



# Gender and the South African Labour Market: Policy relevant research possibilities using South African tax data<sup>1</sup>

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**Abstract:** This framing paper has three primary objectives. First, it provides an overview of the South African Revenue Services (SARS) tax data which has recently been made available. Second, the paper provides a brief overview of the South African literature focussed on the gender-dynamics of the labour market to frame this scoping paper and to identify the gaps in the existing literature. Lastly, we identify feasible gender-based studies which were previously limited due to the paucity of tax administrative data and inhibited the replication of international studies in South Africa. The recommendations from the paper will provide context to the call for research proposals in the upcoming round of funding under the Inequality and Public Revenue work streams of the Southern Africa — Towards Inclusive Economic Development project. A broad review of gender-based employment discrimination, wage distribution, occupational segregation, job turnover, the gender-wage gap and labour demand is taking place in a related study. In finalising this paper, the two studies will be harmonised to give an overview of the literature, research gaps and policy relevant research possibilities related to the gender-dynamics of the South African labour market.

**Key words:** gender, income inequality, employment, wages, administrative data

**JEL Classification:** J01, E24

## 1. Introduction

South Africa has a rich history of publicly available survey data which has been used extensively to study the labour market, and specifically its gendered dynamics. However, a paucity of firm-level data, and in particular matched employee-employer data, contributes to a number of gaps in the existing South African literature. This scoping paper aims to analyse the gaps in the existing literature and to provide guidance on the areas in which the recently available administrative tax data can be used to contribute to our knowledge on the experience of women in the labour market.

To this end, this paper provides an overview of the limitations of the prominent South African survey data, as well as the advantages and limitations of using administrative data in Section 2. Section 3 provides an overview of the South African Revenue Services (SARS) data, the available gender component, and the limitations specific to the SARS data. In Section 4, we provide a brief overview of the South African literature relevant to this scoping paper, before highlighting the areas in which the SARS tax data can provide a contribution to the existing literature.

## 2. Types of data

The following section provides a brief outline of some of the research limitations and challenges associated with using survey data. Following this, we discuss the advantages and disadvantages that tax administrative data provides in the analysis of gender in the South African labour market.

### 2.1 Limitations to South African Survey Data

South Africa has a rich history of publicly available survey data which has been used extensively to study the labour market, and specifically its gendered dynamics. The three key sources of data that have traditionally been used to study women in the labour market are the Census, the General Household Survey (GHS) and the Quarterly Labour Force Survey (QLFS) which, together with the Quarterly Employment Statistics (QES), feed into the annual release of the Labour Market Dynamics Study (LMDS).

The South African Census has been conducted in 1996, 2001 and 2011, with plans for additional censuses every ten years. As typical of a census, it covers a large sample and is the benchmark for all surveys conducted by the national statistics office, Statistics South Africa (Stats SA). Despite the large sample, the infrequency of data collection as well as the extensive delays in releasing the data for public use makes this an unsuitable data source for researchers wishing to conduct up-to-date analysis. In addition, Casale and Posel (2002) suggest that the Census measurement of employment status might be rudimentary as only a few questions in the census are related to the employment activity. As an example of this, the authors point out that no distinction is made between employment in the formal and informal sectors in the Census questionnaire.

The GHS is an annual household survey conducted by Stats SA since 2002, replacing the October Household Survey (OHS) which ran from 1993–99. The GHS covers six broad areas, namely education, health and social development, housing, households' access to services and facilities, food security, and agriculture. While there is some data collected on individual's labour market activities, this survey does not cover a comprehensive range of data related to wages and employment activity.

The QLFS is a household-based survey conducted every quarter, with a focus on labour market activities. While the QLFS is frequently released and includes data on economic activities, some components of the survey are not released to the public in the quarterly format. Since 2008, the

QLFS has been collated into the LMDS, which includes the data which is not released in the QLFS, such as income. However, there are delays in releasing the annualised LMDS — it has currently only been released up to 2016.

