

**EMPLOYMENT POLICY EFFECTS ON FIRM
DYNAMICS: EVIDENCE FROM THE SOUTH
AFRICAN LABOUR MARKET**

**BY
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Nature of Contribution	Extent of Contribution
<ol style="list-style-type: none"> 1. Data cleaning, and all Stata coding 2. Estimation and data analysis 3. Write up of literature review 4. Write up of results 5. All additional manuscript texts 6. All tables and figures. 	85%

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Date: 5 September 2019

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The undersigned hereby confirm that

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Productivity and the Impact of Bargaining Councils: An Analysis of Labour Productivity in South Africa’s Manufacturing Sector”,

2. no other authors contributed to Chapter 2 “The Impact of the Employment Equity Act of 1998 on Employment Strategies of Firms”; Chapter 3 “The Bargaining Council Minimum Wage Dataset: A Discussion of Capturing, Cleaning, and Descriptives; Chapter 4 “Employment Effects of Bargaining Council Decisions”; Chapter 5 “South African Labour Productivity and the Impact of Bargaining Councils: An Analysis of Labour Productivity in South Africa’s Manufacturing Sector”, besides those specified above, and
3. potential conflicts of interest have been revealed to all interested parties and that the necessary arrangements have been made to use the material in Chapter 2 “The Impact of the Employment Equity Act of 1998 on Employment Strategies of Firms”; Chapter 3 “The Bargaining Council Minimum Wage Dataset: A Discussion of Capturing, Cleaning, and Descriptives; Chapter 4 “Employment Effects of Bargaining Council Decisions”; Chapter 5 “South African Labour Productivity and the Impact of Bargaining Councils: An Analysis of Labour Productivity in South Africa’s Manufacturing Sector”, of this dissertation.

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Abstract

As South African policymakers strive to tackle low economic growth, poverty, unemployment, and inequality, the ability to unpack the effects of policy at a firm-level is key to the reformulation of more effective policy. The effects of Acts and policies within the South African labour market have not been well studied, especially when considering them from the firm-level. This thesis adds to the sparse literature by providing insights into how particular government labour market policies have affected firm dynamics.

Firstly, this thesis is the first to conduct an impact study of the Employment Equity Act of 1998 on employment and production strategies of South African firms. The Act is a threshold policy, demanding that firms with 50 or more employees comply with it. Analysis revealed that there is a high possibility that the introduction of the Act has created a distortion in employment which has resulted in an inefficient allocation of resources at a firm level. This results in a lower employment of labour, particularly at the small, medium enterprise level, showing a potential unintended consequence of the Act.

Secondly, this thesis utilises a new-to-the-world dataset, which was constructed purely to facilitate the research conducted within this thesis –the Bargaining Council Minimum Wage Dataset (BCMWD). This dataset is then utilised to generate descriptive results, not only showcasing its usefulness as a dataset, but also illustrating the evolution of minimum wages over time, as well as providing up to date estimates of Bargaining Council coverage.

Thirdly, by using the BCMWD this thesis unpacks the effects of the existence of Bargaining Councils and their minimum wage agreements on firm dynamics – particularly on wages, and

employment. The results reveal that despite the minimum wages prescribed by said Bargaining Councils, the average employee still reports a wage that is 42% below the stipulated minimum. Furthermore, the extension of updated Bargaining Council agreements is shown to have a detrimental effect on employment, whereby it decreases by approximately 8%. Yet again, this marks the intended effect of this area of policy as counterproductive.

Lastly, this thesis unpacks the evolution of labour productivity in post-apartheid South Africa, especially in relation to Bargaining Councils. The thesis concludes that aggregate labour productivity (in manufacturing) in South Africa has been growing and that almost all of this growth has been driven by within-industry growth, with little being driven by cross-industry reallocation. Furthermore, this thesis suggests that the negative relationship exhibited by initial labour productivity and labour productivity growth speaks to a “catching-up” behaviour by lower labour productivity sub-sectors. And an analysis of Bargaining Council effects suggests that the presence of Bargaining Councils is correlated with sub-sectors being more productive. This result reinforces the notion that Bargaining Council agreements force less productive firms to restructure to become more productive, likely favouring more skilled employees over their less skilled counterparts.

Opsomming

Terwyl Suid-Afrikaanse beleidmakers daarna streef om lae ekonomiese groei, armoede, werkloosheid en ongelykheid aan te spreek, is die vermoë om die effek van beleid op die vlak van die firma te bepaal die sleutel tot die formulering van meer effektiewe beleid. Die effek van Wette en beleid in die Suid-Afrikaanse arbeidsmark is nog nie goed bestudeer nie, veral vanuit die oogpunt van die firma gesien. Hierdie tesis voeg by tot die skrapse, beskikbare literatuur deurdat dit insig bied in hoe dinamiek in die firma geaffekteer word deur regeringsbeleid ten opsigte van die arbeidsmark.

Eerstens, hierdie tesis is die eerste om 'n studie te maak van die impak van die Wet Op Gelyke Indiensneming van 1998 op die indiensnemings- en produksie strategieë van Suid-Afrikaanse firmas. Die Wet is 'n drupel beleid, deurdat dit vereis dat slegs firmas met meer as 50 werknemers daaraan moet voldoen. Analise het openbaar dat daar dus 'n groot moontlikheid bestaan dat die implementering van die Wet gelei het tot 'n distorsie in indiensneming, met 'n gevolglike oneffektiewe allokasie van bronne op firma-vlak. Dit lei tot verlaagde vlakke van indiensneming, veral by klein- en mediumgrootte firmas, wat 'n potensiële en onbedoelde newe-effek van die Wet uitwys.

Tweedens, die tesis maak gebruik van 'n nuwe datastel wat geskep was met die uitsluitlike doel om die navorsing binne-in die tesis te fasiliteer – die sogenaamde Bedingingsraad Minimum Lone Datastel (“Bargaining Council Minimum Wage Dataset”, oftewel BCMWD). Die datastel word aangewend om beskrywende resultate te genereer, wat nie slegs die nuttigheid van die datastel tentoonstel nie, maar ook die evolusie van minimum lone oor 'n gegewe tydperk illustreer, en onlangse skattings van die dekking van Bedingingsrade verskaf.

Derdens, deur gebruik te maak van die BCMWD ontleed die tesis die effek van Bedingingsrade en minimum loonooreenkomste op firma dinamiek – veral ten opsigte van lone en indiensneming. Die resultate wys dat ‘n gemiddelde werknemer, ten spyte van minimum loonooreenkomste voorgeskryf deur Bedingingsrade, nogsteeds ‘n loon wat 42% laer is as die voorgeskrewe minimum sal rapporteer. Daar word ook uitgewys dat die verlenging van opgedateerde loonooreenkomste ‘n negatiewe effek op indiensneming het, deurdat dit produktiwiteit met 8% verlaag. Dit beklemtoon weereens dat die uitwerking van hierdie area van beleid inderdaad teenproduktief is.

Laastens ontleed die tesis die evolusie van arbeidsproduktiwiteit in post-apartheid Suid-Afrika, veral ten opsigte van Bedingingsrade. Die tesis kom tot die gevolgtrekking dat totale arbeidsproduktiwiteit in die Suid-Afrikaanse vervaardigingssektor gegroei het, en dat die meerderheid van die groei te dankie is aan groei binne-in spesifieke industrieë en nie gedryf was deur herallokasies tussen industrieë nie. Die tesis stel ook voor dat die negatiewe verhouding tussen aanvanklike arbeidsproduktiwiteit en die groei in arbeidsproduktiwiteit dui op “inhaal” gedrag deur laer arbeidsproduktiwiteitsubsektore. Verder stel ‘n analise van die effek van Bedingingsrade ook voor dat die teenwoordigheid van Bedingingsrade lei tot verhoogde produktiwiteit in subsektore. Dié resultaat beklemtoon die idee dat ooreenkomste met Bedingingsrade daartoe lei dat minder produktiewe firmas geforseer word om te herstruktureer om sodoende meer produktief te raak, waarskynlik ten bate van meer bekwame werknemers en ten koste van hul minder bekwame eweknieë.

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List of Abbreviations

AMERU	African Microeconomic Research Unit
ANC	African National Congress
BCMWD	Bargaining Council Decision Dataset
BCEA	Basic Conditions of Employment Act
DoL	Department of Labour
EEA	Employment Equity Act
FGT	Foster-Greer-Thorbecke
IPAP	Industrial Policy Action Plan
LFS	Labour Force Survey
LRA	Labour Relations Act
LSS	Large Sample Survey
NDP	National Development Plan
NT	National Treasury
OCR	Optical Character Recognition
OHS	October Household Surveys
PALMS	Post-Apartheid Labour Market Series
QLFS	Quarterly Labour Force Survey
SARS	South African Revenue Service
SALDRU	South African Labour and Development Research Unit
SDA	Skills Development Act
SMMEs	Small, micro, and medium enterprises

Chapter 1: Introduction

1.1 BACKGROUND

After the end of apartheid in 1994, South Africa became a free country, with equal rights, and a democratic voice. However, it also emerged with a legacy of low economic growth, a high poverty rate, chronic unemployment, and excessive inequality. Since this time policymakers have been tasked with alleviating poverty, remediating inequality, and stimulating employment.

Almost one quarter of the South African population had to survive on less than \$2 a day, with more than half the population surviving on less than \$4 per day (Edwards et al., 2014). This poverty was heavily biased along racial lines with 61% of the African community living in poverty. One of the major contributing factors to this skewed poverty measure was the skewed labour market (see Banerjee et al., 2008), with the African labour force having the lowest employment rates, and exceedingly high unemployment rates.

To tackle these challenges of poverty, unemployment, and inequality, the ANC government introduced the first of what would become many policy plans (Edwards et al., 2014). The Reconstruction and Development Plan (RDP) of 1994 was the first major policy plan to try and redress the imbalances left behind by the previous administration - socially, economically, and spatially. The aim of the RDP was to combine growth, development, reconstruction, redistribution, and reconciliation into one strategy. The RDP argued that growth and development were not mutually exclusive, and that development without growth would not be financially viable, whilst growth without development and transformation would simply perpetuate South Africa's problems and thus not be socially nor politically stable (Reitzel, 2008).

Rooted in the RDP principles were a suite of labour market reforms. These new regulations were driven primarily by a need to promote inclusion and transformation within the South African labour market. The five main Acts that were implemented during this period were, (i) the Labour Relations Act (LRA) of 1995; (ii) the Basic Conditions of Employment Act (BCEA) of 1997; (iii) the Employment Equity Act (EEA) of 1998; (iv) the Skills Development Act (SDA) of 1998; and (v) the Skills Development Levies Act (SDLA) of 1999. The aim of these laws was to put in place a set of socially acceptable minimum standards of working conditions and to bring South African employment legislation into line with international standards (Black & Rankin, 1998). Table 1.1 outlines the key aims of each respective Act.

Table 1.1: Aims and coverage of South African labour legislation

Name of Act	Key aims of Act	Coverage of Act
Labour Relations Act (1995)	<ul style="list-style-type: none"> • Ensure orderly collective bargaining and workplace democracy • Ensure effective labour market dispute resolution (CCMA) 	All workers except the defence force, secret services and essential services
Basic Conditions of Employment Act (1997)	<ul style="list-style-type: none"> • Improve minimum rights for all workers • Improve enforcement mechanisms • Role of Employment Conditions Commission to inform minister of labour. • Extend the rights of collective bargaining 	All workers except the defence force, secret services and essential services, including part-time
Employment Equity Act (1998)	<ul style="list-style-type: none"> • Eliminate unfair discrimination • Ensure implementation of affirmative action • Promote racial transformation of the labour market to be more in line with the country's demographics. 	Employees in 'designated' firms (firms in excess of 50 employees)
Skills Development Act (1998)	<ul style="list-style-type: none"> • Devise and implement national, sector and workplace strategies to improve skills of the workforce 	Designated employers and sectors

Skills Development Levies Act (1999)	<ul style="list-style-type: none"> • Collect funding for the National Skills Fund 	All employers except the public service, religious and charity organisations
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Source: Leibbrandt et al (2010)

Almost 20 years after the introduction of the LRA, a set of amendments to the LRA were passed in 2014. These amendments focused primarily on how to treat part-time and contract workers and those employed through temporary employment services (or labour brokers). These amendments generally strengthen the position of those already in jobs and reduced the flexibility of firms in terms of hiring. Secondly, a National Minimum wage was implemented in South Africa in early 2019.

The effects of these Acts and policies on the South African labour market have not been well studied, especially when considering them from the firm-level. With a lot of current discussions being held in South Africa regarding the transformation of the labour market, workers' rights, and the implementation of a National Minimum Wage, this thesis aims to add to the sparse literature by providing insights into how these government policies have affected firm dynamics. This thesis aims to provide comment on the outcomes of these policies, as well as the potential unintended consequences. As is the case with all policies, these policies have costs and benefits attached to them, and this thesis will unpack these at firm-level to provide a more nuanced and comprehensive discussion of their impacts.

This thesis extends the existing South African literature in multiple ways. It is the first to conduct an impact evaluation of the Employment Equity Act of 1998 and its impact on employment levels and firms' choice of inputs. Secondly, this thesis brings with it a new-to-the-world dataset, which was constructed purely to facilitate the research conducted within this thesis – that of the Bargaining Council Minimum Wage Dataset (BCMWD). Thirdly, by using this new dataset, this thesis unpacks the effects that collective bargaining in South Africa has on firm employment, workers' wages, and labour productivity.

1.2 THE IMPACT OF THE EMPLOYMENT EQUITY ACT OF 1998 ON EMPLOYMENT STRATEGIES OF FIRMS

The legislative and regulatory environment of the South African labour market has been radically transformed, with a key focus on extending a large range of rights to all employees in order to address inequalities created under the apartheid regime (Benjamin, 2005). However, while the introduction of the new regulatory framework through the Labour Relations Act, the Basic Conditions of Employment Act, and the Employment Equity Act has created a more secure work environment for some employees (especially in the formal sector), it has been argued that it has significantly increased the cost of employing labour. These costs, however, are presumably more burdensome for smaller firms and firms that are trying to compete in the global market (Rankin, 2006; CDE, 2013).

Chapter 2 investigates the impact of one particular labour market policy – the Employment Equity Act of 1998 - on South African firms' employment and production strategies.

The Act was designed to address unequal access to employment opportunities created by the racially segmented labour market under the apartheid regime. Thus, by legislating affirmative action, the Act requires firms that employ more than 50 employees to provide a detailed employment strategy, over a five-year period, that outlines how the firm intends to restructure its workforce to reflect the demographic composition in the region in which it operates.

A number of recent international studies have investigated the impact of size-dependent regulation on employment and production dynamics of firms around the policy assignment threshold (Garicano et al, 2013; Gourio & Roys, 2013; Ramasawy, 2013). A common finding is that the distribution of firms in countries with size-dependent regulations exhibits a significant concentration of firms below the policy threshold. This indicates that regulation influences firm decisions and firm growth.

This chapter extends these analyses to the South African context. Using the fact that the Employment Equity Act is also a size-dependent regulation which applies to firms of 50 employees and more, the chapter utilises a Regression Discontinuity Design (RDD) approach to investigate the impact of the Act on firm dynamics for firms that fall just around the policy threshold. Using matched 1996 Manufacturing Census and 2001 Large Sample Survey data to track changes in employment intensity and production strategies of firms that operated in 1996 with a workforce of around 50 employees allows the observation of firms before and after the implementation of the Act. If the standard RDD assumptions hold, then any differences in employment intensity or production strategies of policy treated firms that were initially above the threshold and therefore were exposed to the Act compared to firms that fell below the threshold can be attributed to the fact that the policy treated firms were required to comply with the Act.

The chapter concludes that there is a high possibility that the introduction of the Employment Equity Act of 1998 has created a distortion in employment which has resulted in an inefficient allocation of resources at a firm level. What results is a lower employment of labour, particularly at the small and medium enterprise level. This illustrates that smaller firms may be changing their capital-to-labour composition to avoid having to comply with the Act.

1.3 THE BARGAINING COUNCIL MINIMUM WAGE DATASET

The labour market reforms of the late 1990s and early 2000s introduced two types of institutionalised wage bargaining. The first is sectoral determination. This covers a group of sectors where it is difficult for workers to organise. In these sectors the Minister of Labour sets minimum wages which are periodically renewed (Edwards et al., 2014). The second are Bargaining Councils, which cover sectors where worker organisation is more easily established. Bargaining Councils cover collective bargaining at a sectoral, rather than firm or plant, level

and are formed by representatives of businesses and workers in a specific sector. If a Bargaining Council represents most workers and employers within a sector then agreements reached by that council are extended to all participants in the sector, irrespective of whether they were party to such agreements, although a formal exemption can be applied for and granted by the Minister of Labour (Edwards et al., 2014).

Prior to this chapter there has been no fully-fledged dataset containing the wages prescribed by the respective Bargaining Councils that could be used for research. This particular form of data is essential for unpacking various outcomes related to collective bargaining within the South African labour market i.e. the effects on employment, wages, and labour productivity. Existing literature has only been able to make use of cross-sectional or sector specific Bargaining Council data.

The dataset in question currently contains wages and other details for 28 of the 38 registered private sector Bargaining Councils; the other ten are excluded due to lack of availability of their Bargaining Council agreements. The dataset contains 19 409 observations, with varying degrees of variation in minimum wage announcements, particularly sectorally, sub-sectorally, geographically, occupationally and by time. Some councils have national representivity, while others are restricted to a particular province, or even to a particular city or town. Some cater for very specific industries, while others cover a wide range of sub-sectors. The vast majority of councils captured provide minimum wages that have been disaggregated by occupation.

Chapter 3 outlines the history and background of Bargaining Councils (paying attention to their importance in South Africa's labour economy). The chapter then offers a discussion on the data collection process, and cleaning methodologies employed to create the Bargaining Council Minimum Wage Dataset.

Lastly, the chapter proceeds with a discussion of the metadata of the dataset, as well as of some descriptive statistics to illustrate its importance and potential usage.

1.4 EMPLOYMENT EFFECTS OF BARGAINING COUNCIL DECISIONS

Bargaining Councils have been shown to cause lower levels of employment and fewer small firms in the areas and sectors where they exist (Magruder, 2012). In sectors like clothing there is descriptive evidence of their deleterious effects (Nattrass and Seekings, 2012). However, these studies have only used cross-sections of data and broad definitions of coverage (Magruder, 2012) or focused on a specific industry (Nattrass and Seekings, 2012) and have not considered how these councils may constrain firm-level adjustment - and, consequently, employment adjustment. This chapter provides a detailed analysis of these Bargaining Councils and their relationship with wages and employment.

Using the dataset discussed in chapter 3, chapter 4 matches the Bargaining Council data to officially collected labour market data. The Post-Apartheid Labour Market Series (PALMS) combines 39 labour market surveys collected by Statistics South Africa since 1994, defines variables in a consistent way, weights observations consistently and calculates real earnings at an individual level during this period. Respondents in these surveys also report the size of the firms that they work for. This data is linked to the Bargaining Council database through the sectors in which people work. This chapter thus investigates sector level outcomes which are correlated to Bargaining Council coverage and agreements and allows the chapter to explore whether or not workers are receiving the prescribed minimum wages.

This chapter exploits three aspects of variation to identify the effect of Bargaining Councils on employment and wages: first, regional variation in coverage (some areas are covered by Bargaining Councils whilst others are not); second, time variation (different Bargaining Councils have rounds of collective bargaining at different times); and third, variation in wage

levels for different occupations within a Bargaining Council (different occupational levels have different set wages for different sectors and these do not correspond across sectors). This variation, and the changes which occur after different rounds of collective bargaining, is then used to examine whether these agreements are associated with wage outcomes, employment levels and employment by different sizes of firms.

The results of this chapter conclude that despite minimum wages prescribed by said Bargaining Councils, the average employee still receives (or reports) a wage that is 42% below the stipulated minimum. Furthermore, the extension of updated Bargaining Council agreements is shown to have a detrimental effect on employment, whereby the presence of a new bargaining council agreement decreases employment in firms subjected to the new agreement by approximately 8%. These results are robust to both individual and firm level characteristics.

1.5 SOUTH AFRICAN LABOUR PRODUCTIVITY AND THE IMPACT OF BARGAINING COUNCILS

Very little is known about the evolution of labour productivity in post-apartheid South Africa, especially with its relation to Bargaining Councils. Existing work on labour productivity in South Africa has mostly focused on aggregate figures and generally portrayed the observed increase in labour productivity levels as a positive outcome. In a country that is grappling with glaring unemployment issues, while trying to navigate effective policy mix to remedy this issue, the study of labour productivity with its relation to Bargaining Councils should be considered vital.

Chapter 5 unpacks the effects of Bargaining Council agreements on labour productivity in two distinct ways: (i) at a sectoral level – utilising the created Bargaining Council Minimum Wage Dataset this chapter is able to match this with sectoral-level data and conduct an evaluation of the effects of these councils; (ii) at a firm-level – relying on firm level data, this chapter will

unpack which firms (by way of firm characteristics) are most affected by Bargaining Council decisions. The evaluation techniques in both aforementioned contexts rely on regressions to control for fixed effects.

This chapter concludes that aggregate labour productivity (in manufacturing) in South Africa has been growing and that almost all of this growth has been driven by within-industry growth, with minimal of the growth being driven by cross-industry reallocation.

This chapter suggests that the negative relationship exhibited by initial labour productivity and labour productivity growth speaks to a “catching-up” behaviour by lower labour productivity sub-sectors. The analysis of Bargaining Council effects suggest that the presence of Bargaining Councils is correlated with sub-sectors being more productive. This result reinforces a notion that Bargaining Council agreements force less productive firms to restructure to become more productive, likely favouring more skilled employees over their less skilled counterparts – placing a burden on those employees who would be considered to be in the most precarious employment position. Another explanation may be that these Bargaining Council agreements force less productive firms (which are typically more labour intensive) to exit the market.

1.6 SUMMARY

The research contained in this thesis explores the effects of government policy (particularly that of labour market regulations) on the dynamics of firms. The research is unique and adds to the existing literature in three distinct ways. Firstly, it is the first to conduct a thorough impact evaluation of the Employment Equity Act of 1998 – thus determining whether the Act facilitated the transformation of the labour market that the South African government aimed to achieve. Secondly, this thesis utilises a new-to-the-world dataset, which was constructed purely to facilitate the research conducted within this thesis – that of the Bargaining Council Minimum

Wage Dataset (BCMWD). A substantial amount of time and effort was dedicated to capturing, cleaning, and constructing this dataset. Thirdly, by using this new dataset, this thesis unpacks the effects that collective bargaining in South Africa has on firm employment, workers' wages, and labour productivity.

Literature on the effects of the Acts and policies discussed in this thesis is typically quite sparse, and the studies that do exist typically are only evaluated at an aggregate level, with minimal research being conducted at the firm-level. Since discussions on transformation of the labour market, workers' rights, and the implementation of a National Minimum Wage, are consistently topical in the South African economy, this thesis adds to the limited literature by providing insights into how these government policies have affected firm dynamics.

In summary, this thesis highlights the importance and usefulness of robust, and comprehensive studies on South African labour market regulations. This thesis makes it quite clear that while these policies and regulations are rooted in good intentions, they can result in unexpected trade-offs. If the South African government truly wishes to stimulate growth, accelerate transformation, reduce inequality, and generate employment it is imperative that a deeper understanding of firm behaviour is obtained. The results of this thesis serve to caution against treating firms as homogeneous, especially through the application of policy and regulation: it is clear that no "one-size-fits-all" policy approach is appropriate.

Chapter 2: **The Impact of the Employment Equity Act of 1998 on Employment Strategies of Firms**

2.1 INTRODUCTION

With the first democratic elections in South Africa in 1994, the newly elected government inherited an economic system of low growth, high government debt, mass unemployment, poverty and inequality with little worker protection, especially of African workers. To address these socio-economic problems, the newly elected government combined a development path of job creation through macro-economic stability, fiscal discipline and export-oriented growth and a radical restructuring of the labour market with a focus on worker rights. Thus, during the 1990s South Africa was not only re-introduced into the global economy through the lifting of sanctions and deliberate trade liberalisations, but various progressive labour regulations were introduced to create a more inclusive labour market. The rationale of these policies was to create an environment that would improve the quality of employment for South Africans, especially those most disadvantaged under apartheid. Together these two broad policy changes introduced a tension which firms had to grapple with: how to respond to a new set of labour regulations whilst simultaneously facing increased global competition. This chapter's focus is on labour regulation, specifically the Employment Equity Act of 1998.

After the fall of apartheid, the legislative and regulatory environment of the South African labour market was radically transformed. A key focus was on extending a large range of rights to all employees to address inequalities created under the apartheid regime (Benjamin, 2005). However, while the introduction of the new regulatory framework through the Labour Relations Act (LRA), the Basic Conditions of Employment Act (BCEA), and the Employment Equity

(EE) Act has created a more secure work environment for some employees (especially in the formal sector), it has been argued that it has significantly increased the cost of employing labour (Rankin, 2006). These costs are presumably more burdensome for smaller firms, since they often have a fixed-cost component (for example employing specific human resource time or skills), and firms that are trying to compete in the global market, since the period of introduction corresponded with an increase in global trade driven by the re-emergence of low labour-cost producers like China (Rankin, 2006).

The Employment Equity Act (EEA) of 1998 was designed to address unequal access to employment opportunities created by the racially segmented labour market under the apartheid regime. Thus, by legislating affirmative action, the Act requires firms that employ 50 or more employees to provide a detailed employment strategy over a five-year period that outlines how the firm intends to restructure its workforce to reflect the demographic composition in the region in which it operates.

While this Act may have been instituted over 20 years ago, it has become topical again more recently. In the latter half of 2015 the South African Department of Labour announced its plans to take approximately 1,400 firms to the Labour Court for failing to comply with the Employment Equity Act of 1998. This announcement linked to the 2014-15 report of the Commission for Employment Equity which found that the pace of transformation in the private sector had remained slow.

With focus being put heavily back on the South African labour market, this chapter aims to explore the shifts in labour market regulation and legislation in South Africa from 1994

onwards. It will investigate the impact of one particular labour market policy –the Employment Equity Act of 1998 – on South African firms’ employment and production strategies.

The paper shows that the Employment Equity Act of 1998 indeed created a discontinuity at the 50-employee level; with firms above the 50-employee threshold having significantly less employment, asset value, and capital expenditure relative to firms that fall beneath the threshold. Thus, the introduction of the Act has resulted in two distinctly different groups of firms that have adopted different approaches to how they treat capital and labour within the firm.

2.2 LITERATURE REVIEW

2.2.1 A BRIEF HISTORY OF SOUTH AFRICAN LABOUR REGULATION

The fall of apartheid in 1994 prompted a radical transformation of the South African labour market. Through a suite of new labour regulations which were rooted in the Reconstruction and Development Programme (RDP¹) principles of a more inclusive society with equal opportunities and the prevention of worker exploitation, the South African labour market was reformed. These new labour regulations were driven by at least two forces (Edwards et al., 2014). The first was the need to modernise the existing labour regulations to become more inclusive, especially since under the apartheid regime, many rights of workers who were not white were ignored. The second was the role which organised labour played in the final years of apartheid and the negotiated transition to democracy. The Congress of South African Trade Unions (COSATU) was an active opponent of the apartheid system and played an important

¹ The Reconstruction and Development Plan (RDP) of 1994 was South Africa’s first major policy plan to try to redress the imbalances of the previous administration, socially, economically and spatially. The aim of the RDP was to combine growth, development, reconstruction, redistribution and reconciliation into one strategy.

role in the negotiations surrounding the transition and the crafting of regulations during the early period of democracy (Edwards et al., 2014).

The five main Acts² introduced during this period consisted of:

1. **The Labour Relations Act (LRA) of 1995:** The key aim of the LRA was to ensure orderly collective bargaining and workplace democracy; as well as to ensure effective labour market dispute resolution through the Commission for Conciliation, Mediation and Arbitration (CCMA). This Act covered all workers apart from those employed by the South African defence force, secret services, and essential services³.
2. **The Basic Conditions of Employment Act (BCEA) of 1997:** The key aim of the BCEA was to improve the minimum rights for all workers in South Africa, including part-time workers, but excluding those employed by the South African defence force, secret services, and essential services.
3. **The Employment Equity Act (EEA) of 1998:** The key aim of the EEA was to eliminate unfair discrimination and ensure the implementation of affirmative action in South Africa. This Act was only pertinent to designated firms – i.e. firms with more than 50 employees.
4. **The Skills Development Act (SDA) of 1998:** The key aim of the SDA was to design and implement national, sector, and workplace strategies to improve the skill set of the South African workforce.

² A sixth Act was added in 2001 by means of the Unemployment Insurance Act (UIA), which set out the conditions pertaining to unemployment insurance.

³ Almost 20 years after the introduction of the LRA, a set of amendments to the LRA were passed in 2014. These amendments focused primarily on how to treat part-time and contract workers and those employed through temporary employment services (or labour brokers). These amendments generally strengthen the position of those already in jobs and reduce the flexibility of firms in terms of hiring (Edwards et al., 2014).

5. **The Skills Development Levies Act (SDLA) of 1999:** This Act was utilised to collect funding for the National Skills Fund – a fund which was inherently supported by all employers except for public service, religious, and charity organisations.

The main aim of these Acts was to ensure that a socially acceptable minimum standard of working conditions was in place in South Africa, and to bring South African employment legislation into line with international standards (Black & Rankin, 1998). Since this chapter has its primary focus on the Employment Equity Act of 1998, it is imperative that more detail is given surrounding this particular policy.

The rationale of introducing the EEA in South Africa was to enforce transformation on the basis that organisations would not empower sufficient numbers of black employees of their own free will (Leonard & Grobler, 2006). Leonard & Grobler (2006) go on to say that there has been some evidence of transformation at work, but the implementation of the EEA is often reduced to a question of legal compliance.

The available literature regarding the EEA of 1998 is relatively thin. The majority of research that has been done surrounding this Act is often of a qualitative nature⁴, and has often relied on a survey-type basis in which the researcher utilises various techniques to draw meaning from open-ended questions posed to the subjects. Research surrounding the EEA which has been more quantitative has been focused on the upper echelons of employment, namely the executive and management positions within firms. This work is clearly not representative of the greater population of South Africa and is often criticised by South African labour unions as being

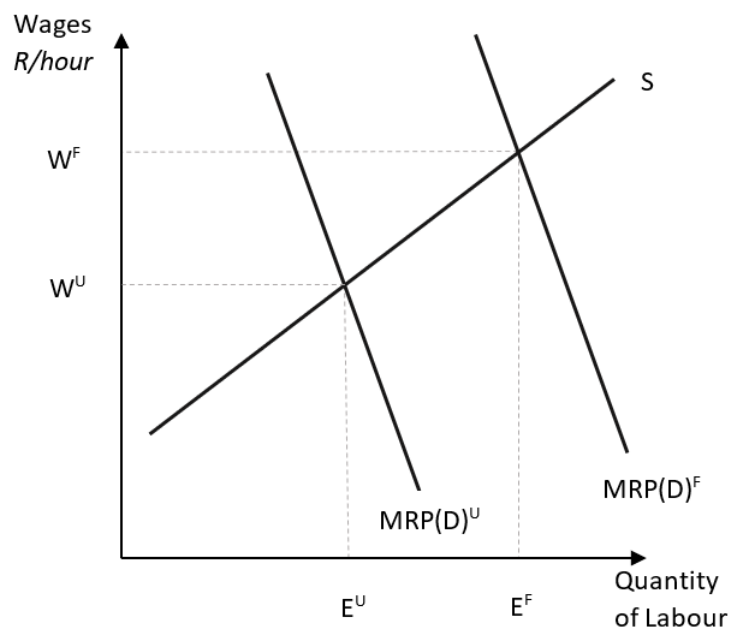
⁴ See: De Beer & Radley (2000), Denton & Vloeberghs (2003), Ng & Burke (2004), and Oosthuizen & Naidoo (2010)

“meaningless” within the context of true transformation (Coetzee & Vermeulen, 2003). This chapter fills a void in the existing literature by focusing on the impact of the EEA on smaller firms, particularly those falling around the 50-employee level, thus being more inclusive and more attuned with South Africa’s population.

2.2.2 DISCRIMINATION AND THE EMPLOYMENT EQUITY ACT OF 1998

Discrimination within the labour market can be defined as a scenario where workers are treated differently in terms of recruitment, pay, benefits, and promotion from other workers due to their inherent non-economic characteristics including gender, religion, race, and/or age. Treatment may be positive, whereby one group receives perks that the other does not, but in reality, discrimination tends to follow the path of the negative, and involve a particular group being treated unfavourably – especially in the case of pre-1994 South Africa.

Negative discrimination typically leads employers to downgrade their expected value of employment of a particular group, reducing the expected marginal revenue of productivity, and shifting the demand curve leftwards (see figure 2.1). This effectively reduces the wage rate of the discriminated group (unfavoured – W^U), while also reducing employment prospects (shown by equilibrium E^U).

Figure 2-1: MRP of favoured and unfavoured employees

To combat discrimination, The Employment Equity Act was enacted by President Nelson Mandela and the Parliament of South Africa in 1998. The Act recognised that “as a result of apartheid and other discriminatory laws and practices, there are disparities in employment, occupations and income within the national labour market; and that those disparities create such pronounced disadvantages for certain categories of people that they cannot be redressed simply by repealing discriminatory laws [sic]” (Department of Labour, 1998).

As a result, the purpose of this Act is to “promote the constitutional right of equality and the exercise of true democracy” (Department of Labour, 1998), “eliminate unfair discrimination in employment” (Department of Labour, 1998), “ensure the implementation of employment equity to redress the effects of discrimination” (Department of Labour, 1998), “achieve a diverse workforce representative of our people [sic]” (Department of Labour, 1998), “promote economic development and efficiency in the workforce” (Department of Labour, 1998), and to “give effect to the obligations of the Republic as a member of the International Labour Organization” (Department of Labour, 1998). Parts of the Act address all employers within the

South African labour market (such as Chapter 2 of the Act – ‘Prohibition of unfair discrimination’). However, this chapter is primarily concerned with the aspects that deal with designated employers⁵ and designated employees⁶, which mainly appears in chapter 3 of the Act – ‘Affirmative Action’.

Affirmative action measures are intended to ensure that suitably qualified employees from designated groups have equal employment opportunities and are equitably represented in all occupational levels of the workforce. Such measures must include:

- i. Identification and elimination of barriers with an adverse impact on designated groups;
- ii. Measures which promote diversity;
- iii. Making reasonable accommodation for people for designated employees from designated groups;
- iv. Retention, development and training of designated groups, including but not limited to skill development; and
- v. Preferential treatment and numerical goals to ensure equitable representation, which excludes quotas.

In order to implement affirmative action measures, a designated employer is expected to:

- i. Consult with employees – this consists of but is not limited to discourse with employees over areas of concern for discrimination in the workplace;
- ii. Conduct analysis;

⁵ A designated employer refers to an employer that employs 50 or more employees. May also be referred to as a ‘designated firm’.

⁶ A designated employee refers to an individual that is either black (black is a blanket term to represent African, Coloured, and Indian individuals), female, or disabled who are citizens of the Republic of South Africa by birth or descent, or became citizens of the Republic of South Africa by naturalization. May also be referred to as a ‘designated group’.

- iii. Prepare an Employment Equity Plan – this plan may not be shorter than one year and not longer than five years, and must include a timetable for the achievement of objectives and goals for each year of the plan; and
- iv. Report to the Director-General on progress made in the implementation of the plan – the Director-General may appeal to the labour court of South Africa to impose a fine on a designated employer if the preparation and execution of the Employment Equity Plan are not met.

Furthermore, a designated employer is expected to appoint a manager to oversee the preparation and execution of the Employment Equity Plan; consequently, the designated firm is also expected to make resources available for these endeavours.

It is readily apparent from clauses within the Employment Equity Act (most notably the chapter on ‘affirmative action’) that the Act is a threshold policy and is only applicable to firms with 50 or more employees. Thus, this chapter will move on to discuss threshold policies, their impact on firms, and methodologies for investigating them.

2.2.3 THRESHOLD EFFECT ON FIRMS

Small firms often face lighter regulation than their larger counterparts. It is economically rational for small firms to only have to comply with a handful of regulations as the cost of compliance may be too high for these firms to bear. However, regulation must be phased in as a firm grows – thus creating a phase-in effect at a few finite points which are sometimes referred to as “threshold effects” (Gourio & Roys, 2012). In the case of this chapter, the threshold effect being investigated is that of compliance with the Employment Equity Act of 1998 which applies to firms with 50 or more employees.

Table 2.1: Divisions among small, and medium enterprises as defined by the National Small

Enterprise Size	Number of Employees	Business Act	
		Annual Turnover	Gross Assets, excluding fixed property
Medium	< 100 - 200*.	< 4,000,000 – 50,000,000*.	< 2,000,000 – 18,000,000*.
Small	< 50.	< 2,000,000 – 25,000,000*.	< 2,000,000 – 4,500,000*.
Very Small	< 10 - 20*.	< 200,000 – 500,000*.	< 150,000 - 500,000*.
Micro	< 5.	< 150,000.	< 100,000.

Source: The National Small Business Act 102 of 1996

Note: Units for 'annual turnover' and 'gross assets' presented above are in South African Rands.

Note: * indicates industry dependence – the large bands shown above indicates the global definition for classification, but each industry in the South African economy has its own well-defined size-classification system.

As the preceding table shows, consideration of firms around the 50-employee threshold implies that the Act could directly affect firms that can be considered small, medium enterprises (SMEs), and that the EEA is not a policy geared towards only the larger South African firms. South Africa's National Development Plan (NDP) recognises the importance of small, and medium enterprises in South Africa as drivers of economic growth, and as absorbers of excess labour within South Africa. According to Abor and Quartey (2010), small businesses contribute approximately 57% to the South African GDP and are responsible for approximately 61% of South African employment. These figures alone provide a clear indication that small businesses in South Africa have a massive impact on the country's economy.

Bearing in mind the aforementioned divisions, it is important to ascertain what proportion of the South African business environment these divisions represent. Wittenberg, Arrow and Kerr (2013), produced work based on figures gathered from the Quarterly Employment Survey of Statistics South Africa which contains employment information on a nationally representative sample of enterprises, from 2005 to 2011. The authors illustrate that firms employing 20-49, or 50-99 employees account for approximately 27% of the manufacturing sector. These firms could directly encounter the threshold effects of the EEA, making the EEA a serious consideration for firms within this bracket.

Almeida & Carneiro (2008) studied the effects of labour regulation in Brazil; utilising data on employment, output, capital, and regulations at specific levels, it was established that labour regulation constrains firm size. Almeida & Carneiro (2008) stated that these negative effects on firm size (when measured in terms of employment numbers) are also likely to be associated with negative effects on overall country employment. This sentiment was echoed by Gourio & Roys (2012) who studied the threshold effects of various labour regulations in France around the 50-employee threshold. It was revealed that the size distribution of firms became visibly distorted with a large contingent of firms having exactly 49 employees in order to avoid tighter regulation. The paper went on to state that firms treated the regulations as a sunk cost which was approximately equal to one year of an average employee salary – clearly illustrating that regulation is providing a constraining effect on firm size.

Ramaswamy (2013) further solidifies the idea that threshold effects can be a hindrance to firm size by claiming that there is a “missing middle⁷” within the size distribution of the Indian manufacturing sector. The paper claims that this “missing middle” is a result of threshold effects that are generated by various labour regulations within India. This effect was first observed by Dhar & Lydall (1961), and corroborated by Mazumdar & Sarkar (2013), where it was stated that the size group of 6-49 workers accounts for more than 55% of total non-household manufacturing in 2005. Hasan & Jandoc (2013) estimated that this number could be as high as 85% in 2005 if household enterprises were included in total manufacturing employment.

Ramaswamy (2013) analyses data from 1998-2008 and reports that this missing middle is still prevalent within India. Firms falling within this size-class have higher contract-worker

⁷ ‘Middle’ is in reference to medium-sized firms.

intensity, which supports the proposition that firms utilise non-permanent workers in order to stay beneath the threshold. These empirical results supported the threshold effects of size-dependent labour regulations and fiscal incentives.

As previously stated, South Africa relies heavily on its SME industry for labour absorption and economic growth. If the threshold effects of size-dependent labour regulations (such as those generated by the EEA) hold in the same way that they do within Brazil, France, and India, there may be a cause for concern. This chapter will attempt to fill a vital gap in the literature by unpacking potential threshold effects of the Employment Equity Act of 1998 and seeing how South African firms respond⁸.

2.3 THEORETICAL BACKGROUND

2.3.1 ANTI-DISCRIMINATION LABOUR MARKET POLICY

The impact of anti-discrimination labour market regulation on both efficiency and equity remains a hotly contested topic that has given rise to two schools of thought. According to Freeman (1993), these differing perspectives can be summed up as the “distortionist” perspective, and the “institutionalist” perspective.

Distortionists view additional regulation as a cost and as an interference in the market process that impedes efficiency and creates a sub-optimal allocation of labour (Fontana & Paciello, 2007). Due to this reduction in overall efficiency, additional regulation is expected to reduce

⁸Due to limited information on the decision making process that lead to the development of the Act, it is not possible for this paper to present alternate scenarios whereby the paper would have been able to measure the impact if there was no Act at all; nor will the paper be able to measure the impact if the Act had been passed for a different threshold; nor will it be able to measure the impact if the Act had not had a threshold and had instead been binding on all firms. In order to tackle any of these alternate scenarios, this paper would have to be able to find information (information that seemingly does not exist) that explains the deliberation process that lead to the enactment of the Employment Equity Act of 1998 as it currently stands. It is possible that the threshold of 50 employees was decided on by following international evidence, or alternatively because 50 employees represents a cut-off point between small and medium business classification as shown by table 2.1.

economic growth, which is further expecting to increase inequality. In the distortionist view, the alternative to a regulated market is one that is characterised by a perfectly competitive structure that ensures workers choose whether they shall work or not by comparing the given perfectly competitive wage with the marginal utility of a non-market activity (Fontana & Paciello, 2007).

