings of Fafchamps (2009), Breau and Brown (2011) observed that firm characteristics had a more pronounced effect on the wage premium than individual characteristics.

The employer–employee matched data have also been used to explore the export dynamics of firms, workers, and jobs (firm-worker spells, as they have been called by Martins & Opromolla, 2009). By adding firm-fixed effects, individual-fixed effects, and job-fixed effects to the estimations of the export

wage premium, some studies have determined what happened to firms' (and individuals') wages when they entered the export market (Fafchamps, 2009; Martins & Opromolla, 2009; Schank et al., 2007). The average wages of a firm seemed to increase when it entered the export market, whereas an individual's wages did not increase (or increased by less than 0.01 log points) when he or she joined an exporting firm or when the firm in which the individual worked started to export (Fafchamps, 2009; Martins & Opromolla, 2009; Schank et al., 2007).

Using employer–employee matched panel data, Schank et al. (2010) tracked German firms over time. They found that the export wage premium had already existed some years before the firm entered the export market. This suggests that the wage premium was not the result of exporting per se but was rather explained by the type of firm (more productive and better paying) that, through a process of self-selection, went into exporting.

The export wage premium can be overestimated, as the average wage in an exporting firm could be increased by a specific group of workers within an exporting firm (Fu & Wu, 2013). It is therefore important to consider the wage distribution of firms. In other words, the average wage premium is not necessarily representative of the wage differentials between different quantiles of the wage distribution. For example, when workers with higher ability/more talent are employed by exporting firms, the average wage of exporting firms would increase and the export wage premia would be overestimated (Fu & Wu, 2013). To identify the effects of unobservable talent/ability of workers on the export wage premium, the use of quantile regression analysis (to show the wage distribution) has become more popular in wage differential studies with respect to education, gender, and working condition (Choi & Jeong, 2007).

It is not only the individual and firm characteristics but also the export destination that influence the export wage premium. A Spanish study distinguished between the wages of firms operating purely in the domestic market and those selling to the domestic and European Union markets as well as the rest of the world. The study demonstrated that the export premium increased in relation to the remoteness of the market and to employee education levels, 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 (LIDs) and high-income destinations (HIDs), respectively (De Loecker, 2007; Park et al., 2010; Shevtsova, 2012; Turco & Maggioni, 2013). Firms exporting to HID paid higher average wages than those exporting to LIDs (Brambilla et al., 2012). This supports the hypotheses of Verhoogen (2008), Brambilla et al. (2012), and Brambilla and Porto (2016) that the export destination influences product quality, which in turn influences worker quality and ultimately wages. 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. Similarly, there was a so-called skills bias in export destinations for Argentinian manufacturing exporters in a study by Brambilla et al. (2012). This "skills bias" can be observed in that exports to high-income countries (relative to middle-income or their domestic market) necessitated higher worker skill levels, which in turn implied higher wages (Brambilla et al., 2012). A more recent study by Brambilla and Porto (2016) confirmed this. By studying 82 countries they showed that high-income countries demanded higher-quality goods (and firms exporting to these destinations subsequently paid higher wages). Sutton (2007) demonstrated the relationship between labor cost and quality by arguing that the higher a country's labor cost, the higher the product quality should be (while not jeopardizing international competitiveness). Higher-quality

products in turn require improved technology, which goes hand in hand with more educated workers.

2.2 | South African literature

In the South African context, firm-level studies confirmed that South African exporting firms have superior characteristics to those of nonexporting firms (Edwards et al., 2008; Matthee & Krugell, 2012; Naudé et al., 2010; Naughtin & Rankin, 2014; Rankin, 2001, 2013). Also, exporters were found to pay a wage premium (Edwards et al., 2008; Rankin, 2001, 2013). However, there were two main limitations to these studies. First, they relied on samples rather than the population of firms and workers. The use of administrative data allows one to consider the whole population of firms rather than just a sample (which can be influenced by sampling procedures). Second, they were on a firm level that did not consider worker characteristics. Two papers by Matthee et al. (2016) and Edwards et al. (2016) addressed the first limitation, and a paper by Rankin and Schöer (2013) addressed the second limitation.

The United Nations University World Institute for Development Economics Research (UNU-Wider), in collaboration with the National Treasury and SARS, launched a project with the aim of understanding the factors underpinning the expansion of high-productivity firms in South Africa. Using newly available tax administrative data, this project provided researchers insight—for the first time—into the export dynamics of South African firms (Edwards et al., 2016; Matthee et al., 2016). Following Bernard et al.,'s (1995) approach to 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 nonexporters. More specifically, Matthee et al. (2016) found that firms exporting multiple products to multiple destinations had the highest export wage premium.

Edwards et al. (2016) grouped South African trading firms into three clusters, namely those that only exported, those that only imported, and two-way traders. The export wage premium was the highest among two-way traders, followed by importers-only and then exporters-only. Although the specific export wage premium was not the main focus of these studies, both verified that a wage premium existed. As these two studies were conducted on a firm level (as opposed to an employer–employee level), the export wage premium might have been overestimated as it did not control for individual characteristics (as suggested by Klein et al., 2013; Munch & Skaksen, 2008; Schank et al., 2007).