Both the GHS (formerly OHS) and the QLFS (and relatedly the LMDS) are subject to the usual survey data issues such as non-response, attrition and under sampling. Changes in the questionnaire over time and changes of the definitions of employment are some of the particular issues in the OHS and QLFS data described by Casale and Posel (2002). In addition, survey data tends to under-report earnings at the top end of the wage distribution, which may be because of missing information on high wage earners in the survey data, reluctance of high wage earners to report their wages, or wage earners excluding benefits such as pension and bonuses from their gross income (Wittenberg 2017). This may lead, for example, to distortions in measures of income inequality.

In more recent years, the National Income Dynamics (NIDS) has been used to examine gender differences in income and gender inequality in the labour market (d'Agostino and Scarlato 2016; Posel et al. 2016). NIDS began in 2008 and is the first national household panel study in South Africa. It is conducted every two years, and most recently released Wave 5, conducted in 2017. The survey covers a wide range of themes, with a focus on labour market and economic activity. This creates a rich dataset of individual and household level history for researchers to study, enabling them to track individuals and their movements in and out of the labour market over time, thereby uncovering the dynamics of labour force participation in South Africa. However, NIDS suffers from the same survey data issues as the OHS and QLFS, in addition to challenges associated with weighting a panel dataset over time.

None of the individual-level surveys described above provide matched employee-employer level data. While there is limited firm-level data available in South Africa<sup>2</sup>, before the SARS data became available there was no large-scale dataset containing matched employee-employer data. Therefore, while there exists a rich analysis of the individual characteristics associated with labour market outcomes in South Africa, there is a paucity of information on labour demand or the dynamics between the individual and firm.

## **2.2 Advantages of administrative tax data**

Internationally, the use of administrative data for empirical research is becoming more common (Card et al. 2010). Over and above survey data, administrative data is appealing for research as it offers several advantages. Research using administrative tax records to evaluate public policy has become widespread.

Administrative data offer much larger sample sizes than survey data and can even host the full population of interest. The data is often similar to a census with all almost total coverage of the population in question. The large number of observations in administrative data lends well to a large set of research methods and gives us confidence about the statistical power of the results.

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<sup>2</sup> Two prominent firm surveys are the QES and the Survey of Employers and the Self-Employed (SESE). The QES is a quarterly enterprise-based survey which collects data on VAT-registered firms with turnover greater than R300 000. The survey therefore excludes informal businesses, and does not cover the agriculture or domestic services sector. The QES also excludes and description the unemployed or the employed, including their demographic profile, education level or hours of work etc. While SESE contains both firm and individual level data, it is a small sample limited to non-VAT registered businesses.

The regular collection of administrative records mean that administrative data are longitudinal in nature. This enables reliable policy evaluation as it provides data for before, during and after policy implementation enabling long-term follow up.

Administrative records can provide more dependable information than survey data. Tax records are often audited providing an added level of reliability. Technological advances also mean tax forms are sometimes prepopulated with information from employers or information previously provided to the revenue collector. Lastly, the use of administrative data can be less costly than designing surveys and collecting new data.

### **2.3 Disadvantages of administrative tax data**

There are of course several challenges when using administrative data. The first challenge is that researchers do not collect the administrative data and have no control of what or how the information is collected. Therefore, the data collected might not be suitable for research, and information not required by administrative data collectors may be incomplete or incorrect. This feeds into the second data challenge, namely a lack of theory and research methods to guide the use of administrative data (Wallgren and Wallgren 2007). This means that information on the how the dataset was constructed is not available through a metadata or data guide, leaving researchers to make their own assumptions about the data which often cannot be verified.

Thirdly, administrative data gives us information over time through the panel, but the data is drawn at a specific point in time. Any corrections or updates to the administrative data will therefore not be included. Lastly, due to the confidential nature of administrative data, the data is not publicly available. Many research projects using administrative data indicate the examination of the data in a secure facility or where the data has been anonymised for research purposes or both.