However, in developing countries, policymakers have to contend with issues that are more complex than what the distortionist view suggests. The ‘removal’ of distortions may not reveal an underlying perfectly competitive model of the labour market. Instead, it may expose imperfections on both the labour demand side and the labour supply side (Fontana & Paciello, 2007). Market imperfections on the demand side often take the form of monopsony, of which there is evidence in both developed and developing countries (Fontana & Paciello, 2007). Employers derive monopsony power from the fact that it is costly for workers to leave the firm and to get a new similar job. Uneven market power becomes a significant problem especially for workers who belong to vulnerable groups – such as those who were discriminated against in South Africa. Under these circumstances, employers can discriminate against disadvantaged workers, underpay those who are immobile, force employees to work more than they wish under the threat of dismissal or fail to ensure them against the risk of illness or disability.

Even when distortionists recognise the limited relevance of the perfectly competitive model, the proponents of labour market liberalization still argue that intervention could only cause further distortions (Fontana & Paciello, 2007). By contrast, institutionalists think that labour market interventions could potentially increase allocative efficiency, thus leading to a better economic performance. Institutionalists would argue for policies that involve positive discrimination, such as job quotas for more favourable jobs or the disproportionate provision

of more resources for education and training, and affirmative action policies which encourage the recruitment and promotion of disadvantaged workers.

With both views in mind, most of the empirical evidence on the impact of anti-discriminatory labour market reforms both in developed and developing countries suggests that labour regulations have modest effects on economic efficiency and growth (Fontana & Paciello, 2007). The efficacy of affirmative action as a policy to overcome discrimination depends, in part, upon the impact it has on employment. Some economists argue that the relationship between wage increases and employment is such that the resulting job losses would be small, but the social transformation aspect would outweigh the prospect of the job losses.

2.3.2 RESPONDING TO THE EMPLOYMENT EQUITY ACT

One of the main points of analysis in this chapter is how firms respond to EEA in terms of their trade-off between labour and capital. From baseline economic theory on production, it is known that firms can trade-off between capital and labour in order to maintain a pre-specified level of production. Thus, firms aim to optimise production (either through cost minimisation or through profit maximisation). This trade-off is not new to South Africa and has been happening for a number of years. There has been a steady rise in the capital-to-labour ratio in manufacturing over time (especially during the 1990s⁹) – thus, production still increased as employment fell due to the higher investment in capital stock. It is possible that this shedding of labour in favour of capital was exacerbated by the implementation of the Employment Equity Act of 1998 – a fact that this chapter aims to establish.

Intuitively, the cost of labour can be classified as L ; however, after the passing of the Employment Equity Act of 1998, the cost of labour for firms that are above the threshold of 50

⁹ See Samson et al., 2001

employees becomes $L+\lambda$. Naturally, this implies that the relative cost of capital would be lower at the threshold of 50 employees, and firms would gravitate towards increasing capital employed, and decreasing labour.

Figure 2-2¹⁰: Expected Discontinuity in Profit Construction of Firms

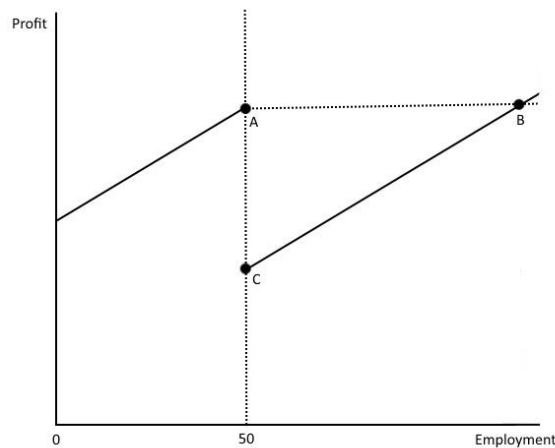


Figure 2.2 illustrates the proposed discontinuity that would exist within firms' profit construct. Gourio & Roys (2012) proposed that threshold policies are treated by firms as lump-sum sunk costs. As a result, the relationship between profit and employment would be maintained once the EEA was introduced; however, a discontinuity would be created. Firms would have incentive to be at either point A, or at point B in the preceding figure, but no firm would have incentive to be at point C. As a result, it can be expected that a shedding of employment around the threshold as firms would try to maintain profit levels by reducing costs would be seen; alternatively, firms would show a much larger growth in employment to get back to a level of profit that was being generated before the threshold was introduced. In simple terms, a firm has two strategies at its disposal when facing the Employment Equity Act of 1998: it can either substitute capital for labour, resulting in decreased employment, or it may increase employment dramatically if it treats the Act as a sunk cost. Ultimately firms will create a negative effect on

¹⁰ This figure presents the relationship between profit and employment as a linear relationship for simplicity only – it is more likely that this relationship is actually quadratic in nature.

the labour market (in terms of decreased employment) only if the first strategy is dominant. Due to the nature of the data at this chapter's disposal, it is easy to identify four distinct groups of firms within the panel. These are firms that have differed in response to the EEA with regard to how they decided to treat their employment levels. Consequently, these four types of firms are:

- i. Firms that were below 50 employees for both time periods.
- ii. Firms that were above 50 employees for both time periods.
- iii. Firms that were below 50 employees in 1996 and above 50 employees in 2001.
- iv. Firms that were above 50 employees in 1996 and below 50 employees in 2001.

These groups can be assumed to be distinctly different from each other in the way that they choose to approach their labour/capital ratios within their firm. The production function that this chapter has imposed on these firms is that of a typical Cobb-Douglas. Classically, a Cobb-Douglas production function is a particular functional form of the production function that is widely used to represent the relationship between two or more inputs and the amount of output that can be produced. In this instance, the inputs utilised are those of capital and labour. The function utilised within this chapter can be shown in its linearised form as:

$$\ln(Y) = \ln(A) + a_1 \ln(L) + a_2 \ln(K) \quad (2.1)$$

As a result, it is expected that these four different groups will exhibit different production functions after the passing of the employment equity Act. This will be further discussed under section 2.6.4 of this chapter.

2.4 DATA

This chapter will make use of one primary dataset; a matched dataset using data from the Manufacturing Census of 1996, and the Large Sample Survey (LSS) of 2001. Statistics South Africa (Stats SA) has carried out a census of the 3-digit manufacturing sector on a biannual

basis (Fedderke & Simbanegavi, 2008), the last of which was conducted in 1996. After this, Stats SA started to produce the Large Sample Survey, the first of which was released in 2001. In order to make this data useful, this chapter has matched firms from the 1996 census to the 2001 LSS according to firm identification numbers and, as a result, 1471 firms were matched. The dataset captures variables such as employment numbers, book value of fixed assets at the beginning of the year (asset value), capital expenditure on new assets, wages, and output value. This panel dataset will be referred to as the LSS 96/01 from this point forward.

The manufacturing sector is the sector of focus for a variety of reasons, that can be summarised as: (i) it is a traditional industry within South Africa and has a long history; (ii) it is well-defined, and as a consequence, it has reliable data; (iii) when publishing the National Development Plan, the South African government highlighted manufacturing as a key sector that can play a pivotal role in alleviating poverty and growing the economy – this has been reiterated in subsequent Industrial Policy Action Plans.

Naturally, there are limitations to the data that is being utilised. Firstly, the dataset can be considered small, especially with regard to the number of firms that fall within the neighbourhood of the 50-employee threshold. Secondly, since the data collected deals exclusively with manufacturing firms, the data is not representative of the South African population. Thirdly, the dataset cannot account for firms that split their business into separate entities in order to trade as two entities, and consequently escape the regulations imposed by the EEA.

The dataset is also not able to observe firms that left the market due to the introduction of the EEA, nor the firms that didn't enter the market due to the EEA's presence. Thus, these results can only be extended to firms that remained within the market after the passing of the EEA.

2.4.1 VARIABLES

There are a handful of variables of interest in this Chapter. These will shed light on the manner in which firms deal with the implementation of the Employment Equity Act of 1998. A short description of why each variable is important, and what this chapter expects that variable to reflect is as follows:

- **Employment numbers:** This variable is crucial to the chapter as the chapter aims to investigate the impact that the Employment Equity Act of 1998 had on firm employment. It is expected that employment numbers would fall for firms trying to remain (or transition to) below the threshold of the Act.
- **Book value of fixed assets at the beginning of the year (asset value):** This measure provides insight into the labour-capital ratio that a firm has. It is to be expected that firms that choose to actively engage with the Act will have higher asset values than other firms.
- **Capital expenditure on new assets:** If firms change the level of labour that they employ, it is expected that a shift would also be seen in terms of capital. Firms would trade off labour for capital if they are trying to remain (or transition to) below the threshold of the Act.
- **Average wages:** The average wage would indicate the firm's behaviour and stance towards labour once the Act was passed. If a firm were to stay below the threshold, it can be expected that firms of this nature would pay a higher average wage in order to retain more skilled staff. Firms falling above the threshold would show the opposite as they would not have the need to pay an efficiency wage.

- **Output value:** This chapter hypothesises that firms will trade off labour with capital if the firm actively tries to avoid having to comply with the Act. This chapter expects that output should not change, as firms would change their labour-capital ratios in such a way that output remains constant.
- **Labour productivity:** This variable is important in regard to this chapter as it further indicates how firms are adjusting both their labour-capital ratio, and their output once the Act was implemented. This chapter expects that labour productivity would rise for firms that actively shed employment to fall below the threshold, as these firms would aim to have their output remain constant, while dealing with a smaller workforce.

2.5 METHODOLOGY

This chapter will employ a Regression Discontinuity Design (RDD), Ordinary Least Squares Regressions, and descriptive statistics as its methodologies for analysis.

2.5.1 DESCRIPTIVE APPROACH

The descriptive statistics approach will allow this chapter to illustrate changes that occurred within firms that were affected by the implementation of the Employment Equity Act. Furthermore, this approach will allow the chapter to contrast how firms have adapted to the implementation of the Act in terms of their hiring policies, capital structure, production technologies, and wage structures.

2.5.2 ORDINARY LEAST SQUARES

In order to understand the relationship between capital and labour more intensely, a Cobb-Douglas production function will be imposed on the data in question. This function takes the form of:

$$Y(L, K) = AL^{a_1} K^{a_2} \quad (2.2)$$

which may be linearised as:

$$\ln(Y) = \ln(A) + a_1 \ln(L) + a_2 \ln(K) \quad (2.3)$$

Utilising Ordinary Least Squares regressions, this function will be estimated for various neighbourhoods within the data.

2.5.3 REGRESSION DISCONTINUITY DESIGN

This chapter makes use of a sharp regression discontinuity design¹¹. Utilisation of the RDD methodology allows for the causal effects of interventions by assigning a cut off or threshold above or below which an intervention is assigned to be elicited. In this Chapter, the intervention that is considered is that of the introduction of the Employment Equity Act; as a result, the threshold that will be utilised is 50 employees; furthermore, the running variable in question will always be employment. This chapter will employ the RDD on the LSS 96/01 in order to ascertain what effects the Employment Equity Act of 1998 had on the firms within the sample. This dataset is ideal as the EEA falls exactly between the two waves, which allows this chapter to track firms prior to the implementation of the Act when they were less likely to be aware of the Act, as well as to three years after the Act's implementation. Furthermore, as this chapter uses 50 employees as the policy threshold, it will consider firms with 40-49 employees as the data to be used before the threshold, and firms with 50-60 employees as the firms after the

¹¹ The intention of this chapter is to measure the implementation of the legislation and not the enforcement thereof. In this case, all firms with less than 50 employees would not be treated.

Firms above 50 employees would be treated with what one may call a two-stage treatment. In essence, **(i)** firms are expected to comply, and **(ii)** if they don't, they will be punished. In essence, all firms above 50 employees will end up being treated by one of these two scenarios – which is the reason for arguing that this is a sharp RDD.

threshold. This bandwidth is based on similar decisions that were made by the studies that were discussed in the literature review, as well as the results of `rdrobust`¹² which indicate a bandwidth selection of 10 units on each side of the cutoff.

2.5.3.1 PARAMETRIC

The purpose of this methodology is to provide a graphical depiction of the variables of interest and how they may differ before and after the 50-employee threshold. A typical approach is followed here as proposed by Lee & Lemieux (2009) whereby bins are generated, the mid-points of these bins are found, and interaction terms for treatment are generated before running polynomial regressions. These polynomial regressions take the form of:

$$Y_i = \alpha + \beta_1 X_i + \beta_2 X_i^2 + \dots + \beta_p X_i^p + \gamma d_i + \delta_1 d_i X_i + \delta_2 d_i X_i^2 + \dots + \delta_p d_i X_i^p, \quad (2.4)$$

where Y_i represents the variable of interest, X_i is the running variable (1996 employment), and d_i the assignment dummy variable.

In RDD, the shape of the functional relation between the outcome variable and the assignment score is very important. Misspecification of the model can lead to biased estimation of the treatment effect (Lee & Munk, 2008). Bias may also be increased in model estimates if the data points utilised are too close to the cut-off (Lee & Munk, 2008). When a polynomial model is fitted to the data, a term of higher order than the data may suggest should be included in the starting model; however, this leads to inefficient estimates.

¹² A Stata package

To reduce bias due to model misspecification, over-fitting of the model may be necessary. But this will require either a larger sample size or lower efficiency of estimates; under-fitting of the parametric model, meanwhile, leads to increased bias. There is therefore a need to strike a balance between efficiency and bias - this is known as the “variance-bias trade off”.

Gelman & Imbens (2014) add to the argument by showing three somewhat related reasons why high-order polynomials are a poor choice in regression discontinuity analysis. Firstly, estimates based on a polynomial regression can be interpreted as the difference between a weighted average of the outcomes for the treated variables and a weighted average for the controls. These weights depend only on the threshold and the values of the forcing variable, and not on the values of the outcomes. The chapter found that weights implied by higher order polynomial regressions were not as attractive as those for local linear regressions. Secondly, the chapter argues that results are highly sensitive to the order of the polynomial that is imposed. Thirdly, Gelman & Imbens (2014) state that inference based on higher order polynomials is often poor – which can have misleading results.

For the reasons mentioned above this chapter begins by over-fitting the model with more polynomial and interaction terms than is deemed necessary. The chapter proceeds by eliminating insignificant orders (moving from higher order to lower order), stopping once the polynomial order is shown to be significant. After proceeding in this fashion, it was established that a second-degree polynomial provided the best fit for the available data, with a bandwidth of 10 units either side of the 50-employee threshold for the parametric design¹³. These results are also supported by descriptive graphs shown later in this chapter.

¹³ This bandwidth was selected to create a large enough sample size for the parametric regression discontinuity design, as well as to be in-keeping with the prevailing literature.

2.5.3.2 NON-PARAMETRIC

Non-parametric estimation does not represent a solution to functional form issues raised by parametric RD designs, and should therefore be viewed as complementary to, rather than as a substitute for, parametric estimation (Lee & Lemieux, 2009). It is for this reason that the non-parametric approach is also utilised by this chapter. As mentioned above, this chapter makes use of a sharp regression discontinuity design, whereby the impact of the threshold generated by the EEA can be calculated via the following expression (Khandker, Koolwal, & Samad, 2010):

$$I = (y^+ - y^-)/(s^+ - s^-), \quad (2.5)$$

where y^+ is the mean outcome for firms that fall above the 50-employee threshold, and y^- is the mean outcome for firms that fall below the 50-employee threshold; s^+ is the mean treatment status for firms that are expected to comply with EEA regulation, and s^- is the treatment status for firms that are not expected to comply with EEA regulation. This chapter treats the RD design as strict, implying that the treatment status of a firm is a deterministic function of whether or not the firm falls above the 50-employee threshold. As a result, firms that fall above the threshold are assigned $s^+=1$, and firms that fall below the threshold are assigned $s^-=0$. The design is considered sharp rather than fuzzy because the chapter has no meaningful way of measuring firm compliance with EEA. In this respect, what is being measured is intention to treat (ITT) – implying that this chapter is truly measuring the lower bound of treatment on firms.

It must be noted that the parametric and the non-parametric approaches have different bandwidths. The bandwidth selected for the parametric approach was based on the need to keep a large enough sample size, while not increasing the bias of estimators from being too close to

the threshold; this reasoning has been reiterated by previous studies that have been cited within the literature review of this chapter. The non-parametric approach has a stricter method for selecting optimal bandwidth available to it; this is the approach offered up by Imbens & Kalyanaraman (2009).

Imbens & Kalyanaraman (2009) argue that there is an optimal, data dependent, bandwidth choice rule available when selecting the optimal smoothing parameter (bandwidth) for the regression discontinuity estimator in a non-parametric design. Utilising this rule through the application of an additional Stata package, “RD”, the optimal bandwidth is shown to be 5 units on either side of the 50-employee threshold.

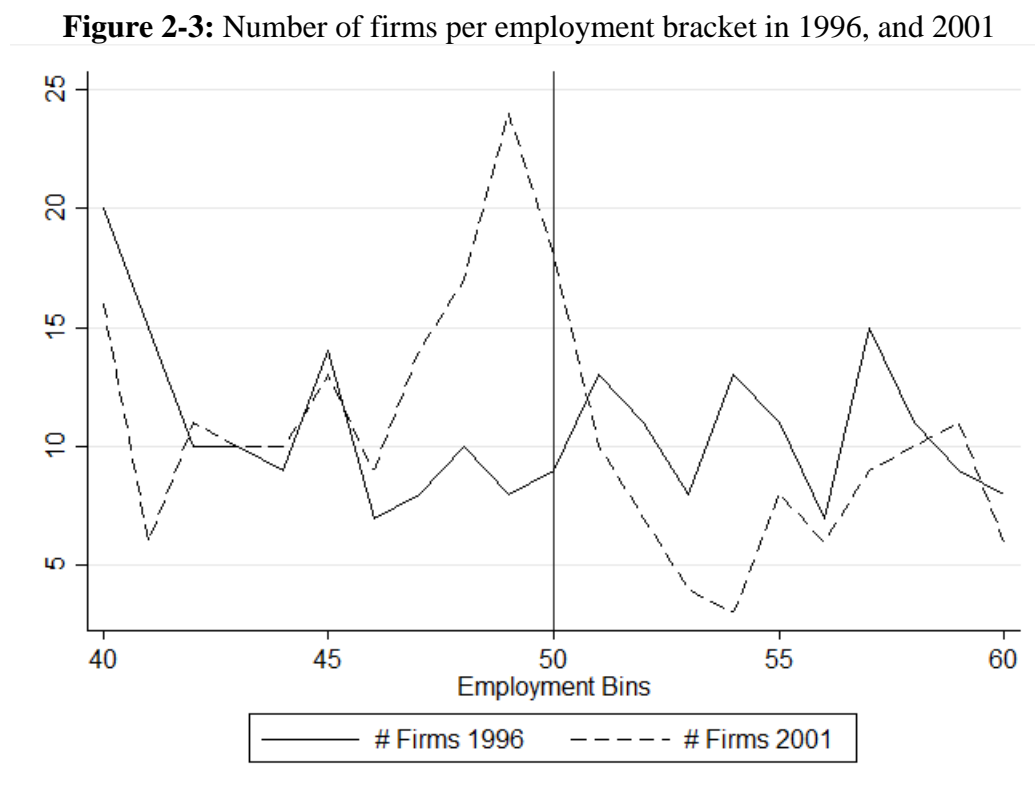
This chapter will proceed by running the parametric analysis with the bandwidth of 10 units. This bandwidth will also be applied to the non-parametric approach, before running the non-parametric at its optimal bandwidth of 5 units – comparisons between the two will be noted and assessed.

While extremely interesting, we have no way of studying phase two, since we do not have data on firms that did comply or not. Thus, all we can measure is stage one, which is purely the implementation of the Act.

2.6 THE RESPONSE TO EEA – ANALYSIS OF 1996/2001 DATA

2.6.1 DESCRIPTIVE ANALYSIS

This section of the chapter will deal exclusively with the LSS 96/01 sample and will utilise the methods discussed earlier in order to investigate the impact of the Employment Equity Act on firms within South Africa. This section will look at the impact the Act had on firms when it was unanticipated, and consequently how firms changed their employment strategies, capital outlay, and wage structures once the Act had been passed.



The passing of the Employment Equity Act in 1998 could not be anticipated by firms – thus, it is unlikely that many firms managed to adjust to the threshold effects that were imposed by the Act before it was passed. Figure 2.3 plots the firm size distribution of the LSS 96/01 sample.

In the period of 1996 employment showed no noticeable patterns. However, once the EEA was passed in 1998, the line-plot of 2001's employment numbers elicits a concise result. After the

passing of the Act, firm employment started to cluster below the 50-employee threshold, with a noticeable dip in the number of firms employing more than 50 employees. There is an obvious increase in the number of firms falling below the 50-employee threshold, and a clear decrease in firm numbers above the threshold. As expected, the employment bracket showing the greatest increase is that of 49 employees – eliciting the idea that many firms were willing to decrease employment numbers to just below the threshold, but not a large degree further. With firms acting according to a priori expectation, it is equally important to take note of how output reacted to the changes in firm employment.¹⁴

In order to investigate the potential effects that the Employment Equity Act may have had, it is vital to look at the average levels of employment, asset value, capital expenditure on new assets, wages, and output value in 1996, 2001, and the average differences between the two for firms that were below, and above the 50-employee threshold. These figures are summarised in table 2.2.

Table 2.2: Average levels, and average differences for firms above and below the 50-employee threshold in 1996, and 2001 (R'000s)

	Average level for firms with 40-49 employees (1996/2001)	Average level for firms with 50-60 employees (1996/2001)	Average change for firms with 40-49 employees (2001 – 1996)	Average change for firms with 50-60 employees (2001 – 1996)
Asset value	1,212.60 / 1,528.06	1,305.60 / 1,787.88	360.72	417.18
Labour productivity ¹⁵	5.11 / 5.17	5.19 / 5.28	.08	.20
Output	9,816.19 / 11,905.52	11,492.62 / 13,976.99	2,867.26	2,752.08
Average wages per employee	42.22 / 44.42	43.20 / 44.46	1.96	3.04
Capital expenditure on new assets	265.47 / 309.98	216.75 / 230.37	54.21	-5.74

Note: All figures quoted in 1996 Rands.

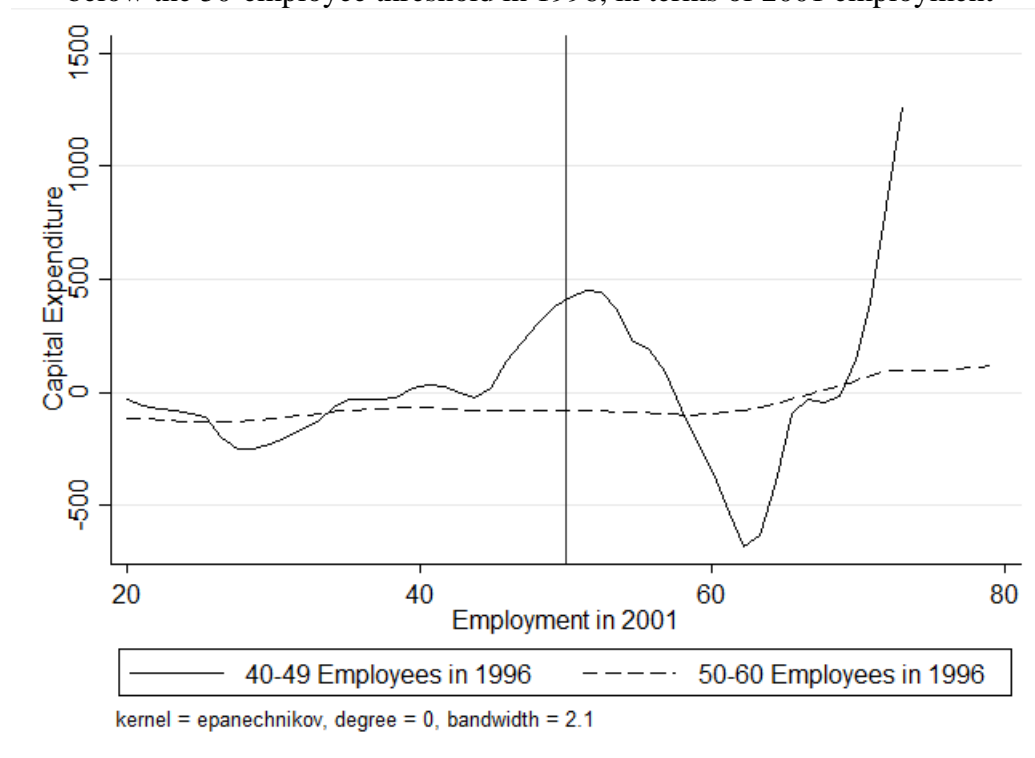
¹⁴ Table A1 in Appendix 1 shows figure 3 in numerical terms.

¹⁵ Labour productivity is defined as total firm output divided by total firm employment.

The preceding table highlights what happened to two different classes of firms after the passing of the Employment Equity Act. The first group is comprised of firms that had employment numbers falling within the band of 40-49 employees in 1996 (below); the second group being that of firms with 50-60 employees in 1996 (above).

The first figure that stands out is the average change on capital expenditure on new assets for firms with 40-49 employees. This figure stands at an average of R54 211, which elicits the idea that these firms are becoming more capital intensive in order to avoid hiring additional labour. Consequently, their 50-60 employee counterparts showed a negative average difference of R5 742, suggesting a slowdown in capital expansion. Both groups of firms showed growth in terms of output, both of which came close to the R2 800 000 mark. However, it can be concluded that this growth in output is likely to have been attributed to a growth in capital of the firm, as labour productivity was virtually unchanged for both groups (and is also fairly equal in both groups). Knowing that employment numbers had changed, which was illustrated earlier on by the clustering effects shown in figure 2.3. It can be concluded that the capital expenditure on new assets was the driving force behind not only maintaining but increasing output.

Figure 2-4: Average difference in log of capital expenditure on new assets of firms above and below the 50-employee threshold in 1996, in terms of 2001 employment

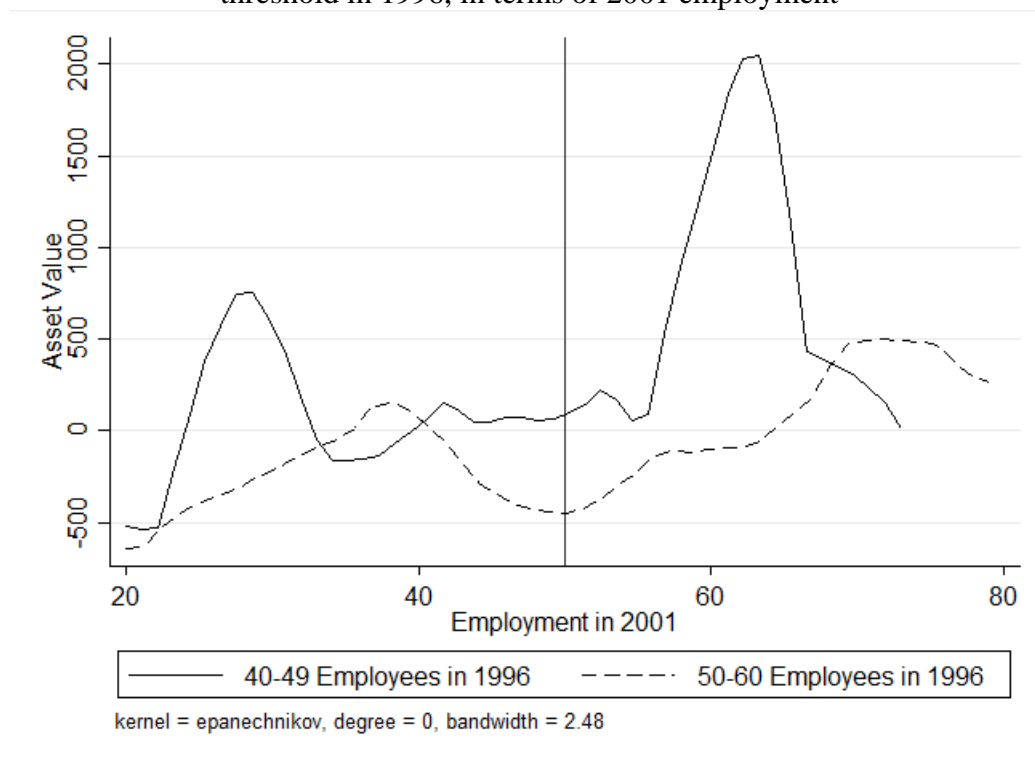


These average levels and average differences provide mass insight into the practices of firms in the presence of the Employment Equity Act. But it is more illuminating to follow one particular group of firms and see how they changed over time. The following series of graphs illustrate the average differences¹⁶ that occurred for firms that fell within the 40-60 employee bracket in 1996 for all of the aforementioned variables, plotted against employment in 2001. Average differences are plotted against the Y-axis, with the X-axis measuring 2001 employment figures. The first major finding to emanate from figure 2.4 is that capital expenditure on new assets for firms that were below the threshold in 1996 outstrips that of firms that were above the threshold in 1996, when looking at the 50-employee mark in 2001. This prompts the idea that these firms were intent on keeping employment levels below the threshold, and instead substituting away from labour towards capital. Furthermore, firms that were below the threshold in 1996 and

¹⁶ All average differences were calculated as the mean of the 2001 value less the 1996 value.

above it in 2001 tend to show a downward slope in capital expenditure, yet again reiterating the clear relationship between capital and labour – the firms that chose to increase employment consequently started spending less on capital expansion. However, it is not only the capital expenditure on new assets that is of interest to this chapter. Hence the following graph will illustrate the average difference in asset values for firms that were above and below the threshold in 1996.

Figure 2-5: Average difference in asset value of firms above and below the 50-employee threshold in 1996, in terms of 2001 employment



As is evident from the preceding graph, firms that were above the 50-employee threshold in 1996 show an average difference that tracks zero. However, firms that were below the threshold in 1996, and above it in 2001, showed a very high average difference in asset value. This illustrates that firms that chose to cross the threshold and start to comply with the Employment Equity Act regulations did so in order to accelerate their growth through higher employment, and capital values. This is concurrent with the proposed model in the theoretical background of this chapter: firms aim to maintain output by either shedding employment, or by increasing it

exorbitantly to try and get back to the initial level of output that was attained before the discontinuity created by the implementation of the EEA.

Figure 2-6: Average difference in average wages per employee of firms above and below the 50-employee threshold in 1996, in terms of 2001 employment

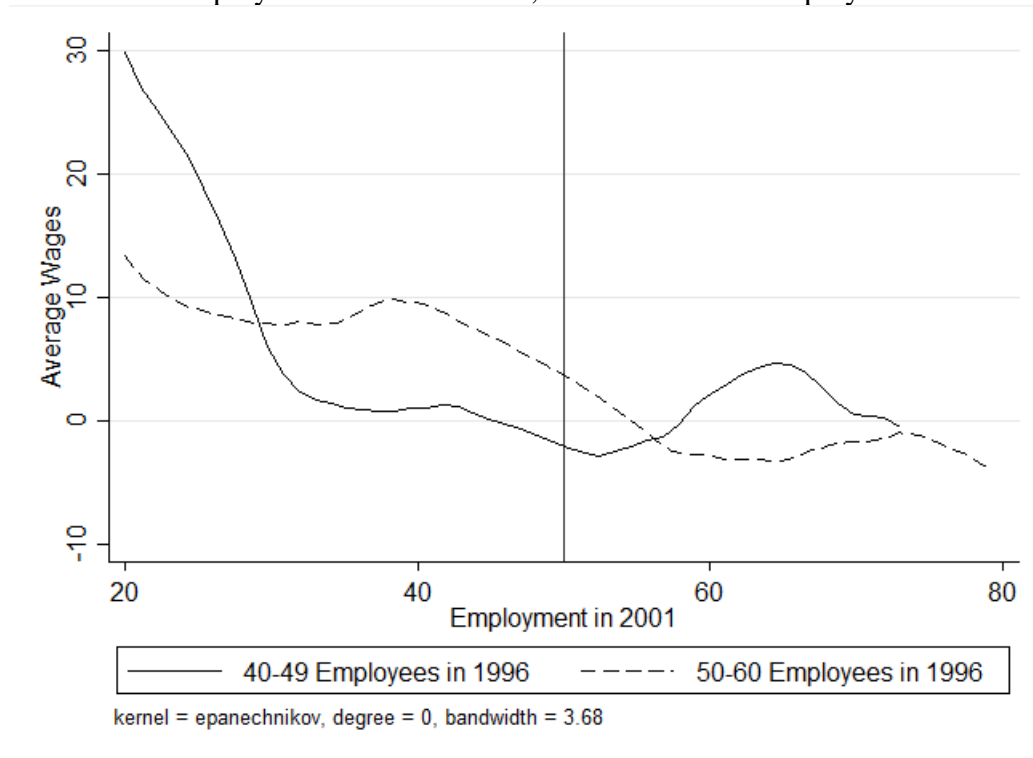
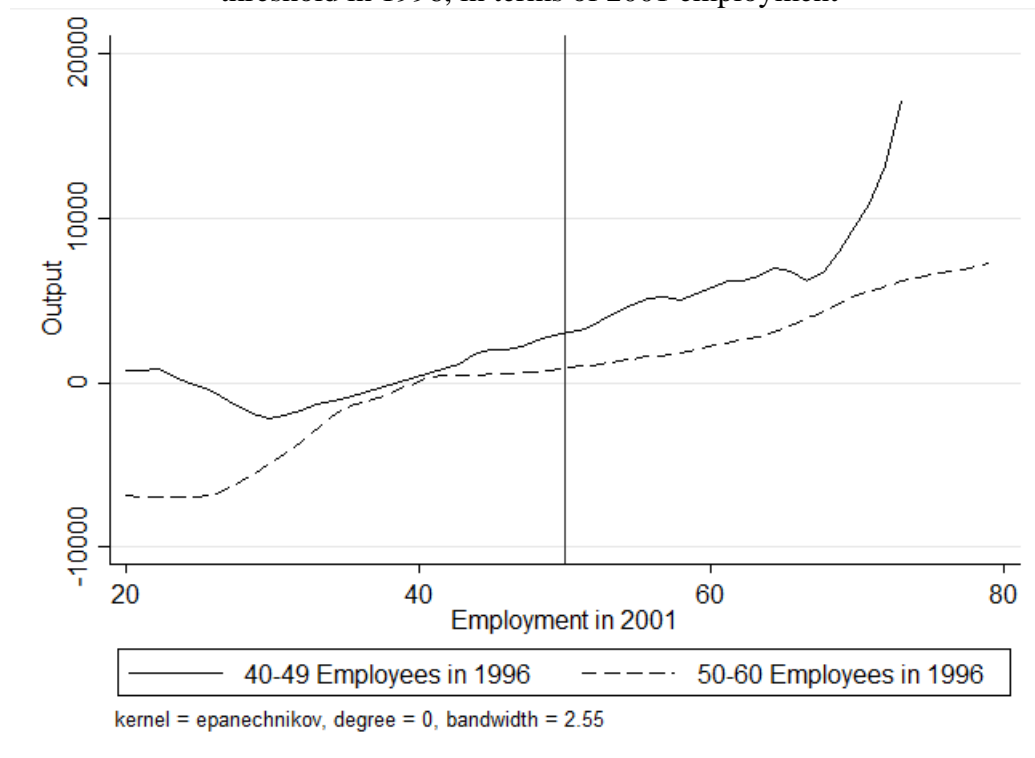


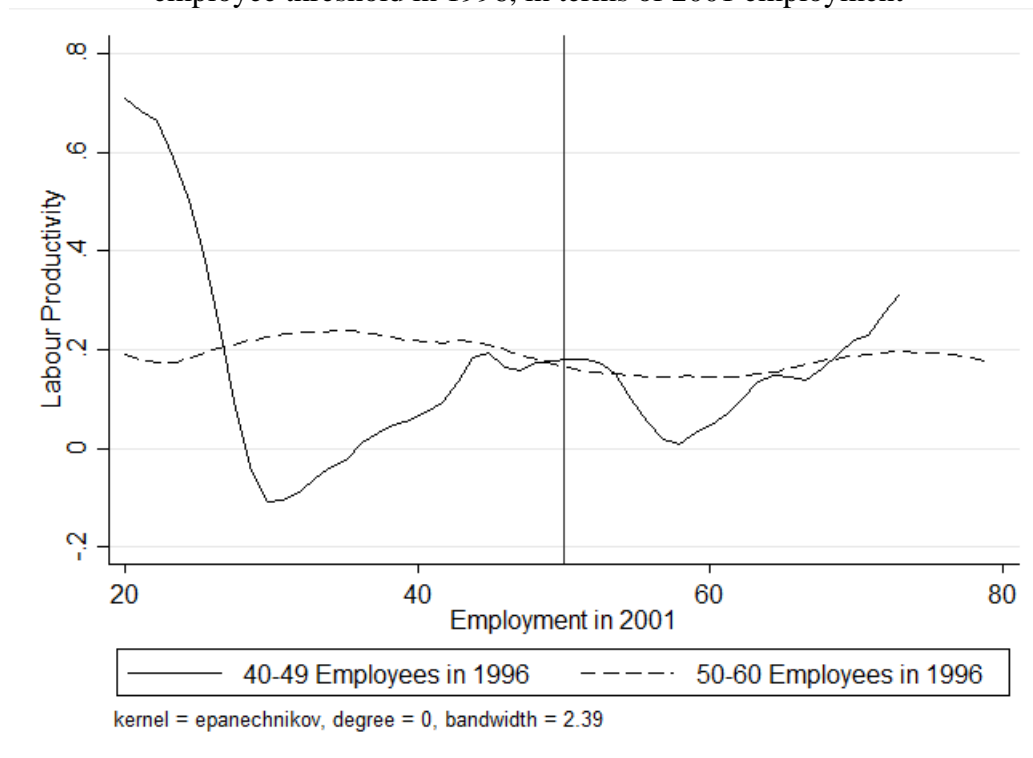
Figure 2.6 shows the average difference in average wages per employee. It is easily recognisable that firms that were above the threshold in 1996, and subsequently below in 2001, had a higher average difference in wages than those that remained below the threshold. This is indicative of firms choosing to pay higher wages in order to retain skilled and efficient labour to try and maintain their level of output. Conversely, firms that were below the threshold in 1996, and above it in 2001, paid lower wages as the need to pay efficiency wages in order to retain a skilled labour force to the initial level of output was traded against an increased workforce.

Figure 2-7: Average difference in output of firms above and below the 50-employee threshold in 1996, in terms of 2001 employment



Perhaps the most important variable considered is that of the average change in output. As figure 2.7 illustrates, for the most part the change in output is close to 0, especially for firms that were above the 50-employee threshold in 1996. This is a key finding as it shows that output was maintained irrespective of a firm's decision to switch employment strategies. Furthermore, firms that actively chose to cross from below the threshold in 1996 to above it in 2001, recorded a positive average difference. This shows that these firms experienced output growth, and consequently chose to keep growing their firms while accepting the regulation of the Employment Equity Act as a sunk cost.

Figure 2-8: Average difference in labour productivity of firms above and below the 50-employee threshold in 1996, in terms of 2001 employment



At the threshold, both firms that were above and below the 50-employee threshold in 1996 have a very similar log of labour productivity – a fact that was already easily observed in table 2.2. However, what is interesting is the fact that firms that were above the threshold in 1996 have a fairly constant positive average difference in labour productivity across all levels of employment in 2001. This is explained by these firms either having fewer employees, higher output, or a smaller negative change in output relative to a negative change in employment. Firms that were below the threshold in 1996 offer up a more variable trend in terms of their average difference in labour productivity.

This chapter is focused on the threshold effects provided by the Employment Equity Act of 1998; as a result, it is important to establish that firms on both sides of this threshold before the Act was passed were intrinsically the same via their inherent characteristics. The following tables provide the mean values of wages, output, capital expenditure on new assets, asset value,

and labour productivity for firms falling either just above the threshold, or just below it. This is done for both the 40-49/50-59 and 45-49/50-55 bands for reasons that have been previously discussed in this chapter.

Table 2.3: Mean characteristics of firms above/below 50 employee threshold in 1996

	45-49	50-55	t-stat	Pr(T > t)
	employees	employees		
	(R '000)	(R '000)		
	Mean	Mean		
Asset value	1,212.60	1,305.60	-0.79	0.43
Capital Expenditure On New Assets	265.47	216.75	0.04	0.97
Output	9,816.19	11,492.62	-1.10	0.27
Average Wages	42.22	43.20	-0.25	0.80
Labour Productivity	5.11	5.19	-0.66	0.51

Table 2.4: Mean characteristics of firms above/below 50 employee threshold in 1996

	40-49	50-59	t-stat	Pr(T > t)
	employees	employees		
	(R '000)	(R '000)		
	Mean	Mean		
Asset value	1,167.33	1,370.70	-0.93	0.35
Capital Expenditure On New Assets	255.77	236.11	0.89	0.37
Output	9,038.26	11,224.90	-2.38	0.02
Average Wages	42.46	41.41	0.38	0.70
Labour Productivity	5.09	5.08	0.12	0.91

It is easily observable that the means of each category are fairly close to each other; however, this is not sufficient to state that these two groups are similar to each other. In order to establish similarity, a basic Student's t-test was employed for independent samples with equal variances.

As the Student's t-test reveals in table 2.3, all of the variables in question have p-values that are well past the value of 0.05. Thus, at a 95% confidence level it may be said that the two groups

are similar, and not different. As a result, these two groups are perfectly comparable, and this chapter may continue on to use them within the intended RDD analysis. As it is seen in table 2.4, p-values of all variables besides output indicate similarity at the 95% level. Since output is still significantly similar at the 10% level, it is sufficient for this analysis that the similarity is high enough for this band to be utilised within analyses of this chapter.