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

3 | EMPIRICAL ANALYSIS

3.1 | Data

This article used newly available tax administrative data to conduct a firm-, individual- and job-level analysis, which formed part of a project launched by the National Treasury in collaboration with UNU-WIDER. The data were supplied by SARS. There were three main sources of tax administrative data: first, the job-level tax form data (IRP5 certificates) completed by employers on behalf of their employees; second, the customs data for all South African export transactions; and the CIT return data submitted by corporate firms. To construct an employer–employee matched data set, the CIT and customs data (employer data) were merged into the IRP5 (employee) data. The merging was made possible by the use of a conjunction table (linking the firms' identifiers from each data set) provided by SARS. The three data sets pertained to different reporting years; therefore, the dates were aligned to arrive at a panel data set from 2010 to 2014.

The IRP5 certificates provided information on workers on a job level (a job being defined as a unique individual–firm match). The raw IRP5 data were adjusted to remove duplicate certificates, multiple job spells, and invalid periods worked. The IRP5 certificates included information on the number of days an individual worked in a specific job (start and end dates), his or her income (in South African Rand), and the birth date (from which age could be determined). It is important to note that there were no data on the skill level, education, or gender of workers, and the data were limited to worker's age and length of tenure. As the number of days worked differed from one job to the next, the monthly wages variable was calculated by dividing the income by the number of days worked (to get the daily wage equivalent). The results was then multiplied by 30 to get the monthly equivalent wages. Even though the final panel data set was from 2010 to 2014, the tenure of each job was calculated by using the IRP5 data from 2008 to 2014. 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 divided by 365).

The customs transaction data included information on the trader (firm), the product exported (on Harmonized System six-digit code level), the export destination country, the value of the transaction (in South African Rand), and its statistical value (number of units). The raw customs data were sorted out by removing duplicate transactions and excluding small and sporadic exporters trading less than R10,000 (this still left 99% of the export data). To relate the customs transaction data to the IRP5 data, the former were merged onto the firm level. The reason for this was that the only relationship between these two data sets was the conjunction table provided by SARS, which relates firms' identifiers from each data set (the IRP5, customs, and CIT). From the customs data, a variable was created, which indicated the export destination group that a firm served. An exporter can be in one of three destination groups, namely *SACU only* (firms exporting only to Southern African Customs Union countries), *Africa only* (firms exporting only to African countries), and *international* (firms exporting to both African and non-African countries).

The income tax returns submitted by corporate firms (CIT) included each firm's annual income statements and balance sheets. From these financial statements, the *Property Plant and Equipment* line item was used to measure capital intensity, and the *Sales* line item was used to measure output. The main industry code (profit code classifier) of each firm was used to identify the sector in which it operated. The profit code classifier was condensed to the four-digit The International Standard Industrial Classification of All Economic Activities (ISIC) classification used by SARS to select the firms in the manufacturing sector (ISIC 4 classification: codes 1010–1033).

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

3.2 | Descriptive statistics on exporters and monthly wages

Figure 1 illustrates that, on aggregate, more jobs[1] are provided by exporting firms than nonexporting firms. To be more specific, it is the exporters exporting *internationally* (to both African and non-African countries) that provide the most jobs in the manufacturing sector.

In terms of the wage distribution of jobs in the South African manufacturing sector, Figure 2 provides an indication of how the export destination determines the monthly wages of workers.[2] Rankin and Schöer (2013) found that, on average, the wages of South African firms exporting to the regional market (SADC) were lower than those of nonexporting firms. Furthermore, they showed that the average wages of firms exporting outside the region were higher than those of both regional exporters and domestic producers (Rankin & Schöer, 2013).

The data in this article show similar results, with the average wages of firms exporting to the *international* market being the highest followed by those of firms exporting to *Africa only* and thereafter by those of firms serving either *SACU only* or the domestic market. At the 5th percentile of the wage distribution, the difference between the monthly wages earned by those employed at an exporting firm (serving the *international*, *Africa-only,* or *SACU-only* market) and those at a nonexporting firm is small. As one moves to the upper tail of the distribution, there is a bigger 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 at a firm that exports to *Africa only*. A job at a firm that either is a nonexporter or exports to *SACU* only pays the least.

