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GENERAL & APPLIED ECONOMICS | RESEARCH ARTICLE

Trade and wage disparities in South Africa

Brian Tavonga Mazorodze^{1*}

Abstract: Literature on trade and wage disparities has gained prominence since the mid-90s following the push for trade liberalization across the globe. Despite the 26 years of empirical research, however, questions of whether trade closes or widens the wage gap remain relevant today, particularly in countries such as South Africa where income inequality remains a persistent policy concern. Against this background, this paper contributes to the literature by examining the effect of trade on relative wages between skilled and low-skilled workers in South Africa using a local municipality-level dataset observed between 1995 and 2019. Results from the system GMM estimator confirm that trade has had a positive and non-trivial effect on wage disparities in the past two decades. When decomposed into exports and imports, it is the latter that appears to have added a relatively large wage premium on skilled workers at the expense of low-skilled workers. This result is crucial in designing both trade and industrial policies. In particular, it brings to the fore the need for targeted interventions that protect low-skilled workers. Such interventions may include programs for skills upgrade and trade protectionist policies in low-skill labour-intensive industries.

Subjects: Economics; Industrial Economics; Labour Economics; Development Economics

Keywords: trade wage disparities; skilled-workers; semi-skilled; low-skilled workers; South Africa

1. Introduction

The relationship between trade and wage disparities has a long history in trade literature. We have learnt from earlier papers (Esquivel, and Rodriguez-López, Sachs et al., 1994; Robbins & Gindling, 1999;

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PUBLIC INTEREST STATEMENT

Wage inequality has dramatically increased since the mid-90s following waves of trade liberalization. During the same period, international trade flows for South Africa have, for the best part, surged probing scholars to reconsider trade intensity as one important factor behind the rise in wage inequality. This research, therefore, sought to answer the question of whether trade can help explain wage inequality between skilled and low-skilled workers in South Africa. The message from this paper is that trade does explain wage inequality across these groups. The wage gap between low-skilled and skilled workers appears to have widened as a consequence of international trade. The conclusion is therefore that trade favours certain workers (skilled) while hurting others (low-skilled workers).

Slaughter, 1998 and more recently; Wood, 2018) that trade can have important effects on wage disparities. Their explanation is intuitive and one that is more complementary than it is competing with the famous Heckscher-Ohlin (HO) theory. In an economy where unskilled labour is abundant and used intensively to produce a particular good, production and trade of that good facilitates an increase in the wages of unskilled workers and a drop in the wages of skilled workers. Viewed this way, the effect of trade on wage disparities primarily manifests through the restructuring of factor prices.

Empirically, the category of low-skilled workers accounts for a significant share of total employment in developing countries. As will be fully shown in the subsequent section, for example, low-skilled workers in South Africa take up nearly 40% of total employment. More interestingly, the average wage of skilled workers is roughly 2.5 times that of low-skilled workers when focusing on the 1993 to 2019 period in South Africa. In the North West province, this number rises to 4.2 and is 3.6 in the country's capital province, Gauteng. Does international trade, which grew significantly in the last two decades, partially explain these disparities?

As an attempt to answer the above question, this paper splits workers into low-skilled and skilled workers and proceeds to establish how trade affects wage disparities across these two groups. Erten et al. (2019) and Edwards and Behar (2006) have contributed immensely to this research area but much of their contribution focuses on the effects of trade liberalization as opposed to trade itself. The latter is essentially an outcome of the former and appreciating this conceptual difference is important intuitively. Unlike these studies, this paper focuses squarely on how trade affects relative wages. In theory, the framework in L.F. Katz and Murphy (1992) and Autor et al. (2008) is applied here as the bedrock from which the empirical analysis is based.

While standard literature largely relies on workers within the manufacturing sector, this paper provides a unique dimension by relying on a local municipality-level panel dataset for South Africa. This local-level dataset is unique and attractive on three grounds. First, it captures the practical reality that municipalities, although belonging to the same country, can have different trade intensities. Inland municipalities far from seaports can be marginalised from global trade by distance and the concomitant transport costs. Second, there is a great deal of diversity in the stock of skilled and low-skilled workers across municipalities which is needed in empirical analysis of this sort in so far as it allows us to control for unobserved area-specific factors that can potentially distort the relationship between trade and wage disparities in a panel data framework. Third, with 226 local municipalities, a local municipality-level dataset washes away problems of micronumerosity owing to a sample size that is larger than what one would naturally get from using a country-level dataset for a single economy.