However, when making use of the `rdrobust` package in Stata to ensure that there are no marked differences in the variables of 1996, a scenario arises whereby discontinuities in these variables do appear to be present. These discontinuities arise even when using a “fake” cut-off points. This likely occurs due to the sparsity of data around the cut-off point, and since RDD primarily relies on information very close to the cut-off to estimate the causal effect, this chapter would be remiss not to urge caution in interpreting the results presented by the RDD analysis.

2.6.2 PARAMETRIC ANALYSIS

The preceding analysis is useful, and indicative of the fact that prior to the implementation of the EEA in 1998, firms falling around the threshold were inherently similar; this similarity allows the chapter to proceed with its parametric analysis of the impact that the EEA may have had on firms in 2001.

Table 2.5 below illustrates the results of estimating equation (2.4) in both first and second-degree polynomials for variables of interest that include, output, capital expenditure, asset value, labour productivity, and average wages per worker. These regressions were restricted to include only firms that had between 40 and 59 employees in 1996. The most noticeable result is that all 5 regressions in the second-degree polynomial exhibit impacts that are significant at the 5% level at least. All of the coefficients of impact (γ) exhibit negative signs, implying that

after the introduction of the EEA, there was a decrease in output, asset value, capital expenditure, average wages per workers, and labour productivity. It is to be expected that the linear results would potentially have incorrect signs and magnitude, as well as being insignificant due to the fact that the production function, and relationship between capital, labour, and other variables would not be linear, but more quadratic in nature. So, the quadratic results are the ones to which attention should be given. These results reiterate the findings presented by figures 2.4 - 2.8; most notably the fact that firms moving from below the threshold in 1996 to above it in 2001 show a decrease in a capital expenditure. This directly corroborates the substitution of labour with capital. Furthermore, it is also noticeable that average wages decreased for firms that went from below to above the threshold – this is intuitive since these firms have no need to pay higher wages in order to retain more skilled and efficient staff. The rest of these quadratic results can be interpreted in a similar fashion.

Table 2.5: Mean characteristics of firms above/below 50 employee threshold in 1996 (40-49/50-59 bandwidth)

	Linear	Quadratic
Capital Expenditure 2001		
γ (Impact)	3.97 (6.134)	-277.921*** (18.067)
Constant	-.691 (1.792)	60.267*** (16.116)
Asset Value 2001		
γ (Impact)	-.899 (2.935)	-111.718*** (17.467)
Constant	7.241*** (.590)	17.312 (12.091)
Output 2001		
γ (Impact)	3.341 (2.199)	-104.633*** (30.477)
Constant	8.565*** (1.406)	51.054 (29.970)
Average Wages 2001		
γ (Impact)	.867 (1.085)	-43.666** (16.575)
Constant	4.486*** (1.033)	32.887** (11.724)

Labour Productivity 2001

γ (Impact)	2.502* (1.204)	-48.121** (20.516)
Constant	5.156*** (.975)	26.421* (13.748)

Note: * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$
Standard errors are given in parentheses

These results of the preceding parametric analysis are depicted graphically below. The graphs show both the linear and quadratic RDD for the variables of interest and a noticeable, significant “jump” occurs in each graph at the 50-employee threshold. Following the suggestion of (Lee & Lemieux, 2009), a non-parametric approach will now be utilised in order to complement the parametric RD design estimation, and as a way to ensure robustness of the findings.

Figure 2-9: Parametric RDD of the log of Capital Expenditure in 2001

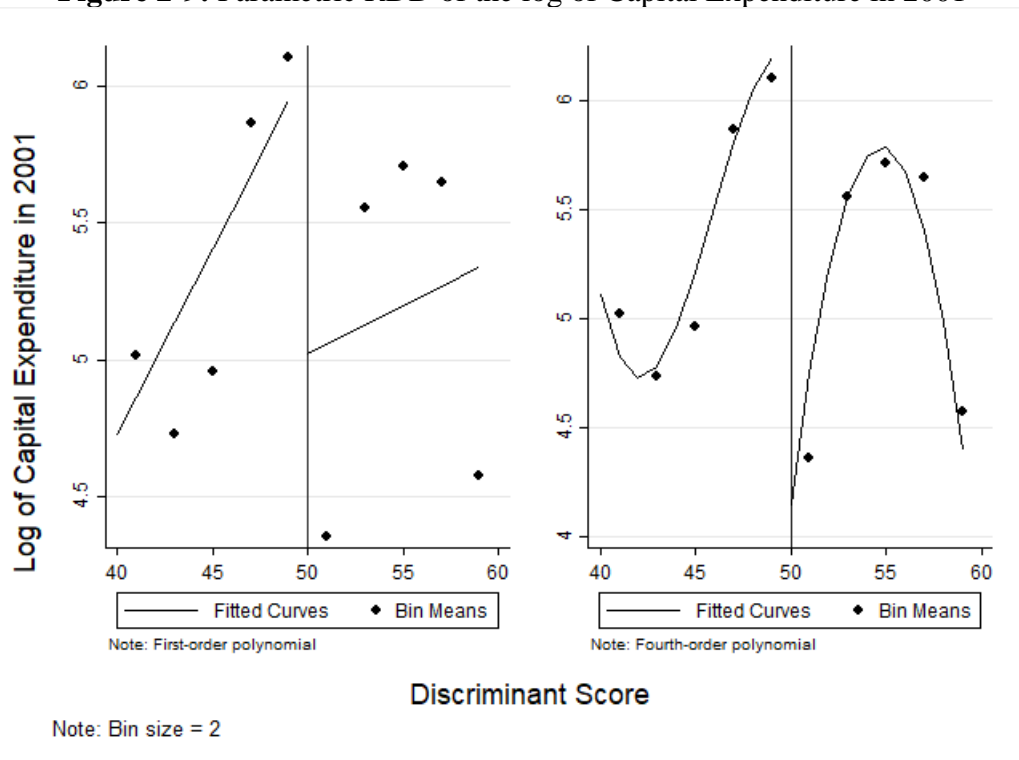


Figure 2-10: Parametric RDD of the log of Asset Value in 2001

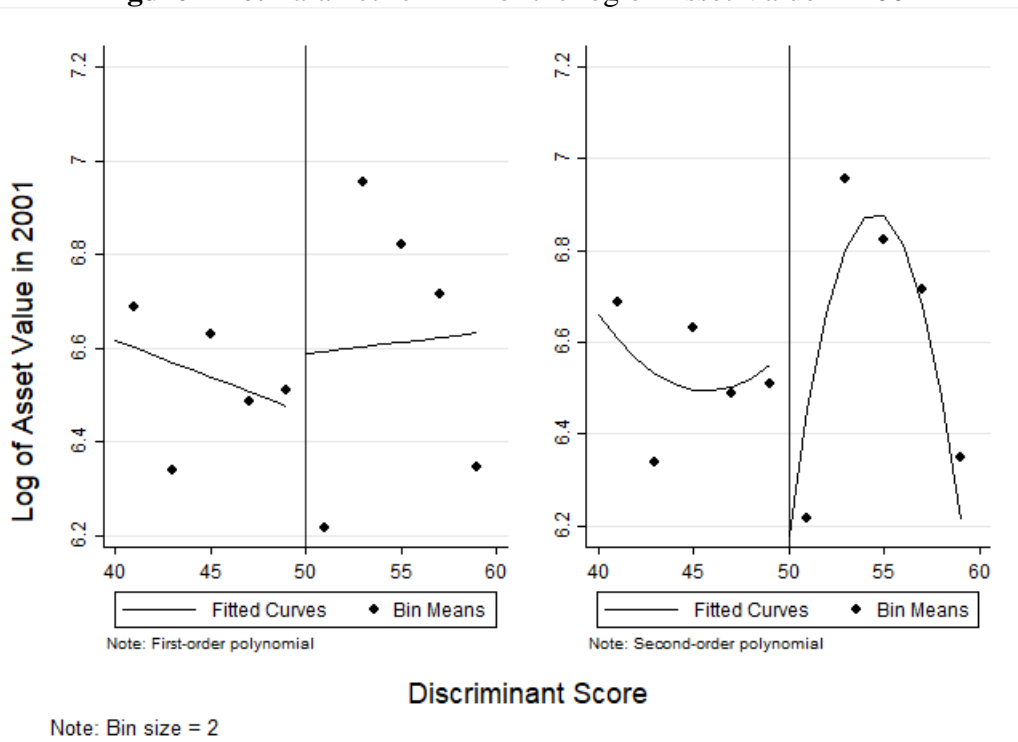


Figure 2-2: Parametric RDD of the log of Output in 2001

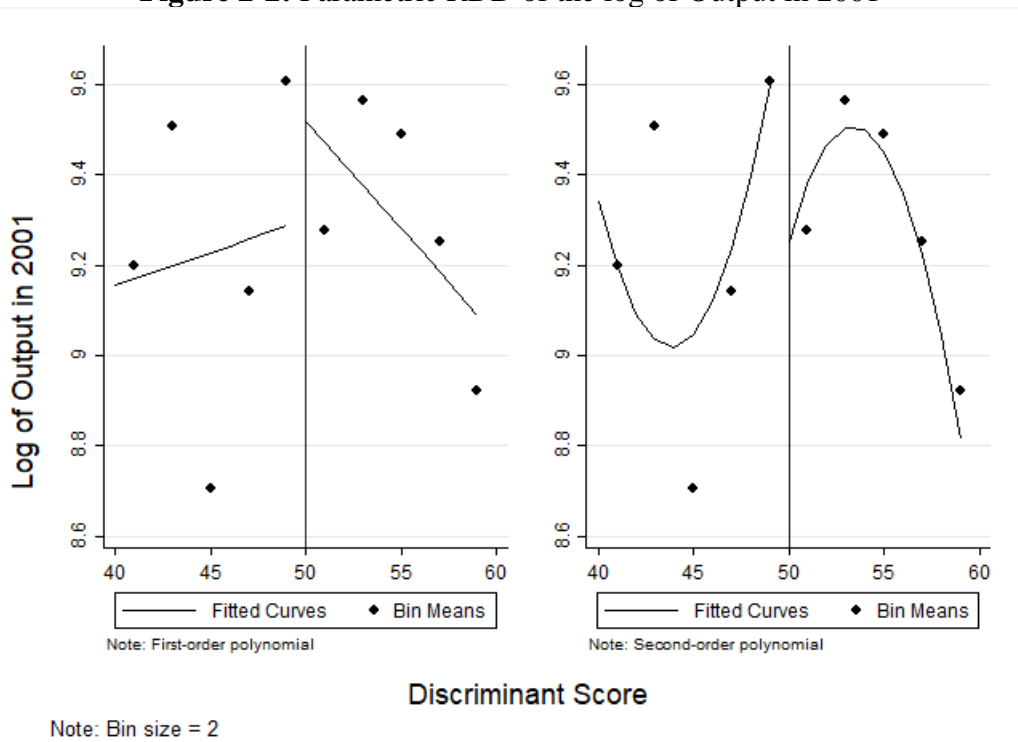


Figure 2-3: Parametric RDD of the log of Average Wage in 2001

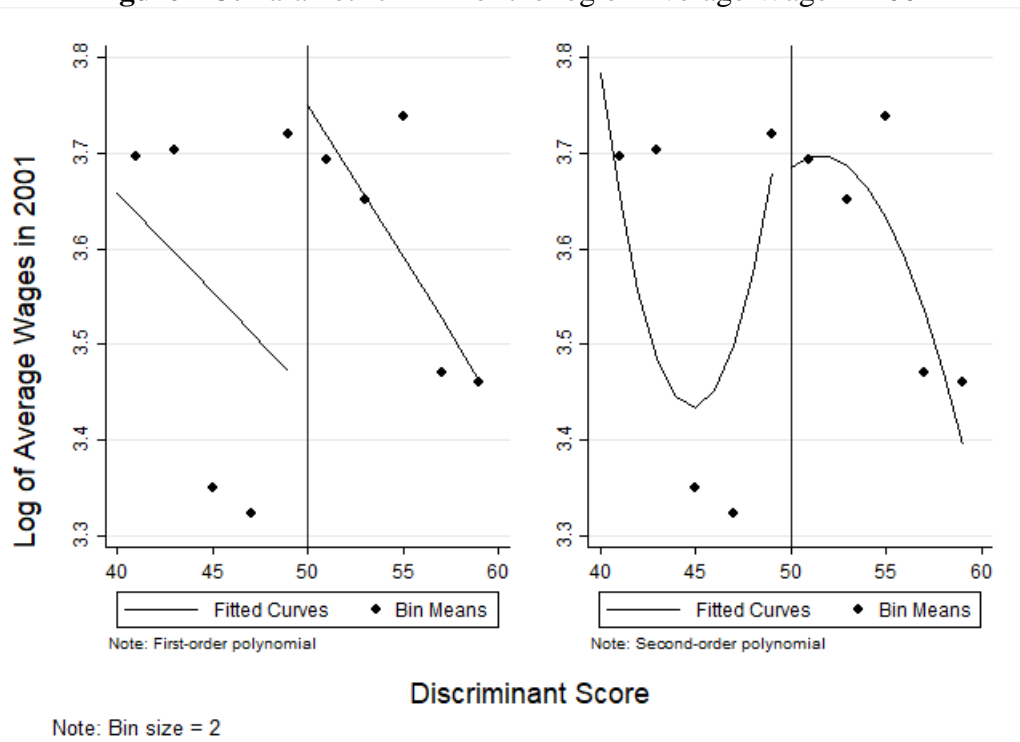
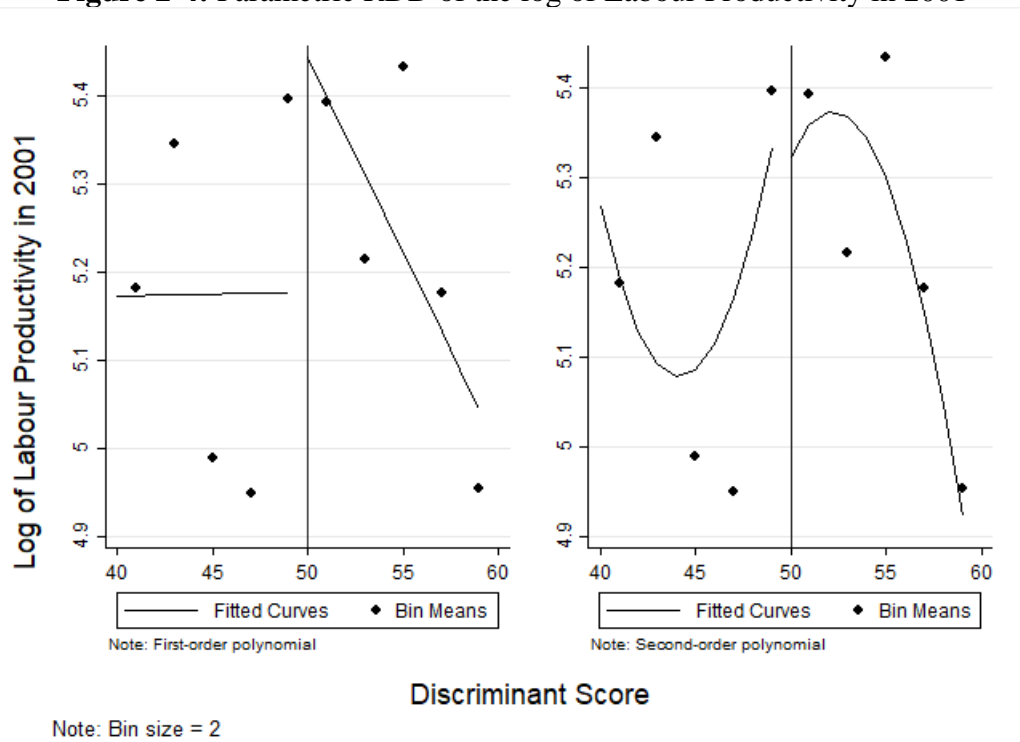


Figure 2-4: Parametric RDD of the log of Labour Productivity in 2001



2.6.3 NON-PARAMETRIC ANALYSIS

Following the preceding parametric analysis, this section deals with the application of a non-parametric approach to the LSS 96/01. The utilisation of a non-parametric approach is useful in this chapter: the ultimate benefit of the non-parametric approach is that it does not assume a functional form, and the data alone dictates the functional form that is employed. The following table presents the treatment effect size (the observed coefficient) which is estimated via equation (2.5), the estimate bias, the estimate standard error, as well as the t-statistic in order to test the hypothesis that the treatment effect is different from zero.

Table 2.6: Strict regression discontinuity design results of various outcome variables (40-60)

	Observed	Bias	Std. Error	t-stat
Employment	3.761	-.400	4.242	.887
Output	2,121.248	138.287	2,326.026	.912
Asset Value	46.398	38.819	396.956	.117
Capital Expenditure	-136.468*	21.050	81.335	-1.678
Average Wages	-.550	-.215	4.076	-.135
Labour Productivity	.083	.008	.090	.924
Δ Employment	-6.951*	-.445	4.161	-1.670
Δ Output	-335.701	157.342	1,805.665	-.186
Δ Asset Value	-115.620	34.587	367.361	-.315
Δ Capital Expenditure	-105.858	6.270	102.671	-1.031
Δ Average Wages	.289	-.116	3.725	.078
Δ Labour Productivity	.0598	.011	.064	.929

Note: *p<0.10 **p<0.05 ***p<0.01

Table 2.6 illustrates the results of the non-parametric RDD on the bandwidth of 40-49/50-60 employees. Significance only emanates from capital expenditure and the change in employment. With a negative sign on the capital expenditure coefficient, this would constitute firms that grew their employment base, and switched towards labour and away from capital. This is in keeping with a priori expectation.

What is of more interest in this set of results is the change in the variables as outcomes. The change in employment, asset value, capital expenditure, average wages, labour productivity,

and output were constructed by taking the deflated 2001 values and subtracting the 1996 values. These variables were then estimated using the same non-parametric approach and illustrate the relative changes between the treated and non-treated firms.

It is apparent that the change in employment produces a significant result. Relative to firms below the threshold of 50 employees, firms above the threshold would have seven employees fewer; i.e. if firms below the threshold (non-treated) grew their employment base, the treated firms would have grown by seven employees fewer than the firms below them.

However, with so few significant estimates found within these results, it is important to recall the earlier argument by Imbens & Kalyanaraman (2009) surrounding the optimal bandwidth for non-parametric RDD. Following the procedure outlined by Imbens & Kalyanaraman (2009), the bandwidth utilised is tightened to be optimal – this should lessen the bias witnessed in some instances of the previous results, while the optimal design strives to strike a better balance between bias and variance. As previously discussed, this optimal bandwidth lies at five units either side of the threshold. Utilising the tightened bandwidth, the non-parametric regression discontinuity design was run again, and the following results were obtained.

Table 2.7: Strict regression discontinuity design results of various outcome variables (45-55)

	Observed	Bias	Std. Error	t-stat
Employment	-5.914	0.034	6.059	-0.976
Output	-755.622	-583.687	3,037.546	-0.249
Asset Value	-666.738*	-66.810	532.733	-1.282
Capital Expenditure	-476.591***	-11.826	198.055	-2.406
Average Wages	1.007	-0.576	6.572	0.153
Labour Productivity	0.123	-0.018	0.158	0.779
Δ Employment	-11.161**	-0.018	6.036	-1.849
Δ Output	-1,471.169	-358.288	1,738.149	-0.846
Δ Asset Value	-544.415**	-48.081	277.300	-1.963
Δ Capital Expenditure	-331.438***	-3.803	136.517	-2.428
Δ Average Wages	1.779	-0.331	4.920	0.362
Δ Labour Productivity	0.090	-0.013	0.105	0.854

Note: *p<0.10 **p<0.05 ***p<0.01

After tightening the bandwidth, asset value and capital expenditure are shown to be significant, with both estimates exhibiting negative signs - reinforcing the idea that both capital expenditure and asset value decreased for firms that were below the threshold of 50 employees in 1996, and above it in 2001. This makes intuitive sense as these firms would constitute firms that had grown their employment base and switched towards labour and away from capital.

Change in employment, change in asset value, and change in capital expenditure all produce significant results. Utilising the same interpretation as for the previous table's results reveals that firms above the threshold are growing slower in terms of assets, capital, and employment relative to their smaller counterparts. This is concerning as it should be expected that larger firms (in relative terms) would be more adept at growing, adding to the economy, and absorbing excess labour.

2.6.4 GROUP ANALYSIS

Until now, this chapter has shown results on how firms that were within a 10-employee radius of the threshold in 1996 responded in terms of their 2001 characteristics. This section of the chapter will unpack the story further and delve into what characteristics exist between the four groups that were identified earlier. This will be done utilising an Ordinary Least Squares approach in order to approximate a Cobb-Douglas production function for each of the four groups. The following equations show the estimations of the Cobb-Douglas production functions for each of the groups in question. The equations are estimated utilising 2001 data, and standard errors are shown in parentheses.

Group 1: Above threshold in 1996, below threshold in 2001

$$\ln(Y) = 3.896 + 0.834 \ln(L) + 0.328 \ln(K)$$

$$(0.466)^{***} \quad (0.129)^{***} \quad (0.056)^{***}$$

Group 2: Above threshold in 1996, above threshold in 2001

$$\ln(Y) = 7.088 + 0.248 \ln(L) + 0.202 \ln(K)$$

$$(1.302)^{***} \quad (0.319) \quad (0.067)^{**}$$

Group 3: Below threshold in 1996, above threshold in 2001

$$\ln(Y) = 6.560 + 0.597 \ln(L) + 0.075 \ln(K)$$

$$(1.266)^{***} \quad (0.300)^{**} \quad (0.068)$$

Group 4: Below threshold in 1996, below threshold in 2001

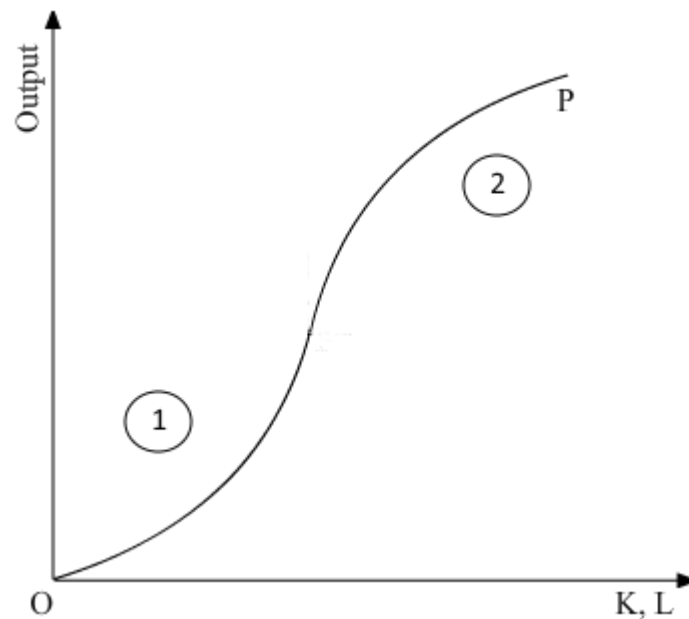
$$\ln(Y) = 4.448 + 0.799 \ln(L) + 0.231 \ln(K)$$

$$(0.742)^{***} \quad (0.213)^{***} \quad (0.070)^{**}$$

The first noticeable implication is that both group 1 and group 4 have increasing returns to scale, while groups 2 and 3 have decreasing returns to scale. Since these production functions are based on 2001 data, this could speak to the idea that group 2 and group 3 are in fact above the 50-employee threshold in 2001; while groups 1 and 4 are below it. The implication of this is two-fold. Firstly, these results match a priori expectation; firms that have increasing returns to scale would find themselves on portion “1” of the following production function. These firms do not have to comply with the EEA as they are below the 50-employee threshold, thus making it possible that these firms experience increasing returns to scale because they have been restrained to a lower level of labour due to the Act. Firms experiencing decreasing returns to

scale would be shown by portion “2” of the following figure; as these firms have crossed over the threshold of 50 employees, they have no reason to hold back on increasing their labour force (in terms of avoiding EEA compliance). Labour and capital are not perfect substitutes, but they are substitutes nonetheless; thus, it would be expected that firms would trade off between the two to attain the input that affords the firm the higher marginal product.

Figure 2-5: Firm production function illustrating returns to scale



When studying the marginal products of capital and labour for each of the above groups, it is noticeable that the marginal product of labour is higher for firms that are below the threshold in 2001 (groups 1 and 4) than for groups that are above it, confirming a priori expectations set out above. This is an obvious finding in terms of traditional theory as marginal product is usually a decreasing function. However, since it could well be the case that the firms have been forced to reduce employment in order to escape compliance with the EEA, it is possible that these firms are missing out on a rather large potential marginal product of labour, and are instead having to resort to the significantly lower marginal product of capital.

2.7 CONCLUSIONS

This chapter has explored the effects of the Employment Equity Act of 1998 on firms in South Africa, by using panel data from 1996, and 2001. This allowed the chapter to utilise Regression Discontinuity Design in order to analyse the effect of the 50-employee threshold that was imposed by the Act. One of the primary findings of this chapter is that the introduction of the Employment Equity Act of 1998 resulted in a clustering effect around the 50-employee threshold that the Act had imposed. There was a noticeable cluster of firms at the 49-employee level that may have been actively trying to escape the additional regulation by shedding employment. Following conventional production theory, it appears firms that chose to accept the Act as a sunk cost increased employment by a large degree in order to maintain initial output levels. Furthermore, these firms also increased their capital investment and asset value levels in order to further facilitate growth of the firm.

The utilisation of both parametric and non-parametric regression discontinuities confirmed a correlation between the implementation of the EEA and the discontinuity at the 50-employee level; with firms above the threshold having significantly less employment, asset value, and capital expenditure relative to firms that fell beneath the threshold. Thus, the introduction of the Act has potentially resulted in two distinctly different groups of firms that have adopted different approaches to how they treat capital and labour within the firm.

Due to the nature of the data available to this chapter, it was able to unpack firms into four distinct groups, namely: those that stayed above the threshold in both 1996, and 2001; those that stayed below the threshold in both time periods; those that were above the threshold in 1996, and below it in 2001; and those that were below the threshold in 1996, and above it in 2001.

By fitting a Cobb-Douglas production function to each of these four groups through an Ordinary Least Squares estimation technique, it was established that these four groups treat their labour capital ratios very differently to each other. It was further revealed that the marginal product of labour is higher for firms that are below the threshold in 2001 than for groups that are above it. Since it could well be the case that the firms have been forced to reduce employment in order to escape compliance with the EEA, it is possible that these firms are missing out on a rather large potential marginal product of labour, and instead have to resort to the significantly lower marginal product of capital.

Ultimately these results create a sense of concern surrounding the South African labour market. These results suggest that due to this threshold, it is possible the distortion in employment that has been created can be labelled as an inefficient allocation of resources (within the manufacturing sector). This would have been caused by firms choosing lower levels of employment as a way to escape the additional policy burden¹⁷. However, it is not only the implementation of the Act that may have caused higher level levels of unemployment. It is also possible that firms may have outsourced production processes that utilise unskilled labour as the main production input. Thus, while the Employment Equity Act (and the Labour Relations Act) was meant to provide a more secure environment for unskilled workers, the responses by firms may have actually led to an increased casualisation of the labour market. Furthermore, these Acts would only help individuals currently in employment to stay in employment, but not necessarily create employment for those individuals who have yet to gain employment. Ultimately this creates an insider-outsider hysteresis within the South African labour market. It

¹⁷ This paper can only identify these possibilities at a firm level and can stake no claim at the economy or sectoral levels.

follows that an understanding of the effect of the changes in labour legislation, not only on the quantity of individuals employed, but also on the ratio of “decent” work¹⁸ to precarious unemployment is needed. It is plausible that total employment in the economy had not decreased¹³ but simply shifted towards casual employment. With labour regulations currently being further extended to cover those in casual employment, it is likely that an increase will be seen in unemployment of workers who had to move into informal employment.

If small and medium enterprises (SMEs) are truly to be the drivers of job creation in South Africa, it is possible that this Act has created a distortion that does not allow these SMEs to deliver on their potential for the South African economy. While the notion of transformation within the labour force is imperative, especially for a nation that suffered years of segregation and discrimination, it would seem that the introduction of the Employment Equity Act of 1998 has not had an optimal effect and has actually led to a situation whereby unemployment may be exacerbated. For the labour market to become truly transformative, while not creating a larger problem in terms of the employment context of South Africa, it would seem that more research would need to be conducted, and a better solution found.

¹⁸ Employment regulated under labour regulation.

Chapter 3: **The Bargaining Council Minimum Wage Dataset: A Discussion of Capturing, Cleaning, and Descriptives**

3.1 INTRODUCTION

Bargaining Councils are collective units made up of one or more trade unions and one or more registered employer organisations in a specific industry. Bargaining Councils are important institutions in South Africa's formal labour markets. They are responsible for determining national wages throughout all industries through a process of collective agreements.

Prior to this chapter there has not been a fully-fledged dataset containing the wages prescribed by the respective Bargaining Councils that could be used for research. For this reason, it was essential to partner with the South African Department of Labour (DoL) in order to gain access to all physical records of the data, as no electronic database of these decisions exists.

The following sections of this chapter will outline the history and background of Bargaining Councils (paying attention to their importance in the labour economy of South Africa). The chapter will then discuss the data collection process and cleaning methodologies employed to create the Bargaining Council Minimum Wage Dataset. Lastly, this chapter will provide a discussion of the metadata of the dataset, as well as of some descriptive statistics to illustrate the dataset's importance and potential usage.

3.2 LITERATURE REVIEW

3.2.1 A BRIEF HISTORY OF SOUTH AFRICAN INTERNATIONAL COLLECTIVE BARGAINING

Bargaining Councils have their innate roots in the multi-employer bargaining system that was present in Europe in the early part of the 20th century. Sinzheimer argued that collective bargaining was a mechanism through which trade unions and employers' organisations could democratise the economy (Dukes, 2011). In short, this combination of trade unions and employers' organisations (bargaining councils) could jointly regulate sectors of the economy by reaching collective agreements that would be extended to the entire sector (Dukes, 2011). A similar concept of industrial self-government found it's placed during a similar time period in the United Kingdom in the form of Whitley councils. The concept influenced early labour legislation in a number of Commonwealth countries, including South Africa (Godfrey et al., 2010).

The emergence of social democratic parties after the First World War in advanced industrialised countries created an environment in which the establishment of this form of bargaining councils thrived (Godfrey, 2018). However, shortly after the economic downturn in the early 1970s, increasing competition from industrialising economies, as well as technological advancement created a less favourable environment for bargaining councils (Godfrey, 2018). As a result, the progress made by organized labour over the years in developed nations began to be rolled back, being described as 'deregulation' or 'flexibility' (Godfrey, 2018). Bargaining councils were one of the main targets of this new-found flexibility as they were seen as a proponent of the perceived rigidity within the labour market. In particular, it was argued that multi-employer bargaining was a 'one size fits all' type of approach that did not take account of the circumstances of individual firms (Godfrey, 2018).

Subsequently, during the 1980s, a global trend towards decentralisation of collective bargaining has emerged as a response to globalisation, and employers and employees are more likely to conclude collective agreements at workplace level. South Africa, where sectoral bargaining is encouraged by the Labour Relations Act is one of the very few exceptions to this practice.

3.2.2 A BRIEF HISTORY OF SOUTH AFRICAN BARGAINING COUNCILS

The Industrial Conciliation Act¹⁹ of 1924 set up the industrial council system²⁰, and represented the first institutionalised representation of collective bargaining in South Africa (SALDRU, 1990). According to Bhorat et al. (2009), “the Act provided the legislative framework for the establishment of industrial councils as well as the framework for the regulation of collective bargaining and industrial conflict”; the Act’s primary act was to establish national, industry-wide councils that would allow industrial sectors to govern themselves by representative employer organisations and trade unions (Godfrey, 1992).

An industrial council was formed when an employer (or a group of employers), met with a registered trade union, and agreed upon the conditions for the industrial council, and then registered the council in term of the Act. Once such a council had been registered, it became a permanent fixture within the collective bargaining system of South Africa (Godfrey, 1992). The establishment of such a council was voluntary, and the geographical and industrial scope was left to be determined by the council itself. However, the Industrial Conciliation Act of 1924 did have an important conditionality to it: a requirement that the council must be representative of the jurisdiction for which the council was seeking registration. The decisions

¹⁹ Later renamed to the Labour Relations Act of 1956.

²⁰ Now known as the Bargaining Council system.

made by these councils are assumed to operate “*ergo omnes*”, which extends these decisions to workers and firms in the sector that may not even be part of the Bargaining Council.

One of the more nuanced statements within the Act was that only employees whom belonged to registered unions could be represented in the industrial council negotiations. The Act went further to define exactly what was recognised as an employee; amongst all of the conditions set out to define an individual as an employee, this Act laid out an important caveat which excluded African people²¹ from this definition (Butcher & Rouse, 2001). With African workers formally excluded as employees, their unions were defined as unregistered but not illegal. This ensured that they could not have a say in industrial council bargaining decisions (Bendix, 1989), creating a system that only benefitted white employees. The exclusion of African workers essentially resulted in a dual system of industrial relations which was defined by race (Godfrey, 1992), with the collective bargaining process for white South African workers being highly centralised, and that of African workers being decentralised.

The voluntary nature of the industrial council system created a situation whereby industrial councils developed in a massively uneven and excessively diverse way (Bhorat et al., 2009). The initial hope of national industrial councils failed to come to fruition for a variety of reasons, including but not limited to: (i) the exclusion of African employees, (ii) deep racial and skills divisions between trade unions, (iii) diverse patterns of industrial development, and (iv) low levels of trade union organisation (Bhorat et al., 2009). These factors bred a system whereby there existed many local and regional industrial councils, but a severely limited number of national industrial councils.

²¹ “African” refers to an individual who is Black (Black is a blanket term to represent African, Coloured, and Indian individuals).

Employer organisations dominated the majority of these councils due to weak trade union organisation, while trade union representation was generally dominated by artisans (Godfrey & Macun, 1991). Thus, employers generally dictated the levels at which collective bargaining took place within the industrial councils, resulting in low levels of prescribed minimum wages, especially for less skilled employees (Godfrey & Macun, 1991). The exclusion of African workers from the bargaining system only served to deepen the systematic wage gap between African and white workers, while reinforcing the dual nature of industrial relations. This exclusion of African workers also led to a situation whereby white workers, particularly in the unskilled and semi-skilled brackets, were replaced by African workers, as employers were able to avoid paying the prescribed minimum wage (Godfrey & Macun, 1991).

African worker participation in the Bargaining Council system started to increase in the early 1980s when the Labour Relations Amendment Act of 1981 removed race from the definition of employee (Butcher & Rouse, 2001) – essentially ending the dual system that had initially been created. Following the Amendment, African workers were encouraged to register and to start to work within the existing system; however, the distrust of the system²² led African workers to continue to work outside of the existing system by resorting to firm/plant level bargaining instead.

Over the course of the 1980s there was a call for greater African worker participation in the Bargaining Councils, with many of the larger unions pressing for more intensive, focused

²² As the system was still seen as primarily associated with white workers of the apartheid regime.

collective bargaining, claiming that it would be more effective than the firm-by-firm strategy that had been followed to that point (Butcher & Rouse, 2001).

The 1990s saw greater change in the Bargaining Council system. With the first democratically elected government succeeding the apartheid government, South African labour regulation needed to be overhauled to reflect the period of transformation and inclusion. The main aim of Acts introduced in this period was to ensure that a socially acceptable minimum standard of working conditions was in place in South Africa, and to bring South African employment legislation into line with the international standards (Black & Rankin, 1998). The five main Acts that were introduced during this period were

1. The Labour Relations Act (LRA) of 1995.
2. The Basic Conditions of Employment Act (BCEA) of 1997
3. The Employment Equity Act (EEA) of 1998.
4. The Skills Development Act (SDA) of 1998.
5. The Skills Development Levies Act (SDLA) of 1999.

The inclusion of prescriptions from these Acts helps to round out the system that exists today, whereby Bargaining Councils are made up of the employers and employees of what are typically the larger firms within a sector. With the transformation laid out within the aforementioned Acts, the inclusion of African employees has essentially shifted the balance of power from being a “whites only” phenomenon, to a situation in which the African workforce has largely dominated these institutions.

3.2.3 BARGAINING COUNCILS OF SOUTH AFRICA: ESTABLISHMENT

In the current system of Bargaining Councils, there are three primary categories under which a registered Bargaining Council may fall: (i) registered private sector Bargaining Councils; (ii) registered local government and government Bargaining Councils; and (iii) registered statutory councils²³. Table 3.1 shows the evolution of the number of Bargaining Councils between 1983 and 2018.

Table 3.1: Number of Bargaining Councils over time

Year	Number of Bargaining Councils	Number of employees covered by Bargaining Council agreements ²⁴
1983	104	-
1992	87	735 533
1998	77	632 992
2000	78	-
2004	57	2 358 012
2008	48	-
2010	47	2 520 718
2014	47	2 505 074
2018	48	-

Source: Godfrey (2012); Department of Labour (2018); Du Toit et al. (2015)

There has been a dramatic reduction in the number of Bargaining Councils over time. In 2018, the 48 Bargaining Councils were comprised of 39 registered private sector Bargaining Councils (21 at the national level, five at a provincial level, and 13 at a city/town level), six registered local government and government Bargaining Councils, and three registered statutory councils.

Du Toit et al. (2006) and Godfrey (2007) provide two reasons for the major drop-off in the number of Bargaining Councils over time. The first being that there was a series of amalgamations of smaller councils to form larger councils – for instance, some regional

²³ A full list of Bargaining Councils (accurate as of October 2018) is provided in Appendix B.

²⁴ The number of employees covered by Bargaining Councils is not available for every year – where possible, this information has been included.

councils were merged to form a national council. The second reason is that there has been a collapse and deregistration of a number of Bargaining Councils over the past 35 years – the building sector was one of the worst casualties, with most of its regional Bargaining Councils disappearing. Du Toit et al. (2006) and Godfrey (2007) go on to state that there are a number of councils that continue to exist but suffer from weak capacity and will likely collapse in coming years – this is particularly suspected of the smaller local councils. Despite the drop-off in the number of Bargaining Councils over time, the number of employees covered by Bargaining Council agreements has continued to grow (table 3.1).

Of the current existing Bargaining Councils, 46% were established in democratic South Africa, with approximately 10% being established in the last eight years alone. The 1940s and 1950s were periods of growth for the establishment of councils, with approximately 31% of current Bargaining Councils established in those eras. Table 3.2 shows a concise breakdown of which councils were established per decade.

Table 3.2: Percentage of current Bargaining Councils established per decade²⁵

Decade	Number established	Percentage
1920s	1	2.08%
1930s	4	8.33%
1940s	7	14.58%
1950s	8	16.67%
1960s	1	2.08%
1970s	1	2.08%
1980s	0	0.00%
1990s	11	22.92%
2000s	10	20.83%
2010s	5	10.42%

Source: Godfrey (2012); Department of Labour (2018); Du Toit et al. (2015)

²⁵ This is a breakdown of current Bargaining Councils and does not account for Bargaining Councils that may have ceased to exist, or merged during this time.

Table 3.3: Timeline of establishment of current Bargaining Councils

1920s	1930s	1940s
<ul style="list-style-type: none"> ❖ Bargaining Council for the Canvas Goods Industry (Witwatersrand and Pretoria) 	<ul style="list-style-type: none"> ❖ Bargaining Council for the Restaurant, Catering and Allied Trades ❖ Building Industry (Bloemfontein) ❖ Building Industry Bargaining Council (Southern and Eastern Cape) ❖ National Bargaining Council of the Leather Industry of South Africa 	<ul style="list-style-type: none"> ❖ Bargaining Council for the Food Retail, Restaurant, Catering & Allied Trades ❖ Bargaining Council for the Laundry, Cleaning and Dyeing Industry (Cape) ❖ Building Industry Bargaining Council (Cape of Good Hope) ❖ Building Industry Bargaining Council (East London) ❖ Building Industry Bargaining Council (Kimberley) ❖ Metal and Engineering Industries Bargaining Council ❖ National Bargaining Council for the Sugar Manufacturing and Refining Industry
1950s	1960s	1970s
<ul style="list-style-type: none"> ❖ Bargaining Council for the Furniture Manufacturing Industry of the Western Cape ❖ Bargaining Council for the Furniture Manufacturing Industry of the Eastern Cape ❖ Bargaining Council for the Furniture Manufacturing Industry of the South Western Districts ❖ Bargaining Council for the Furniture Manufacturing Industry, KwaZulu-Natal ❖ Bargaining Council for the Laundry, Cleaning and Dyeing Industry (KwaZulu-Natal) ❖ Building Bargaining Council (North and West Boland) ❖ Motor Industry Bargaining Council ❖ National Bargaining Council for the Road Freight and Logistics Industry (NBCRFLI) 	<ul style="list-style-type: none"> ❖ The Bargaining Council for the Diamond Cutting Industry 	<ul style="list-style-type: none"> ❖ Bargaining Council for the New Tyre Manufacturing Industry
1990s	2000s	2010s
<ul style="list-style-type: none"> ❖ Bargaining Council for the Contract Cleaning Services Industry (KwaZulu-Natal) ❖ Bargaining Council for the Grain Industry ❖ Bargaining Council for the Meat Trade, Gauteng ❖ Education Labour Relations Council ❖ General Public Service Sectoral Bargaining Council ❖ National Bargaining Council for the Electrical Industry of South Africa ❖ Public Health and Social Development Sectoral Bargaining Council ❖ Public Service Coordinating Bargaining Council ❖ Safety and Security Sectoral Bargaining Council 	<ul style="list-style-type: none"> ❖ Bargaining Council for the Fishing Industry ❖ Furniture Bargaining Council ❖ Motor Ferry Industry Bargaining Council of South Africa ❖ National Bargaining Council for Clothing Manufacturing Industry ❖ National Bargaining Council for the Chemical Industry ❖ National Bargaining Council for the Wood and Paper Sector ❖ National Textile Bargaining Council ❖ South African Local Government Bargaining Council ❖ Statutory Council for the Squid and Related Fisheries of South Africa 	<ul style="list-style-type: none"> ❖ Amanzi Bargaining Council ❖ Bargaining Council for the Civil Engineering Industry ❖ National Bargaining Council for the Hairdressing, Cosmetology, Beauty and Skincare Industry ❖ National Bargaining Council for the Private Security Sector ❖ Statutory Council for the Fast Food, Restaurant, Catering and Allied Trades (SCFFRCAT)

❖ South African Road Passenger Bargaining Council (SARPBAC)	❖ Statutory Council of the Printing, Newspaper and Packaging Industry of South Africa
❖ Transnet Bargaining Council (National)	

Source: Godfrey (2012); Department of Labour (2018); Du Toit et al. (2015)

For the purposes of this chapter, and indeed the Bargaining Council Minimum Wage Dataset (BCMWD) as a whole, only registered private sector Bargaining Councils were captured. This decision was driven largely by the availability of data, and the bureaucracy that is entailed in gathering such information – more details on this are provided in the following data section of this chapter.