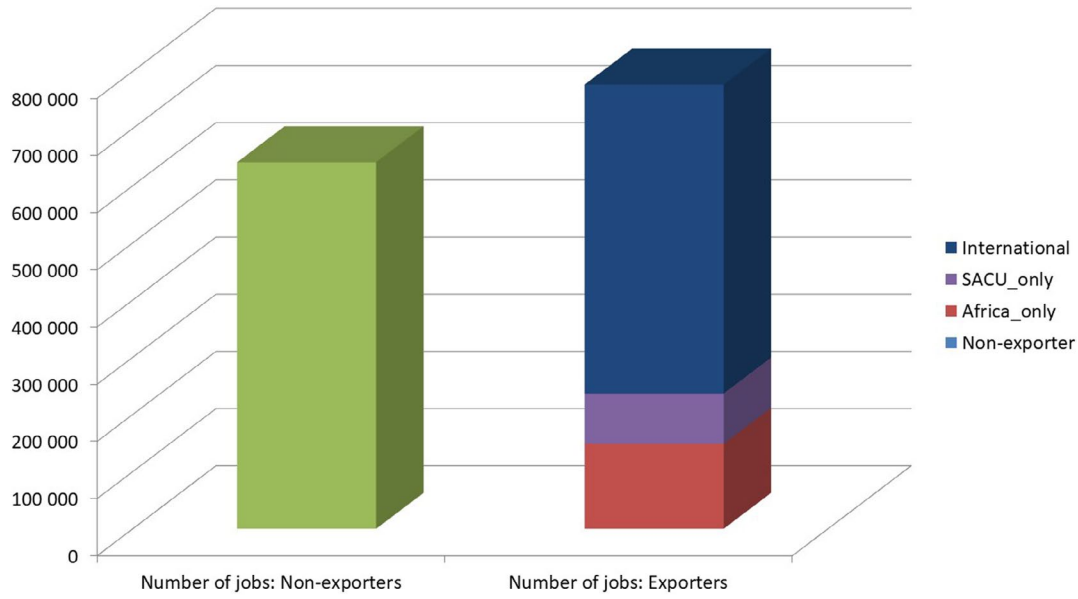

FIGURE 1 Number of jobs—exporters versus nonexporters (average 2010–2014). *Source*: Authors' own calculations (See Tables A1 and A2 for more descriptive statistics on the data) [Colour figure can be viewed at wileyonlinelibrary.com]

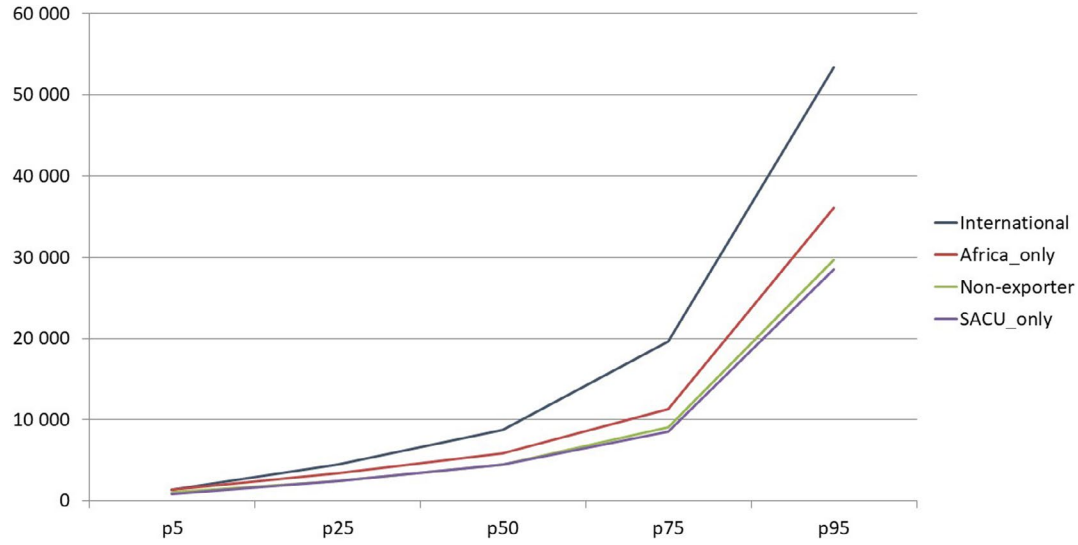

FIGURE 2 Wage distribution (average Rand amount 2010–2014) per export destination. These are absolute figures of monthly wages (levels) with no control variables. *Source*: Authors' own calculations [Colour figure can be viewed at wileyonlinelibrary.com]