Focusing on municipality-level data represents a shift from standard literature, which is closely related to this work. Using firm-level data, this literature relies on models of firm heterogeneity and it includes Yeaple (2005), Verhoogen (2008), Bustos (2011), Burstein et al. (2013), Monte (2011), and Sampson (2014). Other studies have mostly used plant-level data and observed substantial differences in wages between exporters and non-exporters following Bernard et al. (2007) and a theoretical model proposed by Melitz (2003), which analyses the effects of international trade on the distributions of wages and employment across firms. More recent research using linked employer-employee datasets has sought to determine the sources of the exporter wage premium, including Munch and Skaksen (2008), Krishna et al. (2014), and Baumgarten (2013). While this literature clearly enjoys the advantages of capturing firm and plant heterogeneity, it does not provide answers of wage inequalities across different skill sets of workers within municipalities.

South Africa provides a fertile and relevant ground for probing the effects of trade on wage disparities in many respects. Between 1993 and 2019, trade intensities rose by at least 10% as will be shown in the subsequent section. While these trade developments would have excited Adam Smith, they have simultaneously been accompanied by a growing unequal society both in terms of income and wealth. Since there is a unanimous agreement that wages are the biggest contributor

to overall income inequality, it can only be logical for one to probe whether or not trade dynamics are somewhat linked to wage disparities and therefore income inequality by implication.

This research has important trade policy implications. In USA, for example, there are rising concerns that Chinese exports are driving down the demand for low-skilled workers at home and reducing their relative wages in the process. Similarly, for South Africa, the proliferation of imports from China and other emerging markets has to some extent attracted a backlash against trade liberalization on account of imports being viewed as a contributing factor towards the fall in demand for low-skilled workers on home turf. Much of this evidence is found in Edwards and Jenkins (2015), although the ultimate effects of trade on relative wages remain surprisingly under-researched.

Results from the system Generalised Method of Moments (GMM) are quite intriguing. First, trade is found to be a relevant correlate of wage disparities and its effect is non-trivial. Second, trade has had the contribution of increasing the wage premium of skilled and semi-skilled workers relative to the wage of low-skilled workers. This finding supports the view that trade has, in the main, hurt low-skilled workers primarily through declining labour demand and falling relative wages.

The rest of the paper is organised as follows: section 2 provides some stylized facts and the theoretical framework from which the empirical analysis of this paper is based, section 3 specifies the empirical model, results are presented and discussed in section 4 while concluding remarks are provided in section 5.

2. Stylised facts

There are three types of municipalities in South Africa, namely metropolitan, district and local municipalities. In total, there are 278 municipalities in South Africa, comprising eight metropolitan, 44 districts and 226 local municipalities. In the interest of a large sample size, I focus on local municipalities. My definition for skilled and low-skilled workers follows Quantec,¹ which is my primary data source. Skilled workers have specialised training and are able to rate their performance and accumulate specific expertise in line with their tertiary education. According to Quantec's metadata, this category comprises professional, semi-professional, technical, managerial, executive, administrative, and certain transport occupations (e.g., pilot, navigator) occupations. The category of low-skilled workers, on the other hand, comprises workers without particular skills and with no formal education whose jobs mostly require physical strength. This categorization is standard and has been applied in earlier studies such as Fedderke et al. (2012) Fedderke and Mariotti (2002) and more recently Rodrik (2008).

In line with the above definition, Table 1 shows the measures of central tendency with respect to the shares of employment for skilled and low-skilled labour across the 226 municipalities between 1995 and 2019. The intention is to show beyond reasonable doubt that low-skilled workers (a category that has largely been ignored in related theoretical and empirical literature) account for a significant portion of total employment. On average, low-skilled workers accounted for about 39% of total employment. Skilled labour accounted for only 18% of total employment, while the remaining percentage was accounted for by workers classified as semi-skilled workers.

Table 1. Employment shares between 1995 and 2019

Variable	Obs	Mean	Std. Dev.	Min	Max
emp_sk	5650	18.41141	7.246403	4.831246	42.15282
emp_lsk	5650	38.94969	9.393368	17.16784	70.21638

Source: Own computations based on Quantec data

Notes: emp_sk = employment share of skilled workers, emp_lsk = employment share of low-skilled workers

Figure 1. Kernel density graph—wage disparities.