#### Overview of the SARS data

The following section provides more specific information about the tax administrative data available for research at the National Treasury (NT) in Pretoria.

The tax administrative data from SARS is a rich new source of data allowing for new avenues of research. Tax administrative data has been made available to researchers within the National Treasury Secure Data Facility since 2015. Anonymised Company Income Tax, Value Added Tax, Customs, IRP5 and individual tax assessment data is available in the data lab. The data originates from the South African Revenue Service (SARS) where it is anonymised before it is made available to researchers.

IRP5/IT3(a) certificates are submitted to SARS by employers who are registered for pay-as-you-earn (PAYE). Since 2011, each employee receiving remuneration is issued with an Employee Tax Certificate by their employer irrespective of amount earned. Employers also issue IRP5 certificates for remuneration to individuals for consulting services or from retirement funds. The certificates contain the income, deductions, allowances, benefits, medical scheme contributions, age and employment period information for each job in the formal economy. At the time of writing the IRP5 data is available for tax years 2008–18.

The Company Income Tax-IRP5 (CIT-IRP5) panel was created through the joint initiative between SARS, the NT, and UNU-WIDER. The dataset is an unbalanced panel created by linking company income tax (CIT) data, employee tax data (IRP5), value-added tax (VAT) data, and customs records from trading firms. The CIT data includes firm-level information such as revenue amounts, tax paid, location and sector of the firm and is derived from the Income Tax Returns for

Company forms. The CIT-IRP5 panel matches employer–employee variables from the IRP5 and CIT datasets. The panel includes tax information from 2008–15 and is in the process of being updated to include tax information until 2017. Pieterse et al. (2016) provide a more detailed description of the CIT-IRP5 panel. The authors discuss how the panel was constructed, any biases it might contain, and compare the panel with other data sources.

## 2.4 Gender in the SARS data

The gender variable only became available in the IRP5 data at the end of 2017. Gender is not a required field on the IRP5/IT3(a) form and is derived from the South African Identity Number which includes the individual’s gender as the 7<sup>th</sup> digit. As the data is anonymised at SARS, the gender variable is derived before the anonymisation process. The gender variable appears to be well populated and is described in Table 1.

Gender variable in the IRP5 data, 2008–16

Tax year	Missing	Female	Male	Total
2008	839 936	6 046 598	8 435 735	15 322 269
2009	439 752	6 461 279	8 725 662	15 626 693
2010	903 124	6 455 695	8 368 276	15 727 095
2011	775 966	6 743 647	8 784 780	16 304 393
2012	716 346	7 195 521	9 173 485	17 085 352
2013	734 608	7 224 912	9 269 647	17 229 167
2014	726 011	7 555 546	9 509 997	17 791 554
2015	743 791	7 985 558	9 708 359	18 437 708
2016	738 574	7 770 914	9 474 126	17 983 614
2017	877 804	8 765 575	9 902 777	19 537 156
2018	702 572	7 629 875	9 034 049	17 366 496
Source: Authors’ own estimate based on the IRP5 data.				

This the raw estimates of the full population of women working in the formal labour market including both the private and public sector. The IRP5 data also includes partnerships, share blocks and other entities which are represented by the missing gender information in the table above.

## 2.5 Limitations specific to the SARS data

In an ideal world, tax data would include or could be combined with other administrative data to give us all the information one would need to do a complete analysis of gender in the labour market. There are limits to the extent to which the SARS data, in its current form, can help to fill the gaps in the literature we identify in the next section.