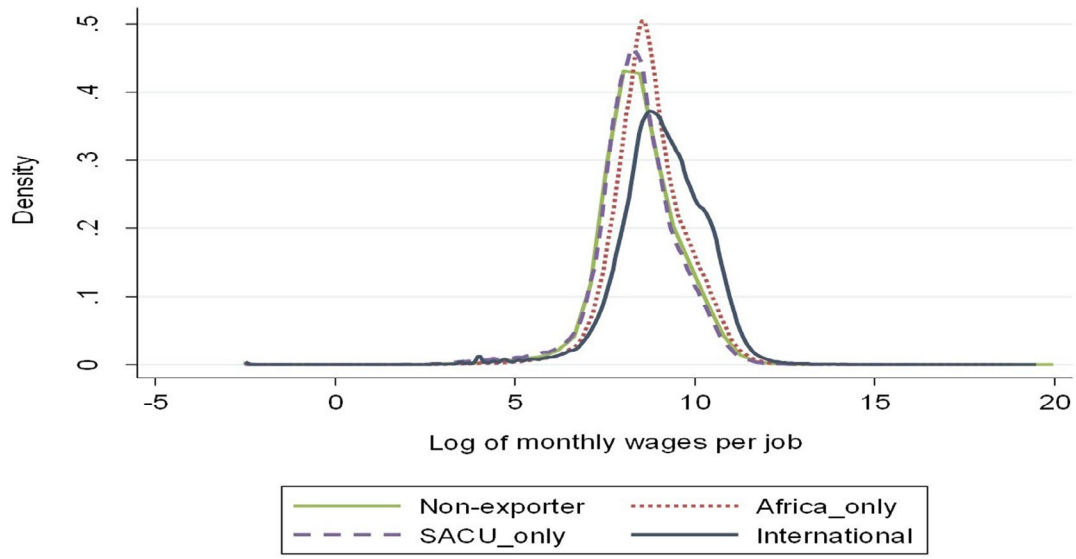

FIGURE 3 Kernel density—exporters versus nonexporters per export destination. *Source*: Authors' own calculations [Colour figure can be viewed at wileyonlinelibrary.com]

Figure 3 shows the kernel densities of wages for the different export destinations. From the figure it is clear that the shapes of the kernel densities for nonexporters 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 workers earn higher wages.

3.3 | Estimation strategy

The descriptive statistics and literature confirm that exporting firms pay higher average wages. The question that arises is why they do so. As noted earlier, there could be different reasons for the export wage premium, stemming from observable firm and individual characteristics, which require further analysis. The starting point for this analysis is to estimate a standard Mincerian earnings function using control variables that control for observable individual and firm characteristics.

$$\ln(X)_{ijt} = \alpha + \beta_1 Exporter_{jt} + \beta_2 Individual_{ijt} + \beta_3 Firm_{jt} + \beta_4 Industry_t + \beta_5 Year + v_j + z_i + n_{ij} + \mu_{ijt} \quad (1)$$

where the terms are defined as follows:

X_{ijt} is the monthly wages per job (for worker i in firm j at time t),

$Exporter_{jt}$ is the dummy variable indicating export status (exporter = 1 and nonexporter = 0),

$Individual_{ijt}$ is the observable individual characteristics (age, age squared, and tenure[3]),[4]

$Firm_{jt}$ is the logarithm-observable firm characteristics, namely firm size: number of workers, capital per worker, and output per worker,

$Industry_t$ is the control dummy (four-digit ISIC classification) to account for industry heterogeneity and industry-fixed effects,

Year is the control dummy for the years,

β_1 is export premia,

v_j is firm-specific effects,

z_i is individual-specific effect,

n_{ij} is job-specific effects, and

μ_{ijt} is the individual error term.

The model is estimated initially with controls for observable individual (age, age squared, and tenure) characteristics and firm (size, capital, and labor productivity) characteristics. To control for unobservable factors, a series of fixed effects are then added. Since the data are on a job level (a unique combination of individual and firm), 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 used to control for firm-fixed effects. In this specification, the export coefficient is identified by firms switching in and out of exporting.

The third estimation of the model follows Fafchamps (2009) by including individual-fixed effects (z_i). With individual-fixed effects the export coefficient is identified by either one of two possible occurrences: first, if a worker switches jobs from a nonexporting firm to an exporting firm (or vice versa), and, second, if a worker stays in the same job but the firm he or she works for switches into or out of exporting.

Since the data are on a job level, one can also use job-fixed effects to control for all observable and unobservable job characteristics. In this specification, the export coefficient is identified by a worker staying in a job and the firm he or she works for starts, or stops, exporting. Following Martins and Opromolla (2009), job-fixed effects (n_{ij}) are used to control for unchanging job-specific characteristics. These job-fixed effects measure the difference in wages within a job, when a firm becomes an exporting firm. Through the addition of these different fixed effects, the model becomes more and more restrictive but provides insight into what drives the export wage premium and firm dynamics (therefore also more realistic).

This article considers another possible approach to studying the export wage premium—that is, by examining it in various parts of the wage distribution. The advantages of using quantile regressions rather than the ordinary least squares (OLS) method were summarized by Koenker and Hallock

(2001). OLS regression results are less robust to outliers than quantile regressions. Quantile regressions provide parameter estimates at different quantiles, whereas OLS provides these at the mean. With quantile regressions, the whole sample of data is used, with observations closer to each quantile weighted more heavily. By using quantile regressions, Equation 1 is estimated to observe the export wage premium at the 5th, 25th, 50th, 75th, and 95th percentiles of the wage distribution.[5]