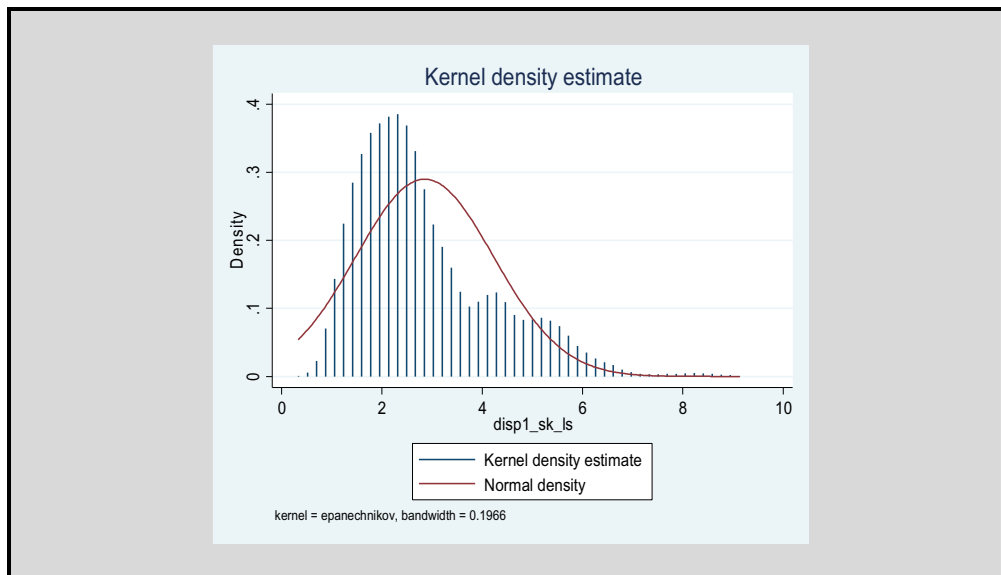


Table 2. Trade in 1995 versus 2019

Variable	Average	Average	Percentage (%) change
	1995	2019	
Trade_share	8.5%	10.1%	18.8%
Imports_share	3.1%	3.4%	9,6%
Exports_share	5.4%	6.7%	24,1%

Source: Author's calculations based on Quantec data

Figure 1 shows the kernel density estimates with normal distribution curves for wage disparities between skilled and low-skilled workers. A visual inspection of this graph confirms that the wages of skilled workers are more than twice those of low-skilled workers on average. The kernel distribution is skewed towards the right suggesting that much of the disparities lie on the positive side of the peak.

In Table 2, I compute changes in three common measures of trade participation between 1995 (the beginning of my sampling period) and 2019. These measures are essentially the total trade share measured by the ratio of exports plus imports to total output as a percentage, export intensity and import penetration. Import penetration is calculated as the ratio of imports to total domestic demand (production plus imports minus exports) for each local municipality. Expressed in percentage terms, the value of the indicator ranges between zero and 100. When it approaches zero, imports are a negligible part of total domestic demand, which is satisfied entirely by domestic production. As it approaches 100, imports account for almost all of the total domestic demand for the production of a given industry. Export intensity is intended to capture the international orientation of local municipalities and their exposure to foreign competition. By measurement, it is the exports of the local municipality expressed as a percentage of its output.

All indicators of trade in Table 2 indicate an increase in trade participation of at least 10% over the 24-year period. The total trade share measure shows the greatest increase of about 19% followed by export intensity, which rose by 24% and lastly import penetration which jumped by about 10%. What these numbers confirm is an increase in the extent to which South Africa's local municipalities participated in global trade since 1995. This pattern has been confirmed in several

studies, albeit at the national level (see Edwards & Jenkins, 2015) and it raises the indispensable question: have these trade developments affected the wage gap of different workers? If so, have the wage gaps widened or narrowed as a consequence of international trade?

2.1. Theoretical framework

Following L.F. Katz and Murphy (1992), I assume a constant elasticity of substitution production function (CES). Assuming the usual case of skilled labour (L_Q) and low-skilled labour (L_{LNQ}). The CES production function takes the following form.

$$Y_t = [\alpha_t(a_t L_{Q_t})^\rho + (1 - \alpha_t)(b_t L_{LNQ_t})^\rho]^{\frac{1}{\rho}} \quad (1)$$

parameters a_t and b_t capture skilled and low-skilled augmenting technical change and α_t represents the share of skilled labour, while ρ will be a parameter governing the elasticity of substitution between the relative skill sets. Hicks-neutral technological progress implies a proportionate increase in the parameters a_t and b_t . “Intensive” skill-biased technological changes involve increases in a_t/b_t as defined by Johnson (1997) and Johnson and Stafford (1999). An increase in α entails “extensive” skill-biased technological changes. Changes in these technical parameters could also represent non-neutral effects on skill groups of changes in the relative prices or quantities of non-labour inputs, such as capital and shifts in the product demand among industries with different skill intensities.