3.3 DATA: THE BARGAINING COUNCIL MINIMUM WAGE DATASET (BCMWD)

3.3.1 CAPTURING

Prior to the creation of the BCMWD, there existed no dataset that captured multiple Bargaining Council decisions (with respect to the minimum wages they enforce) with a panel dimension. All studies that have been conducted in this research space have been forced to make use of either single/repeated cross-sections of data, or data for a singular Bargaining Council across time. This is not surprising as access and availability of the data that underlies the BCMWD was extremely hard to come by²⁶.

Bargaining Council agreements are published by way of government gazettes and are made available to the public. However, there is limited access to digital copies of these agreements – especially in the context of historical publications – a result that is mainly driven by the South African government’s slow approach to digitisation and e-government in general. Thus, relying

²⁶ There are a few public websites that record published minimum wages – however, these websites tend to focus on specific sectors and are not all-encompassing. Furthermore, these websites tend to have gaps in time, or are highly aggregated (providing the average minimum wage per sector rather than the varying levels of disaggregation that are prescribed by the Bargaining Council agreement). Lastly, these public websites tend to rely on self-reported data from employees, thus not accurately capturing the true minimum. As a result, it is difficult to use these resources to construct a fully functional and consistent dataset.

on existing physical copies for historical data was the only option left available for the creation of this dataset.

This in itself presented another challenge. The physical copies of these Bargaining Council agreements are meant to be stored at the South African Department of Labour (DoL); and while this is the case for a good majority of the records, there are a number of gazettes that have been lost over time either through moving of record repositories, inadequate inventory of storage, or damage. Furthermore, the DoL does not keep electronic copies of historical gazettes, only keeping copies of the most recent agreements. Bargaining Councils themselves are also meant to keep historical records of their agreements, however, some Bargaining Councils refuse to share the information, stating that it is “not for public use”; while other Bargaining Councils are simply uncontactable – either due to outdated contact details, or due to lack of interest in responding.

Bargaining Councils do not have to publish new agreements on an annual basis; instead these agreements are published after each new round of collective bargaining. There is no uniform time pattern for this, and this varies from council to council. Of the 38 registered private sector Bargaining Councils, 28 have been captured in the BCMWD. Table 3.4 below outlines which Bargaining Councils were captured, and the years in which bargaining agreements existed and were captured; table 3.5 outlines councils that were not captured, and the reasons for this.

Table 3.4: Captured Bargaining Councils, and years captured

Bargaining Council	Years
Bargaining Council for the Building Industry (Bloemfontein)	2014-2018
Bargaining Council for the Canvas Goods Industry (Witwatersrand and Pretoria)	2009-2018
Bargaining Council for the Civil Engineering Industry	2014-2018
Bargaining Council for the Fishing Industry	2007-2008; 2012-2014; 2016-2018
Bargaining Council for the Food Retail, Restaurant, Catering & Allied Trades	2007-2018
Bargaining Council for the Furniture Manufacturing Industry of the Western Cape	2012-2017
Bargaining Council for the Grain Industry	2017
Bargaining Council for the Laundry, Cleaning and Dyeing Industry (Cape)	2007-2018
Bargaining Council for the Laundry, Cleaning and Dyeing Industry (KwaZulu-Natal)	2014-2016
Bargaining Council for the Meat Trade, Gauteng	2002; 2004; 2007-2009; 2013; 2015; 2017
Bargaining Council for the Restaurant, Catering and Allied Trades	2011-2015
Building Bargaining Council (North and West Boland)	2007-2018
Building Industry Bargaining Council (Cape of Good Hope)	2010-2018
Building Industry Bargaining Council (Kimberley)	2011-2015
Furniture Bargaining Council	2008-2009; 2011-2012; 2014; 2016-2017
Metal and Engineering Industries Bargaining Council	1988-1989; 1991-2011; 2013-2018
Motor Ferry Industry Bargaining Council of South Africa	2012-2013
Motor Industry Bargaining Council	2004; 2008--2018
National Bargaining Council for Clothing Manufacturing Industry	2006-2011; 2013
National Bargaining Council for the Chemical Industry	2001-2018
National Bargaining Council for the Electrical Industry of South Africa	2001-2017
National Bargaining Council for the Hairdressing, Cosmetology, Beauty and Skincare Industry	2008; 2010;2012- 2014; 2017-2018
National Bargaining Council for the Road Freight and Logistics Industry (NBCRFLI)	2009-2018
National Bargaining Council for the Wood and Paper Sector	2012-2016
National Bargaining Council of the Leather Industry of South Africa	2006-2007; 2011; 2013; 2016; 2017; 2018
National Textile Bargaining Council	2006-2014

South African Road Passenger Bargaining Council (SARPBAC)	2012-2015; 2017
The Bargaining Council for the Diamond Cutting Industry	2005-2007

Table 3.5: Non-captured Bargaining Councils, and reasons for non-capture

Bargaining Council	Reason for non-capture
Amanzi Bargaining Council	Agreements unavailable; Bargaining Council uncontactable
Transnet Bargaining Council (National)	Agreements said to be not be for public dissemination
Bargaining Council for the Contract Cleaning Services Industry (KwaZulu-Natal)	Agreements unavailable; Bargaining Council uncontactable
Bargaining Council for the Furniture Manufacturing Industry of the Eastern Cape	Agreements unavailable; Bargaining Council uncontactable
Bargaining Council for the Furniture Manufacturing Industry of the South Western Districts	Agreements unavailable; Bargaining Council uncontactable
Bargaining Council for the Furniture Manufacturing Industry, KwaZulu-Natal	Agreements unavailable; Bargaining Council uncontactable
Bargaining Council for the New Tyre Manufacturing Industry	Agreements unavailable; Bargaining Council uncontactable
Building Industry Bargaining Council (East London)	Agreements unavailable; Bargaining Council uncontactable
Building Industry Bargaining Council (Southern and Eastern Cape)	Agreements unavailable; Bargaining Council uncontactable
National Bargaining Council for the Private Security Sector	This is a recently established council; agreement had not been published at time of capturing
National Bargaining Council for the Sugar Manufacturing and Refining Industry	Agreements said to be not be for public dissemination

As previously mentioned, digital copies of South African Bargaining Council agreements are decidedly scarce; in the face of this, this chapter had to rely on manual and optical character recognition (OCR) data capturing techniques – physical copies of the available agreements were scanned and then had OCR applied to them. The implementation of the OCR methodology was automated using basic scripting techniques in Python. With each Bargaining Council presenting their agreed upon wages in a different format, and with some of the scanned copies of agreements being of poor quality (due to years of weathering and fading of the original physical document) there was no way to eliminate the manual element of the capturing process entirely.

Figure 3.1 illustrates a maximally disaggregated wage table. Whilst not every sector disaggregated and presented the minimum wages in such a completely disaggregated fashion, each sector’s wage table was a permutation of this variation; disaggregating and displaying wages by: sub-sector, and/or grade, and/or occupation, and/or area, and/or wage period.

Figure 3-1: Presentation of a maximally disaggregated wage table

Sector A					
Sub-sector	Grade	Occupation	Minimum wage		Wage period
			Area XX	Area YY	
			Rands	Rands	
(AA)	Grade 1:				
	(i) Qualified	Occupation 1	X11	X12	Daily
		Occupation 2	X21	X22	Hourly
		⋮			
	Learners:				
	(ii) 1 st four months exp.	Occupation 1	X13	X23	Hourly
		Occupation 2	X14	X24	Hourly
		⋮			
	(ii) 2 nd four months exp.	Occupation 1	X15	X25	Monthly
		Occupation 2	X16	X26	Hourly
		⋮			
	(ii) 3 rd four months exp.	Occupation 1	X17	X27	Weekly
		Occupation 2	X18	X28	Weekly
		⋮			
	(ii) Thereafter, qualified wage	Occupation 1	X11	X12	Daily
		Occupation 2	X21	X22	Hourly
		⋮			
	Grade 2:				
	⋮	⋮	⋮	⋮	⋮

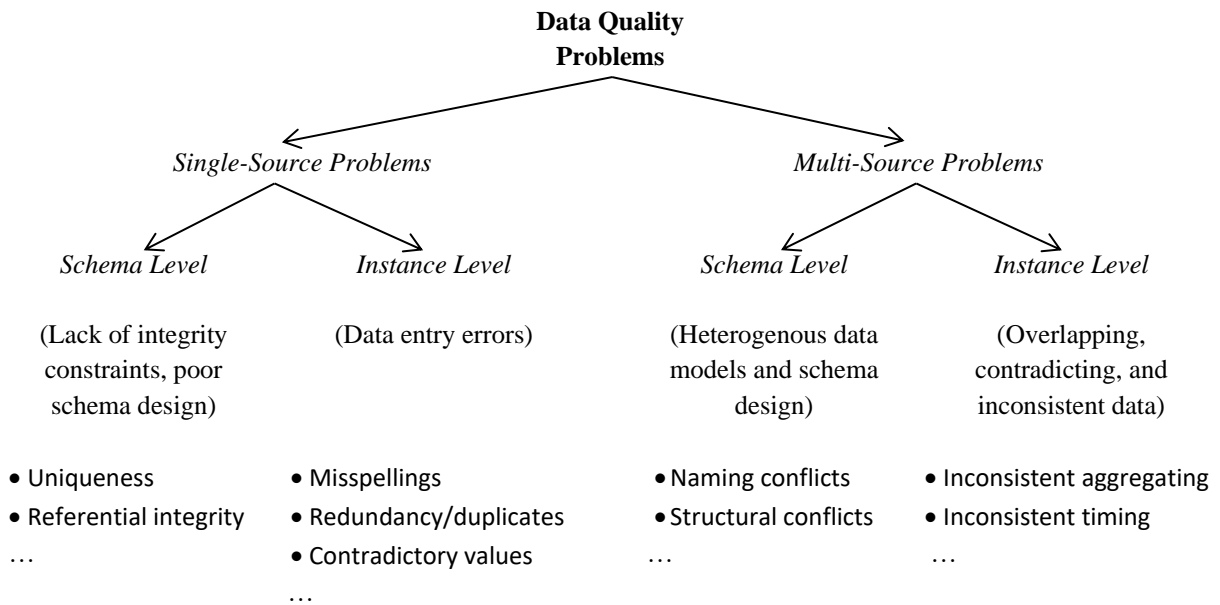
Once the data had been captured for each sector, cleaning methodologies had to be employed to ensure the usefulness of the data, as well as the uniformity of the data’s presentation across both space and time.

3.3.2 CLEANING

Since the BCMWD is comprised of multiple sources of data that are being integrated, the need for data cleaning increases significantly. A good data cleaning approach needs to satisfy several requirements. Firstly, it should detect and remove all major errata and inconsistencies in both individual data sources and when integrating multiple sources (Rahm & Do, 2000). This approach should be created with appropriate tools so as to limit manual inspection, while also being easily extended to cover additional sources. Data cleaning should not be performed in isolation, but together with schema-related data transformations based on comprehensive metadata (Rahm & Do, 2000). Lastly, mapping functions should be specified in a declarative way and be reusable for additional data sources as well as for data querying (Rahm & Do, 2000).

Problems that arise in the dataset can largely be classified as either single-source or multi-source (figure 3.3). Schema-level problems can also be reflected at the instance level; and can be addressed at the schema level by improved schema design, schema translation, and schema integration (Rahm & Do, 2000). Instance-level problems refer to errors and inconsistencies that exist in the actual data and are not visible at a schema level (Rahm & Do, 2000).

Figure 3-2: Classification of data quality problems in data sources



Source: Rahm & Do (2000)

The data quality of a source largely depends on how it is governed by schema and integrity constraints controlling which data values are permissible (Rahm & Do, 2000). The most common single source problems that arose in the BCMWD are described in table 3.6. These single source problems are aggravated when multiple sources are integrated (Rahm & Do, 2000). Each source typically contains dirty data and the data sources may be represented in a different fashion (as shown in figure 3.2). This is because data sources are typically developed, deployed, and presented independently to serve specific needs – resulting in a large degree of heterogeneity with respect to the actual data²⁷.

²⁷ I.e. if occupation = “Security Gard” in Sector A, occupation = “Security Guard” in Sector B, these occupations will be unmatchable.

Table 3.6: Single source problems

Problem	Dirty Data Example (if applicable)	Reasons/Remarks
Missing values	Minwage = .	Unavailable values during data capturing/OCR failed to identify values due to poor quality documents.
Illegal values	Minwage = 123.33.33	OCR failed to differentiate between commas and full stops due to poor quality documents.
Duplicated records	Minwage = 123 occurs as two line items with all other variables remaining constant.	Data entry error/same gazette being captured twice.
Minimum wage not strictly increasing	$\text{Minwage}_t < \text{Minwage}_{t-1}$	Occurs in a handful of cases – mistakes in government gazettes are typically to blame.
Numeric variable appearing as string		Data entry error.
Misspellings	Occupation = “Security Gard”	Data entry error/mistakes in government gazette.
Misfielded values	Occupation = “Grade 1”	Data entry error/OCR failure.

In general, the data cleaning process that was followed to ameliorate the aforementioned problems can be broken down into three phases:

1. **Data analysis:** Utilised to detect which kinds of errors and consistencies are to be removed (table 3.6 already gave examples of those that were most common to the BCMWD). In addition to manual inspection of the data, fit-for-purpose analysis programs and built-in-checkers were employed to detect data quality problems.
2. **Definitions of transformations and mapping rules:** The quality issues identified in step 1 were remediated with fit-to-purpose code that fixed each single source problem. With the BCMWD being comprised of 28 different sectors worth of Bargaining Council agreements, a schema translation was employed to map the different data sources to a common model (see figure 3.2).

3. **Verification:** The correctness and effectiveness of step 2 was tested and evaluated.

Since some errors only become apparent once reaching this step, steps 1 – 3 were repeated until a dataset that was devoid of problems was created.

Having gone through the three phases, the resultant dataset takes the form of figure 3.3. It is immediately observable that each row is now unique, allowing for easier data manipulation, matching, and analysis.

Figure 3-3: Captured data post-schema transformation – the ideal state

Sector	Sub-sector	Grade	Occupation	Area	Wage	Wage period
A	(AA)	Grade 1: Qualified	Occupation 1	Area XX	X11	Daily
A	(AA)	Grade 1: Qualified	Occupation 2	Area XX	X21	Hourly
A	(AA)	Grade 1: Qualified	Occupation 1	Area YY	X12	Daily
A	(AA)	Grade 1: Qualified	Occupation 2	Area YY	X22	Hourly
A	(AA)	Learners: 1 st four months exp.	Occupation 1	Area XX	X13	Hourly
⋮	⋮	⋮	⋮	⋮	⋮	⋮

3.3.3 THE FINAL DATASET

The BCMWD contains 19409 observations and varying degrees of variation in minimum wage announcements, particularly sectorally, sub-sectorally, geographically, occupationally, and by year. Some councils have national representivity, while others are restricted to a particular province, or even to a particular city or town. Some cater to very specific industries, while others cover a wide range of sub-sectors. The vast majority of councils captured provide minimum wages that have been disaggregated by occupation.

Table 3.7 outlines the final structure of the BCMWD, including the description of the variables available, the format of the variable, and the number of unique values the variable takes on.

Table 3.7: Variables of the BCMWD

Variable name	Variable label	Type	Format	Number of unique values
Sector	Sector covered by Bargaining Council	Discrete	String	28
Sub-sector	Sub-sector covered by Bargaining Council	Discrete	String	58
Occupation	Job description of employee	Discrete	String	1 517
Year	Year in which agreement was published	Discrete	Numeric	31
Wage	Stated nominal wage per hour/day/week/month	Continuous	Numeric	8 006
Minwage	Nominal monthly minimum wage	Continuous	Numeric	7 477
Deflwage	Real monthly minimum wage (2010=100)	Continuous	Numeric	10 287
Grade	Grade scale into which occupation falls	Discrete	String	94
Area	Geographic area wage applies to	Discrete	String	69
CPI	CPI with forecast (World Bank Estimates)	Continuous	Numeric	31
Yearofest	Year of establishment of Bargaining Council	Discrete	Numeric	28
Wageperiod	Frequency of wage payment: Either hourly, daily, weekly, or monthly	Discrete	String	4

Source: BCMWD (2019)

In order to illustrate how the BCMWD can be utilised, this chapter will now proceed with a descriptive analysis of Bargaining Councils with the manufacturing industry of South Africa. For the purposes of illustration, and to simplify the analysis, the manufacturing Bargaining Councils that are considered must fit two conditions; (i) be representative at a national level (Bargaining Councils that are representative at only a provincial/town/city level are excluded), and (ii) must have data available for the period of 2008-2017. The Bargaining Councils that meet these conditions are:

- Bargaining Council for the Grain Industry
- Furniture Bargaining Council
- Metal and Engineering Industries Bargaining Council
- Motor Industry Bargaining Council
- National Bargaining Council for Clothing Manufacturing Industry
- National Bargaining Council for the Chemical Industry
- National Bargaining Council for the Electrical Industry of South Africa
- National Bargaining Council for the Wood and Paper Sector

- National Bargaining Council of the Leather Industry of South Africa
- National Textile Bargaining Council

3.4 ESTIMATED BARGAINING COUNCIL COVERAGE

This analysis begins by estimating the number of employees covered by Bargaining Council agreements within the manufacturing sector. To effectively estimate the coverage of these Bargaining Councils, the BCMWD is matched with employment data drawn from the Post-Apartheid Labour Market Series (PALMS) (Kerr et al., 2017).

PALMS is a stacked, cross-sectional dataset containing microdata from 1994-2017, the majority of which had been collected through various surveys over time by Statistics South Africa (StatsSA). The dataset is comprised of the October Household Surveys (OHS) which ran from 1994 to 1999, the bi-annual Labour Force Survey (LFS) running from 2000 to 2007, and the Quarterly Labour Force Surveys (QLFS) which are available from 2008 to 2015. The data is collected at the household level, with each member of the household being surveyed and then weighted using census weights in order to create a sample representative of the South African population. The PALMS dataset captures approximately 120 different variables across time (Kerr et al., 2016). To ensure that coverage is correctly estimated, a few conditions have to be adhered to.

Firstly, the division between formal and informal employment is of crucial importance. Bargaining Council agreements are generally only extended to employers and employees who form part of the formal sector – for this reason, individuals that reported to be self-employed or employed in the informal sector were removed from the PALMS sample. This was further restricted to only include workers who have written contracts with their employers, as a Bargaining Council agreement cannot be binding without one.

Secondly, managers, professionals, associate professionals, and technicians are generally excluded from Bargaining Council coverage. Bhorat et al. (2009) mentions that this is not a legal prescription, but rather one that has been propagated throughout history. Bhorat et al. (2009) goes on to mention that this is only the case in the private sector and not in the public sector. Since the Bargaining Councils covered by this chapter all fall within the private sector, the condition was imposed.

Lastly, each Bargaining Council outlines occupations that are not covered by the respective agreements – to this end; these specific occupations were removed from the dataset. This resulted in a sample that generally falls into the bracket of unskilled and semi-skilled (with little to no skilled individuals²⁸).

The results of this Bargaining Council coverage estimation are presented in two fashions, (i) by percentage of the formal employed cohort of South Africa (table 3.8), and (ii) by the total formal employed cohort of the manufacturing sector of South Africa (table 3.9).

A noticeable pattern emerges from the results in terms of coverage and its relationship with total formal employment – as one proceeds forward in time total formal employment grows, while the percentage of employees covered by Bargaining Councils relative to total formal employment falls. This can potentially be partially explained by the fact that in recent years, even though total formal employment has been growing in South Africa (in absolute terms), there has been a decline in the number of employees in the manufacturing sector (SARB, 2016).

²⁸ This is corroborated in Bhorat et al., (2009).

Noting the decline in employment in the manufacturing sector, attention is turned to the coverage of these Bargaining Councils, relative to total formal manufacturing employment. Table 3.9 shows that in 2008 approximately 61% of formal manufacturing employment was covered by a Bargaining Council; this number declined to approximately 46% in 2017. Metals and engineering was the sector that showed the greatest reduction (approximately 5% when comparing 2008 and 2017).

Table 3.8: Bargaining Council Coverage by total formal employment (2008 - 2017)²⁹

Sector	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Chemicals	114 093 1.15%	96 732 1.05%	80 013 0.97%	95 484 1.13%	94 197 0.99%	102 456 1.02%	93 424 0.90%	101 179 0.97%	94 181 0.89%	101 237 0.94%
Clothing	111 135 1.12%	111 941 1.22%	88 743 1.07%	92 223 1.09%	82 922 0.87%	83 451 0.83%	92 526 0.89%	76 496 0.73%	87 240 0.83%	76 588 0.71%
Electrical	34 523 0.35%	25 194 0.27%	16 897 0.20%	16 036 0.19%	23 208 0.24%	18 095 0.18%	21 516 0.21%	18 669 0.18%	19 148 0.18%	12 881 0.12%
Furniture	39 098 0.39%	34 351 0.37%	27 800 0.34%	27 975 0.33%	32 143 0.34%	27 450 0.27%	35 579 0.34%	30 615 0.29%	20 405 0.19%	18 363 0.17%
Motor Industry	99 131 1.00%	83 428 0.91%	81 599 0.99%	95 884 1.13%	85 065 0.89%	82 771 0.82%	77 931 0.75%	64 925 0.62%	59 589 0.57%	57 092 0.53%
Leather	10 355 0.10%	9 808 0.11%	9 474 0.11%	8 803 0.10%	7 684 0.08%	18 640 0.19%	12 440 0.12%	6 951 0.07%	9 059 0.09%	8 396 0.08%
Metal and Engineering	338 630 3.41%	293 000 3.18%	266 906 3.23%	258 732 3.06%	244 250 2.56%	243 929 2.43%	253 264 2.43%	216 447 2.07%	212 286 2.01%	247 093 2.28%
Textiles	47 336 0.48%	49 238 0.54%	29 626 0.36%	33 611 0.40%	38 601 0.40%	32 726 0.33%	34 220 0.33%	37 270 0.36%	37 228 0.35%	27 836 0.26%
Wood and Paper	109 976 1.11%	92 340 1.00%	85 922 1.04%	74 567 0.88%	75 884 0.79%	57 940 0.58%	66 074 0.63%	73 771 0.71%	66 302 0.63%	78 550 0.73%
Grain	15 039 0.15%	12 163 0.13%	13 881 0.17%	25 497 0.30%	20 152 0.21%	29 523 0.29%	24 605 0.24%	23 362 0.22%	11 667 0.11%	17 947 0.17%
Total BC coverage	919 316 9.27%	808 195 8.78%	700 861 8.49%	728 812 8.61%	704 106 7.37%	696 981 6.94%	711 579 6.84%	649 685 6.22%	617 105 5.85%	645 983 5.97%
Total formal employment	9 920 541	9 202 017	8 258 730	8 467 545	9 559 026	10 044 473	10 406 087	10 439 429	10 542 062	10 826 781

Source: BCMWD (2019); Author's own calculations.

²⁹ Percentages indicated represent individuals covered per sector, divided by total formal employment.

Table 3.9: Bargaining Council Coverage by total formal manufacturing employment (2008 - 2017)³⁰

Sector	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Chemicals	114 093 7.54%	96 732 6.69%	80 013 5.95%	95 484 6.90%	94 197 6.53%	102 456 7.09%	93 424 6.57%	101 179 7.46%	94 181 7.09%	101 237 7.19%
Clothing	111 135 7.35%	111 941 7.74%	88 743 6.60%	92 223 6.66%	82 922 5.75%	83 451 5.77%	92 526 6.51%	76 496 5.64%	87 240 6.57%	76 588 5.44%
Electrical	34 523 2.28%	25 194 1.74%	16 897 1.26%	16 036 1.16%	23 208 1.61%	18 095 1.25%	21 516 1.51%	18 669 1.38%	19 148 1.44%	12 881 0.91%
Furniture	39 098 2.58%	34 351 2.37%	27 800 2.07%	27 975 2.02%	32 143 2.23%	27 450 1.90%	35 579 2.50%	30 615 2.26%	20 405 1.54%	18 363 1.30%
Motor Industry	99 131 6.55%	83 428 5.77%	81 599 6.06%	95 884 6.93%	85 065 5.90%	82 771 5.73%	77 931 5.48%	64 925 4.79%	59 589 4.49%	57 092 4.05%
Leather	10 355 0.68%	9 808 0.68%	9 474 0.70%	8 803 0.64%	7 684 0.53%	18 640 1.29%	12 440 0.88%	6 951 0.51%	9 059 0.68%	8 396 0.60%
Metal and Engineering	338 630 22.38%	293 000 20.25%	266 906 19.84%	258 732 18.69%	244 250 16.93%	243 929 16.88%	253 264 17.82%	216 447 15.96%	212 286 15.99%	247 093 17.55%
Textiles	47 336 3.13%	49 238 3.40%	29 626 2.20%	33 611 2.43%	38 601 2.68%	32 726 2.26%	34 220 2.41%	37 270 2.75%	37 228 2.80%	27 836 1.98%
Wood and Paper	109 976 7.27%	92 340 6.38%	85 922 6.39%	74 567 5.39%	75 884 5.26%	57 940 4.01%	66 074 4.65%	73 771 5.44%	66 302 4.99%	78 550 5.58%
Grain	15 039 0.99%	12 163 0.84%	13 881 1.03%	25 497 1.84%	20 152 1.40%	29 523 2.04%	24 605 1.73%	23 362 1.72%	11 667 0.88%	17 947 1.27%
Total BC coverage	919 316 60.76%	808 195 55.87%	700 861 52.09%	728 812 52.65%	704 106 48.80%	696 981 48.22%	711 579 50.07%	649 685 47.91%	617 105 46.48%	645 983 45.88%
Total formal manufacturing emp.	1 513 001	1 446 590	1 345 425	1 384 240	1 442 983	1 445 456	1 421 201	1 355 953	1 327 637	1 408 045

³⁰ Percentages indicated represent individuals covered per sector, divided by total formal employment.

3.5 EVOLUTION OF MINIMUM WAGES IN MANUFACTURING

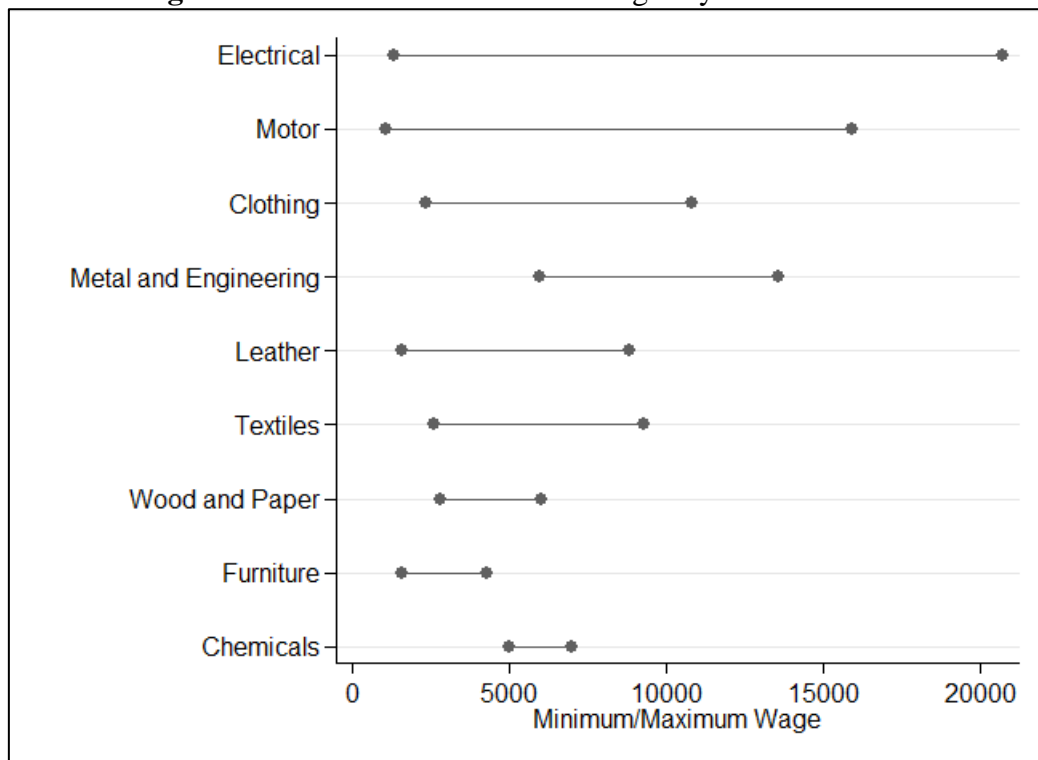
As discussed earlier in this chapter, there is no rule or pattern for how sectors may disaggregate their minimum wages. Table 3.10 illustrates descriptive statistics for the considered Bargaining Councils in 2017. As can be expected, sectors with higher levels of wage disaggregation exhibit higher levels of wage variation. This variation is shown graphically in figure 3.4, with the electrical and motor industries showing the highest levels of variation. Figure 3.5 extends this decomposition to show the variance between the various minima and maxima of minimum wages of different sectors across time – reinforcing the notion that sectors with higher levels of wage disaggregation exhibit higher levels of wage variance.

Table 3.10: Descriptive results for 2017

Sector	Unique values	Minimum	Maximum	Median	Mean
Chemicals	4	5 000	7 000	5 975	5 988
Clothing	110	2 534	11 664	4 088	4 579
Electrical	275	1 316	20 744	6 215	7 264
Furniture	30	1 582	4 305	2 816	2 864
Motor Industry	131	1 078	15 936	5 928	6 262
Leather	105	1 566	8 846	5 481	5 467
Metal and Engineering	46	5 963	13 586	9 904	9 932
Textiles	52	3 098	10 956	5 156	5 512
Wood and Paper	4	2 800	6 503	4 544	4 598

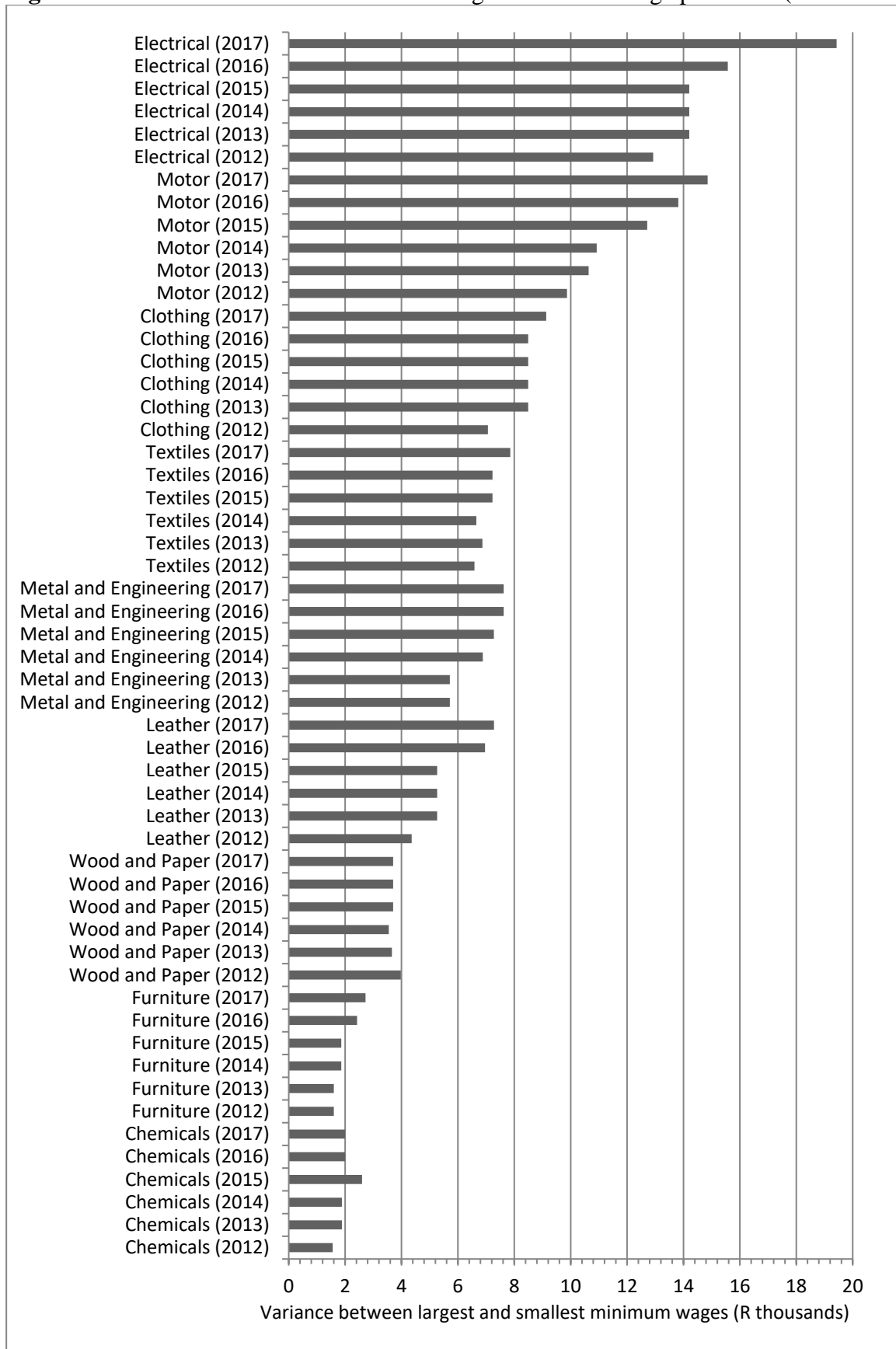
Source: BCMWD (2019); Author's own calculations.

Figure 3-4: Variation of minimum wages by sector for 2017



Source: BCMWD (2019); Author's own calculations.

Figure 3-5: Variance between smallest and largest minimum wage per sector (2012 – 2017)



Source: BCMWD (2019); Author's own calculations.

Table 3.11 shows that the average nominal minimum wage³¹ in every sector has steadily increased (apart from years in which there was no Bargaining Council agreement – in these years, the nominal wage would remain static). In 2017, the metal and engineering sector had the highest average minimum wage, outstripping the lowest average minimum wage (occurring in the furniture sector) by 347%.

Table 3.11: Average nominal wages by sector (2012-2017)³²

Year	Chemicals	Clothing	Electrical	Furniture	Motor Industry	Leather	Metal and Engineering	Textiles	Wood and Paper
2012	4 789	3 508	5 631	2 590	4 362	3 758	6 756	4 138	3 897
2013	5 168	4 259	5 782	2 590	4 706	4 302	6 768	4 409	4 109
2014	5 249	4 259	5 782	2 662	5 293	4 302	8 482	4 667	4 316
2015	5 622	4 259	5 782	2 662	5 518	4 302	9 199	5 068	4 598
2016	5 988	4 259	6 261	2 804	5 886	5 290	9 932	5 068	4 598
2017	5 988	4 579	7 264	2 864	6 262	5 467	9 932	5 512	4 598

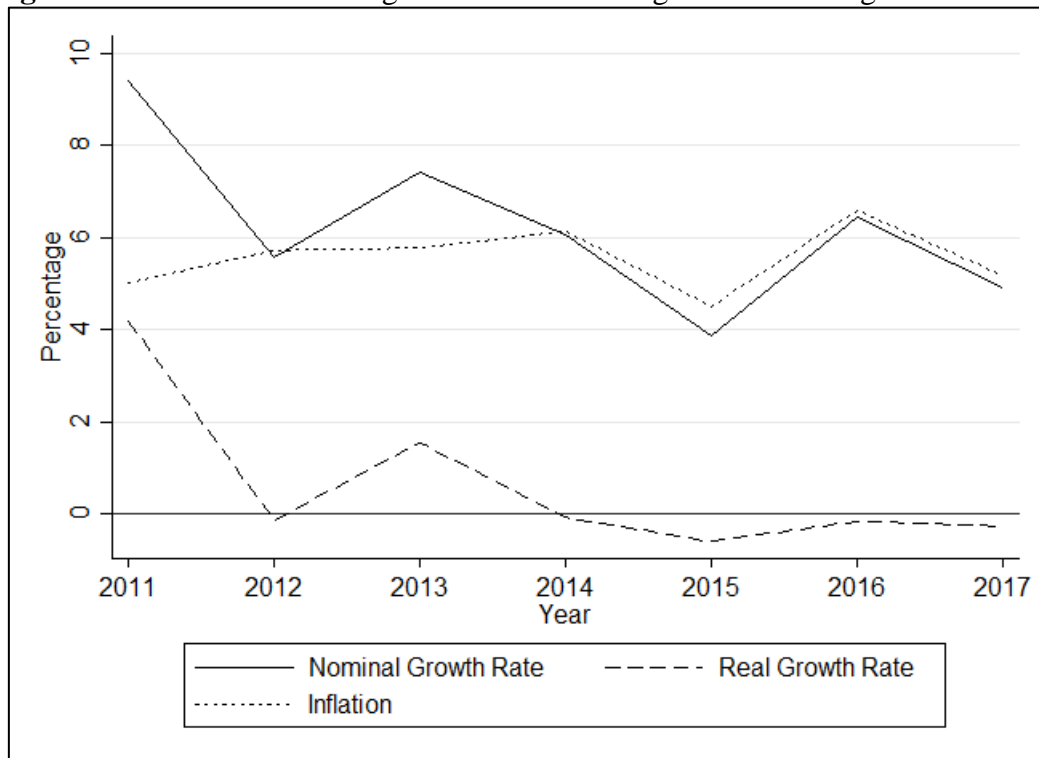
Source: BCMWD (2019); Author's own calculations.

While this growth in average nominal minimum wages may appear impressive, it is the change in the real wages that one is most concerned with, as this better indicates the standard of living that may be attained by an employee. Figure 3.6 illustrates that since 2011 there has been a contraction and stagnation in the growth of real average minimum wages across the manufacturing sector – with only the period of 2012-2014 showing growth of the average real minimum wage that is above 0%. This is a worrying trend as the entire foundation of Bargaining Council minimum wages rests on the notion of social transformation, the protection of the most vulnerable employees, and the amelioration of poverty; however, with what appears to be a shrinking of the real average minimum wage, these goals are not being met³³.

³¹ Note: This is the average of the prescribed nominal minimum wage – this is not necessarily the wage that employees are receiving. For more on compliance with minimum wages, please see Chapter 3 of this thesis.

³² Averages are taken as the summation of unique average wage values per sector divided by the number of unique average wages per sector.

³³ It is worth noting that these findings should only be considered for the manufacturing sector. It is plausible that stagnation of real minimum wages corresponds to manufacturing's performance in international markets. Should data become available on public sector bargaining councils, one would be able to unpack this further – this will be considered for further research.

Figure 3-6: Nominal and real growth rates of average minimum wages vs. inflation

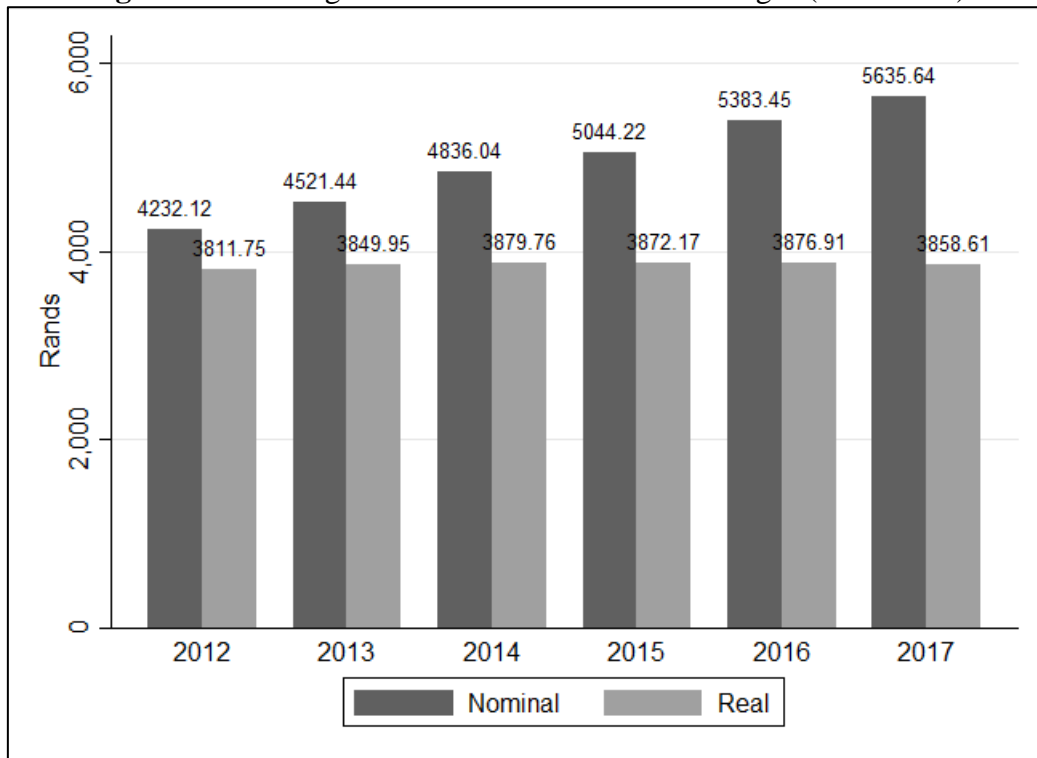
Source: BCMWD (2019); Author's own calculations.