Firstly, for the purpose of studying gender in the labour market, the data does not include education level, occupation, race or hours worked. These are some of the rudimentary variables required for labour market research in South Africa. Secondly, we can only see those employed in the formal sector. The nature of the data means that all informal workers are excluded for the analysis. Individuals who are unemployed are not observed so we would not know whether they are employed in the informal labour market, unemployed or not economically active. Thirdly, there is a lag in the availability of the SARS data. Companies, for example, have 12 months from their financial year-end in which to complete their tax returns; thus, some company data may be incomplete. While the SARS data is panel in nature, any late submissions or revisions submitted after the data is extracted from SARS will not be in the version of data used for research.

### **3. Areas for further research using the SARS data**

The fact that the SARS data takes the form of an employee-employer panel provides the possibility of examining the relationship between firm characteristics such as firm size and tenure and the gender wage gap. As discussed, there are some limitations regarding the scope gender-based analysis of the labour market using the SARS data. This said, there are a number of areas in which the SARS data can contribute to the existing body of literature. While a related study will provide a broad review of the literature on gender-based dynamics of the South African labour market, the following section provides a brief overview of the relevant literature in order to frame the contribution of the SARS data.

#### **3.1 Overview of relevant literature**

##### *Gender, employment and wages*

There have been many studies using survey data to analyse the gendered dynamics of employment in post-apartheid South Africa. Casale (2004) show that, post-apartheid, the South African labour market has become increasingly feminised and argue that factors such as lower marriage rates and changes in household structure may have driven this change. However, this has also led to an increase in unemployment for women, who consistently face higher unemployment rates than men in South Africa. Although women are less likely to be employed than men with the same endowments (Leibbrandt et al. 2010; Oosthuizen 2006). Oosthuizen (2006) found that gender was of decreasing importance for explaining probability of employment between 1995 and 2004. More recently, Kimani (2015) showed that women are less likely to transition out of unemployment into employment than men.

Furthermore, studies find a gender wage gap between men and women, even after accounting for individual characteristics such as education and age (Burger and Yu 2007; Casale and Posel 2011; Muller 2009; Ntuli 2007), with the wage-gap increasing in the post-apartheid years (Burger and Yu 2007; Ntuli 2007). The gender wage gap is largest at the bottom end of the wage distribution (Bhorat and Goga 2013; Ntuli 2007), with pure gender discrimination accounting for the majority of the gap between the 20<sup>th</sup> and 50<sup>th</sup> quantiles (Bhorat and Goga 2013).

While there is a rich body of literature analysing employment and wages and their gender dynamics, the limitations of survey data as well as the scarcity of firm-level data results in a number of gaps in the literature. Relevant to this scoping paper is the fact that survey data — which represents a snapshot in time - does not allow for the analysis of intensity of employment, or the proportion of the year for which an individual is employed. In addition, limitations to survey data including non-response, attrition or under-sampling may distort existing analysis of the gender wage gap. Finally, while there is much analysis of the supply-side determinants of employment and wages,

there is little demand-side analysis of the same. The ways in which the SARS data can be used to fill these gaps is discussed in more detail in section 3.2.

#### *Worker flows and labour demand*

While there have been a handful of studies estimating worker flow, job flow and job churn in South Africa, they differ in methodology and therefore comparability due to differences in the types of data used. Banerjee et al. (2008) use panel household survey data to estimate gross flows over labour market states between 2002–03. They find that 16 percent of the formal sector in 2002 have transitioned out of this state by 2003, with males and females equally likely to have retained formal employment over the period. As expected, females are more likely than males to transition out of the labour market when leaving formal employment. However, because this data does not link individuals to firms, they cannot measure worker flow (a measure of hires and separations) which is typically defined from the firm perspective.

Kerr et al. (2014) use the Quarterly Employment Statistics survey (QES) firm data to analyse job creation and destruction from the firm perspective, finding that firms create or destroy around 20 percent of total jobs in a 12-month period. However, analogous to the above, this study does not include individual information and therefore does not analyse these measures from the worker perspective, whether male or female.