Assuming perfect competition in goods and labour markets and that skilled and unskilled workers are paid their marginal product; we can use equation (1) to solve for the ratio of marginal products of the two types of labour. This yields a relationship between relative wages in year t W_{Q_t}/W_{LNQ_t} and relative supplies in year t L_{Q_t}/L_{LNQ_t} given by equations (2) and (3).

$$P[\alpha_t(a_t L_{Q_t})^\rho + (1 - \alpha_t)(b_t L_{LNQ_t})^\rho]^{\frac{1}{\rho}-1} \alpha a^\rho L_Q^{\rho-1} = W_Q \quad (2)$$

$$P[\alpha_t(a_t L_{Q_t})^\rho + (1 - \alpha_t)(b_t L_{LNQ_t})^\rho]^{\frac{1}{\rho}-1} (1 - \alpha) b^\rho L_{LNQ}^{\rho-1} = W_{LNQ} \quad (3)$$

$$W_{Q_t}/W_{LNQ_t} = \frac{\alpha_t}{1 - \alpha_t} + \left[\frac{a_t}{b_t}\right]^\rho \left[\frac{L_{Q_t}}{L_{LNQ_t}}\right]^{\frac{1}{\sigma}} \quad (4)$$

In logarithmic form, equation (4) can be expressed as

$$\ln\left[\frac{W_{Q_t}}{W_{LNQ_t}}\right] = \ln\left(\frac{\alpha_t}{1 - \alpha_t}\right) + \rho \ln\left[\frac{a_t}{b_t}\right] + \frac{1}{\sigma} \ln\left[\frac{L_{Q_t}}{L_{LNQ_t}}\right] \quad (5)$$

which can be equivalently written as

$$\ln\left[\frac{W_{Q_t}}{W_{LNQ_t}}\right] = D_t + \frac{1}{\sigma} \ln\left[\frac{L_{Q_t}}{L_{LNQ_t}}\right] \quad (6)$$

where

$$D_t = \ln\left(\frac{\alpha_t}{1 - \alpha_t}\right) + \rho \ln\left(\frac{a_t}{b_t}\right)$$

The greater the elasticity of substitution σ in (6) between the two skill groups and the smaller the impact of shifts in relative supplies on relative wages, the greater must be the fluctuations in demand

shifts (D_t). Changes in D_t can occur due to skill biased technological change, non-neutral changes in the relative prices or quantities of non-labour inputs and shifts in product demand either from domestic or international fluctuations. Implementing an empirical version of equation (6), L. Katz and Autor (1999) propose to replace the unobserved time series D_t by a time trend and/or relative demand movement's proxies, such as cyclical indicators or international trade measures.

Since the primary aim is to establish the impact of trade on relative wages, I prefer specification (6) that substitutes D_t by measures of trade (Ψ), technological progress and GDP to capture economic developments. The final specifications will be as follows:

$$\ln \left(\frac{W_Q}{W_{LNQ}} \right)_{it} = \beta_0 + \beta_1 \ln \Psi_{it} + \theta' X + \varepsilon_{it} \quad (7)$$

where equation (7) captures the impact of trade (Ψ) on wage disparities between skilled and low-skilled labour through β_1 controlling for technological progress, GDP and relative labour supplies embedded in vector X .

3. Data description

I rely on a panel dataset comprising 226 local municipalities with data observed between 1995 and 2019. This represents a panel dataset of $T = 25$ and $N = 226$ which totals 5650 observations (25×226). Selection of the sampling period (1995–2019) is dictated by data availability on trade variables, while the reliance on local municipality level data is motivated by the desire to work with a large sample size that has diversity and high variability. This is the first empirical paper to work with trade and wage variables at the local municipality level in South Africa.

In terms of variable measurement, the wage of a skilled worker relative to the wage of a low-skilled worker ($\frac{W_Q}{W_{LNQ}}$) is proxied by the real remuneration per employee for skilled workers as a ratio of real remuneration per employee for low-skilled workers. This measure of wage disparities is desirable in so far as it allows us to establish how trade variables affect the wages of skilled workers relative to those of low-skilled workers as predicted by the theoretical framework in the preceding section. An increase in this ratio represents an increase in the gap between the real remuneration of a semi-skilled worker relative to the real remuneration of a low-skilled worker. Relative labour supplies are computed in a similar fashion. Using employment figures, the supply of skilled labour relative to the supply of low-skilled labour is measured by the employment of skilled workers as a ratio of the employment of low-skilled workers. GDP meant to capture economic developments is measured by real output (2010 = 100). The variables of interest total trade share, export intensity and import penetration are as defined in section 2.