Noting that it is plausible that averages may be misleading, as one sector could be dragging down the average as a whole, attention is turned to the average nominal and real minimum wage by sector. These wages are illustrated in figures 3.7 and 3.8³⁴.

When comparing the 2012 period to 2017, chemicals, clothing, and furniture show a noticeable decline in real wage or 5%, 4%, and 22% respectively. The motor and leather industries show the most positive real wage growth with 24% and 35% increases respectively.

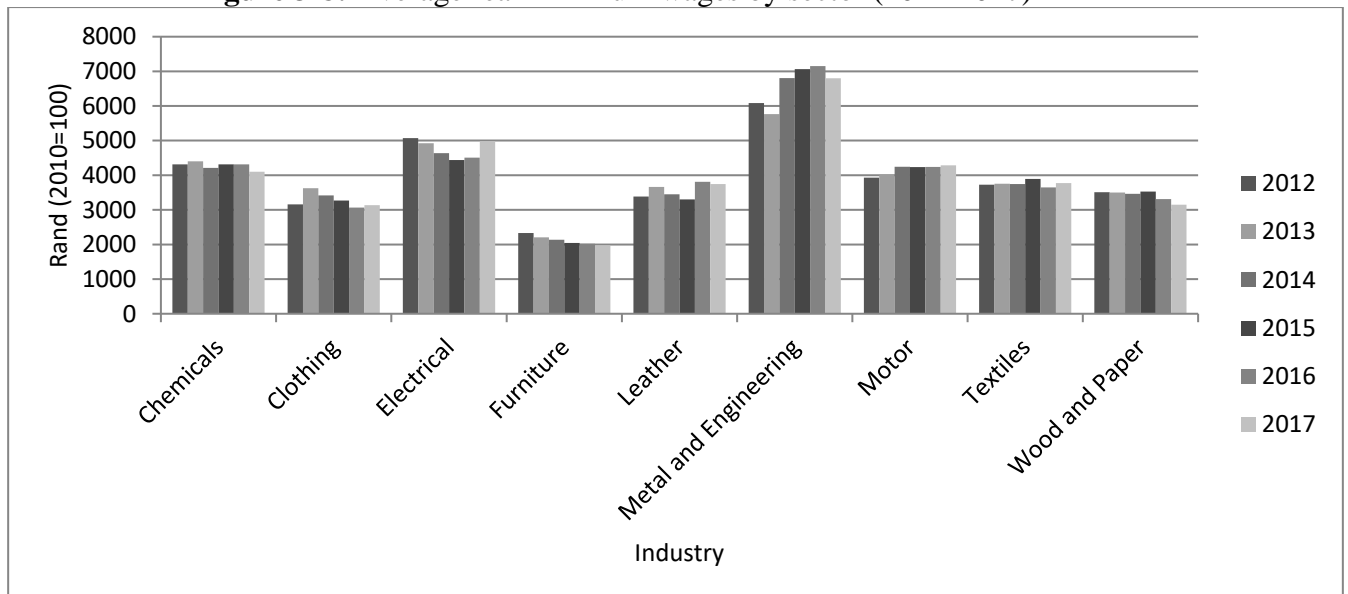
³⁴ Further graphical decomposition of these wages across time by sector are shown in Appendix B.

Figure 3-7: Average nominal and real minimum wages (2012-2017)



Source: BCMWD (2019); Author's own calculations.

Figure 3-8: Average real minimum wages by sector (2012-2017)



Source: BCMWD (2019); Author's own calculations.

3.6 CONCLUSIONS

Bargaining Councils are a complex phenomenon with effects on the economy that have only just begun to be unpacked. Due to the lack of coherent and complete data in this space – specifically with regards to the minimum wages set by Bargaining Councils – this particular research area has had to rely on limited analysis, small samples, and has largely been limited to time-invariant estimations.

This chapter has described the capturing, construction, and cleaning of the most comprehensive Bargaining Council minimum wage dataset for South Africa thus far (The Bargaining Council Minimum Wage Dataset (BCMWD)). The chapter further delved into the metadata of the dataset, laying out basic descriptives obtainable from the data, as well as illustrating some of the practical applications of such data. From the evolution of wages, to the estimation of Bargaining Council coverage, this chapter has shown that this new dataset has a place within this field of research and will be greatly beneficial for future studies.

The next two chapters of this thesis will make use of this dataset to unpack the effects of these minimum wages that have been set by Bargaining Councils on (a) employment and earnings, and (b) labour productivity within the South African economy.

With this data entering the public domain, it is hopeful that this data will find its natural place among the literature and serve as a tool to further expand the growing field of Bargaining Council and minimum wage research in South Africa.

Chapter 4: **Employment Effects of Bargaining Council Decisions: An Analysis of Minimum Wages in South Africa**

4.1 INTRODUCTION

After the fall of apartheid in 1994, unions and Bargaining Councils played a crucial role in South Africa's early stages of transformation. However, research into the effects of Bargaining Councils have been constrained by the opaqueness of their wage rates and decisions – there are many different wages, covering many different types of jobs, decided at various time. And although this data should be easily available within the public domain since it is gazetted, it is extremely hard to come by. As a result, research in this space has remained sparse.

South Africa has a unique collective bargaining structure: wages are mostly set at a sectoral level. In this structure wages are set in two ways. The first occurs where worker organisation is difficult. In this circumstance, the National Minimum wage will apply to all workers within that sector. This minimum wage applies regardless of the job level but may differ geographically. The second approach to wage setting is through Bargaining Councils - these are made up of the employer and employee representative. The decisions made by these Bargaining Councils, if these councils are deemed to be sufficiently representative of the sector, are assumed to operate "*ergo omnes*" – which means that these decisions are extended to all workers and firms in the sector, even those who were not part of the decision-making process. These Bargaining Councils set minimum wages for different levels of employee which may differ by region. In practice "representivity" is interpreted as employing more than half of the workers within the industry and large employers tend to dominate these councils.

It is claimed that the decisions made by Bargaining Councils are essential for South Africa, specifically in a transformation context, whereby minimum wages set by these Bargaining Councils have been argued to be necessary for supporting not only the worker, but the extended family of said worker due to the lingering effects of the apartheid regime (Finnemore & van der Merwe, 1987)³⁵. Furthermore, it is suggested that the existence of Bargaining Councils and the extension of their decisions protects workers from low wages, long hours and unhygienic conditions (Finnemore & van der Merwe, 1987). Critics of the collective bargaining system have shown the deleterious effects of the system whereby it places a special burden on small firms, increases business failures and discourages start-ups, and contributes to South Africa's high unemployment rate. However, these studies have only used cross-sections of data and broad definitions of coverage (Magruder, 2012) or focused on a specific industry (Nattrass and Seekings, 2012) and have not considered how they may constrain firm level adjustment, and consequently employment, to increasing import competition. This chapter will provide a detailed analysis of these Bargaining Councils and their relationship with wages and employment during a period of increasing trade in South Africa.

This chapter requires that a database of Bargaining Councils and their decisions is built through the extraction of information from government gazettes. Wages and working conditions agreed upon by Bargaining Councils vary by coverage of the council, by region and by job description. This database will capture the various agreements of these councils and will link these to individual level outcomes in officially collected labour market data.

Using this database, the chapter exploits three aspects of variation to identify the effect of Bargaining Councils on employment and wages: first, regional variation in coverage (some

³⁵ These effects include (but are not limited to): a lack of skills of an individual; insufficient work experience of an individual due to being excluded from the workforce during Apartheid.

areas are covered by Bargaining Councils whilst others are not); second, time variation (different Bargaining Councils have rounds of collective bargaining at different times); and third, variation in wage levels for different occupations within a Bargaining Council (different occupational levels have different set wages for different sectors and these do not correspond across sectors). This variation, and the changes which occur after different rounds of collective bargaining, can then be used to examine whether these agreements are associated with wage outcomes, employment levels and employment by different sizes of firms.

The results from this analysis can be used to discuss how this collective bargaining structure may constrain firm responses to increases in competition through imports. It seems likely that these structures will prevent firms from adjusting to increased competition, potentially from imports, by decreasing real wages (Rankin, 2016). This in turn raises questions about how countries can create, or protect, better paying “decent” jobs in a globalised environment.

4.2 LITERATURE REVIEW

4.2.1 THE EFFECTS OF BARGAINING COUNCILS IN SOUTH AFRICA

The effects of Bargaining Councils in South Africa have been widely discussed in the past two decades³⁶; however, much of the academic research has been limited by the availability of data. Existing research has dealt with this in two ways. First, by only conducting a cross-sectional analysis, ignoring time effects and, secondly, by focusing only on a specific industry or sector. This section will proceed to outline the literature in two components: the first a theoretical model as described by Moll (1996), and the second South African empirical literature outlining the impact of Bargaining Councils in the South African context.

³⁶ See Godfrey & Macun, 1991; Godfey, 1992; Moll, 1996; Schultz & Mwabu, 1998; Butcher & Rouse, 2001; Borat et al., 2009; Magruder, 2012.

4.2.1.1 MOLL'S MINIMUM WAGE MODEL

Since the right to bargain centrally is one which must be voluntarily exercised, it is possible that Bargaining Council agreements exist systematically in the industries, magisterial districts, and years in which local labour markets make them particularly profitable for the firms who pursue centralised bargaining (Magruder, 2012). Moll (1996) followed this rationale and outlined a theoretical model discussing the implications of Bargaining Councils for small and large firms. This model rests on the basis of a few assumptions. Firstly, it is assumed that there is no government intervention in labour markets, and that wages are correlated with firm size. This is because there are economies of scale in union organisation, so union densities are higher at large firms, and because there are no unions below a threshold firm size. In the absence of a bargaining agreement, large unionised firms would pay a privately bargained wage (w^{LU}), while non-unionised firms and small firms would pay a wage dictated by market forces, (w^{MF}). If a Bargaining Council agreement existed, and a wage accord was reached under this agreement, there would be a third wage possibility, (w^{BC}). Due to the *ergo omnes* nature of Bargaining Councils, all firms within the sector would have to comply with the prescribed wage, w^{BC} .

According to Moll (1996), it is presumed that $w^{LU} > w^{BC} > w^{MF}$, making it readily apparent that under a Bargaining Council agreement the wages for large unionised firms decrease, while the wages for small firms and large non-unionised firms increase. The net result of this is that larger firms pay a lower wage than they would have if market forces had dictated the wage, and some small firms are forced out of the market, with others facing a barrier to entry. With lower amounts of small firms within the market competition is decreased, and larger firms have lower incentive to operate efficiently. The result is a pervasive negative effect on economic growth³⁷.

³⁷ For a more in-depth analysis of the application of this model and its predicted results, please see Moll (1995, 1996).

The following section of this chapter outlines existing literature which demonstrates the impact of Bargaining Councils on the South African labour market, as well as evidence that supports Moll's model.

4.2.1.2 THE IMPACT OF SOUTH AFRICAN BARGAINING COUNCILS

Schultz and Mwabu (1998) investigated the impact of unions on South African wages. The authors used a national probability sample of the South African population collected at the end of 1993 by the South African Labour and Development Research Unit. Some 43 974 individuals from 9 000 households were drawn from 360 sample clusters. Schultz and Mwabu (1998) used quantile Ordinary Least Squares regressions to first examine the impact of union status dummies across deciles on wages. The wage function estimates show that union membership among African workers increases their wages by 145% at the bottom 10th percentile of the wage distribution and by 11% at the top 90th percentile. Among white workers, the relative increase in union wages is 21% at the 10th percentile but is associated at the 90th percentile with a reduction of 24%. The authors found that on average a unionised African worker received a wage that was 60% higher than a non-unionised African worker with the same characteristics. A white union worker received a wage that was 5% lower than their un-unionised counterpart. Schultz and Mwabu (1998) observed that the centralised bargaining system in South Africa was meant to minimise 'within-industry union and non-union' wage differentials; however they found wage differentials to still be significant (controlling for human capital variables, rural residence and industry). The authors estimated that cutting the union wage effect by half could reduce unemployment for young Africans by 2% and increase labour force participation rate.

Building on the implications for small firms that ultimately pay higher wages³⁸, many papers have shown that Bargaining Councils induce a wage premium for their members (Butcher & Rouse, 2001), particularly at the bottom of the income distribution (Schultz & Mwabu, 1998). Borat et al. (2009) levelled a major criticism against Bargaining Council agreements in that, due to the *ergo omnes* nature of the agreements small firms - and consequently their employees - are negatively affected. The authors use the 1995 October Household Survey and the September 2005 Labour Force Survey (LFS) to estimate the proportion of workers covered by Bargaining Councils. In 1995, 15% of formally employed workers were part of Bargaining Councils; the figure stood at 32% in 2005. Through quantile regressions Borat et al. (2009) estimated the impact of a range of explanatory variables on the wage distribution. Between 1995 and 2005, union membership awarded a wage premium across the wage distribution; it also reduced wage inequality especially at the lower end of the distribution. Another major finding of Borat et al. (2009) was that public sector Bargaining Council members earned more than private sector Bargaining Council members, and on average more than workers not covered by the Bargaining Council system. This observation held true across employees of all races, genders, and even held when controlling for occupation. There was a strong association between wage premium and union membership between 1995 and 2005.

Magruder (2012) used the South African Labour Force Survey and Government Gazette to estimate the effect of Bargaining Council on wages and employment, paying attention to variations with space, across industries and over time. The author assumed spatial continuity and used a difference-in-differences approach as a benchmark for Bargaining Councils on employment and small firm employment. Magruder (2012) argued that although Bargaining

³⁸ As discussed in section 2.2.1

Council agreements are enforced in a spatially discontinuous way, it can be assumed that labour markets are spatially continuous within South Africa. The author then employed a spatial regression discontinuity, and spatial fixed effects to show that Bargaining Councils in South Africa are associated with lower employment in a particular industry, higher wages and lower employment in small firms; the employment per industry decreased by an estimated 8-13% due to Bargaining Council agreements, with the loss in employment being largely concentrated in small firms. For spatial fixed effects, Magruder (2012) found that the estimates were robust to magisterial district, magisterial district-year and magisterial district-industry effects.

Revisiting the Bargaining Council dilemma, Bhorat et al. (2012) examined union and Bargaining Council wage premia for formally employed Africans using the Labour Force Survey of 2005. The authors argued that previous literature found higher estimates of the wage premium by failing to control for variables that capture the nature of the workplace such as firm size, type of work and non-wage benefits. Utilising an OLS regression the authors estimated a union wage gap of between 6% and 41%, depending on the specifications used. To correct for the fact that the union status may be endogenous with respect to wages, the authors then utilised a probit model within the wage equation. The authors found that the wage premiums for non-union workers were 9% and 10% for private and public sector Bargaining Council systems respectively. Bhorat et al. (2012) further found evidence that unions negotiate for awards for their members outside of the bargaining system.

Von Fintel (2016) investigated South Africa's unemployment problem from both a supply side and demand perspective. The author made use of a district pseudo-panel compiled from Household Surveys and OLS estimated elasticities of labour demand, labour supply and unemployment with respect to wages. The author estimated various labour market outcomes to

district level wages and concluded that the labour market was primarily driven by wages, while labour supply was less sensitive to changes in wages. A major finding by the author was that in comparison to low paid workers, the wage effects of middle to highly paid workers lead to suppressed demand for labour and increased local unemployment. Cross-district unionisation rates and the distribution of large firms were responsible for this observation. According to von Fintel (2016), a significant component of the wage effect on labour market outcomes was due to these wage-setting institutions.

Nattrass & Seekings (2012) further the criticism of Bargaining Councils by stating that “Bargaining Councils push some employers to restructure production in more capital and skill intensive directions. The result is job destruction (sic).” This is not the first South African policy to be criticised for achieving the exact opposite of its goal. Chapter 2 already showed that the implementation of the Employment Equity Act of 1998 had similar results in terms of restructuring and not the protection effects of workers as it had intended – a similar result that Nattrass and Seekings (2012) show to be true of Bargaining Councils.

This chapter aims to address three primary shortcomings of the previous analyses³⁹. Firstly, this chapter will not be restricted to a cross-sectional analysis, and thus can identify trends over time. Secondly, this chapter will not be limited to a single sector or industry and can thus study effects between industries. Lastly, this chapter has largely disaggregated data and can thus exploit between variations of occupation, industry, and region.

³⁹ Of which each previous paper suffered from at least one.

4.3 DATA

The dataset used in this chapter was created specifically for studying the effect of Bargaining Council decisions and their implications on employment effects – the Bargaining Council Minimum Wage Dataset (BCMWD)⁴⁰.

As the time of writing this chapter, the dataset only contained the minimum wage decisions of three Bargaining Councils⁴¹: (i) Metal and Engineering, (ii) Textiles, and (iii) Clothing. The data on these Bargaining Councils were chosen as the first to be captured because they represent three of the top five largest Bargaining Councils, in terms of their coverage (Bhorat et al., 2009).

To conduct the analysis in this Chapter, the BCMWD is matched with employment and wage data drawn from the Post-Apartheid Labour Market Series (PALMS).

PALMS is a stacked, cross-sectional dataset containing microdata from 1994-2015, the majority of which was collected through various surveys over time by Statistics South Africa (StatsSA). The dataset is comprised of the October Household Surveys (OHS) which ran from 1994 to 1999, the bi-annual Labour Force Survey (LFS) running from 2000 to 2007, and the Quarterly Labour Force Surveys (QLFS) which are available from 2008 to 2015. The data is collected at the household level, with each member of the household being surveyed and then weighted using census weights in order to create a sample that was representative of the South African population. The PALMS dataset captures approximately 120 different variables across time (Kerr et al., 2016), including wages, occupation, gender, race, province, years of education, and hours worked in the previous week.

⁴⁰ As discussed in Chapter 3.

⁴¹ The dataset is considered to be in on-going development, hence why only three councils had been captured at the time of writing.

Before matching could proceed, certain conditions had to be imposed on the PALMS dataset to ensure congruence with the BCMWD.

Firstly, the division between formal and informal employment is of crucial importance. Bargaining Council agreements are generally only extended to employers and employees who form part of the formal sector – for this reason, individuals who reported themselves as self-employed or employed in the informal sector were removed from the sample. This was further restricted to only include workers who have written contracts with their employers, as a Bargaining Council agreement cannot be binding without one.

Secondly, managers, professionals, associate professionals, and technicians are generally excluded from Bargaining Council coverage. Bhorat et al. (2009), mentions that this is not a legal prescription, but rather one that has been propagated throughout history. The authors go on to mention that this is only the case in the private sector and not in the public sector. Since the Bargaining Councils covered by this Chapter all fall within the private sector, the condition was imposed, and individuals matching this description were removed.

Lastly, specific occupations that were not covered by the Bargaining Councils (as stated in the government gazettes) were removed. This resulted in a sample that generally falls into the bracket of unskilled and semi-skilled (with little to no skilled individuals⁴²).

Having restricted the sample to only those individuals that meet the aforementioned criteria, a standardised grade structure was imposed on both datasets. This standardised grade structure

⁴² This is corroborated in Bhorat et al., (2009).

exists within some Bargaining Councils already, as these councils were used as the basis for the imposed structure.

Each grade within a specific Bargaining Council represents a variety of occupations. Under this approach, a cleaner (along with other very low-skilled occupations) would be classified under a lower grade than what a driver (and other similarly skilled occupations) is. These grade structures vary from sub-sector to sub-sector.

To illustrate how these grade structures may vary, the following example is considered. When considering the textile sector, if the “woven and crochet” sub-sector grade structure is compared with the “carpet” sub-sector grade structure (shown below), it is immediately noticeable that the “woven and crochet” sub-sector has a more disaggregated grade structure than that of the “carpet” sub-sector. Different grade structures exist within most of the captured sub-sectors, which brings a lot of disaggregation into the data.

Woven and crochet⁴³:

$$\begin{aligned} & \textit{Grade A1} < \textit{Grade A2} < \textit{Grade A3} < \textit{Grade B1} < \textit{Grade B2} < \textit{Grade B3} \\ & < \textit{Grade B4} \end{aligned} \quad (4.1)$$

Carpets⁴⁴:

$$\textit{Grade 1} < \textit{Grade 2} < \textit{Grade 3} < \textit{Grade 4} < \textit{Grade 5} \quad (4.2)$$

⁴³ Grade A1 is the lowest skilled – i.e. has the lowest minimum wage.

⁴⁴ Grade 1 is the lowest skilled – i.e. has the lowest minimum wage.

In order to ensure comparability, this chapter created a standardised grade structure upon into which wages were reassigned, with Grade 1 being the least skilled and Grade 5 being the most skilled (shown below)⁴⁵. For sub-sectors that assigned a unique minimum wage for each occupation, these occupations were manually assigned into the new grade structure based on the varying skill level that each distinct occupation entails⁴⁶. With this standardised structure in hand, the PALMS data was reduced to the same form – assigning each occupation into its requisite grade.

$$\text{Grade 1} < \text{Grade 2} < \text{Grade 3} < \text{Grade 4} < \text{Grade 5} \quad (4.3)$$

With the PALMS dataset having been adequately restricted to only those employees who are covered by a Bargaining Council agreement, the dataset was matched with the BCMWD on four distinct variables, namely: year, sector, region, and grade. This resulted in a matched dataset that contains employment and wage information at the individual level, along with the minimum wage that said individual should receive, with that minimum wage depending on the year, sector, region, and grade that the individual falls into.

4.4 BARGAINING COUNCILS AND THEIR EFFECTS

This chapter exploits three key aspects of variation to identify the effect of Bargaining Councils on employment and wages: first, regional variation in coverage; second, time variation (different Bargaining Councils have rounds of collective bargaining at different times); and

⁴⁵ (1) Least skilled; (2) Less skilled; (3) Average skilled; (4); More skilled; (5) Most skilled.

⁴⁶ These occupations were compared with similar occupations in other sub-sectors in order to gather an idea of what skill level should be assigned, as well as checking that minimum wages were higher for higher skilled individuals after reassignment had taken place

third, variation in wage levels for different occupations within a Bargaining Council (different occupational levels have different set wages for different sectors and these do not correspond across sectors). This variation, and the changes which occur after different rounds of collective bargaining, can then be used to examine whether these agreements are associated with wage outcomes, employment levels and employment by different sizes of firms.

This chapter concludes with an exploration of the coverage of Bargaining Councils, whether or not there is a non-compliance of minimum wage agreements by employers, and the effect of Bargaining Council agreements on wages and employment.

4.4.1 ESTIMATION OF BARGAINING COUNCIL COVERAGE

Extending the work of Borat et al. (2009), this analysis begins by estimating the number of employees covered by Bargaining Council agreements for the three sectors of interest. Covered employees are defined in the same way as they were previously: namely, they are formal employees, working for a wage, with a written contract, in the private sector, and they are not managers, professionals, associate professionals, or technicians. The number of covered employees is expressed numerically, and as a percentage of total formal employment in table 4.1, below.

Table 4.1: Estimated Bargaining Council coverage by percentage of total formal employment

	2009	2010	2011	2012	2013	2014	2015
Clothing	107,545	95,004	98,869	90,654	88,761	97,284	85,956
	(1.17%)	(1.15%)	(1.17%)	(0.95%)	(0.88%)	(0.94%)	(0.82%)
Metal and Engineering	288,577	271,471	256,295	267,185	267,701	260,303	219,030
	(3.14%)	(3.29%)	(3.03%)	(2.80%)	(2.67%)	(2.50%)	(2.10%)
Textiles	48,523	33,696	38,061	39,568	36,366	39,142	41,595
	(0.53%)	(0.41%)	(0.45%)	(0.41%)	(0.36%)	(0.38%)	(0.40%)
Total formal employment	9,200,493	8,247,306	8,458,264	9,546,210	10,034,927	10,398,459	10,423,018

A noticeable pattern emerges from the results in terms of coverage and its relationship with total formal employment – as one proceeds forward in time, total formal employment grows, while the percentage of employees covered by Bargaining Councils relative to total formal employment falls. This can potentially be partially explained by the fact that all three of the captured Bargaining Councils fall under the manufacturing (when talking about the sectoral organization in terms of national accounts), and in recent years, even though total formal employment has been growing in South Africa (in absolute terms), there has been a decline in the number of employees in the manufacturing sector (SARB, 2016).

Noting the decline in employment in the manufacturing sector, attention is turned to the coverage of the three Bargaining Councils, relative to total formal manufacturing employment. Table 4.2 illustrates that on average, the clothing Bargaining Council covers approximately 6.7% of formal manufacturing employees, while metal and engineering, and textiles cover approximately 18.6% and 2.8% respectively. These three Bargaining Councils alone cover

approximately 28% of all formal manufacturing employees – again validating the choice of these three councils for analysis⁴⁷.

Table 4.2: Estimated Bargaining Council coverage by percentage of total formal manufacturing employees

	2009	2010	2011	2012	2013	2014	2015
Clothing	107,545 (7.43%)	95,004 (7.06%)	98,869 (7.14%)	90,654 (6.28%)	88,761 (6.14%)	97,284 (6.85%)	85,956 (6.34%)
Metal and Engineering	288,577 (19.95%)	271,471 (20.18%)	256,295 (18.52%)	267,185 (18.52%)	267,701 (18.52%)	260,303 (18.32%)	219,030 (16.15%)
Textiles	48,523 (3.35%)	33,696 (2.50%)	38,061 (2.75%)	39,568 (2.74%)	36,366 (2.52%)	39,142 (2.75%)	41,595 (3.07%)
Total formal manufacturing employment	1,446,590	1,345,425	1,384,240	1,442,983	1,445,456	1,421,201	1,355,953

Source: PALMS (2009-2015) and BCMWD, authors' own calculations.

Tables 4.1 and 4.2 have expressed how many employees are covered by the three Bargaining Councils in question, relative to both total formal employment, and total formal manufacturing employment. The result is that a sizable portion of employees are covered by these three Bargaining Councils alone, and as a consequence, a large portion of employees are therefore entitled to some form of minimum wage. However, as implied by Bhorat et al. (2011) and Basu et al. (2010), the existence of a minimum wage, and employees actually earning said minimum wage are not mutually exclusive. The following section of this chapter is dedicated to quantifying the gap between reported earnings and prescribed minimum wages.

⁴⁷ There are other Bargaining Councils within the manufacturing sector; however, they were not captured for this paper.

4.4.2 THE GAP BETWEEN REPORTED REAL EARNINGS AND THE PRESCRIBED MINIMUM WAGE

When utilising matched employment and minimum wage data, the existence of a minimum wage is by no means a guarantee that earnings reported by an employee will be greater than or equal to said minimum wage. An increasing body of literature outlines *non-compliance* with minimum wage agreements as the primary reason for this observed gap⁴⁸.

An employer that is covered by a Bargaining Council agreement yet fails to adhere to the conditions laid out therein can be considered to have been *non-compliant* with the agreement. It is the responsibility of the South African Department of Labour to monitor and enforce compliance with the agreements; this is done using a team of labour inspectors. If through the course of an inspection a firm is found to have violated the conditions of these agreements, the inspector issues a warning to the firm and gives said firm 21 days in which to comply. If at the end of 21 days the firm is still found to be non-compliant, the firm is issued with another written document, namely a compliance order (Bhorat et al., 2011). If at the end of the next 21 days, the firm is still non-compliant, the case is referred to the South African Labour Court, which will institute punitive measures upon the firm if the firm is found to be in contravention of the conditions of the agreement. However, there are caveats to the idea of non-compliance, the most notable being the idea of *exemptions*.

An employer may apply to be exempt from some or all clauses of the extension of the Bargaining Council agreement. This application will then be considered by the respective Bargaining Council, and a decision will be made as to whether or not the application for exemption will be accepted or denied. There can be up to nine criteria upon which the

⁴⁸ See Bhorat et al., 2011; Ronconi, 2008; Andalón & Pages, 2008; Lemos, 2009; and Maloney & Nuñez, 2003.

Bargaining Council makes its decision, and it is unknown what weight each criterion carries in the decision-making process (Godfrey, 2006). These exemptions are the most critical way in which an SMME may be able to bypass the extension of these agreements if it cannot comply with the requirements⁴⁹.

According to Borat et al. (2011), South Africa has a large degree of non-compliance of Bargaining Council agreements by employers – especially with respect to the prescribed minimum wage. The authors utilise 2007 South African labour force data and estimate that, on average, 44% of workers covered by a bargaining agreement are paid a wage below the minimum⁵⁰; furthermore, the authors estimate that the average shortfall was approximately 35% of the prescribed minimum wage. These figures are extremely high and give reason for alarm. However, it is likely that these numbers have been over-estimated; upon inspection of Borat et al. (2011), this chapter has identified three elements that could be influencing this potential over-estimation.

The first element is that of the matching procedure. Borat et al. (2011), mention that employees are matched with minimum wages, however, no further discussion is offered as to how this is carried out– this in and of itself could be leading to an overstatement of the level of non-compliance. Rigorous matching is essential to ensure that the worker under consideration from employment data is actually entitled to the prescribed minimum wage that said worker has been matched with. Inability to do so accurately could lead to a situation whereby the level of non-compliance is either over or under-estimated.

⁴⁹ Anecdotal evidence suggests that a key element in the Bargaining Councils' decision-making process is the profitability of the firm – if the firm is shown to be profitable, the request for exemption is often denied.

⁵⁰ 44% is the average percentage of employees that work below minimum wage, whilst covered by a Bargaining Council agreement; when considering each sector individually, this percentage varied between 8 and 70 percent.

The second element is one that all researchers have to be aware of when utilising surveyed wage data - the issue of systematic underreporting. Underreporting can be caused by a variety of factors, including (but not limited to) an employee not taking taxation and benefits into account when reporting wages, an employee's inability to remember their actual earnings accurately, as well as "motivated mis-remembering" whereby individuals underreport their wage in order to ensure a continuation of any monetary support by the state (Moore et al., 1997; Finn, 2015). Taking both of these aforementioned elements into account, it is possible that what is reported by Borat et al. (2011) is an overestimation of non-compliance.

The final element is that of exemptions – without being able to accurately identify how many employers (and consequently their employees) are exempt from the minimum wage, it is difficult to categorically state that the reason for the observed gap between reported earnings and the minimum wage is due to non-compliance.

While this chapter has been circumspect with regard to matching, attempting to limit this overestimation by utilising the new, standardised grade structure upon which workers were matched with their respective, prescribed minimum wage, there is still a distinct possibility that underreporting of wages in the PALMS dataset does exist. This chapter does attempt to control for a variety of factors to limit the effect of this potential underreporting. However, there is no perfect set of controls that can completely offset the effects of this potential underreporting.

Ultimately, to truly untangle the issue of non-compliance from matching issues, underreporting, and lack of data of exemptions, more complete data are required. It is for these reasons that this chapter focuses on the gap between reported earnings and the prescribed

minimum wage and is excessively circumspect when making claims that this gap could stem from non-compliance.

The rest of this section unpacks this wage gap via three methods, the first being that of a graphical approach whereby kernel density functions are estimated to illustrate the distribution of wages relative to the prescribed minimum wage. The second approach follows a family of indices measuring differences between prescribed minima and reported wages⁵¹. Lastly, this chapter utilises regressions with a variety of controls to attempt to reduce the potential levels of underreporting.

4.4.2.1 KERNEL DENSITY ESTIMATES OF THE GAP BETWEEN REPORTED EARNINGS AND PRESCRIBED MINIMA

To begin analysis, a graphical approach is utilised in order to investigate the distribution of reported earnings by employees relative to the prescribed minimum wages – this is done across all three sectors, for all five grades, and for the time period: 2010 – 2014. This graphical approach takes the form of kernel density plot, whereby (x_1, x_2, \dots, x_n) is an independent and identically distributed sample drawn from some distribution with an unknown density, f . To approximate the probability density function $f(x)$, the following equation is utilised:

$$\hat{f}_h(x) = \frac{1}{n} \sum_{i=1}^n K_h(x - x_i) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x - x_i}{h}\right) \quad (4.4)$$

where function K refers to the kernel, which determines the weights of the estimation, and h is the smoothing parameter (also known as the scale parameter) (Lancaster University, 2017). To

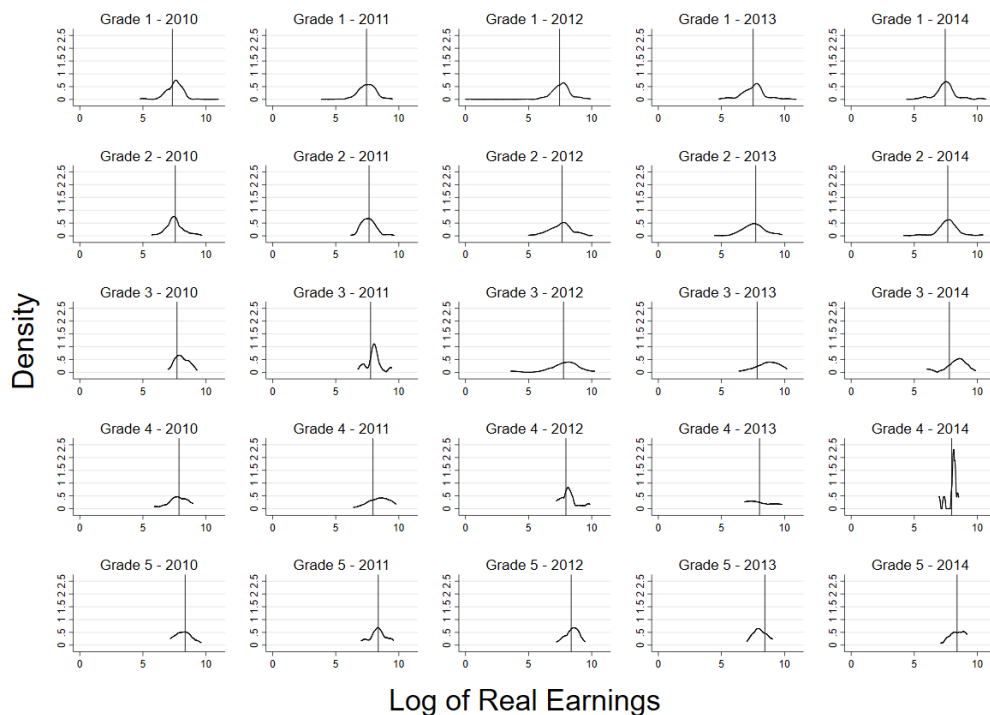
⁵¹ As outlined in Borat et al., (2011).

ensure smooth estimates, this chapter utilised an Epanechnikov kernel for K , where $K(u)$ takes a value of $\frac{3}{4}(1-u^2)$ if the absolute value of x is smaller than 1, and 0 otherwise.

$$K(u) = \begin{cases} \frac{3}{4}(1-u^2) & \text{for } |u| \leq 1 \\ 0 & \text{otherwise} \end{cases} \quad (4.5)$$

The results of these approximations are shown in figures 4.1 – 4.3, where the imposed vertical line represents the prescribed minimum wage relevant to each combination of sector, grade, and year. If workers received the minimum wage prescribed, it would be expected that there would be a spike in density around the vertical line, with no part of said density lying to the left of the minimum wage line⁵².

Figure 4-1: Kernel density estimates of real earnings, clothing sector, (2010-2014)



⁵² For a more detailed discussion on Kernel Density Estimation please see Lancaster University (2017).

Figure 4-2: Kernel density estimates of real earnings, metal and engineering sector, (2010-2014)

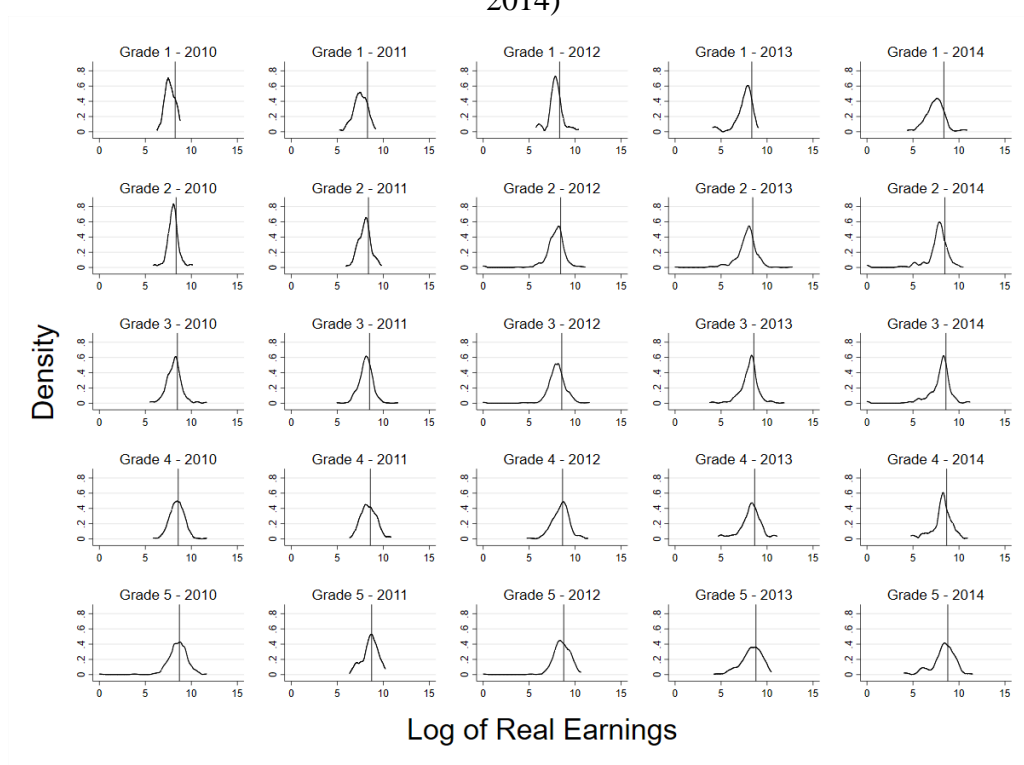
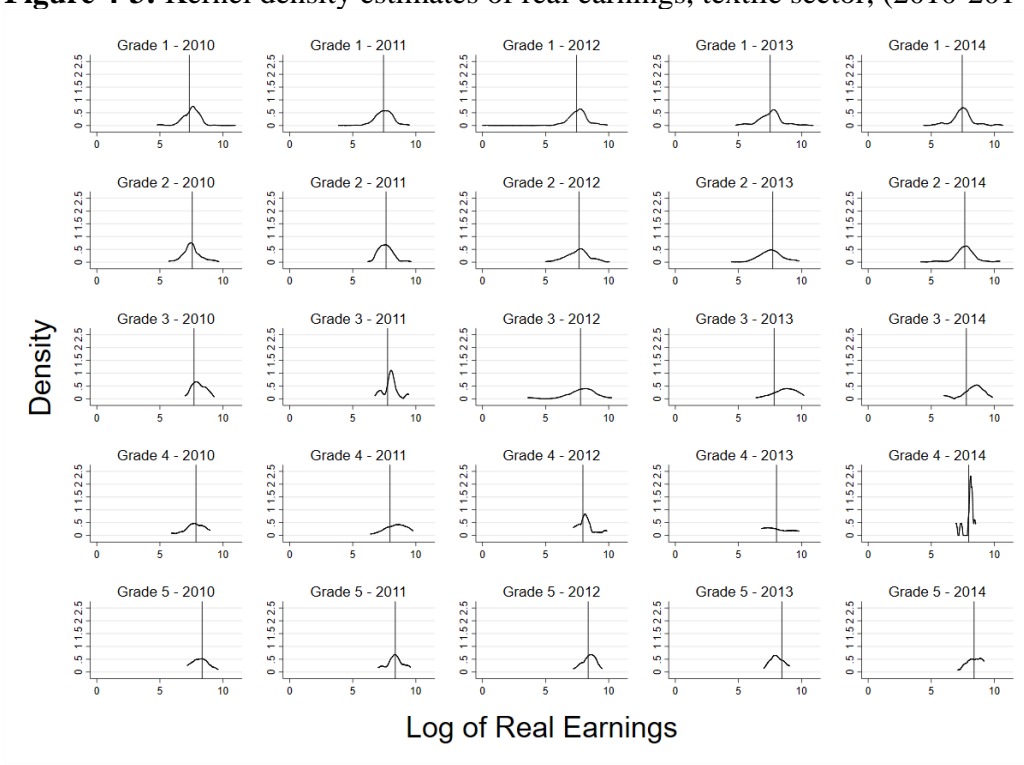


Figure 4-3: Kernel density estimates of real earnings, textile sector, (2010-2014)



As can be seen from the preceding figures, a large degree of the considered combinations of sector, grade, and year show a density that peaks below the minimum wage line. This implies that there are a large number of employees across the considered sample that are earning below their prescribed minimum wage. As discussed in the previous section, this could be reflective of non-compliance by employers with minimum wage agreements; however, it is also likely that a degree of over-estimation is also reflected via these results.

While this graphical approach affords meaningful insight into the story of the wage gap between reported earnings and their relevant prescribed minima, due to the variation of this gap between different grades and sectors, a more numerical approach may prove beneficial.