One study which does use matched firm-individual data is by Kerr (2018), who use the SARS IRP5-CIT panel data to evaluate worker flows and job churn in South Africa. They find that while worker flows are high on average, there is considerable heterogeneity in worker experience by level of earnings and firm type. However, at the time of the study information on the gender of employees was not available in the data, precluding any analysis on how these measures may differ across gender.

The recent addition of a gender variable into the SARS data therefore makes it possible to evaluate job churn and worker flows by gender using matched employer-employee data, something which is yet to be done in South Africa.

#### *Tenure, employment spells and wages*

International studies suggest a positive relationship between tenure and wages, but that returns to tenure are higher for men than for women (Ioakimidis 2012; Munasinghe et al. 2008). In South Africa, the unavailability of matched firm-employee data has thus far largely precluded studies of the relationship between tenure and wages for men and women. Similarly, survey data does not allow for analysis of job spells without a detailed, retroactive module on employment history. McKeever (2006) uses data including a retrospective employment questionnaire to examine transitions between the formal and informal economy in South Africa. They find that, on average, employment spells in the formal sector are longer for men than for women, however they do not conduct an analysis of the relationship between these job spells and wages. In addition, the data covers a small geographical area and is from 1991. The availability of the SARS firm and individual data therefore allows for the possibility of examining the relationship between tenure, job spells and wages by gender in the formal sector, using a vast, up-to-date panel of data.

#### *Trade and wages*

There are a number of studies analysing the relationship between trade and wages. Internationally, it is well-documented that exporting firms pay higher wages than non-exporting firms (Bernard et al. 1995; Bernard et al. 2007; Schank et al. 2007). In South Africa, the availability of the SARS data



— which includes customs data — has recently made it possible to analyse this same relationship. Matthee et al. (2017), using the SARS data, provide evidence for a firm exporter wage premium in South Africa. Similarly, Edwards et al. (2018) find a wage premium associated with trading firms, with the highest premium for firms which both import and export. However, at the time of both these studies, data on the gender of employees was not available.

### 3.2 Areas for further research

#### *Worker flows and job churn*

As discussed in the literature review, there have been a handful of studies analysis firm-level job churn and worker flow in South Africa, with only one of these using matched employer-employee data. The recent addition of a gender variable into the SARS data therefore makes it possible to evaluate job churn and worker flows by gender using matched employer-employee data, something which is yet to be done in South Africa. There are a number of interrelated concepts with can be analysed with this data, each of which may differ across gender:

- a) job creation and destruction by firms
- b) worker flows, or the sum of hires and separations<sup>3</sup>
- c) job churn, or worker flows in excess or those created by job reallocation.

The SARS data allows for an analysis of these concepts, taking into account the available firm characteristics, as well as whether these aggregate measures differ by gender.

#### *Tenure, employment spells and wages*

The 10-year SARS panel provides the necessary data to track individuals moving in and out of the formal labour market over time. This will allow for evaluation of tenure, employment spells and subsequent wages earned by gender. Particularly, the data allows for evaluation of the effect of spells outside of the formal labour market on subsequent wages earned, and if these effects are similar across men and women. While there is limited data on individual characteristics in the data, the panel nature of the data allows for the use of a fixed effects model in evaluating the effect of movements in and out of the formal labour market on wages earned. This model controls for individual time-invariant characteristics, such as race. There is also scope to examine the relationship between firm tenure and wages for men and women, although the lack of substantial individual level data may preclude econometric analysis.

It is important to note that any study using the SARS data to examine formal sector employment spells and wage suppression will not be able to identify the states a worker flows into or out of when leaving or joining the formal sector as the SARS data does not contain information on what an individual is doing when they do not appear in the formal labour market data. While the study by Banerjee et al. (2008) suggests that workers transitioning in and out of the formal sector are most likely to be coming from and moving into unemployment, studies using the SARS data will not be able elaborate on this finding by design of the administrative data.