The next subsection specifies the empirical models.

3.1. Empirical model

Based on the theoretical framework, I consider the following empirical equation as an effort to establish how trade affects wage disparities between skilled and low-skilled.

$$\ln \left(\frac{W_Q}{W_{LNQ}} \right)_{it} = \beta_0 + \beta_1 \Psi_{it} + \beta_2 TP_{it} + \beta_3 \ln \left(\frac{L_Q}{L_{LNQ}} \right)_{it} + \beta_4 \ln (GDP)_{it} + \varepsilon_{it} \quad (8)$$

$$t = 1995, \dots, 2019 \quad i = 1, \dots, 226$$

where \ln denotes natural logarithm, subscripts i and t are local municipality and time indexes, respectively, Ψ is a 3×1 vector of trade variables that includes total trade share, export intensity and import penetration, TP denotes technological progress captured by a simple way of a time trend and in some cases time dummies following Cottani et al. (1990) and Ghura and Grennes (1993), ε is

Table 3. Variable description and data sources

Variable	Description	Source
emp_sk_ls	Relative labour supply of skilled and low-skilled workers	Quantec
trade_share	Exports plus imports divided by total output multiplied by 100	Quantec
import_share	Imports divided by total output plus imports minus exports multiplied by 100	Quantec
export_share	Exports divided by total output multiplied by 100	Quantec
disp1_sk_us	Real remuneration per employee of skilled workers divided by real remuneration per employee of low-skilled workers	Quantec
lngdp	The logarithm of real output per worker (2010 = 100)	Quantec

the disturbance term, while β_1 is the parameter of interest which represents the partial effect of trade variables on the relative wages. Since literature is inconclusive regarding the effect of trade on wage disparities, I expect this parameter to be either positive, negative, significant or insignificant [Table 3](#).

3.2. Method of estimation

In choosing the appropriate method of estimating equations (8), I primarily consider two main aspects, namely the panel properties of the dataset and the potential endogeneity problem. With respect to the former, the panel dataset at hand has the dimensions of $T = 25$ and $N = 226$. This necessitates an estimation method that suits cases of a small T and large N . In relation to the latter, there are valid potential endogeneity concerns for three reasons. First, there is a possibility of third factors nested in the disturbance term that may influence both international trade and relative wages. Second, some of our variables could be measured with error, including the relative wages that are proxied by relative real remuneration as opposed to relative real earnings. Third, there is potential reverse causation since the relative wages can influence the extent to which local municipalities participate into global trade. Given these issues, an appealing estimator which addresses endogeneity in cases of small T and large N is either the difference Generalized Method of Moments (GMM) by Arellano and Bond (1991) or the system GMM by Blundell and Bond (1998) and Arellano and Bover (1995). In this paper, the latter is used as Blundell and Bond (1998) through Monte Carlo simulation conclude that the system GMM estimator is relatively more efficient as compared to the first difference estimator.

4. Results and discussion

Before presenting regression results, I begin with summary statistics presented in [Table 4](#). For brevity's sake, interest is limited only to variables of interest. On average, a typical local

Table 4. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
emp_sk_ls	5,650	0.5327122	0.3146521	0.0688051	2.257143
trade_share	5,650	9.70298	11.38806	1.450318	90.80254
import_share	5,650	3.426792	4.920575	0.3055654	81.66404
export_share	5,650	6.276188	9.244076	0.6864067	83.83088
disp1_sk_ls	5,650	2.851501	1.375897	0.5338182	8.928705
lngdp	5,650	8.447468	1.167896	4.921863	11.59524

Table 5. Trade and wage disparities – skilled vs low-skilled

	2-step SysGMM	2-step SysGMM	2-step SysGMM
	Variant (1)	Variant (2)	Variant (3)
disp_sk_ls(-1)	0.960*** (0.001)	0.972*** (0.0002)	0.972*** (0.0003)
emp_sk_us	0.212*** (0.004)	0.164*** (0.001)	0.171*** (0.002)
lngdp	-0.038*** (0.0004)	-0.036*** (0.0004)	-0.039*** (0.0003)
trade_share	0.008*** (0.0006)		
import_share		0.004*** (0.0001)	
export_share			0.001*** (0.0003)
Constant	0.294 (0.003)	0.347 (0.002)	0.360 (0.003)
Time dummies	yes	yes	yes
AB Test Order (1) prob>z	0.0254	0.0258	0.0260
AB Test Order (2) prob>z	0.3436	0.3374	0.3433
Sargan test prob>chi2	0.6892	0.1741	0.1748
Obs	5424	5424	5424
Prob>chi2	0.0000	0.0000	0.0000