4.4.2.2 MINIMUM WAGE SHORTFALL INDICES

To investigate the gap between reported earnings and prescribed minima in more quantitative terms, this chapter follows a methodology laid out by Borat et al., (2011). This approach utilises a family of indices which are analogous to the family of poverty indices introduced in 1984 by Foster, Greer, and Thorbecke. The approach allows for the calculation of the percentage of those who report earnings which are below the prescribed minimum wage, the normalised gap between the reported wage and minimum wage, as well as the normalised square of this gap. The model takes on the following form:

$$V_{\alpha} = E \left\{ \left[\frac{(w^{\min} - w)}{w} \right]^{\alpha} \right\} \quad (4.6)$$

where w is the reported wage received by individual i , w^{\min} is the minimum wage relevant to individual i , α is an index that emphasises concern about the size of the gap between reported

earnings and the relevant minima, and E is the expectation operator with respect to the wage distribution in the sector to which w^{min} applies (Bhorat et al., 2011). When $\alpha=0$, the index collapses to a standard measure of the percentage of workers covered by a Bargaining Council agreement with reported wages below the prescribed minimum wage. When $\alpha=1$, the index captures the size of the gap – more weight is placed on larger gaps as α increases. Lastly, when $\alpha=2$, the square of the size of the gap is received. Table 4.3 depicts the weighted results of this analysis including the ratio, V_1/ V_0 , which illustrates the average wage shortfall below the respective minima.

Table 4.3: Estimates of minimum wage shortfall indices (by grade and sector)

	V_0	V_1	V_2	V_1/ V_0
Clothing	0.67	0.27	0.14	0.40
Least skilled	0.67	0.27	0.15	0.40
Less skilled	0.69	0.27	0.14	0.39
Average skill	0.40	0.16	0.09	0.40
More skilled	0.54	0.22	0.13	0.41
Most skilled	0.60	0.22	0.11	0.37
Metal and Engineering	0.72	0.33	0.20	0.46
Least skilled	0.84	0.43	0.27	0.51
Less skilled	0.80	0.37	0.22	0.46
Average skill	0.74	0.34	0.20	0.46
More skilled	0.62	0.28	0.17	0.45
Most skilled	0.60	0.29	0.18	0.48
Textiles	0.55	0.23	0.13	0.42
Least skilled	0.65	0.24	0.13	0.37
Less skilled	0.61	0.28	0.17	0.46
Average skill	0.43	0.19	0.10	0.44
More skilled	0.37	0.17	0.10	0.46
Most skilled	0.31	0.16	0.10	0.52
Total	0.69	0.31	0.18	0.45

Source: PALMS (2010-2014) and BCMWD, authors' own calculations.

Following the method laid out by Bhorat et al. (2011), it can be seen that the total share of employees below the minimum wage is close to 70%, while the average wage shortfall per employee (V_1/ V_0) is approximately 45%. Employees in the “more skilled”, and “most skilled” classification have the lowest incidence of being paid below the prescribed minimum, while employees in “less skilled” and “least skilled” have a significantly higher probability of being paid below the minimum wage. At 72% of employees paid under the relevant minima, and an

average of the wage being 46% less than the prescribed minima, the metal and engineering sector seems to be representative of the largest gap between reported real earnings and the prescribed minimum wage.

These results are congruent with the findings of Borat et al. (2011) and fall within a similar range to that of other developing countries⁵³. These findings promote the idea that non-compliance is evidently very present, and that it is contributing to the gap between reported real earnings and the legislative minima. As stated previously, there is likely to be a degree of overestimation present in these findings; however, it is unlikely that this potential overestimation can override the conclusion that there is a large degree of non-compliance amongst employers with regard to the minimum wages in the sectors that this chapter considers. Irrespective, the chapter will proceed with a series of regressions to control for underreporting of wages in the following section.

4.4.2.3 REGRESSION ESTIMATES OF THE WAGE SHORTFALL

In this chapter's final attempt to unpack the gap between reported earnings, and prescribed minimum wages, a series of regressions are used. These regressions control for various factors which should limit the effect of underreporting on results, allowing the chapter to make a more substantial comment on the topic of non-compliance. This chapter utilises both Ordinary Least Squares (OLS) regressions and quantile regressions; OLS is completed with multiple specifications in order to ensure robust results, and quantile regressions are based on the subsequent preferred specification.

⁵³ See Andalón & Pages, 2008; Lemos, 2009; and Maloney & Nuñez, 2003; Murahwa, 2016.

The OLS regression takes the form of:

$$\ln(RRE)_i - \ln(RMW)_i = \alpha + \beta_1 X_{ki} + \varepsilon_i \quad (4.7)$$

where $\ln(RRE)_i$ is the reported real earnings of an individual, and $\ln(RMW)_i$ is the real minimum wage applicable to the same individual. X_{ki} is a vector containing control variables such as sector of employment of the individual, grade of individual, age and experience of the individual, province, firm size, gender, and race. The constant and disturbance term are provided by α and ε respectively.

Quantile regressions are utilised in order to investigate effects of explanatory variables at different points in the distribution of the difference between reported earnings, and the respective minimum wage. While through OLS estimation, a sample mean is derived through the minimising of the sum of squared residuals, quantile regressions derive the sample median through the minimisation of the sum of absolute residuals. The quantile regression estimator for quantile q minimises the following function:

$$Q(\beta_q) = \sum_{i: y_i \geq x_i'} q |y_i - x_i' \beta_q| + \sum_{i: y_i < x_i'} (1 - q) |y_i - x_i' \beta_q| \quad (4.8)$$

The above function provides the solution for the q^{th} quantile, where $0 < q < 1$ ⁵⁴, facilitating the estimation of Q at any point in the distribution of the variable of interest (i.e. the dependent

⁵⁴ Where $q=0.5$, estimation is conducted at the median, whereas OLS provides estimation at the mean.

variable). y_i is the difference between real reported earnings and the real minimum wage, while x_i is a vector of control variables (Baum, 2013).

4.4.2.3.1 ORDINARY LEAST SQUARES ESTIMATES

As mentioned in the previous section, OLS is run under multiple specifications, namely: **(i)** firm characteristics only, **(ii)** firm and employee characteristics, and **(iii)** firm and employee characteristics including year dummies. The results of these specifications are shown in table 4.4.

Table 4.4: Ordinary Least Squares estimation of the logged difference between reported real earnings, and real minimum wage, under multiple specifications

Log (RRE) – Log(RMW)	Specification (i)	Specification (ii)	Specification (iii)
Sector (Clothing=Base)			
Metal and Engineering	-0.240*** (0.024)	-0.464*** (0.032)	-0.467*** (0.032)
Textiles	0.097*** (0.036)	0.000 (0.037)	-0.002 (0.037)
Firm size (Small=Base)			
Medium/Large	0.050** (0.021)	0.080*** (0.021)	0.088*** (0.021)
Province (Gauteng=Base)			
Western Cape	-0.106*** (0.029)	-0.092* (0.040)	-0.082* (0.040)
Eastern Cape	-0.020 (0.042)	-0.072 (0.042)	-0.071 (0.042)
Northern Cape	-0.370*** (0.108)	-0.350** (0.107)	-0.347** (0.106)
Free State	-0.290*** (0.045)	-0.242*** (0.044)	-0.240*** (0.044)
KwaZulu-Natal	-0.123*** (0.030)	-0.172*** (0.031)	-0.169*** (0.031)
North West	0.014 (0.052)	0.041 (0.051)	0.041 (0.051)
Mpumalanga	0.333*** (0.058)	0.309*** (0.057)	0.302*** (0.057)
Limpopo	-0.495*** (0.095)	-0.425*** (0.094)	-0.378*** (0.094)
Race (Black=Base)			
Coloured		0.074* (0.037)	0.067 (0.037)

Indian/Asian		0.354*** (0.044)	0.345*** (0.044)
White		0.570*** (0.043)	0.564*** (0.043)
Grade ((5) - Most skilled = Base)			
(1) - Least skilled		0.004 (0.042)	0.002 (0.042)
(2) - Less skilled		-0.074* (0.038)	-0.071 (0.038)
(3) - Average skilled		-0.009 (0.037)	-0.005 (0.037)
(4) - More skilled		0.113** (0.041)	0.111** (0.040)
Experience		0.004** (0.001)	0.004** (0.001)
Gender (Male=Base)			
Female		-0.249*** (0.025)	-0.251*** (0.024)
Years of education		0.047*** (0.004)	0.047*** (0.004)
Hours worked in last 7 days		-0.001 (0.001)	0.000 (0.001)
Year (Base=2010)			
2011			-0.018 (0.029)
2012			-0.077* (0.030)
2013			-0.154*** (0.030)
2014			-0.216*** (0.030)
Constant	-0.175*** (0.033)	-0.504*** (0.085)	-0.421*** (0.087)
Observations	8924	8831	8831

Source: PALMS (2010-2014) and BCMWD, authors' own calculations.

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.05$

*** $p < 0.001$

Across all three specifications, certain commonalities emerge – the first being that of a significant, negative constant⁵⁵. This implies a negative difference between real reported earnings and the real minimum wage, indicating that a significant portion of individuals are

⁵⁵ Note: A negative coefficient implies that a wage gap exists such that $RRE < RMW$. A positive coefficient implies $RRE > RMW$.

earning less than the prescribed minima. Secondly, individuals employed by medium or large firms⁵⁶ are shown to have an approximately 5% larger differential (i.e. more likely to pay above minimum wage) than those employed by small firms⁵⁷, implying that these employees are more likely to be paid above the minimum wage

The third finding is that relative to the clothing sector, textiles are not significantly different, and the coefficient indicates almost no change when switching from clothing to textiles. However, metal and engineering indicate a much larger, significant difference when switching from clothing. This difference indicates that individuals in metal and engineering have a 24% larger wage gap⁵⁸ than those individuals in clothing. These findings reiterate what was shown in table 4.3, whereby clothing and textiles were shown to have similar wage gaps and metal and engineering had the highest wage gap of the considered sectors. The final commonality indicates that all provinces (except for Mpumalanga) characterise a larger wage gap relative to individuals employed within Gauteng.

The inclusion of individual characteristics illustrates effects that are to be expected within the South African context. Females demonstrate a significant, larger wage gap relative to males (25% larger); years of education, and years of experience are shown to have a significant positive effect, thus reducing the gap between reported real earnings and real minima by approximately 4.7%, and 4% respectively. All races are shown to have a smaller wage gap relative to the one experienced by black workers, with white workers having a gap that is approximately half that of black workers.

⁵⁶ Firm size specification is based on the National Small Business Act 102 of 1996, whereby small firms have less than 50 employees, medium firms have less than 100 employees, and large firms have in excess of 100 employees.

⁵⁷ When looking at specification (i).

⁵⁸ When looking at specification (i).

Over time, there appears to be a widening of the wage gap. This could be reflective of economy wide factors, including the economic slowdown in South Africa, which had a pronounced effect on the manufacturing sector (under which all three of these considered sub-sectors fall). Chapter 2 has already shown South Africa to be an economy which is very adept at switching between capital and labour when costs are exacerbated in terms of labour. With decreasing economic returns due to slowed growth (World Bank, 2015), it is possible that firms did not keep up with wage updating, allowing for the widening of the wage gap over time.

Grade is shown to have an ambiguous effect on the wage gap experienced by workers. When compared to the most skilled workers, it is seen that those falling into group (2) and (3), less skilled, and average skilled respectively, have a larger wage gap than that of the most skilled workers. However, employees falling into the least skilled (1) and more skilled (4) categories are shown to have a smaller wage gap than employees in the most skilled category. Barring the effect on group (4), the rest of the coefficients are insignificant, implying that the grade or occupation of an employee may not have a significant bearing on how likely they are to be paid above or below the prescribed minimum wage.

Strangely, as individual level controls are introduced, the wage gap grows in magnitude (i.e. the constant becomes larger in absolute value). This is contrary to expectations, as these covariates should proxy for groups who systematically under-report wages. As a result, it does not seem that these controls are capturing systematic patterns of under-reporting in wages. As a result, specification (i) is the preferred specification of the model, combining firm and individual characteristics, as well as a time component; as a result, all subsequent discussion will centre on this specification.

4.4.2.3.2 QUANTILE REGRESSION ESTIMATES

Building on specification (i) as discussed in the previous section, the quantile regression estimates of the model are shown in table 4.5.

Similar findings emerge through the quantile regressions as to what was shown vis-à-vis the OLS estimation. In almost all quantiles, metal and engineering employees are shown to have a larger incidence of a negative wage gap relative to the clothing industry. The textile industry now exhibits a significant difference relative to the clothing industry above the 50th quantile.

Firm size emerges as a significant determinant for the wage gap; those employed by medium or large firms experience a larger wage gap (i.e. more likely to pay above minimum wage) than those employed by small firms, but only at the upper end of the distribution. This result could speak to what was expressed by Moll's (1996) model, where it was shown that small firms are less likely to be able to absorb the prescribed minimum wage costs assigned by Bargaining Councils. Thus, what these results seem to reflect is that smaller firms are more likely to pay employees beneath the minimum wage, as they cannot keep up with the wage as easily as their medium and large counterparts.

Table 4.5: Quantile estimation of the logged difference between reported real earnings, and real minimum wage, at different quantiles

Log(RRE-RMW)	Quantile (0.1)	Quantile (0.25)	Quantile (0.5)	Quantile (0.75)	Quantile (0.9)
Sector (Clothing=Base)					
Metal and Engineering	-0.464*** (0.054)	-0.310*** (0.029)	-0.197*** (0.022)	-0.0736** (0.025)	-0.0198 (0.042)
Textiles	0.00682 (0.080)	0.0596 (0.043)	0.137*** (0.032)	0.254*** (0.037)	0.215*** (0.063)
Province (Gauteng=Base)					
Western Cape	-0.226*** (0.065)	-0.0907* (0.036)	-0.104*** (0.027)	-0.118*** (0.030)	-0.121* (0.052)
Eastern Cape	-0.0794 (0.093)	-0.0825 (0.050)	-0.06 (0.038)	-0.00703 (0.043)	-0.0736 (0.073)
Northern Cape	-0.239	-0.141	-0.238* (0.038)	-0.144	-0.286

	(0.238)	(0.129)	(0.097)	(0.109)	(0.188)
Free State	-0.151	-0.323***	-0.399***	-0.375***	-0.516***
	(0.099)	(0.054)	(0.040)	(0.045)	(0.078)
KwaZulu-Natal	-0.143*	-0.196***	-0.223***	-0.164***	-0.159**
	(0.066)	(0.036)	(0.027)	(0.030)	(0.052)
North West	0.077	-0.0395	-0.0431	-0.111*	-0.232*
	(0.115)	(0.063)	(0.047)	(0.053)	(0.091)
Mpumalanga	-0.0726	0.0624	0.222***	0.363***	0.573***
	(0.129)	(0.070)	(0.052)	(0.059)	(0.102)
Limpopo	-0.314	-0.579***	-0.629***	-0.570***	-0.444**
	(0.210)	(0.114)	(0.085)	(0.096)	(0.166)
Firm size (Small=Base)					
Medium/Large	0.021	0.044*	0.053**	0.064**	0.081*
	(0.047)	(0.025)	(0.019)	(0.021)	(0.037)
Constant	-0.958***	-0.513***	-0.104***	0.212***	0.654***
	(0.072)	(0.039)	(0.029)	(0.033)	(0.057)
Observations	8831	8831	8831	8831	8831

Source: PALMS (2010-2014) and BCMWD, authors' own calculations.

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.05$

*** $p < 0.001$

4.4.2.4 CONCLUSIONS ON THE GAP BETWEEN REPORTED EARNINGS AND PRESCRIBED MINIMA

From all of the preceding sets of results, it is clear that there is a wage gap between the real reported earnings of an employee, and the prescribed minimum wage that should be received. As this chapter has stated before, there are numerous factors that could lead to an over-estimation of this result. However, even when controlling for these factors (as best as this chapter can without having richer data), the wage gap is still present. It appeared that that these control variables (and in fact any variables within the PALMS dataset) are incapable of capturing systematic underreporting of wages – if the underreporting of wages could even be considered systematic at all.

The omnipresent wage gap that reveals itself reinforces the findings of Bhorat et al. (2011), whereby the authors claim that there is a significant amount of non-compliance with these Bargaining Council agreements by employers. This chapter has found that even when controlling for factors that influence the underreporting of real wages, this wage gap still exists.

While it is possible that this is purely indicative of non-compliance with minimum wages, it is also plausible that if each worker systematically under-reported wages in the same way, that a similar result may be obtained. However, without easily accessible administrative data⁵⁹ – particularly at a worker level - this thesis is unable to unpack this any further, leaving this to be considered for future work.

This non-compliance could be indicative of a firm's inability to keep up with minimum wages, especially in an increasingly competitive time frame in the South African economy. Results revealed that it is small firms that have employees that are most critically underpaid with respect to the prescribed minimum wage, reinforcing Moll's (1996) model and illustrating that these firms are potentially the hardest hit by increasing labour legislation.

4.4.3 EFFECTS ON EMPLOYMENT

This chapter's analysis of employment differs from past studies in one fundamental way – rather than utilising Bargaining Council coverage as an independent variable, it instead utilises whether or not there was a new Bargaining Council agreement issued⁶⁰.

Conceptually the terms sound similar, thus digression is necessary. Bargaining Council coverage is an estimate of how many individuals fall within the criterion that defines the coverage of a particular Bargaining Council. A Bargaining Council agreement, on the other hand, can only exist for those who are covered by a Bargaining Council. These agreements are typically issued periodically and contain updated conditions which must be met by an employer

⁵⁹ Through the form of payslips, financial statements, etc.

⁶⁰ This is done, because as it was explained earlier in in this paper, every individual within the matched dataset is assumed to be covered by a Bargaining Council.

with respect to employees. Not all conditions of employment change with each new agreement; however, minimum wages are always part of the conditions that are updated.

Employers and firms are likely to react negatively to changes that increase operating costs, such as increased wages or increased labour regulation. Firms and employers are more likely to restructure operations and switch to more capital-intensive measures when labour regulations are changed (or increased) to better the conditions of an individual's employment. Thus, it is crucial to unpack the effects that Bargaining Councils have had on South African employment.

This chapter will now proceed to analyse the effect on employment when a new bargaining agreement is extended to employers and employees.

This section follows a similar methodology to section 4.4.2.3, except that the OLS regression for this section is stated as:

$$\log(L)_i = \alpha + \beta_1 BCA_i + \beta_2 X_{ki} + \varepsilon_i \quad (4.9)$$

where $\ln(L)_i$ is the log of employment. BCA_i is a dummy variable indicating whether or not a new Bargaining Council agreement had been issued that was applicable to individual i . X_{ki} is a vector containing control variables such as sector of employment of the individual, grade of individual, union status of an individual, province, firm size, gender, and race. The constant and disturbance term are provided by α and ε respectively. This approach is conducted under multiple specifications.

After selection of the preferred specification, quantile regressions are utilised in order to investigate effects of explanatory variables at different points in the distribution of the log of employment. The mathematical representation of these quantile regressions is expressed in equation (4.8).

4.4.3.1 ORDINARY LEAST SQUARES ESTIMATES

As mentioned in the previous section, OLS is run under multiple specifications. The differences in these specifications range from the inclusion of firm effects, to individual effects, and the inclusion of different interaction terms. These results are shown in table 4.6.

Across all specifications, the effect of a new agreement being present is shown to be significant and negative, implying that the presence of new agreements results in a decrease in the log of employment. This is congruent with the findings of Magruder (2012), which stated that the presence of Bargaining Council agreements can be shown to cause a reduction in the levels of employment within a labour force. Furthermore, under all specifications, where the coefficient of sector is shown to be significant, the coefficient is also positive, implying that out of the three sectors of interest in this chapter, the clothing sector shows the greatest negative change in the log of employment.

Grade is shown to have a positive, significant effect on the log of employment for every grade relative to those individuals that are least skilled; however, this relationship only holds under specification (1). As more covariates are added the regression, the significance of this explanatory variable is dampened and drops off.

This chapter considers specification (5) as the preferred specification of the model. The variables included match those of Bhorat et al. (2009), and this specification exhibits the largest explanatory power, whilst avoiding over-fitting. The rest of this discussion on these results will rest on specification (5).

Union status, gender, race, province, and firm size are all shown to be significant determinates of the log of employment. The effect of unions is shown to have a negative effect on the log of employment when switching from individuals that are not part of a union, to individuals that are. Gender and race both exhibit results that are in accordance with a priori expectation – being female has a negative impact on the employment, whilst only white individuals relative to black workers show higher employment – this can be attributed to the larger presence of black workers in the South African labour force relative to coloureds, and Indians/Asians (SARB, 2016). White individuals still show higher employment, as they represent the race with the lowest incidence of unemployment within the South African labour market (SARB, 2016).

Firm size shows a significant negative coefficient, implying that medium or large firms are absorbing 3% less of the log of employment, relative to small firms. This fact is not too surprising since according to Abor and Quartey (2010), small businesses contribute approximately 57% to the South African GDP and are responsible for approximately 61% of South African employment. Looking at the interaction of new agreements and firm size, it is noticeable that an insignificant effect is experienced, implying that the effect of the presence of a new Bargaining Council agreement does not rely on firm size.

Considering the effects of other interaction terms included in the model leads to some interesting results. It is immediately noticeable that the interaction between an employee's grade

and the presence of a new bargaining agreement is shown to have no significant effect. This implies that any effect induced by new bargaining agreements does not differentiate between the grade or occupation of an individual, and that effects are more likely to be seen at a sectoral level. This is confirmed via the interaction between sector and new bargaining agreements. The result indicates that the metal and engineering sector is likely to have higher employment (relative to the clothing sector), when a new Bargaining Council agreement is introduced. The effect is the opposite for the textile sector, which indicates a more adverse effect on the log of employment when compared with the clothing sector.

Having unpacked these effects at the aggregated mean level, this chapter now moves to its final set of estimations, whereby specification (5) is estimated via a series of quantile regressions.

Table 4.6: Ordinary Least Squares estimation of the log of employment, under multiple specifications

	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
New Agreement (New.Agr) (Base=No)	-0.037** (0.014)	-0.131*** (0.024)	-0.026* (0.012)	-0.090*** (0.022)	-0.084** (0.0312)
Sector					
Metal and engineering	0.207*** (0.016)	0.063* (0.029)	0.067*** (0.016)	-0.030 (0.027)	-0.047 (0.034)
Textiles	0.092*** (0.020)	0.223*** (0.048)	0.009 (0.018)	0.103* (0.042)	0.094* (0.044)
Grade ((1) - Least skilled = Base)					
(2) - Less skilled	0.073*** (0.017)	0.072*** (0.017)	0.045** (0.015)	0.044** (0.015)	0.096** (0.035)
(3) - Average skilled	0.040* (0.020)	0.038* (0.019)	-0.002 (0.018)	-0.003 (0.018)	0.029 (0.041)
(4) - More skilled	0.070** (0.022)	0.068** (0.022)	0.040* (0.020)	0.038 (0.020)	0.025 (0.044)
(5) - Most skilled	0.056* (0.022)	0.056* (0.022)	0.043* (0.021)	0.043* (0.021)	0.085 (0.045)
Union (Base=No)	-0.045*** (0.011)	-0.046*** (0.011)	-0.035*** (0.010)	-0.035*** (0.010)	-0.035*** (0.010)
Total formal employment	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)

Firm size (Small=Base)					
Medium/Large	-0.035**	-0.036**	-0.023*	-0.024*	-0.0377*
	(0.012)	(0.012)	(0.011)	(0.011)	(0.023)
Sector x New.Agr (Clothing x New.Agr = Base)					
Metal and Engineering x New.Agr		0.180***		0.122***	0.144***
		(0.030)		(0.027)	(0.037)
Textiles x New.Agr		-0.149**		-0.106*	-0.096*
		(0.052)		(0.046)	(0.048)
Gender (Base=male)					
Female			-0.139***	-0.140***	-0.140***
			(0.012)	(0.012)	(0.012)
Race (Black=Base)					
Coloured			-0.107***	-0.106***	-0.107***
			(0.018)	(0.018)	(0.018)
Indian/Asian			-0.212***	-0.211***	-0.210***
			(0.021)	(0.0210)	(0.021)
White			0.026	0.028	0.028
			(0.021)	(0.021)	(0.021)
Province (Gauteng=Base)					
Western Cape			-0.373***	-0.371***	-0.370***
			(0.019)	(0.019)	(0.019)
Eastern Cape			-0.374***	-0.368***	-0.368***
			(0.020)	(0.020)	(0.020)
Northern Cape			-1.235***	-1.227***	-1.227***
			(0.048)	(0.048)	(0.048)
Free State			-0.724***	-0.715***	-0.714***
			(0.022)	(0.022)	(0.022)
KwaZulu-Natal			-0.139***	-0.135***	-0.134***
			(0.015)	(0.015)	(0.015)
North West			-0.454***	-0.451***	-0.452***
			(0.025)	(0.025)	(0.025)
Mpumalanga			-0.517***	-0.513***	-0.513***
			(0.029)	(0.028)	(0.028)
Limpopo			-0.382***	-0.380***	-0.379***
			(0.044)	(0.044)	(0.044)
Firm Size x New.Agr (Small x New.Agr = Base)					
Medium/Large x New.Agr					0.0159
					(0.0258)
Grade x New.Agr ((1) x New.Agr = Base)					
(2) x New.Agr					-0.063
					(0.039)
(3) x New.Agr					-0.041
					(0.045)
(4) x New.Agr					0.0186
					(0.0487)

(5) x New.Agr					-0.052 (0.050)
Constant	5.760*** (0.066)	5.914*** (0.069)	6.255*** (0.061)	6.357*** (0.064)	6.342*** (0.064)
Observations	9468	9468	9140	9140	9140
Adjusted R-squared	0.057	0.063	0.266	0.268	0.267

Source: PALMS (2010-2014) and BCMWD, authors' own calculations.

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.05$

*** $p < 0.001$

4.4.3.2 QUANTILE REGRESSION ESTIMATES

The quantile regression estimations help to confirm some of the findings from the previous analysis.

Firstly, union status, gender, race, province, and firm size enter the specification in a similar way to OLS for the majority of the considered quantiles. Secondly, the presence of a new Bargaining Council agreement is still shown to have a significant effect, but only at the lower end of the distribution; the effect is still negative, implying that a presence of a new agreement reduces the log of employment, specifically including, and below the 50th percentile.

Grade and the presence of a new Bargaining Council agreement interacted with grade show an insignificant impact on employment than what was seen under the OLS specification, and the same can be said for the interaction between firm size and the presence of a new agreement. However, the interaction of sector and the presence of a new agreement is still shown to have a significant impact. This impact, when considering metal and engineering relative to clothing, is still shown to be positive, specifically at the lower end of the distribution, whilst textiles show a negative significant relationship in the top end of the distribution.

Table 4.7: Quantile estimation of the log of employment at different quantiles

	Quantile 0.1	Quantile 0.25	Quantile 0.5	Quantile 0.75	Quantile 0.9
New Agreement (New.Agr)					
(Base=No)	-0.131** (0.050)	-0.076* (0.036)	-0.075* (0.034)	-0.077 (0.040)	-0.075 (0.058)
Sector					
Metal and engineering	-0.153** (0.054)	-0.057 (0.039)	-0.089* (0.037)	-0.049 (0.043)	0.118 (0.063)
Textiles	0.016 (0.070)	0.090 (0.050)	0.085 (0.048)	0.067 (0.056)	0.199* (0.081)
Firm size (Small=Base)					
Medium/Large	-0.022 (0.038)	-0.028 (0.027)	-0.050* (0.025)	-0.084** (0.030)	-0.018 (0.043)
Sector#NAgr (Clothing x New.Agr = Base)					
Metal and Engineering x New.Agr	0.222*** (0.054)	0.133** (0.042)	0.146*** (0.040)	0.120* (0.047)	0.052 (0.069)
Textiles x New.Agr	-0.021 (0.077)	-0.099 (0.055)	-0.078 (0.052)	-0.087 (0.061)	-0.214* (0.089)
Grade ((1) - Least skilled = Base)					
(2) - Less skilled	0.087 (0.056)	0.043 (0.040)	0.113** (0.038)	0.115** (0.044)	0.005 (0.065)
(3) - Average skilled	0.085 (0.065)	0.034 (0.046)	0.041 (0.044)	0.039 (0.052)	-0.023 (0.075)
(4) - More skilled	0.093 (0.070)	0.062 (0.050)	0.067 (0.048)	0.030 (0.056)	-0.132 (0.081)
(5) - Most skilled	0.171* (0.072)	0.080 (0.051)	0.149** (0.049)	0.063 (0.057)	-0.016 (0.083)
Grade x New.Agr ((1) x New.Agr = Base)					
(2) x New.Agr	-0.048 (0.062)	-0.036 (0.044)	-0.084* (0.042)	-0.079 (0.049)	0.032 (0.072)
(3) x New.Agr	-0.084 (0.072)	-0.040 (0.051)	-0.027 (0.048)	-0.039 (0.057)	-0.022 (0.083)
(4) x New.Agr	-0.088 (0.078)	-0.053 (0.056)	-0.045 (0.053)	-0.012 (0.062)	0.189* (0.090)
(5) x New.Agr	-0.140 (0.080)	-0.064 (0.057)	-0.110* (0.054)	-0.058 (0.063)	-0.021 (0.092)
Firm Size x New.Agr (Small x New.Agr = Base)					
Medium/Large x New.Agr	0.008 (0.041)	0.021 (0.030)	0.031 (0.028)	0.042 (0.033)	-0.005 (0.048)
Union (Base=No)	-0.013 (0.016)	-0.033** (0.012)	-0.037*** (0.011)	-0.026* (0.013)	-0.035 (0.0189)
Gender (Base=male)					
Female	-0.189*** (0.019)	-0.129*** (0.014)	-0.121*** (0.013)	-0.127*** (0.015)	-0.154*** (0.022)
Race (Black=Base)					
Coloured	-0.078** (0.029)	-0.084*** (0.021)	-0.084*** (0.020)	-0.086*** (0.023)	-0.165*** (0.034)

Indian/Asian	-0.385***	-0.231***	-0.103***	-0.062*	-0.090*
	(0.034)	(0.024)	(0.023)	(0.027)	(0.039)
White	-0.087**	-0.011	0.079***	0.153***	0.090*
	(0.033)	(0.024)	(0.022)	(0.026)	(0.038)
Province (Gauteng=Base)					
Western Cape	-0.368***	-0.359***	-0.352***	-0.369***	-0.398***
	(0.031)	(0.022)	(0.021)	(0.025)	(0.036)
Eastern Cape	-0.408***	-0.313***	-0.271***	-0.310***	-0.384***
	(0.032)	(0.023)	(0.022)	(0.026)	(0.037)
Northern Cape	-1.394***	-1.248***	-1.112***	-1.167***	-1.282***
	(0.076)	(0.054)	(0.052)	(0.060)	(0.088)
Free State	-0.686***	-0.667***	-0.704***	-0.736***	-0.738***
	(0.036)	(0.025)	(0.024)	(0.028)	(0.041)
KwaZulu-Natal	-0.172***	-0.147***	-0.096***	-0.102***	-0.144***
	(0.024)	(0.017)	(0.016)	(0.019)	(0.028)
North West	-0.522***	-0.481***	-0.410***	-0.370***	-0.378***
	(0.040)	(0.028)	(0.027)	(0.032)	(0.046)
Mpumalanga	-0.520***	-0.529***	-0.450***	-0.453***	-0.597***
	(0.046)	(0.033)	(0.031)	(0.036)	(0.053)
Limpopo	-0.426***	-0.333***	-0.313***	-0.338***	-0.449***
	(0.071)	(0.051)	(0.048)	(0.056)	(0.082)
Total formal employment	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	5.663***	5.853***	6.220***	6.730***	7.398***
	(0.106)	(0.076)	(0.072)	(0.084)	(0.123)
Observations	9140	9140	9140	9140	9140

Source: PALMS (2010-2014) and BCMWD, authors' own calculations.

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

4.4.3.3 CONCLUSIONS ON THE EFFECTS OF BARGAINING COUNCILS ON EMPLOYMENT

The estimation of employment effects induced by new Bargaining Council agreements has added to the existing literature by exploring the topic of employment and its relationship with Bargaining Councils in a way that has not been done with regard to the South African labour market before. Rather than estimating the effects on employment by whether or not an employee is covered by a Bargaining Council, this chapter utilised a sample whereby all individuals are members of a Bargaining Council already and estimated the impact of updated Bargaining Council agreements on employment.

The results speak to the idea that the introduction of new agreements does decrease employment, thus having a negative effect on employment within the South African labour market. This magnitude of this effect has a sectoral component to it, but it does not seem to be influenced by the grade (occupation) of an employee, nor by the size of the firm where an employee is hired. Conventional covariates exhibit the expected signs and magnitudes, whereby employment is directly affected by the race, gender, location, union status, years of experience, and years of education of employee.

On a holistic level, these results reinforce the finding of Magruder (2012), which stated that the existence of Bargaining Council agreements had a detrimental effect on South African labour market outcomes, especially that of employment. Magruder (2012) also found that this effect is more concentrated in small firms; however, this chapter has found no indication of this relationship.

4.5 CONCLUSIONS

Bargaining Council agreements are the outcome of a complex bargaining process. This chapter set out to explore the relationship between Bargaining Council agreements and labour market outcomes in South Africa. By exploiting different forms of variation within the way Bargaining Councils assign minimum wages in their agreements, this chapter was able to unpack the effects of these agreements in terms of wages and employment in the South African labour market.

Focusing on three sub-sectors (clothing, metal and engineering, and textiles), this chapter utilised a dataset which is comprised of the minimum wages prescribed by each of the respective Bargaining Councils at different points in time. Matching this data with employment and

earnings data from the PALMS dataset, this chapter was able to estimate effects associated with Bargaining Council agreements.

The introduction of new Bargaining Council agreements is associated with decreased employment, which was shown to be around 8%. This size of this decrease is lowest in the metal and engineering industry, while clothing and textiles exhibit a similar level to each other. When interacting the grade (occupation) of an employee and the size of the firm in which they are employed with an indicator for whether or not a new Bargaining Council agreement was present, the effect was shown to be insignificant – implying that the effect of the introduction of new Bargaining Council agreements exists only at a sectoral level, and does not differentiate between firm size, or the occupation of an employee.

This chapter studied the effect of Bargaining Council agreements on wages in a unique way by looking at the relationship between Bargaining Council agreements, and the wage received by employees. This effect was estimated by regressing the difference between the reported real earnings of an employee and the prescribed minimum wage that said employee should have received on a number of covariates. This chapter concludes that even when controlling for factors that influence the underreporting of real wages this gap is large, standing at an approximate value of 42% - that is, the average employee reports earnings 42% below their prescribed minimum wage.

These conclusions spark concern surrounding South African labour market regulation. Bargaining Councils seem to be associated with the opposite of the outcomes that they aim to achieve – instead of promoting employment, the introduction of a new Bargaining Council agreement is shown to actually decrease employment. Furthermore, rather than having

employees earn above a prescribed minimum wage, most workers still appear to be earning below their prescribed minima – inspiring the idea that the enforcement of this particular branch of labour legislation is perhaps not effective enough.

Bargaining Councils are an integral part of the complex South African labour system, and they have a significant role to play in the transformation of the post-apartheid landscape that the country finds itself in. The results from this chapter illustrate that the effects of Bargaining Councils in their current format are not achieving their goals of increasing wages and employment for those in the labour market who remain most vulnerable. If South Africa is to truly achieve its goals of reducing unemployment and inequality, then perhaps the Bargaining Council system needs to be revisited and adjusted in a way that it can truly benefit the individuals it aims to support.

Chapter 5: South African Labour Productivity and the Impact of Bargaining Councils: An Analysis of Labour Productivity in South Africa's Manufacturing Sector

5.1 INTRODUCTION

Labour productivity⁶¹ is one of the most essential determinants of a country's income level, yet it is a measure that is often misunderstood. In its simplest state, labour productivity is measured as output, either by gross output or value-added, per unit of labour. At an aggregated level, comparisons of labour productivity levels are easy to make because estimates of GDP, population and employment are available for most countries. However, estimates of labour productivity levels for the economy as a whole do not provide insights in the sectoral composition of productivity, nor do they provide insights into the relationship with firm size.

Rising aggregate labour productivity is often thought to be a good thing. But this is not necessarily always the case, especially in a high unemployment economy such as South Africa's. Higher aggregate levels of labour productivity may be triggered by employees actually becoming more productive, or it may be due to a reallocation of the labour profile away from less productive workers. Advances in technology and an increase in capital intensity of a firm can also lead to an increase in labour productivity. If this increase in labour productivity is coming at the expense of increased employment rates, this should be considered a negative policy outcome.

⁶¹ For the purposes of this paper, labour productivity refers to output per full-time employee.

Despite the agreed-upon importance of labour productivity within the realms of South African economic policy debate, to date very little is known about the evolution of labour productivity in post-apartheid South Africa. This research becomes sparser when one considers the relationship between labour productivity and Bargaining Councils. According to Natrass & Seekings (2012) “Bargaining Councils push some employers to restructure production in more capital and skill intensive directions. The result is job destruction (sic)”, creating a situation whereby this restructuring could lead to variations within labour productivity.

Existing work on labour productivity in South Africa has mostly focused on aggregate figures and generally portrayed the observed increase in labour productivity levels as a positive outcome. In a country that is grappling with glaring unemployment issues, while trying to navigate an effective policy mix to remedy this issue, the study of labour productivity and its relation to Bargaining Councils should be considered vital.

This chapter aims to unpack the effects of Bargaining Council agreements on labour productivity in two distinct ways: (i) at a sectoral level – utilising the created Bargaining Council Minimum Wage Dataset (BCMWD) it will be possible to match this with sectoral-level data and conduct an impact evaluation of these councils; (ii) at a firm-level – relying on firm level data, this chapter will unpack which firms (by way of firm characteristics) are most affected by Bargaining Council decisions. To examine these phenomena in South Africa focus

is placed only on the manufacturing sector, and consequently abstract from aggregate labour productivity changes that may be driven by shifts between broader sectors⁶².

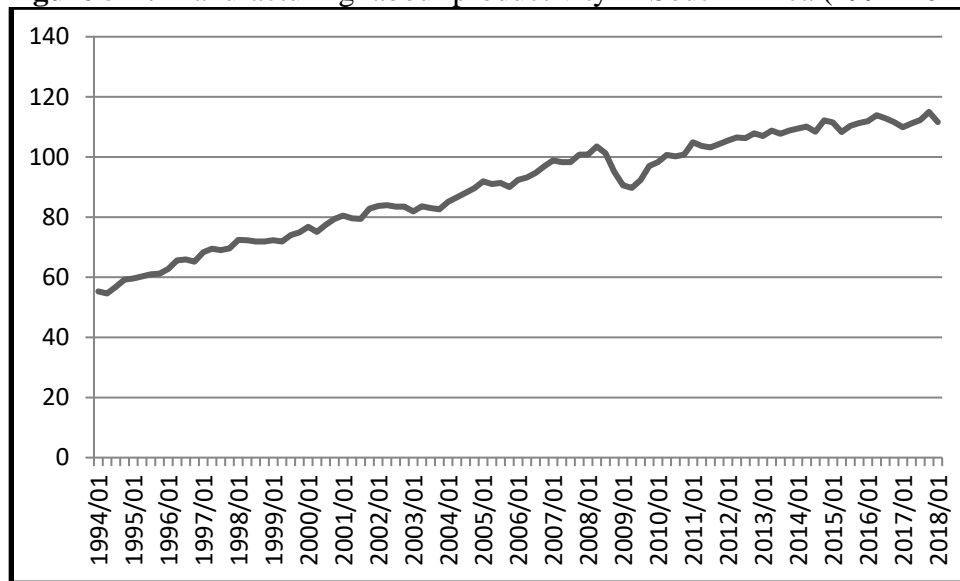
The results from this analysis can better inform ongoing discussions on collective bargaining in South Africa – especially in the more recent context whereby the Labour Relations Amendment Act (LRAA) (No.6 of 2014) (which came into effect on the 1st January 2015) imposed changes on the South African labour market which sought to strengthen the influence and scope of these institutions.

5.2 LITERATURE REVIEW

5.2.1 LABOUR PRODUCTIVITY AND BARGAINING COUNCILS IN SOUTH AFRICA

As previously mentioned, this chapter's area of focus will be South Africa's manufacturing sector. Figure 5.1 shows that aggregate labour productivity has been growing in South Africa since the start of democracy in 1994. Showcasing a relatively consistent rise in labour productivity year-on-year, apart from the period of the global financial crisis of 2008, the productivity index indicates a healthy (albeit decelerating) growth-rate of labour productivity for the time period in question. This is a finding that has been reiterated multiple times by various authors such as Klein (2012), Rankin (2016), Wittenberg (2014), Burger (2015), Manamela (2017), Statistics South Africa (2018), and the World Bank (2017).

⁶² This simplifying assumption is driven by the availability of data at (i) a sector level, (ii) a firm level, and (iii) a Bargaining Council level. A more in-depth discussion of this will be offered later in this paper.

Figure 5-1: Manufacturing labour productivity in South Africa (1994-2018)

Source: South African Reserve Bank series KBP7079L

By comparing the growth of labour productivity in the manufacturing sector versus other sectors of the South African economy between 2011 and 2015 (see World Bank, 2017), it can be seen that manufacturing is the only sector within the economy to have maintained positive labour productivity growth (World Bank, 2017) throughout the five-year period. Consequently, through rigorous TFP analysis in 2018, the World Bank (2018) confirmed that this trend held until the end of the 2018 period. Harding & Rattsø (2010) attempted a comparison of labour productivity between the United States of America and South Africa for disaggregated sub-sectors of manufacturing. It emerged that South Africa has positive labour productivity growth across all of the analysed manufacturing sub-sectors.