#### *Intensity of employment*

The SARS data makes it possible to measure *intensity* of employment, which traditional survey data does not allow for. While survey data will only reveal if an individual was employed within the period of time asked in the questionnaire (usually a week or a month), the administrative SARS data allows for an evaluation of the proportion of the year which men and women are employed

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<sup>3</sup> Kerr (2018) discusses various methodological differences in the calculation of worker flow in the literature, which should be noted.

in the formal sector. In other words, one can evaluate both the make-up of the formal labour market by gender, and the proportion of the year that both men and women spend in formal sector employment. To our knowledge, this is yet to be done on South African data.

#### *The formal sector gender wage gap*

Wittenberg (2017) shows that the QLFS typically underreports wage income in comparison with the SARS tax data, particularly at the top end of the distribution. Therefore, existing studies of the gender wage gap in South Africa may be underestimating wage inequality between men and women. This discrepancy may be because of missing information on high wage earners in the survey data, reluctance of high wage earners to report their wages, or wage earners excluding benefits such as pension and bonuses from their gross income (Wittenberg 2017). Because there are large penalties for non-disclosure of income, the SARS data includes substantially more complete information on wages earned in the formal labour market at the top end of the distribution. Therefore, studies using this data will be able to undertake a more accurate description of formal labour market gender-wage gap at the top end.

Diaz-Bazan (2015) suggests a methodology to measure inequality which optimally combines household survey information with tax records to construct a complete income distribution. This methodology suggests choosing an income threshold to minimise reliance on household survey data at the bottom end of the distribution, where income data under the threshold is taken from household surveys and data above the threshold is taken from tax records. Typically, this threshold is one where tax filings become mandatory. This allows the simultaneous use of survey data, which may be more accurate at the bottom end, and tax data, which is likely to be more accurate at the top end of the wage distribution. It should be noted, however, that Wittenberg (2017) also finds that incomes of the self-employed may be underreported in the SARS data in comparison to the QLFS data, possibly due to non-disclosure by these individuals of some or all income earned to SARS. Therefore, researchers wanting to use the SARS data to measure the gender wage gap in the formal sector should be aware of these heterogeneous discrepancies in both household survey data and the SARS data throughout the wage distribution.

#### *Trade and wages*

As discussed, the existing South African literature finds a wage-premium associated with trading firms, although there is no literature on whether the worker-level benefits to firm trade differ by gender. The SARS data allows for firm-level employment behaviour to be examined. Combined with the Customs data, there is scope for an evaluation of the extent to which trade can create opportunities or improve employment for women.

#### *Demand-side determinants of female employment and wages*

As discussed, there are few studies analysing the demand-side determinants of employment and wages. Furthermore, there is — to our knowledge — no literature on whether these demand-side factors effect men and women differently. The addition of the gender variable to the SARS data allows for an analysis of the demand-side determinants of female employment by firms. Furthermore, a fixed-effects regression can be used to evaluate the firm-level characteristics determining the wages paid to women, holding constant time-invariant individual characteristic.

## 5. Conclusion

The availability of the SARS worker-firm panel of administrative tax data creates a unique opportunity to contribute to the literature on the gender dynamics of the labour market in South Africa. The use of administrative data has a number of advantages over survey data, including a large sample size, regular collection, and more dependable data. In addition, the SARS tax data is the first large-scale matched employer-employee panel dataset in South Africa. Therefore, while South Africa has a strong repository of survey-data based supply-level analysis, the paucity of firm-level data has resulted in limited analysis of demand-side factors affecting women in the labour market.

This paper has identified six areas with scope for further research on the gender dynamics of the formal South African labour market:

1. worker flows and job churn
2. tenure, employment spells and wages intensity of employment
3. the formal sector gender wage gap
4. trade and wages, and
5. demand-side determinants of female employment and wages.

While the use of the SARS tax data creates limitations to the analysis which can be performed in these areas, there remains a substantial number of areas where the existing South African literature can be enhanced with its use.

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