3.4 | Regression results

3.4.1 | Mincerian earnings function with fixed effects

Export wage premium

Table 1 presents the results of estimating Equation 1 with controls for observable individual and firm characteristics (see columns 1–4), adding control for firm-fixed effects (column 5), individual-fixed effects (column 6), and job-fixed effects (column 7). Column 1 shows the wage premium (of 54.65%[6]) for jobs in exporting firms relative to nonexporting firms in South Africa's manufacturing sector (controlling for year and industry). When individual characteristics (age, age squared, and tenure) are added in column 2, the wage differential decreases to 43.48%. Therefore, 11.17% of a person's monthly wages can be explained by these individual characteristics (note that there are no data on skills and education; therefore, this will be "controlled" for in column 6—where the wage premium almost disappears). Once firm characteristics are controlled for (column 3)—this includes firm size, capital intensity, and output per worker—the wage differential decreases 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 he or she works in. Fafchamps (2009) and Breau and Brown (2011) also found firm characteristics to have a bigger 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 in columns 1–4 has disappeared (−1.24%). Therefore, when a firm enters the export market, the average wages of its workers decrease. One possible explanation for this is a change in the composition of the workforce (i.e., the addition of more lower-paid workers). This decrease in average wages of a firm is in contrast to the findings of Schank et al. (2007), Fafchamps (2009), and Martins and Opromolla (2009), who found the average wages of firms to increase as they entered the export market.

Column 6 presents the results when individual-fixed effects (z_i) are added. This regression compares identical workers in two consecutive years. The small export coefficient (2.45%) is identified by two possible scenarios: first, workers moving from nonexporting to exporting firms (switching to different jobs/firms) and, second, 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 decrease. However, from a worker's perspective (column 6), when a worker enters a job at an exporting firm, he or she earns a wage premium compared to what he or she would earn if working in a nonexporting firm. Interestingly, a similar study on Morocco found no evidence of a wage premium when an individual switched to a job at an exporting firm (Fafchamps, 2009).

Job-fixed effects (n_{ij}) are added in column 7. By comparing identical jobs in two consecutive years, the export coefficient (using job-fixed effects) is identified when a worker stays in the same job and his or her firm becomes an exporting firm or leaves exporting. Thus, the export coefficient of 1.44% (column 7) indicates that if a 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

TABLE 1 Export wage premium

	Monthly income (wages)						
	(1)	(2)	(3)	(4)	(5) Firm fixed effects	(6) Individual fixed effects	(7) Job fixed effects
Exporter	0.436***	0.361***	0.104***	0.0514***	−0.0125***	0.0242***	0.0143***
	(0.00192)	(0.00184)	(0.00103)	(0.000977)	(0.00232)	(0.00108)	(0.00118)
Age		−0.111***		−0.103***	−0.0876***	−0.174***	−0.114***
		(0.00110)		(0.000495)	(0.000452)	(0.0124)	(0.0104)
Age squared		1.652***		1.528***	1.299***	2.357***	1.705***
		(0.0136)		(0.00613)	(0.00561)	(0.0167)	(0.0152)
Tenure		0.125***		0.121***	0.130***	0.0360***	0.0311***
		(0.000668)		(0.000296)	(0.000319)	(0.000373)	(0.00138)
Ln (number of workers)			0.0541***	0.0535***	0.0421***	0.0190***	0.0387***
			(0.000241)	(0.000228)	(0.00170)	(0.000383)	(0.000877)
Ln (capital/worker)			0.0235***	0.0194***	0.00381***	0.00818***	0.00338***
			(0.000206)	(0.000195)	(0.000454)	(0.000215)	(0.000230)
Ln (output/worker)			0.295***	0.280***	0.0757***	0.0603***	0.0510***
			(0.000430)	(0.000408)	(0.00156)	(0.000519)	(0.000793)
Year control	Yes	Yes	Yes	Yes		Yes	Yes
Industry controls	Yes	Yes	Yes	Yes		Yes	Yes
Observations	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730
R^2	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

Notes: Premium relative to nonexporters;

***$p < .01$; **$p < .05$; *$p < .1$ (is significant at the 1%, 5%, and 10%, respectively).

Source: Authors' own calculations.

wages decrease when it switches into exporting, but within a job (job-fixed effects), wages increase. Therefore, when a firm starts to export, its average wages decrease, but the continued jobs in that firm pay more. This suggests that the jobs that are added by these firms pay relatively lower wages than those occupied by the firms' current workforce.

Export wage premium to African and non-African countries

Table 2 distinguishes between the different export destinations and segregates the export wage differential (observed in Table 1) in terms of *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 than or equal to a worker at a domestically orientated firm (columns 1–4). Working at a firm exporting to *Africa only* pays slightly more than a nonexporting firm. The highest wage premium is earned at a firm exporting to the *international* market (relative to nonexporting firms).

After firm-fixed effects (column 5) are added, the differences in the wage premium between the destinations narrow substantially. With firm-fixed effects the export coefficient is identified by firms that switch into exporting (involving different destinations). The decrease in average wages of a firm that enters the export market, shown in Table 1 (column 5), can now be better understood. It is the workers in firms entering SACU *only* and *Africa only* whose average wages decrease (−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 is that *SACU-only* exporting firms add lower-paying jobs (i.e., jobs that pay relatively less than the average workers in those firms earn) when switching into the export market (−0.32%), whereas firms switching into the *international* and *African* export markets are expanding their workforce by adding workers who earn relatively similar wages to the average within those firms (0.05% more for *international* and 0.05% less for *Africa*).