Note: *, **, *** denotes $p < 0.1$, $p < 0.05$ & $p < 0.01$, respectively. Standard errors are in parentheses

municipality's trade share (trade_share), import intensity (import_share) and export intensity (export_share) are 9.7%, 3.4% and 6.3%, respectively. The wage per employee in the case of skilled workers is, on average, 2.9 times and at most 9 times higher than the wage per low-skilled employee. In [Table 4](#), this disparity is represented by disp1_sk_us.

Looking at the standard deviations, the total trade share exhibits the highest variability (11.4) followed by export intensity (9.2) and wage disparities between skilled and low-skilled workers (1.4). The highest share of total trade (90.1%), import penetration (82%), and export intensity (84%), belong to Tokologo local municipality of Free State province and were observed in 1995, 2002 and 2006, respectively. The highest wage gaps, on the other hand, are observed in Fetakgomo local municipality of Limpopo province (8.928705), Nkandla local municipality of KwaZulu-Natal Province (3.281599) and Emalahleni local municipality of Mpumalanga province (6.103622).

With the above descriptive statistics, I proceed with formal regression results in [Table 5](#). These results are from a two-step system GMM estimator. The three trade variables are entered separately as they are potentially colinear. Each of the three regression variants in which trade variables are entered separately includes the two control variables, relative labour supply and real output. In all regressions, time dummies were jointly significant from a Wald test and as a result, they were included across the three variants to avoid model underfitting.

Starting with an equation in which the relative wage between skilled and low-skilled workers is the dependent variable, I find some interesting results. Contrary to what one would expect from the HO theory given the abundance of low-skilled labour in South Africa, evidence shows a positive short-run relationship between trade and the wage disparities between skilled and low-skilled workers. In other words, results suggest that trade, whether viewed in terms of the total trade share, export intensity or import penetration, widens as opposed to narrowing the wage gap between skilled and low-skilled workers. Although not quite sizeable, the coefficients of trade are highly significant across the three

Table 6. Trade and wage disparities – semi-skilled vs low-skilled

	2-step diffGMM	2-step diffGMM	2-step diffGMM
	Variant (1)	Variant (2)	Variant (3)
disp_sk_us(-1)	0.641*** (0.001)	0.883*** (0.0001)	0.935*** (0.0001)
emp_sk_us	0.106*** (0.0033)	0.137*** (0.0041)	0.109*** (0.0013)
lngdp	-0.182*** (0.0004)	-0.146*** (0.0003)	-0.148*** (0.0003)
trade_share	0.0164*** (0.0003)		
import_share		0.0055*** (0.0002)	
export_share			0.0023*** (0.0001)
Constant	0.337 (0.001)	0.880 (0.002)	0.116 (0.003)
Time dummies	yes	yes	yes
AB Test Order (1) prob>z	0.0103	0.0410	0.0031
AB Test Order (2) prob>z	0.3083	0.8648	0.6682
Sargan test prob>chi2	0.1691	0.6063	0.1227
Obs	5424	5424	5424
Prob>chi2	0.0000	0.0000	0.0000

Note: *, **, *** denotes $p < 0.1$, $p < 0.05$ & $p < 0.01$, respectively. Standard errors are in parentheses

regression variants, suggesting that trade statistically matters as a correlate of wage disparities between the two categories of workers.

The long-run effect of trade on relative wages is recovered after considering the lagged dependent variable. This can be algebraically written as $\beta_1 / 1 - \theta$, where θ is the coefficient of the lagged dependent variable and β_1 is the short run partial effect of trade on wage disparities. This implies a relatively large effect of trade on wage disparities in the long-run as compared to the short-run. In particular, a 100-percentage point increase in the total trade share, import penetration and export intensity widens the wage gap between skilled and low-skilled workers by a magnitude of 20, 14.3 and 3.5 times, respectively, in the long-run.