The World Bank (2018) cites the restructuring of the manufacturing sector as the primary reason for the observed trend. This fact was reiterated by Rankin (2016), whereby it was noted that increases in labour productivity within the South African manufacturing sector are not driven by reallocation across industries, but rather by reallocations within them; this implies that these changes exist either between or within firms. Rankin (2016) goes further to state that these effects seem to differ with firm size, whereby smaller/medium firms become more labour productive relative to their larger counterparts. Rankin (2016) states that this effect does not seem to be driven by differences in capital intensity across differently sized firms, but rather is associated with changes in real labour costs. Part of the change in these real labour costs could be the presence of Bargaining Council agreements within the sub-sectors of the manufacturing sector.

Klein (2012) studies labour productivity trends in South Africa over a long timeframe, using both macro and sector-level data. It is suggested that excessive real wage increases were associated with lower employment creation, and although real wages and labour productivity have a positive correlation in the long-term, substantial deviations from equilibrium do occur. Furthermore, South Africa's relationship between real wages and labour productivity is weaker than in competitor countries, even when controlling for labour market tightness. South Africa's real wage growth is also driven by other factors, which may include the presence of Bargaining Councils.

South Africa's Bargaining Councils are made up of the employer and employee representatives, and the decisions made by them, if these councils are deemed to be sufficiently representative of the sector, are assumed to operate "*ergo omnes*" – which means that these decisions are extended to all workers and firms in the sector, even those who were not part of the decision-

making process. These Bargaining Councils set minimum wages for different employee levels and skillsets, which may differ by region. Typically, employees and employers of larger firms fill the positions of the representatives within the Bargaining Council structures. Borrowing from Moll (1996), in the absence of a Bargaining Council, large unionised firms would pay a privately bargained wage (w^{LU}), while non-unionised firms and small firms would pay a wage dictated by market forces, (w^{MF}). Since Bargaining Council agreements do exist in this context, there is a third wage possibility, (w^{BC}). Due to the *ergo omnes* nature of Bargaining Councils, all firms within the sector would have to comply with the prescribed wage, w^{BC} . It is presumed that $w^{LU} > w^{BC} > w^{MF}$, making it readily apparent that under a Bargaining Council agreement the wages for large unionised firms decrease, while the wages for small firms and large non-unionised firms increase. The net result is that larger wages are forced onto smaller firms, compelling them to either restructure their labour force composition in favour of more skilled employees, or to exit the market (Rankin, 2016).

Advocates for the existence of these Bargaining Councils make substantiated claims that their existence in South Africa is vital, particularly in a transformation context; minimum wages set by these Bargaining Councils have been argued to be necessary for supporting not only the employee, but said worker's extended family due to the lingering effects of the apartheid regime⁶³. Advocates further argue that the existence of Bargaining Councils and the extension of their decisions protects workers from low wages, long hours, and unhygienic conditions (Finnemore & van der Merwe, 1987).

⁶³ These effects include (but are not limited to): an individual's lack of skills; insufficient work experience of an individual due to being excluded from the workforce during apartheid.

However, critics of the collective bargaining system have shown the deleterious effects of the system, arguing that it places a special burden on small firms, increases business failures and discourages start-ups, and contributes to South Africa's high unemployment rate. Magruder (2012) employed a spatial regression discontinuity and spatial fixed effects to show that Bargaining Councils in South Africa are associated with higher wages and lower employment in small firms, and that the employment per industry decreased by an estimated 8-13% due to Bargaining Council agreements. The loss in employment was largely concentrated in small firms – a finding which was further confirmed in chapter 4.

As shown in the preceding discussion, the effects of Bargaining Councils in South Africa have been widely discussed in the past two decades⁶⁴; however, what has yet to be unpacked is the effect of these Bargaining Councils on labour productivity, and consequently the effect of Bargaining Councils on the labour productivity of firms.

5.2.2 MECHANISMS THROUGH WHICH LABOUR PRODUCTIVITY CAN CHANGE

Starting with a simple production function, it is easy to illustrate and understand the mechanisms that may drive changes in labour productivity. Using gross output as the dependent variable, the production function can be represented as:

$$Y_{it} = f(A_{it}; K_{it}; L_{it}; M_{it}; O_{it}) \quad (5.1)$$

⁶⁴ See Godfrey & Macun, 1991; Godfrey, 1992; Moll, 1996; Schultz & Mwabu, 1998; Butcher & Rouse, 2001; Borat et al., 2009; Magruder, 2012.

Where Y_{it} is gross output, A_{it} is the level of technology in the economy, K_{it} is capital stock, L_{it} is the level of employment, M_{it} is the level of raw materials used in the production process, and O_{it} accounts for other indirect costs such as water, electricity, and transport. Maintaining a standard assumption of production functions, it is assumed that output strictly increases with the addition of any input.

The first mechanism through which labour productivity can change can be seen by keeping the level of employment (L_{it}) fixed, and then raising either K_{it} , M_{it} , or O_{it} . Increases in any of these variables will lead to a rise in gross output (Y_{it}), and as a consequence represent a higher level of labour productivity.

The second mechanism through which labour productivity would rise could be triggered by a rise in the level of technology in the economy (A_{it}). A rise in this level of technology would imply that firms would produce more output with the same level of inputs (L_{it} , K_{it} , M_{it} , and O_{it}). This is typically an unobserved characteristic, and is thus captured within either the residual, or the error term of the model.

The final mechanism through which a rise in labour productivity could be observed has to do with measurement, particularly for the measurement of inputs and outputs. Equation (5.1) treats labour as homogenous and does not account for the quality or productivity of the labourer in question – switching from unskilled employees to more skilled employees would result in a higher labour productivity, even when keeping the total number of employees in the system constant.

Baseline theory dictates that an increase in labour productivity will typically stimulate the demand for labour, as each worker has the potential to produce more. However, according to Rankin (2016), the analysis of broad labour productivity trends has the potential to miss three fundamental concepts. The first is that rising labour productivity can be driven by changes in the factor intensity of other inputs – while this could increase labour utilised if higher levels of employment are required in the production process, it is also equally likely that employment levels would drop, especially if these inputs are strong substitutes for labour inputs. The second is the homogenous treatment of labour, neglecting within-employment changes – labour productivity will increase as individuals become more skilled, or if production is substituted towards employees with more education. The third is that the analysis of labour productivity typically misses the impact of the level of technology on the economy.

5.3 DATA

To examine labour productivity in South Africa, this chapter focuses exclusively on the manufacturing sector, abstracting from labour productivity changes that may be driven by shifts between broader sectors. A further reason for this restriction is that the bulk of Bargaining Councils exist within the manufacturing sector, as discussed in chapter 4, making the manufacturing sector a natural selection for the type of analysis that is being carried out.

To conduct the sectoral analysis, a panel of data was drawn from EasyData by Quantec. EasyData is a service by offered by Quantec that offers a comprehensive collection of South African socio-economic and market indicators. For the purposes of this chapter data on capital, labour, output and employee remuneration was extracted by Quantec at a sub-sector level for the period of 1994 – 2018. This data was collated by Quantec from sources such as Statistics South Africa and the South African Reserve Bank.

For the firm analysis conducted within this chapter, data is drawn from Statistics South Africa's (Stats SA) Large Sample Survey (LSS), which was carried out in 2005 and 2008⁶⁵. The survey collects detailed firm-level information on output, employment, wages, and other financial statement line items. Since this survey is used as a component of South Africa's National Account calculations, larger firms tend to be oversampled. To combat this, weights provided by Stats SA are imposed on the sample.

To capture effects linked to Bargaining Councils for both the sectoral and firm-level analysis, the aforementioned dataset was matched with a Bargaining Council indicator from the Bargaining Council Minimum Wage Dataset⁶⁶ (BCMWD). This indicator is structured in such a way that it is assigned a value of 1 if a Bargaining Council agreement exists for a particular sub-sector, in a particular year; if no such agreement exists then the indicator is assigned a value of 0. Since each indicator is disaggregated to a sub-sectoral level, matching of this indicator to Quantec data and the LSS was conducted on International Standard Industrial Classification (ISIC) codes⁶⁷.

5.4 SECTOR LEVEL LABOUR PRODUCTIVITY

5.4.1 DESCRIPTIVE ANALYSIS

Between 1995 and 2015, all manufacturing sub-sectors have shown positive growth over the 20-year period, albeit it with extremely pronounced heterogeneity. The most productive sub-

⁶⁵ Naturally a longer time period would be preferred, but given the unavailability of good firm-level data in South Africa, this paper has to make concessions and choose the best option available. The best option available in this instance is the LSS for 2005 and 2008.

⁶⁶ A full discussion of the creation, cleaning, and descriptives of this dataset is available in chapter 3.

⁶⁷ Based on ISIC Revision 4.

sector in 2015, *coke, petroleum and nuclear fuel*, outstripped the labour productivity of *wearing apparel* (the least productive manufacturing sub-sector) by 10.5 times. The *basic iron and steel products; casting of metal* sub-sector was the best performer, illustrating a 4.55% increase over the period.

Table 5.1: Industry Level Labour Productivity (R'000)

Industry	ISIC Code	1995	2000	2005	2010	2015	Change 1995 to 2015 %
<u>R&D intensive industries</u>							
Printing, recorded media	324-326	573	544	532	637	694	0.21
Coke, petroleum and nuclear fuel	331-333	2 823	6 827	4 511	4 300	4 456	0.58
Basic chemicals	334	1 920	3 347	4 138	4 100	3 480	0.81
Other chemical products	335-336	1 601	2 358	2 073	2 081	1 744	0.09
Plastic products	338	556	561	691	754	614	0.10
Basic iron and steel products; casting of metal	351, 353	665	1 484	2 049	2 251	3 693	4.55
Non-ferrous metal products	352	840	2 079	2 046	1 697	1 978	1.35
Structural metal products	354	773	1 022	820	716	846	0.09
Machinery and equipment	356-359	395	504	548	637	656	0.66
Electrical machinery	361-366	606	887	948	1 110	1 024	0.69
Radio, television and communication apparatus	371-373	688	751	1 348	1 668	1 849	1.69
Professional equipment	374-376	398	442	579	629	657	0.65
Motor vehicles, parts and accessories	381-383	639	1 104	1 534	1 835	1 723	1.70
Other transport equipment	384-387	280	375	967	889	1 021	2.64
<u>Non-R&D intensive industries</u>							
Food	301-304	579	724	993	1 228	1 186	1.05
Beverages and tobacco	305-306	1 207	1 531	2 070	2 055	1 853	0.53
Textiles	311-312	296	379	502	666	675	1.27
Wearing apparel	313-315	174	175	184	342	422	1.42
Leather and leather products	316	284	391	881	967	1 049	2.70
Footwear	317	198	354	729	915	839	3.23
Wood and wood products	321-322	436	454	567	772	747	0.71
Paper and Paper Products	323	1 363	1 987	2 170	1 745	1 546	0.13
Rubber products	337	454	764	918	1 234	1 196	1.63
Glass and glass products	341	348	464	803	842	886	1.54
Non-metallic mineral products	342	296	523	586	818	772	1.61
Other fabricated metal products	355	329	434	458	644	622	0.89
Furniture	381	233	334	407	606	537	1.31
Other manufacturing groups	392, 395	579	812	954	1 315	1 406	1.43
Manufacturing total							1.177

Within sector productivity growth ⁶⁸	1.170
Between sector productivity growth	0.007

Source: Quantec EasyData, Calculations by author

Noting the heterogeneity present in the labour productivity growth of the sub-sectors, it is interesting to observe that almost all of the increases within manufacturing labour productivity have been driven by within-industry growth, with very little of the growth being driven by cross-industry reallocation. Rankin (2016) states that the reason for this observation may be due to higher labour productivity firms growing relative to lower productivity firms within these sub-sectors, or that there were compositional changes with a relatively higher level of exit rates for lower labour productivity firms.

Figure 5.2 illustrates the growth of real labour productivity⁶⁹ against 1995 labour productivity. The negative relationship between these two components indicates a “catching-up” behaviour by lower labour productivity sub-sectors - sub-sectors with lower initial labour productivity exhibited more labour productivity growth relative to sub-sectors with higher initial labour productivity, over the 20-year period; this finding is reiterated in Rankin (2016). Another possibility for this observed relationship could potentially be the restructuring that smaller firms are forced to take on due to higher wages brought on by Bargaining Council premia, causing

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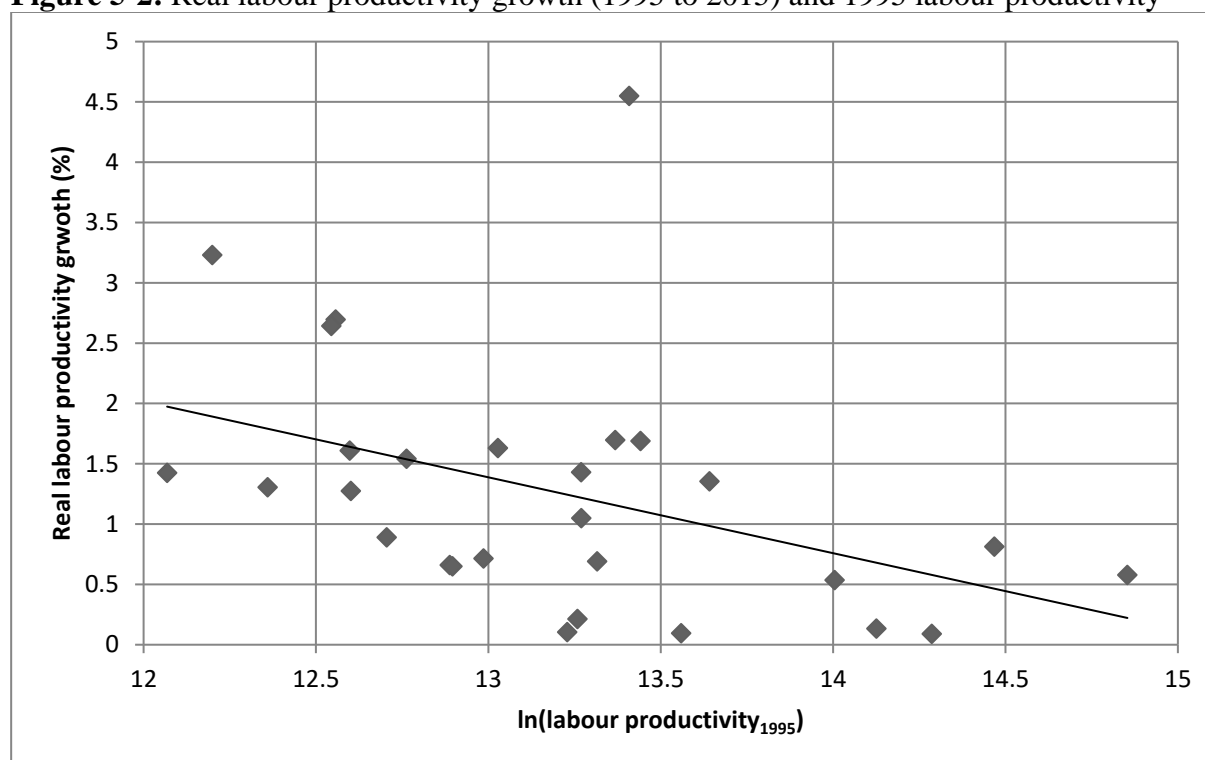
$$\text{Within-sector productivity growth} = \sum_{i=1}^n \left[\left(\frac{\left(\frac{Y_i}{L_i} \right)_t - \left(\frac{Y_i}{L_i} \right)_{t-1}}{\left(\frac{Y_i}{L_i} \right)_{t-1}} \right) \left(\frac{L_{i,t} + L_{i,t-1}}{2} \right) \right] + \left[\left(\frac{\sum_{i=1}^n \left(\frac{Y_i}{L_i} \right)_t - \sum_{i=1}^n \left(\frac{Y_i}{L_i} \right)_{t-1}}{\sum_{i=1}^n \left(\frac{Y_i}{L_i} \right)_{t-1}} \right) \left(\frac{\sum_{i=1}^n L_{i,t} + \sum_{i=1}^n L_{i,t-1}}{2} \right) \right]$$

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$$\text{Real labour productivity growth} = \left[\frac{\left(\frac{Y}{L} \right)_{2015} - \left(\frac{Y}{L} \right)_{1995}}{\left(\frac{Y}{L} \right)_{1995}} \right]$$

smaller, less productive firms to favour more skilled employees at the expense of their less skilled counterparts.

Figure 5-2: Real labour productivity growth (1995 to 2015) and 1995 labour productivity



The systematic difference between sub-sectors with Bargaining Councils and those without starts to emerge when considering the difference in growth of various skill profiles in each of the two cohorts. Figure 5.3 illustrates the difference⁷⁰ in growth rates of three skill compositions between sub-sectors with Bargaining Councils and those without. From this graph, it is apparent that sub-sectors with Bargaining Councils have been showing growth in skilled employees that has consistently outstripped the growth of sub-sectors without Bargaining Councils. Similarly,

⁷⁰ Difference = [Growth rate(sub-sectors with Bargaining Councils) – Growth rate(sub-sectors without Bargaining Councils)]

it can be seen that sub-sectors without Bargaining Councils have a growing unskilled employee base, when compared with sub-sectors that have Bargaining Councils.

Figure 5-3: Difference in growth rates of various skill profiles between sub-sectors with Bargaining Councils and sub-sectors without Bargaining Councils⁷¹

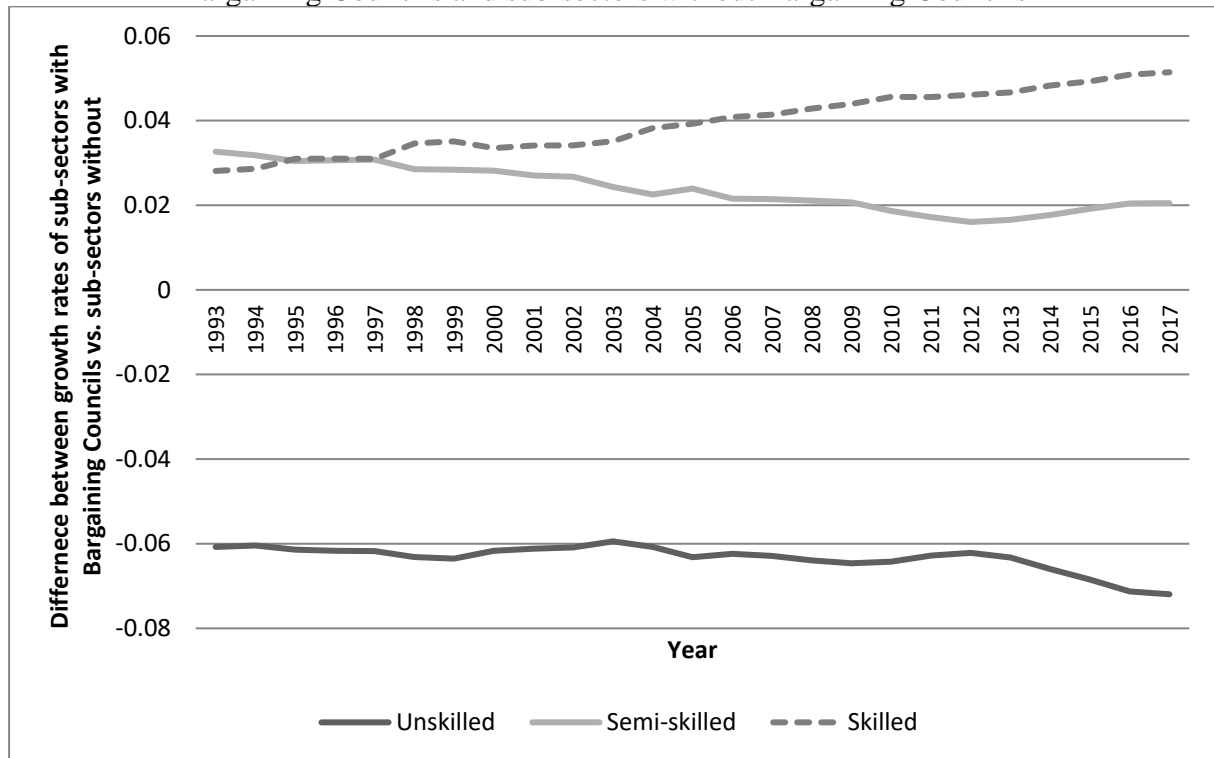


Figure 5.4 examines the relationship between real wage growth, and initial 1995 wages per sub-sector. From this figure, it would appear that sub-sectors with lower initial wages show the highest wage growth. This coincides with the sentiment that sub-sectors with lower labour productivity are “catching up” with their higher labour productivity counterparts, utilising within-sub-sector restructuring and higher wages as the transmission mechanism to achieve higher growth.

⁷¹ Difference is defined as $Y_t - Y_{t-1} / Y_{t-1}$

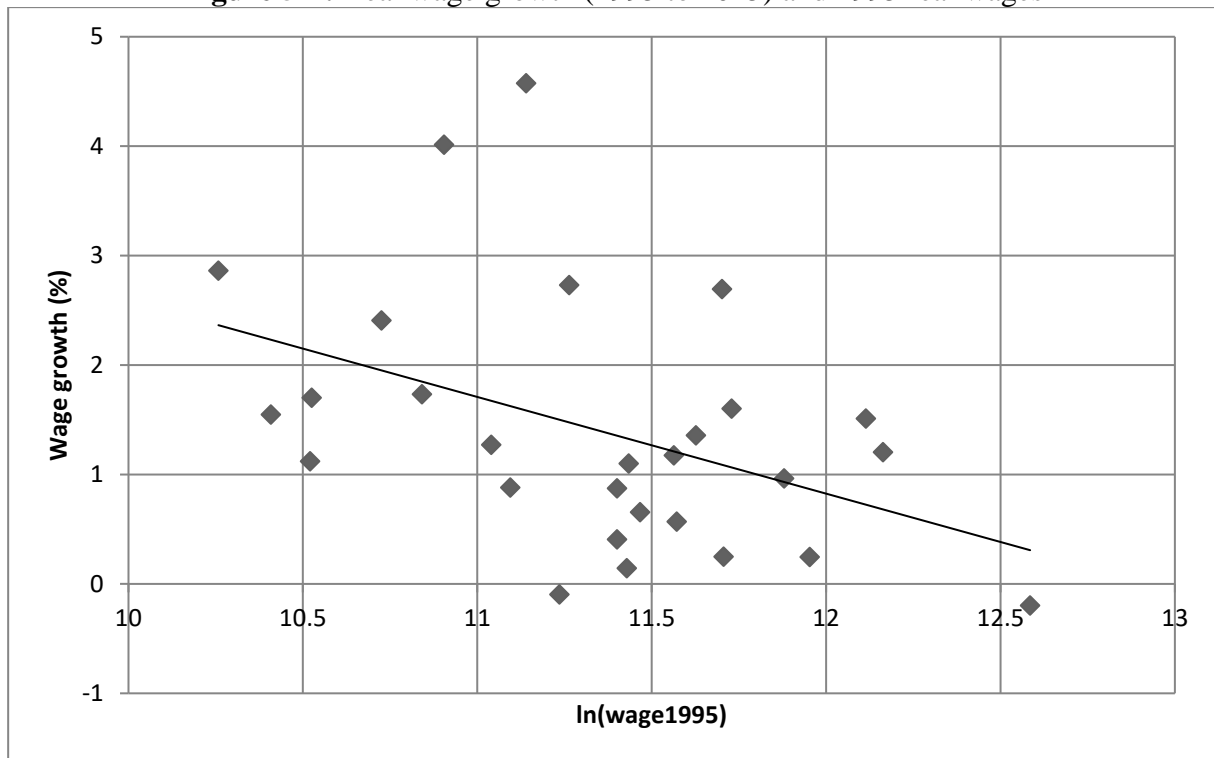
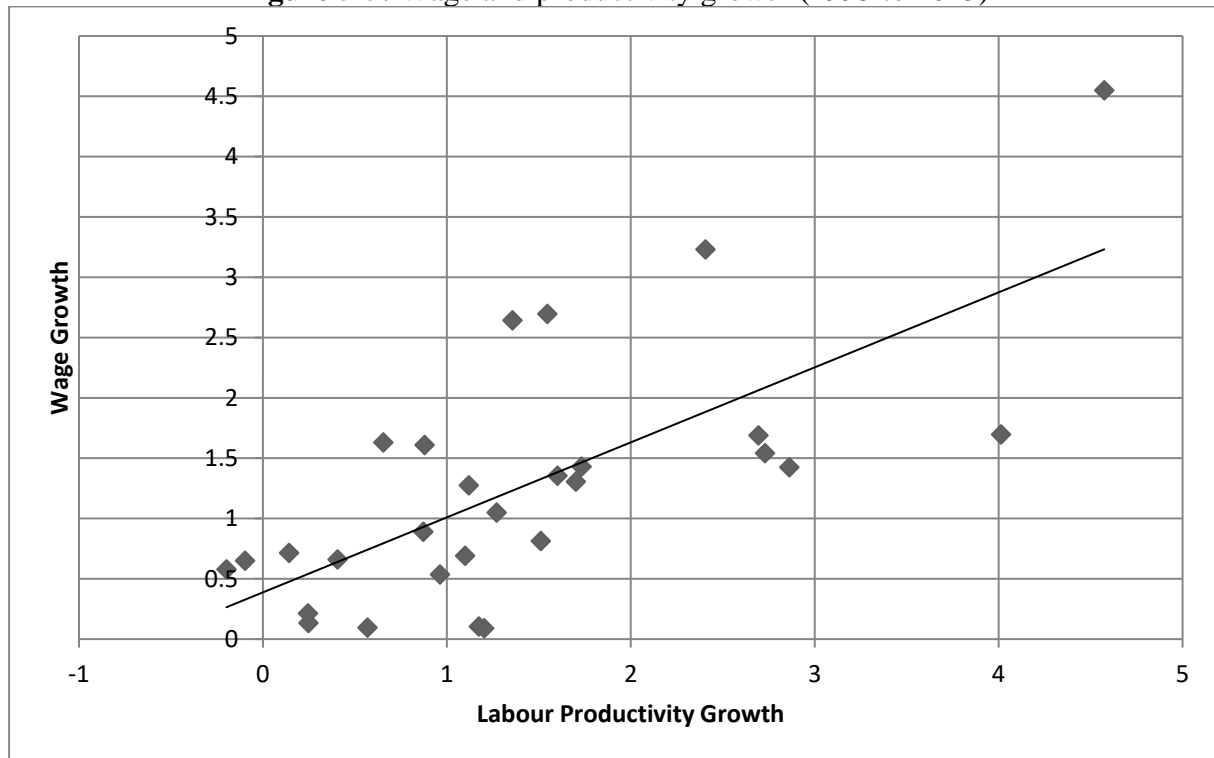
Figure 5-4: Real wage growth (1995 to 2015) and 1995 real wages

Figure 5.5 explores the relationship between labour productivity growth and wage growth. The positive relationship exhibited is well anchored within traditional economic theory. With all things being equal, higher labour productivity should increase demand for workers and result in an increase in wages as long as the labour supply curve is not perfectly elastic (Klein, 2012). Akerlof (1982) added to the argument for this positive relationship by suggesting higher real wages could lead to greater effort from workers, while Wakeford (2004) posited that it is these higher real wages that put upward pressure on labour costs, causing firms to substitute capital for labour, consequently increasing the marginal productivity of labour.

Empirical evidence typically supports the theory of a long-term co-integrating link between growth in labour productivity and growth in the real wage and has been demonstrated in countries such as Israel (Lavi & Sussman, 2001); Australia (Kumar et al., 2009); the United

States of America (Strauss & Wohar, 2004); and South Africa (Wakeford, 2004), (Klein, 2012), (Rankin, 2016).

Figure 5-5: Wage and productivity growth (1995 to 2015)



In summary, these results indicate: (i) That much of labour productivity growth happened within sub-sectors, rather than between them; (ii) There exists a negative relationship between initial labour productivity and labour productivity growth – that is to say that sub-sectors with lower initial labour productivity exhibited more labour productivity growth relative to their counterparts with a higher initial labour productivity, and these lower productivity sub-sectors are in a sense, “catching up”; (iii) Lower initial average wage sub-sectors had higher subsequent levels of labour productivity growth; and (iv) Wage growth and labour productivity growth have a positive correlation, as is confirmed in the prevailing literature.

Bearing these relationships and descriptives in mind, attention is turned to a series of regressions to unpack the effects that Bargaining Councils may have on labour productivity within a sectoral context.

5.4.2 SECTOR LEVEL FIXED EFFECTS

In order to unpack the relationship between labour productivity and Bargaining Councils, a series of regressions are used. These regressions control for various factors which should limit extraneous effects on results, allowing the chapter to make a more substantial comment on the topic of Bargaining Council effects. This chapter utilises both fixed effects (FE) at a sub-sectoral level, and quantile regressions; FE is completed with multiple specifications in order to ensure robust results, and quantile regressions are based on the subsequent preferred specification.

The FE regression takes the form of:

$$\log\left(\frac{Y}{L}\right)_{it} = a_{0it} + a_1 BCA_{it} + a_2 X_{it} + u_{it} \quad (5.2)$$

where $\ln(Y/L)_i$ is the log of labour productivity, and X_{it} is a vector containing control variables such as the log of real wages, log of capital, log of number of skilled, semi-skilled, and unskilled employees, across sub-sectors. BCA is a dummy variable representing whether or not a Bargaining Council wage agreement exists within the sub-sector for a particular time-period (1 = yes, a Bargaining Council agreement was present for the sub-sector in particular period; 0 = no Bargaining Council agreement present). The constant and disturbance term are provided by a_0 and u respectively.

Table 5.2: Fixed effects regressions under different specifications

Log of labour productivity	Spec. (1)	Spec. (2)	Spec. (3)	Spec. (4)	Spec. (5)
BCA_t (0 omitted)					
BCA_t=1	0.435*** (0.0453)	0.325*** (0.0426)	0.173** (0.0527)	0.127** (0.0428)	0.359*** (0.0553)
BCA_{t-1} (0 omitted)					
BCA_{t-1}=1			0.223*** (0.0540)	0.161*** (0.0439)	0.130** (0.0429)
Ln(capital)	1.448*** (0.110)	1.277*** (0.102)	1.226*** (0.108)	0.816*** (0.0907)	0.823*** (0.0881)
Ln(real wage)		0.406*** (0.0360)	0.378*** (0.0362)	0.306*** (0.0311)	0.327*** (0.0304)
Ln(proportion of skilled employees)				0.0182 (0.0113)	0.0167 (0.0110)
Ln(proportion of semi-skilled employees)				-0.0299*** (0.00273)	-0.0302*** (0.00265)
BCA x Ln(proportion of skilled employees)					0.000* (0.000)
BCA x Ln(proportion of semi-skilled employees)					-0.000*** (0.000)
Constant	-6.901*** (1.027)	-8.651*** (0.955)	-7.930*** (1.027)	-2.767** (0.878)	-2.980*** (0.853)
Observations	700	700	672	672	672
Adjusted R-squared	0.283	0.397	0.385	0.597	0.620

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Results from the FE regressions follow traditional economic theory. Holding all else constant, an increase in capital will increase labour productivity across all specifications, and an increase in employment (particularly unskilled employment) drags down labour productivity (*ceteris paribus*). Echoing findings from earlier in this chapter, specifications (2), (3), (4), and (5) illustrate that growth in the real wage is accompanied by labour productivity growth. The inclusion of a Bargaining Council dummy variable (BCA) reveals that in sub-sectors with Bargaining Council agreements, the presence of said agreements is correlated with higher labour productivity relative to sub-sectors that have no agreements present.

Furthermore, when including controls for the proportion of skilled and semi-skilled employees with sub-sectors, it emerges that sub-sectors with skilled employees have a higher labour productivity when compared to unskilled employees. In considering the interaction of the BCA indicator with the proportion of skills controls, it can be seen that sub-sectors with both more skilled employees and BCAs are more productive than their unskilled, non-BCA counterparts.

Having unpacked these effects at an aggregated level, this chapter now moves to explore these relationships through a series of quantile regressions based on specification (5).

5.4.3 SECTOR LEVEL QUANTILE REGRESSIONS

Quantile regressions are utilised in order to investigate effects of explanatory variables at different points in the distribution of the difference between reported earnings, and the respective minimum wage. While through OLS estimation, a sample mean is derived through the minimising of the sum of squared residuals, quantile regressions derive the sample median through the minimisation of the sum of absolute residuals. The quantile regression estimator for quantile q minimises the following function:

$$Q(\beta_q) = \sum_{i: y_i \geq x_i} q \left| \frac{Y}{L} i - x_i' \beta_q \right| + \sum_{i: y_i < x_i} (1-q) \left| \frac{Y}{L} i - x_i' \beta_q \right| \quad (5.3)$$

The above function provides the solution for the q^{th} quantile, where $0 < q < 1$ ⁷², facilitating the estimation of Q at any point in the distribution of the variable of interest (i.e. the dependent variable). Y/L_i is labour productivity, while x_i is a vector of control variables (Baum, 2013).

⁷² Where $q=0.5$, estimation is conducted at the median, whereas OLS provides estimation at the mean.

Following specification (5), and still making use of the Quantec sub-sectoral data, the QLS regressions produce the results shown in table 5.3.

Table 5.3: QLS under specification (3)

Log of labour productivity	Quantile 0.1	Quantile 0.25	Quantile 0.5	Quantile 0.75	Quantile 0.9
BCA_t (0 omitted)					
BCA_t=1	0.584*** (0.0820)	0.528*** (0.0847)	0.410*** (0.0615)	0.151*** (0.0448)	0.126** (0.0488)
BCA_{t-1} (0 omitted)					
BCA_{t-1}=1	0.0745 (0.0636)	0.0801 (0.0657)	0.105* (0.0477)	0.0505 (0.0348)	-0.00804 (0.0379)
Ln(capital)	0.964*** (0.131)	0.956*** (0.135)	0.850*** (0.0979)	0.817*** (0.0714)	0.712*** (0.0777)
Sector (Food is omitted)					
Beverages and tobacco	-0.315 (0.218)	-0.417 (0.225)	-0.689*** (0.163)	-1.140*** (0.119)	-1.241*** (0.129)
Textiles	0.820* (0.390)	0.660 (0.403)	-0.0367 (0.293)	-0.492* (0.213)	-0.793*** (0.232)
Wearing apparel	1.773*** (0.473)	1.500** (0.488)	0.785* (0.354)	0.497 (0.258)	-0.0818 (0.281)
Leather	3.293*** (0.688)	2.980*** (0.711)	2.116*** (0.516)	1.526*** (0.376)	1.039* (0.410)
Footwear	2.785*** (0.679)	2.605*** (0.702)	1.813*** (0.509)	1.246*** (0.371)	0.660 (0.404)
Wood and wood products	0.405 (0.341)	0.171 (0.352)	-0.269 (0.256)	-0.720*** (0.186)	-1.012*** (0.203)
Paper and Paper Products	0.106 (0.277)	0.153 (0.286)	-0.114 (0.208)	-0.571*** (0.151)	-0.747*** (0.165)
Printing and recorded media	0.114 (0.334)	0.0964 (0.345)	-0.296 (0.250)	-0.722*** (0.183)	-0.915*** (0.199)
Coke, petroleum and nuclear fuel	0.484 (0.250)	0.695** (0.258)	0.319 (0.187)	-0.212 (0.137)	-0.203 (0.149)
Basic chemicals	0.240 (0.242)	0.125 (0.250)	-0.170 (0.181)	-0.529*** (0.132)	-0.648*** (0.144)
Other chemical products	0.176 (0.258)	0.143 (0.266)	-0.0565 (0.193)	-0.451** (0.141)	-0.571*** (0.153)
Rubber products	1.231** (0.453)	1.165* (0.468)	0.513 (0.340)	0.00781 (0.248)	-0.306 (0.270)
Plastic products	0.341 (0.353)	0.183 (0.365)	-0.204 (0.265)	-0.618** (0.193)	-0.943*** (0.210)
Glass and glass products	0.198	-0.00437	-0.628*	-0.952***	-1.234***

	(0.385)	(0.397)	(0.288)	(0.210)	(0.229)
Non-metallic mineral products	0.0517 (0.268)	-0.125 (0.276)	-0.472* (0.201)	-0.978*** (0.146)	-1.195*** (0.159)
Non-ferrous metal products	0.499 (0.284)	0.351 (0.293)	-0.138 (0.213)	-0.583*** (0.155)	-0.807*** (0.169)
Basic iron and steel	0.668** (0.250)	0.473 (0.258)	0.246 (0.187)	-0.114 (0.137)	-0.233 (0.149)
Structural metal products	1.634*** (0.457)	1.490** (0.472)	0.935** (0.343)	0.343 (0.250)	-0.0313 (0.272)
Other metal products	0.839* (0.355)	0.710 (0.367)	0.277 (0.266)	-0.0861 (0.194)	-0.464* (0.211)
Machinery and equipment	0.562 (0.372)	0.603 (0.385)	0.0949 (0.279)	0.0635 (0.204)	0.0595 (0.222)
Electrical machinery	1.789*** (0.475)	1.705*** (0.490)	1.101** (0.356)	0.545* (0.260)	0.153 (0.283)
Radio, television and communication apparatus	1.798*** (0.528)	1.661** (0.545)	0.851* (0.396)	0.586* (0.289)	0.312 (0.314)
Professional equipment	2.663*** (0.642)	2.524*** (0.663)	1.526** (0.481)	0.786* (0.351)	0.280 (0.382)
Motor vehicles, parts and accessories	0.693** (0.228)	1.057*** (0.235)	0.849*** (0.171)	0.590*** (0.125)	0.370** (0.136)
Other transport equipment	0.571 (0.446)	0.544 (0.460)	0.390 (0.334)	-0.223 (0.244)	-0.527* (0.265)
Furniture	2.010*** (0.549)	1.778** (0.567)	0.948* (0.411)	0.384 (0.300)	-0.127 (0.326)
Other manufacturing	0.543 (0.288)	0.390 (0.297)	-0.116 (0.216)	-0.613*** (0.157)	-0.841*** (0.171)
Ln(real wage)	0.431*** (0.0451)	0.386*** (0.0466)	0.230*** (0.0338)	0.159*** (0.0247)	0.154*** (0.0268)
Ln(proportion of skilled employees)	0.0361* (0.0163)	0.0219 (0.0169)	0.0127 (0.0122)	0.0119 (0.00892)	-0.00459 (0.00971)
Ln(proportion of semi-skilled employees)	-0.0295*** (0.00393)	-0.0273*** (0.00406)	-0.0267*** (0.00295)	-0.0306*** (0.00215)	-0.0259*** (0.00234)
BCA x Ln(proportion of skilled employees)	0.000** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000** (0.000)	0.000 (0.000)
BCA x Ln(proportion of semi-skilled employees)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)
Constant	-6.532*** (1.594)	-5.804*** (1.646)	-2.807* (1.195)	-1.231 (0.871)	0.153 (0.948)
Observations	672	672	672	672	672

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.05$

*** $p < 0.001$

Congruent with the fixed effects analysis, it can immediately be seen that higher capital and higher real wages lead to higher labour productivity – again, reinforcing traditional economic

theory. The proportion of different skill types, and its consequent interaction with the BCA dummy, also reveals a similar effect to that of the fixed effects analysis.

The presence of the BCA dummy within the regression is positive and significant, indicating that the presence of Bargaining Councils is correlated with sub-sectors being more productive. That is to say that sub-sectors with Bargaining Councils tend to have higher labour productivity when compared with sub-sectors that do not have Bargaining Councils. This effect tapers off as one moves from the lower labour productivity quantiles to the higher end of the labour productivity distribution. This result reinforces a notion that was mentioned in Rankin (2016): that Bargaining Council agreements force less productive firms to restructure to become more productive, likely favouring more skilled employees over their less skilled counterparts. The tapering off of the Bargaining Council effect across the labour productivity distribution also reinforces this narrative.

In summary, through the analysis at a sectoral level, a few distinct findings have been demonstrated. Firstly, it was shown that labour productivity has grown over the period since South Africa's transition to democracy, and that most of this growth was driven by within-sub-sector changes, rather than between sub-sectors. Secondly, lower productivity sub-sectors have been growing faster than highly productive sub-sectors, alluding to the idea that these sub-sectors are "catching up" over time. This growth was also accompanied by a rise in the real wage paid by sub-sectors. Thirdly, it was shown that the presence of Bargaining Councils and their agreements is correlated with higher labour productivity, especially in the lower end of the labour productivity distribution.

Considering the dominance of the within-sub-sector growth that was established in this section of the chapter, it is crucial that a firm-level analysis is now conducted in order to gain a more complete understanding of the effects in play.

5.5 FIRM LEVEL LABOUR PRODUCTIVITY

To begin the firm analysis, one must first ensure the same relationships that were demonstrated during the sectoral analysis hold at the firm-level. As mentioned earlier in the chapter, the analysis for this section rests upon the large sample survey data from Stats SA, particularly for the years of 2005 and 2008.

Similar to the relationship exhibited in figure 5.2, figure 5.6 illustrates the negative relationship between real labour productivity growth, and 2005 labour productivity⁷³ – again, speaking to the notion of a “catching up” behaviour being exhibited by lower labour productivity firms. It is worth reiterating that a possibility for this observed relationship could potentially be the restructuring that smaller firms are forced to take on due to higher wages brought on by Bargaining Council premia, causing smaller, less productive firms to favour more skilled employees at the expense of their less skilled counterparts.

⁷³ A breakdown of this relationship by firm-size cohort is illustrated in figure B1.