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 nonexporting firm to an exporting firm or staying in the same job but their firm becomes an exporter. In column 6, the individual-fixed effects show an increase in wages (relative to nonexporters), but there is a hierarchy in the export coefficients as a firm exports to more distant destinations (*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 in which they he or she is employed switching into exporting (i.e., the firm starts to export to a certain destination).

Thus far, this article has considered the export wage premium by using OLS regressions to compare the average wages of exporters (serving different destinations) to those of nonexporters. Another perspective to consider is how the wage premium is dispersed over the wage distribution (from the 5th to the 95th percentiles). Therefore, 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 Equation 1 (with a series of fixed effects) by using quantile regressions to illustrate the wage premium over the wage distribution.

3.4.2 | Quantile regressions

Distribution of the export wage premium

Figure 4 presents an illustration of the export premium (while controlling for observable individual and firm characteristics as well as industry and year) from the normal OLS regression (Table 1,

TABLE 2 Export wage premium (to African and non-African countries)

	Monthly income (wages)						
	(1)	(2)	(3)	(4)	(5) Firm fe	(6) Individual fe	(7) Job fe
International	0.555***	0.469***	0.182***	0.116***	0.00548**	0.0389***	0.0169***
	(0.00210)	(0.00201)	(0.00119)	(0.00114)	(0.00279)	(0.00127)	(0.00141)
Africa only (excluding SACU)	0.252***	0.2080***	0.0705***	0.0338***	−0.00555**	0.0226***	0.00841***
	(0.00327)	(0.00310)	(0.00148)	(0.00140)	(0.00276)	(0.00134)	(0.00139)
SACU only	0.0431***	−0.0010***	−0.0729***	−0.108***	−0.0320***	0.00544***	0.00169***
	(0.00407)	(0.00386)	(0.00182)	(0.00172)	(0.00285)	(0.00149)	(0.00145)
Age		−0.111***		−0.103***	−0.0875***	−0.174***	−0.114***
		(0.00109)		(0.000494)	(0.000452)	(0.0124)	(0.0104)
Age squared		1.646***		1.525***	1.299***	2.354***	1.705***
		(0.0136)		(0.00613)	(0.00561)	(0.0167)	(0.0152)
Tenure		0.122***		0.120***	0.130***	0.0359***	0.0311***
		(0.000664)		(0.000296)	(0.000319)	(0.000373)	(0.00138)
Ln (number of workers)			0.0447***	0.0458***	0.0417***	0.0175***	0.0388***
			(0.000251)	(0.000238)	(0.00170)	(0.000389)	(0.000877)
Ln (capital/worker)			0.0204***	0.0168***	0.00386***	0.00804***	0.00347***
			(0.000207)	(0.000196)	(0.000455)	(0.000215)	(0.000230)
Ln (output/worker)			0.288***	0.274***	0.0753***	0.0592***	0.0509***
			(0.000432)	(0.000410)	(0.00156)	(0.000521)	(0.000793)
Year control	Yes	Yes	Yes	Yes		Yes	Yes
Industry controls	Yes	Yes	Yes	Yes		Yes	Yes
Observations	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730	6,296,730
R^2	0.156	0.243	0.238	0.315	0.100	0.102	0.119
Number of firms/ID/jobs					49,46 2	2,679,640	3,011,765

Notes: Premium relative to nonexporters;

SACU, Southern African Customs Union.

***$p < .01$; **$p < .05$; *$p < .1$ (is significant at the 1%, 5%, and 10% level, respectively).

Source: Authors' own calculations.

column 4) relative to the quantile regression. The OLS regression minimizes the sum of squared residuals. Therefore, it provides the impact (premium) at the mean (Fu & Wu, 2013). 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 the quantile regression results are considered, 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 quantiles, 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 if he or she worked in a nonexporting firm with similar observable characteristics.

Distribution of wage premium per export destination

Figure 4 pertains to 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 5), it is clear that the wage premium resulting from working in an *international* firm is fairly constant throughout the distribution (but is still the highest premium). The wages paid by *Africa-only* and *SACU-only* exporters are driving the U-shape that is observed in Figure 4. Compared to nonexporters, there is no wage premium in working for *SACU-only* exporters (they pay lower wages than nonexporters). Working in *Africa-only* exporters, there is an export premium at the upper and lower tails of the distribution but not at the 50th percentile. Alcalá and Hernández (2010) also found that for Spanish firms the export premium increased with the remoteness of the market.