Two tests were conducted to determine the validity and relevance of the instruments used in the system. The first diagnostic test, which is the Sargan test for over-identifying restrictions, determines exogeneity or validity of the instruments. The second diagnostic test is the Arellano and Bond (AB) test for AR(1) autocorrelation. AR(1) autocorrelation reflects, in technical sense, the relevance of the instruments, while AR(2) autocorrelation signals inappropriateness of the lags of endogenous variables as instruments of their current values. As results on the lower part of [Table 5](#) suggest, evidence regarding the validity and relevance of the instruments is on the affirmative.

In order to check the robustness of this result, I considered the two-step difference GMM (diffGMM) and the results are presented in [Table 6](#). Interestingly, results from the difference GMM corroborate those from the system GMM. Trade raises the wage gap between skilled and low-skilled workers controlling for real output and relative labour supplies. When decomposed into import penetration and export intensity, it is the former that has a larger effect on the wage gaps relative to the latter. Notwithstanding this observation, the general result is that import penetration and export intensity contributed to the rise in wage inequality between skilled and low-skilled workers between 1995 and 2019.

Evidence from both estimators suggests that trade, in all forms – export intensity and import penetration, has expanded the wage gap between skilled workers and low-skilled workers in South Africa. In the literature, similar results are reported in Helpman et al. (2017), Monte (2011), and Sampson (2014) in which trade is confirmed to have a relevant effect on wage inequalities.

5. Conclusion

Trade has widely been thought of as a relevant factor contributing to the rise in wage and income inequality across the world. This paper has contributed by estimating the effect of trade on the relative wages of skilled and low-skilled workers in South Africa using a local municipality-level dataset. Using two estimation techniques on a panel dataset comprising 226 local municipalities in South Africa observed between 1995 and 2019, the empirical findings lead to the conclusion that trade has a non-trivial effect on relative wages. In particular, the results suggest that trade has had the effect of increasing the wage premium on skilled workers relative to low-skilled workers. The wage gap between workers without formal education (low-skilled workers by definition) has fallen behind that of skilled workers partially due to international trade. These results are crucial in designing both trade and industrial policies. For example, they may necessitate targeted interventions that seek to protect workers with low skills. These are essentially workers without formal education and therefore rely on physical strength. Such targeted interventions may include things like on-the-job training for skills upgrade and trade protectionist policies in low-skill labour-intensive industries.

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Note

1. Quantec is a commercial consultancy firm which gathers macro and micro data for South Africa.

References

- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277–297. <https://doi.org/10.2307/2297968>
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29–51. [https://doi.org/10.1016/0304-4076\(94\)01642-D](https://doi.org/10.1016/0304-4076(94)01642-D)
- Autor, D. H., Katz, L. F., & Kearney, M. S. (2008). Trends in US wage inequality: Revising the revisionists. *The Review of Economics and Statistics*, 90(2), 300–323. <https://doi.org/10.1162/rest.90.2.300>
- Baumgarten, D. (2013). Exporters and the rise in wage inequality: Evidence from German linked employer–employee data. *Journal of International Economics*, 90(1), 201–217. <https://doi.org/10.1016/j.jinteco.2012.10.001>
- Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2007). Firms in international trade. *Journal of Economic Perspectives*, 21(3), 105–130. <https://doi.org/10.1257/jep.21.3.105>
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
- Burstein, A., Cravino, J., & Vogel, J. (2013). Importing skill-biased technology. *American Economic Journal: Macroeconomics*, 5(2), 32–71. DOI:10.1257/mac.5.2.32
- Bustos, P. (2011). Trade liberalization, exports, and technology upgrading: Evidence on the impact of MERCOSUR on Argentinian firms. *American Economic Review*, 101(1), 304–340. <https://doi.org/10.1257/aer.101.1.304>
- Cottani, J. A., Cavallo, D. F., & Khan, M. S. (1990). Real exchange rate behavior and economic performance in LDCs. *Economic Development and Cultural Change*, 39(1), 61–76. <https://doi.org/10.1086/451853>
- Edwards, L., & Behar, A. (2006). Trade liberalisation and labour demand within South African manufacturing firms. *Studies in Economics and Econometrics*, 30(2), 127–146. <https://doi.org/10.1080/10800379.2006.12106411>
- Edwards, L., & Jenkins, R. (2015). The impact of Chinese import penetration on the South African manufacturing sector. *The Journal of Development Studies*, 51(4), 447–463. <https://doi.org/10.1080/00220388.2014.983912>
- Erten, B., Leight, J., & Tregenna, F. (2019). Trade liberalization and local labor market adjustment in South Africa. *Journal of International Economics*, 118, 448–467. <https://doi.org/10.1016/j.jinteco.2019.02.006>
- Fedderke, J., Shin, Y., & Vaze, P. (2012). Trade, technology and the labour market: The case of South Africa. *Oxford Bulletin of Economics and Statistics*, 74(6), 808–830. <https://doi.org/10.1111/j.1468-0084.2011.00685.x>
- Fedderke, J. W., & Mariotti, M. (2002). Changing labour market conditions in South Africa: A sectoral analysis of the period 1970–1997. *South African Journal of Economics*, 70(5), 830–864. <https://doi.org/10.1111/j.1813-6982.2002.tb00047.x>
- Ghura, D., & Grennes, T. J. (1993). The real exchange rate and macroeconomic performance in sub-Saharan Africa. *Journal of Development Economics*, 42(1), 155–174. [https://doi.org/10.1016/0304-3878\(93\)90077-Z](https://doi.org/10.1016/0304-3878(93)90077-Z)
- Helpman, E., Itshkhoki, O., Muendler, M. A., & Redding, S. J. (2017). Trade and inequality: From theory to estimation. *The Review of Economic Studies*, 84(1), 357–405. <https://doi.org/10.1093/restud/rdw025>