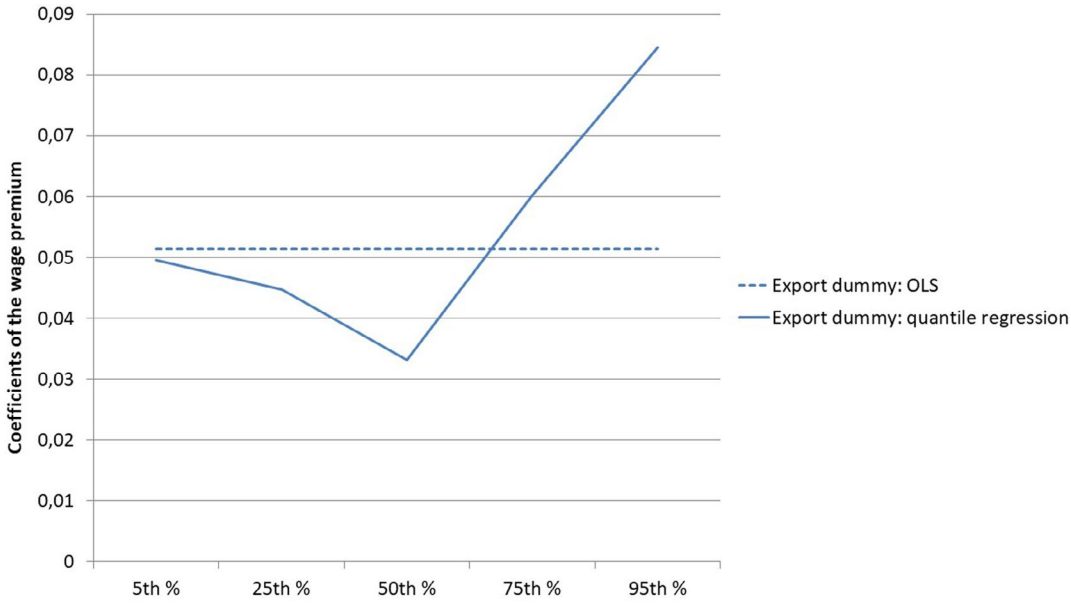

FIGURE 4 Distribution of the coefficients of the export wage premium. Premium relative to nonexporters (controlling for observable individual and firm characteristics as well as industry and year) and all the coefficients of the quantile regression are significant at the 1% level. Source: Authors' own calculations [Colour figure can be viewed at wileyonlinelibrary.com]

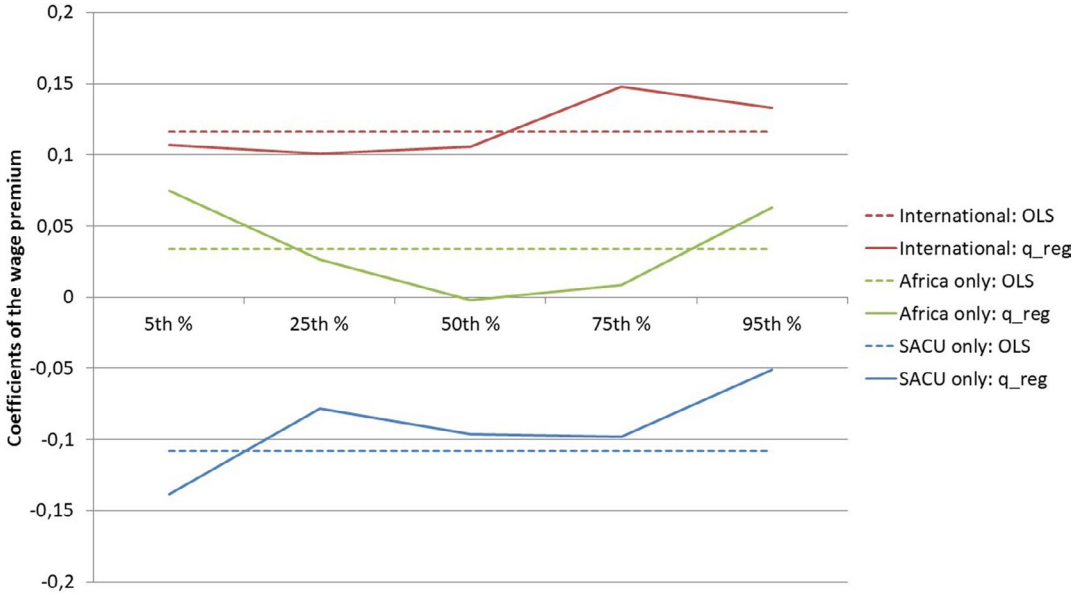

FIGURE 5 Distribution of the coefficients of the wage premium per export destination. Premium relative to nonexporters (controlling for observable individual and firm characteristics as well as industry and year) and all the coefficients of the quantile regression are significant at the 1% level. *Source*: Authors' own calculations [Colour figure can be viewed at wileyonlinelibrary.com]

4 | CONCLUSIONS

In keeping with the literature on exporting firms' characteristics in developed and developing countries, South African exporters have been found to pay higher average wages than nonexporters. Studies on the export wage premium in South Africa have, however, been limited either to panel or cross-sectional sample data (where results might have been 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 data set 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 exporting activities themselves (export status). The study makes a further contribution by considering other dynamics that could add to the wage premium—that is, considering the influence of different export destinations (regional versus *international*) as well as quantile regressions.