- Johnson, G., & Stafford, F. (1999). The labor market implications of international trade. *Handbook of Labor Economics*, 3(2), 2215–2288. doi:10.1016/S1573-4463(99)30020-1
- Johnson, G. E. (1997). Changes in earnings inequality: The role of demand shifts. *Journal of Economic Perspectives*, 11(2), 41–54. <https://doi.org/10.1257/jep.11.2.41>
- Katz, L., & Autor, D. (1999). Changes in the wage structure and earnings inequality. In O. Ashenfelter & D. Card (Eds.), *Handbook of labor economics*. (Vol. 3A, pp. 1463–1555). Elsevier.
- Katz, L. F., & Murphy, K. M. (1992). Changes in relative wages, 1963–1987: Supply and demand factors. *The Quarterly Journal of Economics*, 107(1), 35–78. <https://doi.org/10.2307/2118323>
- Krishna, P., Poole, J. P., & Senses, M. Z. (2014). Wage effects of trade reform with endogenous worker mobility. *Journal of International Economics*, 93(2), 239–252. <https://doi.org/10.1016/j.jinteco.2014.03.003>
- Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *econometrica*, 71(6), 1695–1725. <https://doi.org/10.1111/1468-0262.00467>
- Monte, F. (2011). Skill bias, trade, and wage dispersion. *Journal of International Economics*, 83(2), 202–218. <https://doi.org/10.1016/j.jinteco.2010.11.004>
- Munch, J. R., & Skaksen, J. R. (2008). Human capital and wages in exporting firms. *Journal of International Economics*, 75(2), 363–372. <https://doi.org/10.1016/j.jinteco.2008.02.006>
- Robbins, D., & Gindling, T. H. (1999). Trade Liberalization and the relative wages for More-skilled workers in Costa Rica. *Review of Development Economics*, 3(2), 140–154. <https://doi.org/10.1111/1467-9361.00057>
- Rodrik, D. (2008). Understanding South Africa's economic puzzles. *Economics of Transition*, 16(4), 769–797. <https://doi.org/10.1111/j.1468-0351.2008.00343.x>
- Sachs, J. D., Shatz, H. J., Dearnorff, A., & Hall, R. E. (1994). Trade and jobs in US manufacturing. *Brookings Papers on Economic Activity*, 1994(1), 1–84. <https://doi.org/10.2307/2534630>
- Sampson, T. (2014). Selection into trade and wage inequality. *American Economic Journal: Microeconomics*, 6(3), 157–202. doi:10.1257/mic.6.3.157
- Slaughter, M. J. (1998). International trade and labour-market outcomes: Results, questions, and policy options. *The Economic Journal*, 108(450), 1452–1462. <https://doi.org/10.1111/1468-0297.00353>
- Verhoogen, E. A. (2008). Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector. *The Quarterly Journal of Economics*, 123(2), 489–530. <https://doi.org/10.1162/qjec.2008.123.2.489>
- Wood, A. (2018). The 1990s trade and wages debate in retrospect. *The World Economy*, 41(4), 975–999. <https://doi.org/10.1111/twec.12619>
- Yeaple, S. R. (2005). A simple model of firm heterogeneity, international trade, and wages. *Journal of International Economics*, 65(1), 1–20. <https://doi.org/10.1016/j.jinteco.2004.01.001>



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