The results show that there is a 54.65% wage premium paid to workers in exporting firms in the South African manufacturing industry (when year and industry are controlled for). Around 11.817% of the wage premium can be explained by individual characteristics (i.e., age, age squared, and length of tenure), and 43.48% is due to specific firm characteristics (firm size, capital intensity, and output per worker). Therefore, the export wage premium decreases from 54.65% 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 firms start to export to *SACU*, they add relatively lower-paying jobs (i.e., jobs that pay 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 who earn relatively similar wages to the average worker 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 on what they would earn in a nonexporting firm. However, there is a hierarchy in the export coefficients as a firm exports to more distant destinations (*SACU only*, *Africa only,* and *international*). When workers stay in the same job and their firm starts to export, there is an increase in their wages. From a firm's point of view, when it enters the export market, it adds "similar or lower-paying" jobs (relative to the firm's average wages); therefore, such a firm is adding relatively "similar or lower-paid" workers. But for the workers starting to work at an exporting firm (relative to a nonexporting firm), they have "better-paying jobs" than they would have if they were starting to work at a nonexporting firm. Individuals staying in the same job when their firm starts to export also experience an increase in their wages.

In terms of the distribution of wages, the highest export wage premium is found among 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 quantiles, there is a certain premium level in working in an exporting firm (while controlling for observable firm and individual characteristics). When considering export destinations, it is clear that the wage premium resulting from working in a firm serving the *international* market is the highest and is fairly constant throughout the distribution (from the 5th to the 95th percentiles). When working in *Africa-only* exporters, there is an export premium at the upper and lower tails of the distribution but not at the 50th percentile. Furthermore, there is no wage premium when working for *SACU-only* exporters (they pay lower wages than nonexporters).

It is only when firm-, individual-, and job-specific unobservable characteristics (firm-, individual-, and job-fixed effects) are controlled for that the observed export wage premium becomes so small that it effectively disappears. Therefore, the difference observed in the wage premium paid by an *international* exporter is not about being labeled an exporter. Rather, it is because of the "type of firm" (unobservable firm characteristics) that exports, the "type of workers" (unobservable individual characteristics) it employs, and the "type of jobs" (unobservable job characteristics) it creates. On the contrary, the "type of firm" (unobservable firm characteristics) could, in effect, determine if a firm is an exporter. In other words, it could be those firms with superior characteristics that opt to go into exporting. There is an endogeneity issue in this analysis that cannot be disentangled. This endogeneity results from the unobservable firm characteristics that possibly make a firm the type that exports.

From a policy perspective, it is clear that just creating exporters (changing a firm's export status) is not going to create an export wage premium. Rather, it is about changing the unobservable firm characteristics 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 (and tends to employ "better" workers who have more skills, experience, and higher levels of education, thus making them more productive). Policymakers should therefore focus on formulating policies that increase firm-level productivity.

This article shows that the export premium is due to specific types of workers being selected for specific jobs (and firms). As the literature confirms, exporters are usually more capital intensive, they are larger, and their workers have unobservable individual characteristics (could be higher skills), who then earn higher wages. As the panel data set utilized in this article was 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 individuals who are employed by exporters.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID


Carli Bezuidenhout https://orcid.org/0000-0003-3741-3178

ENDNOTES

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

[2] This is calculated on the individual-job level (not on the aggregate-firm level).

[3] Tenure is defined as working in the same job (individual–firm match) from one year to the next (calculated from 2008 to 2014).

[4] The age, age squared, and tenure variables have been entered as levels (i.e., not as logarithms).

[5] Quantile regressions with fixed effects are also estimated. This is done by means of the quantile regression estimator for panel data developed by David Powell (2016). The results are available from the authors on request.

[6] The regression estimates the impact on ln (wage); therefore, the percentage is calculated as follows: exponent(beta) − 1.

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APPENDIX

Tables A1 and A2 provide more information (descriptive statistics) on the data.

TABLE A1 Number of firms and jobs

	2010	2011	2012	2013	2014
Number of firms	29,916	32,429	32,013	35,373	30,249
Nonexporter	24,959	25,561	24,868	27,256	22,992
Exporter by switches	**4,957**	**6,868**	**7,145**	**8,117**	**7,257**
Continuous	3,956	5,396	5,234	5,663	3,956
Enter	–	2,912	1,749	2,883	1,594
Exit	–	457	570	519	663
Exporter by destination	**4,957**	**6,868**	**7,145**	**8,117**	**7,257**
SACU only	1,124	1,726	1,770	2,027	1,636
Africa only (excluding SACU)	1,836	2,284	2,454	2,719	2,590
International	1,997	2,858	2,921	3,371	3,031
Number of jobs per year	1,325,662	1,437,020	1,418,586	1,567,477	1,340,419

Abbreviation: SACU, Southern African Customs Union.

TABLE A2 Descriptive statistics on firms and workers per group

		Exporters			
Firm and worker	**Nonexporters**	**International**	**SACU only**	**Africa only**	**Switchers**
Firm size (number of employees)	7	32	12	19	15
Firm productivity	545,235	1,185,082	758,971	962,327	8,702,434
Firm capital per worker	22,677	55,492	27,257	32,426	36,494
Worker average age	36.1	37.0	36.5	37.1	36.3
Average job tenure	4	5.5	4.3	4.6	4.9

Abbreviation: SACU, Southern African Customs Union.