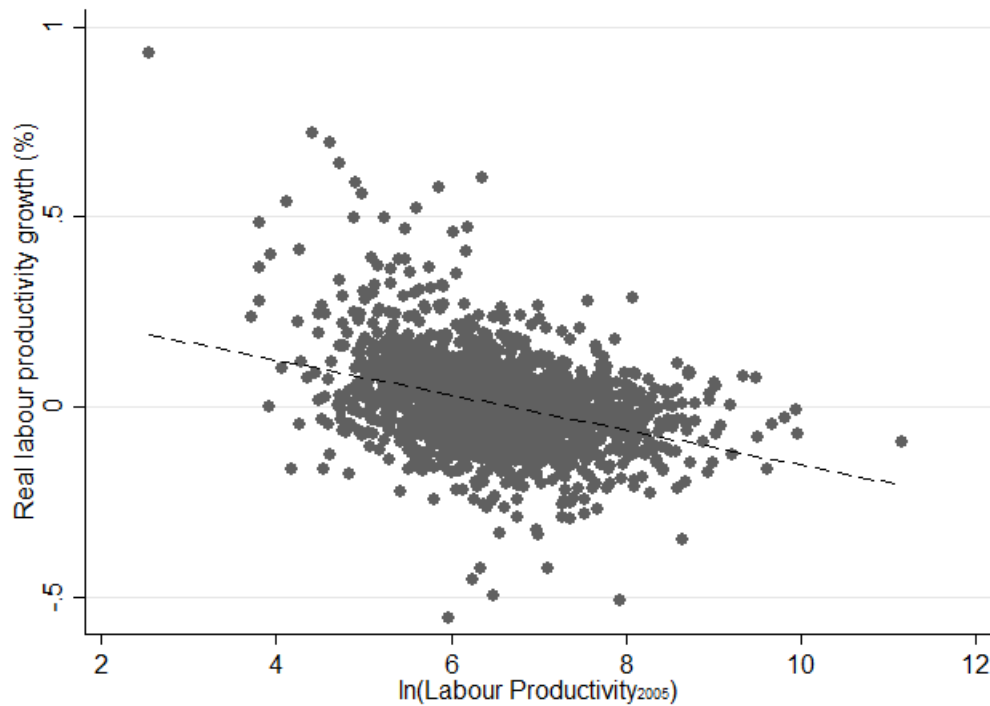
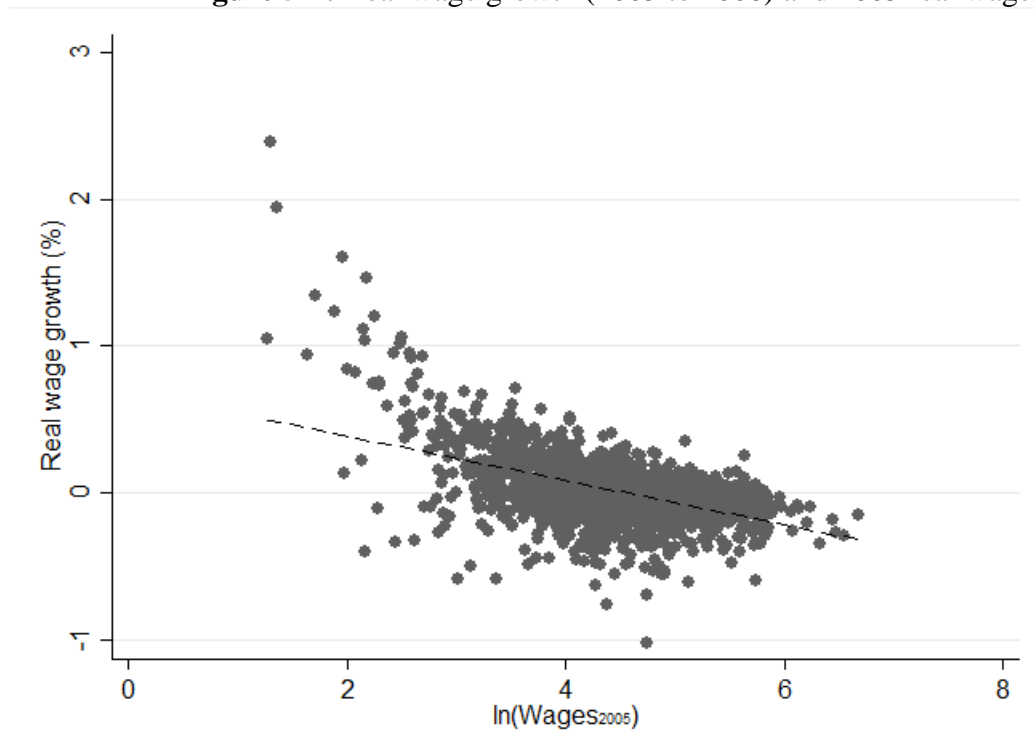
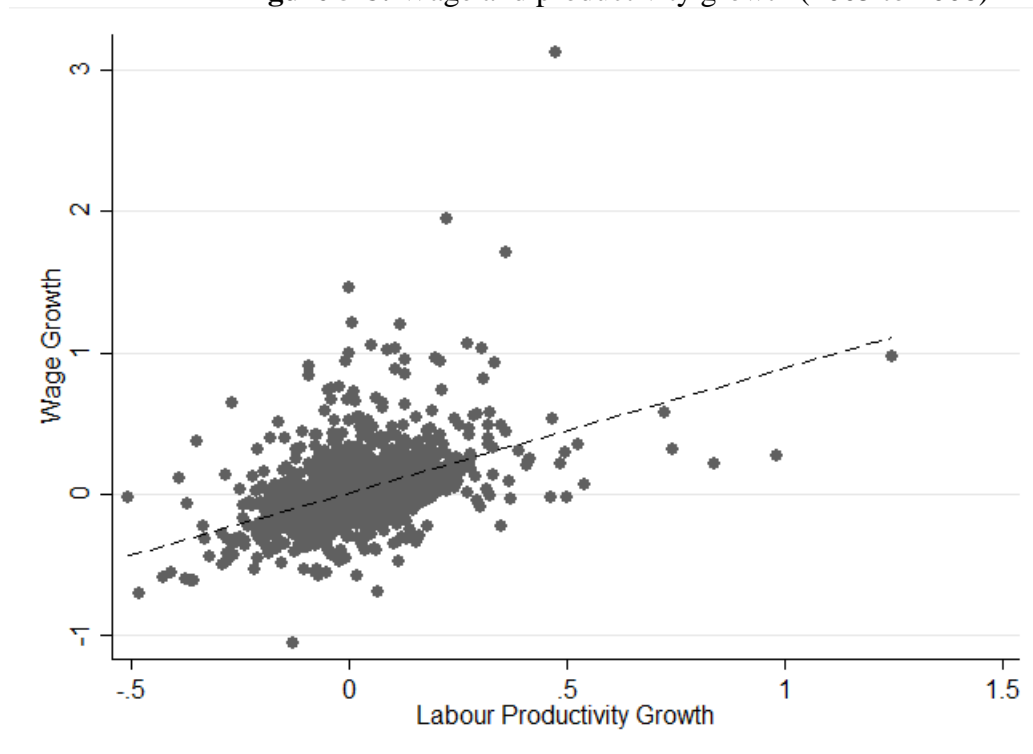
Figure 5-6: Real labour productivity growth (2005 to 2008) and 2005 labour productivity

Figure 5.7 examines the relationship between real wage growth and initial 2005 wages per firm. Similar to the sectoral analysis of this shown in figure 5.4, firms with lower initial wages showed the highest wage growth⁷⁴. Again, this coincides with the sentiment that sub-sectors with lower labour productivity are “catching up” with their higher labour productivity counterparts, utilising within-sub-sector restructuring and higher wages as the transmission mechanism to achieve higher growth.

⁷⁴ A breakdown of this relationship by firm-size cohort is illustrated in figure B2.

Figure 5-7: Real wage growth (2005 to 2008) and 2005 real wages

Finally, figure 5.8 explores the relationship between labour productivity growth and wage growth. The positive relationship is the same as the one exhibited in figure 5.5 of the sectoral analysis and is still well-rooted within traditional economic theory. With all things being equal, higher labour productivity should increase demand for workers and result in an increase in wages as long as the labour supply curve is not perfectly elastic (Klein, 2012), as seems to be the case here.

Figure 5-8: Wage and productivity growth (2005 to 2008)

This firm level analysis shows a very similar pattern to the previous sectoral-analysis. Again, there exists a negative relationship between initial labour productivity and labour productivity growth – reinforcing the notion of a “catching up” behaviour. Lower initial average wage firms had higher subsequent levels of labour productivity growth; and wage growth and labour productivity growth had a positive correlation, as was confirmed in the previous section of this chapter.

As this chapter did for its sectoral analysis, it now moves to a series of regressions to unpack the effect that Bargaining Councils and their subsequent agreements may have at a firm-level.

5.5.1 FIRM LEVEL ORDINARY LEAST SQUARES REGRESSIONS

In this section, regressions are run as close as possible to match the earlier specifications shown within the sectoral analysis section. However, since a different dataset is being utilised for the firm-level analysis, some concessions must be made.

Firstly, the LSS 2005 & 2008 does not contain measures of the proportion of skilled, versus semi-skilled, versus unskilled employment – thus, it cannot be controlled for. Secondly, with this dataset only containing two periods, utilisation of a lag of the Bargaining Council dummy variable is ill-advised. However, what can now be controlled for is the effect that firm size, and its consequent interaction with the Bargaining Council dummy variable, may introduce.

Specification (1) is run to replicate the earlier sectoral analysis, while specification (2) takes firm size into account.

Table 5.4: OLS Results under different specifications

Log of labour productivity	Specification (1)	Specification (2)
BCA_t (0 omitted)		
BCA_t=1	0.518*** (0.0970)	0.0317*** (0.00825)
Ln(capital)	0.0944*** (0.00680)	0.0990*** (0.00452)
Ln(real wage)	0.707*** (0.0311)	0.702*** (0.0128)
Sector (Food is omitted)		
Beverages and tobacco	0.261* (0.123)	0.266*** (0.0643)
Textiles	0.611*** (0.102)	0.611*** (0.0736)
Wearing apparel	0.587*** (0.111)	0.590*** (0.114)
Leather	-0.332*** (0.0771)	-0.317*** (0.0753)
Footwear	0.432*** (0.0879)	0.425*** (0.0489)
Wood and wood products	-0.534***	-0.501***

Chapter 5: South African Labour Productivity and the Impact of Bargaining Councils: An Analysis of Labour Productivity in South Africa's Manufacturing Sector

	(0.118)	(0.123)
Paper and Paper Products	-0.873***	-0.879***
	(0.156)	(0.0719)
Printing and recorded media	-0.424**	-0.397**
	(0.145)	(0.138)
Coke, petroleum and nuclear fuel	-0.160	-0.157
	(0.161)	(0.102)
Basic chemicals	0.0987	0.106*
	(0.0814)	(0.0482)
Other chemical products	-0.267**	-0.246***
	(0.0869)	(0.0688)
Rubber products	0.175	0.181*
	(0.154)	(0.0743)
Plastic products	0.138	0.131*
	(0.0837)	(0.0569)
Glass and glass products	-0.203*	-0.198**
	(0.0960)	(0.0699)
Non-metallic mineral products	0.0242	0.0385
	(0.0922)	(0.0533)
Non-ferrous metal products	-0.157	-0.143**
	(0.0896)	(0.0488)
Basic iron and steel	0.225*	0.237*
	(0.102)	(0.0955)
Structural metal products	0.118	0.112
	(0.133)	(0.0697)
Other metal products	0.0930	0.0897
	(0.0851)	(0.0536)
Machinery and equipment	-0.170	-0.157**
	(0.0970)	(0.0547)
Electrical machinery	-0.0709	-0.0555
	(0.0915)	(0.0818)
Radio, television and communication apparatus	-0.262*	-0.234
	(0.127)	(0.125)
Professional equipment	0.0194	0.0208
	(0.117)	(0.0859)
Motor vehicles, parts and accessories	0.268**	0.274***
	(0.0911)	(0.0588)
Other transport equipment	-0.614***	-0.591***
	(0.0936)	(0.0741)
Furniture	-0.729***	-0.714***
	(0.162)	(0.0742)
Other manufacturing	0	0
	(.)	(.)
Employment (10-19 omitted)		0
20-49 Employees		0.146***
		(0.00363)
50-99 Employees		0.219***

		(0.00375)
100+ Employees		0.335***
		(0.00361)
BCA x Employment (BCA x 10-19 Employees omitted)		
BCA x 20-49 Employees		-0.0319***
		(0.00773)
BC=1 x 50-99 Employees		-0.0392***
		(0.00798)
BC=1 x 100+ Employees		-0.0404***
		(0.00753)
Constant	2.252***	2.195***
	(0.132)	(0.0654)
Observations	7468	7468

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

From these results, it can be seen that the effects of capital and real wages still hold true to traditional economic theory. The effect of the Bargaining Council dummy variable is positive and significant, as it was for the sectoral analysis, showing again that there is a definite correlation between Bargaining Councils and labour productivity.

The introduction of firm size and its subsequent interaction with the Bargaining Council dummy variable, as controls generates interesting results. As it would be expected a priori, larger firms are more productive than their smaller counterparts. What is interesting are the effects introduced by the interacted variables. When compared to the omitted category (BC x 10 – 19 employees), all other interacted terms are negative – implying that while Bargaining Councils might be responsible for growth in labour productivity, it would appear that this effect is strongest in small, less productive firms i.e. these firms are “catching up”. Furthermore, this firm level data suggests that firm size is highly correlated with the BCA premium, thus the

explanation of a higher BCA coefficient in the sectoral analysis could potentially be due to different (and changing) firm size profiles i.e. fewer smaller firms.⁷⁵

In order to understand how this effect may hold through the distribution of labour productivity, a series of quantile regressions are utilised.

5.5.2 FIRM LEVEL QUANTILE REGRESSIONS

Basing the quantile regressions on specification (2) from the preceding section, table 5.5's results are obtained.

As has come to be expected in this chapter, capital and the Bargaining Council dummy variable exhibit are both positive and significant – however, no discernible pattern can be seen when looking at the Bargaining Council coefficient across the distribution. When looking at real wages, it can be seen that the effect an increase in real wages has on labour productivity is larger when looking at the lower end of the labour productivity distribution.

When considering the interaction of the Bargaining Council dummy variable with firm size, a notable fact stands out. Firms with lower employment stand more to gain in terms of labour productivity when Bargaining Councils are present than when compared with their larger counterparts. This again points to the notion of “catching up”. It would appear that large firms receive the lowest increase of labour productivity when Bargaining Councils are present, versus any other firm size cohort, across the distribution of labour productivity.

⁷⁵ This is confirmed via the regression estimates in Appendix F, whereby table F1 shows the regression without an interaction between Bargaining Councils and firm size, while table F2 shows the regression estimates without firm size.

Table 5.5: QLS under specification (2)

Log of labour productivity	Quantile 0.1	Quantile 0.25	Quantile 0.5	Quantile 0.75	Quantile 0.9
BCA_t (0 omitted)					
BCA_t=1	0.415*** (0.0987)	0.667* (0.327)	0.720*** (0.120)	1.060*** (0.188)	0.882*** (0.190)
Employment (10-19 omitted)					
20-49 Employees	0.124 (0.0879)	0.0919* (0.0359)	0.166*** (0.0376)	0.0894 (0.0652)	-0.169 (0.144)
50-99 Employees	0.223* (0.0885)	0.139*** (0.0235)	0.151*** (0.0403)	0.0887 (0.0572)	-0.169 (0.141)
100+ Employees	0.166 (0.0942)	0.0538* (0.0261)	0.168*** (0.0436)	0.104* (0.0516)	-0.162 (0.140)
BCA x Employment (BCA x 10-19 Employees omitted)					
BCA x 20-49 Employees	-0.186 (0.211)	-0.228 (0.310)	-0.237* (0.111)	-0.312*** (0.0948)	-0.0535 (0.188)
BC=1 x 50-99 Employees	0.0263 (0.171)	-0.228 (0.295)	-0.302** (0.106)	-0.457*** (0.0886)	-0.286 (0.147)
BC=1 x 100+ Employees	-0.242 (0.183)	-0.293 (0.296)	-0.335** (0.109)	-0.468*** (0.0761)	-0.308* (0.157)
Ln(capital)	0.0828*** (0.00774)	0.101*** (0.00409)	0.0967*** (0.00362)	0.0969*** (0.00835)	0.102*** (0.0120)
Ln(real wage)	0.949*** (0.0246)	0.792*** (0.0189)	0.715*** (0.0166)	0.656*** (0.0247)	0.615*** (0.0424)
Sector (Food is omitted)					
Beverages and tobacco	0.146 (0.173)	0.232 (0.157)	0.0770 (0.0437)	0.538** (0.171)	0.569 (0.295)
Textiles	0.534* (0.228)	0.590*** (0.155)	0.504*** (0.105)	0.771*** (0.128)	0.834*** (0.231)
Wearing apparel	0.561*** (0.133)	0.492*** (0.0961)	0.484*** (0.132)	0.523*** (0.130)	0.816*** (0.0657)
Leather	-0.107 (0.123)	-0.281*** (0.0693)	-0.285*** (0.0780)	-0.393** (0.130)	-0.544*** (0.0890)
Footwear	0.268*** (0.0456)	0.376* (0.158)	0.363*** (0.0531)	0.570*** (0.143)	0.754*** (0.166)
Wood and wood products	-0.0586 (0.133)	-0.358*** (0.0712)	-0.596*** (0.117)	-0.726** (0.268)	-0.676 (0.358)
Paper and Paper Products	-1.440** (0.476)	-0.658 (0.413)	-0.702*** (0.0809)	-0.836*** (0.136)	-1.023*** (0.0779)
Printing and recorded media	-0.368** (0.125)	-0.470*** (0.116)	-0.596*** (0.133)	-0.454 (0.294)	-0.501*** (0.0949)
Coke, petroleum and nuclear fuel	-0.506*** (0.0259)	-0.161 (0.181)	-0.233*** (0.0517)	0.0498 (0.304)	0.119 (0.327)
Basic chemicals	0.0823	0.133	0.0319	0.190	0.172

	(0.0600)	(0.156)	(0.0324)	(0.139)	(0.181)
Other chemical products	-0.184	-0.337***	-0.376***	-0.248	0.0643
	(0.140)	(0.0755)	(0.0853)	(0.200)	(0.159)
Rubber products	0.177***	-0.0566	-0.124***	0.353	0.730
	(0.0291)	(0.158)	(0.0316)	(0.555)	(0.844)
Plastic products	0.137	0.158	0.0668	0.166	0.257
	(0.117)	(0.155)	(0.0477)	(0.147)	(0.184)
Glass and glass products	-0.173	-0.156	-0.0980	-0.270	-0.255***
	(0.156)	(0.0948)	(0.0889)	(0.142)	(0.0533)
Non-metallic mineral products	0.0364	0.0104	-0.0570	0.0804	0.279
	(0.0678)	(0.165)	(0.0381)	(0.150)	(0.288)
Non-ferrous metal products	-0.229	-0.195	-0.159*	-0.0555	-0.151
	(0.126)	(0.174)	(0.0741)	(0.150)	(0.185)
Basic iron and steel	0.0151	0.0687	0.163**	0.441**	0.385*
	(0.0513)	(0.174)	(0.0511)	(0.164)	(0.190)
Structural metal products	-0.158***	0.0855	-0.0320	0.242	0.408
	(0.0242)	(0.158)	(0.0888)	(0.152)	(0.248)
Other metal products	0.197	0.173	0.0236	0.171	-0.0625
	(0.120)	(0.176)	(0.0594)	(0.147)	(0.158)
Machinery and equipment	-0.0465	-0.102	-0.160	-0.0636	-0.240
	(0.0887)	(0.157)	(0.141)	(0.134)	(0.215)
Electrical machinery	0.0486	0.0325	-0.0799	0.0234	-0.293
	(0.233)	(0.160)	(0.0462)	(0.150)	(0.182)
Radio, television and communication apparatus	-0.244	-0.470***	-0.442**	-0.315	-0.0828
	(0.180)	(0.0756)	(0.144)	(0.194)	(0.237)
Professional equipment	-0.0402	-0.0298	-0.0892	0.138	0.195
	(0.0939)	(0.215)	(0.0572)	(0.177)	(0.205)
Motor vehicles, parts and accessories	0.284***	0.295	0.144*	0.372*	0.309
	(0.0652)	(0.187)	(0.0673)	(0.168)	(0.216)
Other transport equipment	-0.451***	-0.522***	-0.587***	-0.686***	-0.571***
	(0.102)	(0.0744)	(0.109)	(0.137)	(0.154)
Furniture	-0.524	-0.574*	-0.791***	-0.765***	-0.435
	(0.273)	(0.226)	(0.109)	(0.183)	(0.358)
Other manufacturing	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)
Constant	0.423**	1.367***	2.061***	2.620***	3.470***
	(0.132)	(0.180)	(0.0838)	(0.174)	(0.268)
Observations	7468	7468	7468	7468	7468

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

5.6 CONCLUSIONS

Labour productivity is one of the most essential determinants of a country's income level, yet it is a measure that has been understudied in South Africa. Existing work on labour productivity in South Africa has mostly focused on aggregate figures and generally portrayed the observed increase in labour productivity levels as a positive outcome. As South Africa is a country grappling with glaring unemployment issues, while trying to navigate an effective policy mix to remedy this issue, the study of labour productivity with its relation to Bargaining Councils is vital.

This chapter extended the literature on labour productivity in South Africa in multiple ways. By utilising both sectoral and firm level data, this chapter was able to speak to the evolution of labour productivity in post-apartheid South Africa, as well as to investigate the effects that Bargaining Councils may have on labour productivity both at a sector and firm-level.

This chapter confirms that aggregate labour productivity in South Africa has been growing. When comparing growth of labour productivity between 1995 and 2015, all manufacturing sub-sectors have shown positive growth over the 20-year period, albeit it with extremely pronounced heterogeneity. Almost all of the growth within manufacturing labour productivity have been driven by within-industry growth, with very little of the growth being driven by cross-industry reallocation. This may be due to higher labour productivity firms growing relative to lower productivity firms within these sub-sectors, or because there were compositional changes with a relatively higher level of exit rates for lower labour productivity firms. Following Rankin's (2016) suggestion, it seems that more attention in South African

industrial policy needs to be focused within industries, rather than the current industry-specific focus of South Africa's Industrial Policy Action Plan (IPAP).

By comparing labour productivity growth with initial levels of labour productivity, this chapter suggests that the negative relationship portrayed by these two components may speak to a “catching up” behaviour by lower labour productivity sub-sectors. Another possibility for this observed relationship could potentially be the restructuring that smaller firms are forced to take on due to higher wages brought on by Bargaining Council premia, causing smaller, less productive firms to favour more skilled employees at the expense of their less skilled counterparts – hampering those whom the South African government would consider to be the most vulnerable in terms of employment. This effect holds under both sectoral and firm-analysis, as does the positive relationship between labour productivity growth and wage growth.

In the sectoral regression analysis, the presence of the BCA dummy within the regression is positive and significant, indicating that the presence of Bargaining Councils is correlated with sub-sectors being more productive. This effect tapered off as one moved from the lower labour productivity quantiles to the higher end of the labour productivity distribution. This result reinforces a notion that Bargaining Council agreements force less productive firms to restructure to become more productive, likely favouring more skilled employees over their less skilled counterparts. The tapering off of the Bargaining Council effect across the labour productivity distribution also reinforces this narrative.

The analysis at a firm level generated similar results; while the introduction of firm size and its subsequent interaction with the Bargaining Council dummy variable as controls generated interesting results. As it would be expected a priori, larger firms are more productive than their

smaller counterparts. The results imply that while Bargaining Councils might be responsible for some growth in labour productivity, it would appear that this effect is strongest in small, less productive firms i.e. these firms are “catching up”. Furthermore, this firm level data suggests that firm size is highly correlated with the BCA premium, thus the explanation of a higher BCA coefficient in the sectoral analysis could potentially be due to different (and changing) firm size profiles i.e. fewer smaller firms.

Naturally, there are caveats to these findings. It is plausible that factors which could not be accounted for could also partially explain the findings from this chapter. Without adequate measures for levels of technology, and exporting behaviour, it is possible that the results would diminish if better controls could be instituted through the utilisation of more complete data. This will be considered for further research.

Chapter 6: Conclusions

6.1 SUMMARY

This thesis adds significantly to the discussion on the effects of government policy (particularly that of labour regulation) on firm dynamics. It does so through three key elements. Firstly, it is the first to conduct a thorough impact evaluation of the Employment Equity Act of 1998 – thus determining the effects the Act had on employment, be it intentional or unintentional. Secondly, this thesis utilises a new-to-the-world dataset, which was constructed purely to facilitate the research conducted within this thesis – the Bargaining Council Minimum Wage Dataset (BCMWD). Thirdly, by using this new dataset, this thesis unpacks the effects that collective bargaining in South Africa has on firm employment, workers' wages, and labour productivity.

Chapter 2 investigates the impact of the Employment Equity Act of 1998 on employment and production strategies of South African firms. Since the Act is a threshold policy, only demanding that firms with 50 or more employees comply with it, by using matched 1996 Manufacturing Census and 2001 Large Sample Survey data this chapter could track changes in employment intensity and production strategies of firms that operated in 1996 with a workforce of around 50 employees. Analysis revealed that there is a high possibility that the introduction of the Act has created a distortion in employment which has resulted in an inefficient allocation of resources at a firm level. This results in a lower employment of labour, particularly at the small, medium enterprise level, showing a potential unintended consequence of the Act. This thesis was not able to conduct this analysis over a longer time period to see if this distortion was sustained, and this should be considered for future work.

Chapter 3 outlines the capturing, cleaning, and construction of the Bargaining Council Minimum Wage Dataset. This new-to-the-world dataset is then utilised to generate descriptive results, not only showcasing its usefulness as a dataset but also illustrating the evolution of minimum wages over time as well as providing up to date estimates of Bargaining Council coverage.

Chapter 4 makes use of the aforementioned dataset to determine what effects the existence of Bargaining Councils, and their minimum wage agreements have on firm dynamics – particularly employment. The results of this chapter conclude that despite minimum wages prescribed by said Bargaining Councils, the average employee still reports a wage that is 42% below the stipulated minimum. Furthermore, the extension of updated Bargaining Council agreements is shown to have a detrimental effect on employment, whereby it decreases by approximately 8%. Yet again, this marks the intended effect of this area of policy as counterproductive.

Lastly, chapter 5 unpacks the evolution of labour productivity in post-apartheid South Africa, especially with its relation to Bargaining Councils. The chapter concludes that aggregate labour productivity (in manufacturing) in South Africa has been growing and that almost all of this growth has been driven by within-industry growth, with little of the growth being driven by cross-industry reallocation. Furthermore, this chapter suggests that the negative relationship exhibited by initial labour productivity and labour productivity growth speaks to a “catching up” behaviour by lower labour productivity sub-sectors. An analysis of Bargaining Council effects, meanwhile, suggests that the presence of Bargaining Councils is correlated with sub-sectors being more productive. This result reinforces a notion that Bargaining Council agreements force less productive firms to restructure to become more productive, likely

favouring more skilled employees over their less skilled counterparts. Again, this affects those in the more precarious portion of employment the most.

6.2 POLICY

Since the end of apartheid in 1994 the notions of increased employment, lower inequality, and poverty alleviation have remained central to the South African government's mandate. With the ushering in of democracy South Africa implemented a set of new labour regulations. These regulations were intended to modernise existing regulations and extend protection and rights to workers who were not covered under apartheid-era regulations. A close relationship between government and organised labour meant that these regulations focused on the conditions of work, protection of employment, and institutionalised bargaining structures for those with jobs, rather than making it easier for companies to employ people (Edwards et al., 2014). These two broad policy changes thus were in tension: government was aiming to achieve transformation of the workplace, the generation of employment, and the improvement of worker welfare, while firms grappled with more restrictive employment regulations due to new labour regulations.

Although the South African economy has created relatively large numbers of jobs in the last 20 years, the rate of job creation and the types of jobs created have not been sufficient to reduce the absolute level of unemployment nor the unemployment rate substantially (Edwards et al., 2014). The post-apartheid labour market has benefitted those at the top of the income and skills distribution the most and jobs and wages for those in high-skilled occupations have increased substantially relative to low-skilled occupations (Edwards et al., 2014). This was showcased in chapters 2, 3, and 5.

Most of the observed change in labour demand has been driven by within-sector changes. Within sectors the labour-intensity of production has been decreasing and the skills-intensity increasing – this is only reinforced through the presence of Bargaining Councils, as well as Acts such as the Employment Equity Act of 1998.

With a better understanding of firm responses to changes in their environment, it is also possible to unpack employment effects that are subsequent to changes in firm outcomes. The effects of firm outcomes on the quantity and quality of employment are equally likely to differ across sectors and skill levels. It is for that reason that any discussion trying to align labour market reform and economic growth policy needs to be based on a thorough understanding of such firm and employment dynamics.

While this thesis will not be prescriptive in terms of actual policy changes that should be enforced, it will implore any and all policymakers to take consideration of the following two points before instituting any more reforms or regulations within the South African economic landscape.

Firstly, firms are heterogeneous, and cannot be treated with a “one-size-fits-all” policy approach. Doing so results in unintended consequences, often at the expense of those the policy aims to protect. Secondly, in reference to this heterogeneity, this thesis would implore all subsequent studies that inform policymakers to take firm-level data into account, rather than focusing on aggregate statistics. The results obtained through aggregate measures often miss the true dynamics at play, especially with respect to the protection of workers and the transformation of the South African labour market.

6.3 FUTURE DIRECTIONS

While the main chapters of this thesis contribute significantly to the on-going debates surrounding labour market regulations in South Africa, each chapter could benefit from further research. Firstly, Chapter 2 focuses on results generated through an analysis on the manufacturing sector; however, while manufacturing is a substantial part of the South African economy, it is not the only sector of interest. It would therefore be of interest to analyse how firms from other sectors responded to the EEA. Additionally, the presence of new robustness checks such as “rdrobust” (in both R and Stata) would be useful to include in future iterations of this chapter. Furthermore, chapter 2’s analysis is conducted in a relatively short timeframe. It would be of interest to rerun these tests at much later dates in time to unpack whether the unanticipated effect of the EEA still holds, or if it has tapered off.

Secondly, at the time of writing chapter 3, data was only available for three bargaining councils (clothing, textiles, and metal and engineering). It would be beneficial to rerun the analysis making use of the fully completed BCMWD. Using this expanded dataset would potentially facilitate an even better understanding of the dynamics that are play when it comes to the relationship between employment and bargaining council decisions.

Thirdly, it would be of interest to expand the analysis of chapters 2, 3, and 5 to include more firm characteristics. With the groundwork laid, and the bargaining council data collection complete, it would be interesting to see how results change when including other covariates such as exporter status, geographical location of the firm, age of the firm, among others. Furthermore, using this dataset in competition analysis would ultimately be beneficial.

Lastly, it would be of interest to keep the BCMWD up-to-date. The initial capturing of this data was a gigantic task, and one that should not have been taken in vain. By collecting further iterations of data, this will facilitate further research in the field, and hopefully prompt more researchers to unpack these areas of analysis.

6.4 FINAL REMARKS

If there is one thing that has become clear through the production of this thesis, it is that data is the most essential component required for rigorous policy evaluation. Most countries still struggle with access to good quality data, especially at a firm level, and South Africa is no different.

As South Africa continues to grapple with the legacy of problems left behind from Apartheid administration, this thesis would implore all researchers, policymakers, and government employees to do their utmost to share and provide access to good quality data – particularly firm-level data. This is a crucial first step in ensuring that all policies enacted from this point forth are rooted in a more rigorous and detailed understanding of the South African economy.

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[1] Department of Labour

Appendices

APPENDIX A: NUMBER OF FIRMS PER EMPLOYMENT BRACKET IN 1996 AND 2001

Table A1: Number of firms per employment bracket in 1996 and 2001

Number of employees	1996		2001		Net change (2001-1996)
	Number of firms	Percentage	Number of firms	Percentage	
40	20	8.85%	16	7.21%	-1.64%
41	15	6.64%	6	2.70%	-3.94%
42	10	4.42%	11	4.95%	0.53%
43	10	4.42%	10	4.50%	0.08%
44	9	3.98%	10	4.50%	0.52%
45	14	6.19%	13	5.86%	-0.33%
46	7	3.10%	9	4.05%	0.95%
47	8	3.54%	14	6.31%	2.77%
48	10	4.42%	17	7.66%	3.24%
49	8	3.54%	24	10.81%	7.27%
50	9	3.98%	18	8.11%	4.13%
51	13	5.75%	10	4.50%	-1.25%
52	11	4.87%	7	3.15%	-1.72%
53	8	3.54%	4	1.80%	-1.74%
54	13	5.75%	3	1.35%	-4.40%
55	11	4.87%	8	3.60%	-1.27%
56	7	3.10%	6	2.70%	-0.40%
57	15	6.64%	9	4.05%	-2.59%
58	11	4.87%	10	4.50%	-0.37%
59	9	3.98%	11	4.95%	0.97%
60	8	3.54%	6	2.7%	-0.84%
Total	226	100%	222	100%	

Note: Percentage is the number of firms for each employment bracket over the range 40-60, divided by the total number of firms between 40 and 60 employees. Number of firms is the raw number of firms in each employment bracket.

APPENDIX B: LIST OF CURRENT BARGAINING COUNCILS⁷⁶

Registered Private Sector Bargaining Councils

Amanzi Bargaining Council

Registered on 06/09/2012

Bargaining Council for the Building Industry (Bloemfontein)

Registered on 17/09/1934

Building Industry Bargaining Council (Kimberley)

Registered on 27/09/1945

Building Industry Bargaining Council (Southern and Eastern Cape)

Registered on 16/07/1937

Building Industry Bargaining Council (Cape of Good Hope)

Registered on 16/06/1944

Building Industry Bargaining Council (East London)

Registered on 15/10/1948

Building Bargaining Council (North and West Boland)

Registered on 13/04/1950

Bargaining Council for the Canvas Goods Industry (Witwatersrand and Pretoria)

Registered on 21/09/1921

National Bargaining Council for Clothing Manufacturing Industry

Registered on 07/08/2003

Bargaining Council for the Contract Cleaning Services Industry (KwaZulu-Natal)

Registered on 30/09/1992

Bargaining Council for the Civil Engineering Industry

Registered on 07/12/2012

National Bargaining Council for the Chemical Industry

Registered on 03/12/2001

The Bargaining Council for the Diamond Cutting Industry

Registered on 19/02/1960

National Bargaining Council for the Electrical Industry of South Africa

Registered on 15/12/1998

Bargaining Council for the Fishing Industry

Registered on 14/12/2001

Bargaining Council for the Food Retail, Restaurant, Catering & Allied Trades

Registered on 30/09/1941

Bargaining Council for the Restaurant, Catering and Allied Trades

Registered on 13/07/1936

Furniture Bargaining Council

Registered on 26/04/2006

⁷⁶ Accurate as of October 2018

Bargaining Council for the Furniture Manufacturing Industry of the Western Cape

Registered on 08/08/1958

Bargaining Council for the Furniture Manufacturing Industry of the Eastern Cape

Registered on 19/02/1959

Bargaining Council for the Furniture Manufacturing Industry of the South Western Districts

Registered on 23/02/1959

Bargaining Council for the Furniture Manufacturing Industry, KwaZulu-Natal

Registered on 03/06/1954

Bargaining Council for the Grain Industry

Registered on 27/03/1990

National Bargaining Council for the Hairdressing, Cosmetology, Beauty and Skincare Industry

Registered on 14/11/2013

Bargaining Council for the Laundry, Cleaning and Dyeing Industry (Cape)

Registered on 08/01/1946

Bargaining Council for the Laundry, Cleaning and Dyeing Industry (KwaZulu-Natal)

Registered on 03/03/1955

National Bargaining Council of the Leather Industry of South Africa

Registered on 19/08/1934

Bargaining Council for the Meat Trade, Gauteng

Registered on 01/04/1999

Metal and Engineering Industries Bargaining Council

Registered on 16/06/1947

Motor Industry Bargaining Council

Registered on 15/07/1952

Motor Ferry Industry Bargaining Council of South Africa

Registered on 28/05/2003

Bargaining Council for the New Tyre Manufacturing Industry

Registered on 19/08/1970

National Bargaining Council for the Road Freight and Logistics Industry (NBCRFLI)

Registered on 11/05/1953

South African Road Passenger Bargaining Council (SARPBAC)

Registered on 20/11/1998

National Bargaining Council for the Sugar Manufacturing and Refining Industry

Registered on 19/05/1947

National Textile Bargaining Council

Registered on 26/01/2004

Transnet Bargaining Council (National)

Registered on 02/10/1991

National Bargaining Council for the Wood and Paper Sector

Registered on 27/05/2005

National Bargaining Council for the Private Security Sector

Registered on 21/06/2018

Registered local government and government Bargaining Councils

Education Labour Relations Council

Registered on 14/10/1999

General Public Service Sectoral Bargaining Council

Registered on 28/07/1999

Public Health and Social Development Sectoral Bargaining Council

Registered 28/07/1999

Public Service Coordinating Bargaining Council

Registered 13/10/1997

Safety and Security Sectoral Bargaining Council

Registered on 28/07/1999

South African Local Government Bargaining Council

Registered on 01/03/2001

Registered statutory councils

Statutory Council for the Fast Food, Restaurant, Catering and Allied Trades (SCFFRCAT)

Registered on 14/12/2012

Statutory Council for the Squid and Related Fisheries of South Africa

Registered on 25/09/2007

Statutory Council of the Printing, Newspaper and Packaging Industry of South Africa

Registered on 01/06/2001

APPENDIX C: AVERAGE NOMINAL AND REAL WAGES PER SECTOR (2012-2017)

Figure C1: Nominal and real average minimum wages - Chemicals

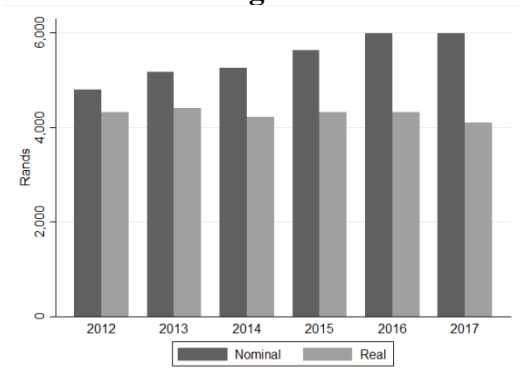


Figure C2: Nominal and real average minimum wages - Clothing

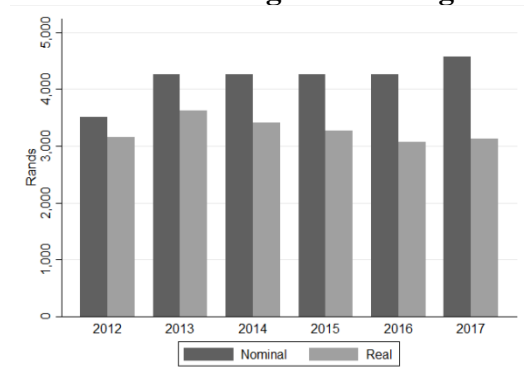


Figure C3: Nominal and real average minimum wages - Electrical

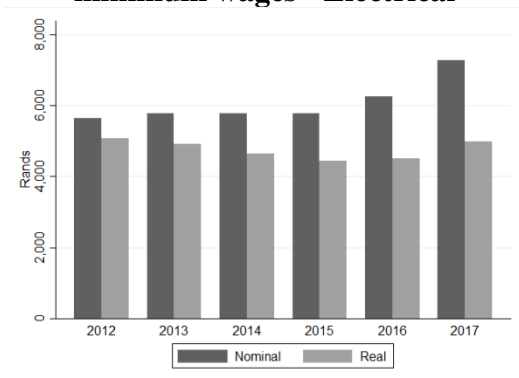


Figure C4: Nominal and real average minimum wages - Furniture

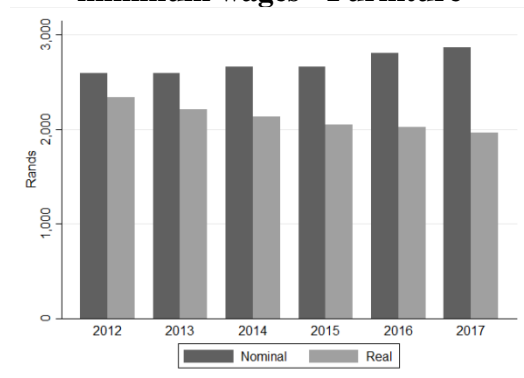


Figure C5: Nominal and real average minimum wages - Leather

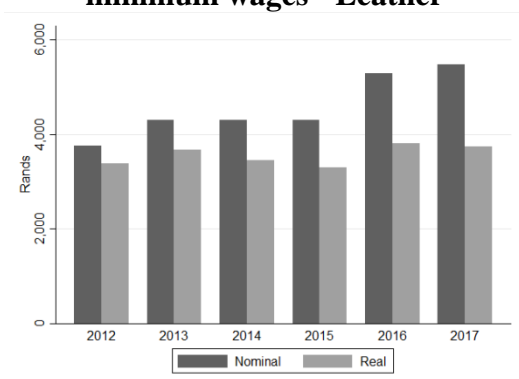


Figure C6: Nominal and real average minimum wages - Metals and Engineering

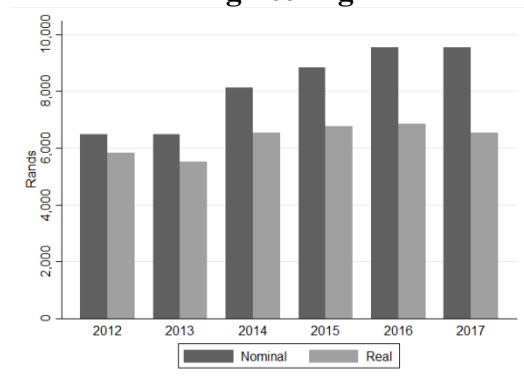


Figure C7: Nominal and real average minimum wages - Motor

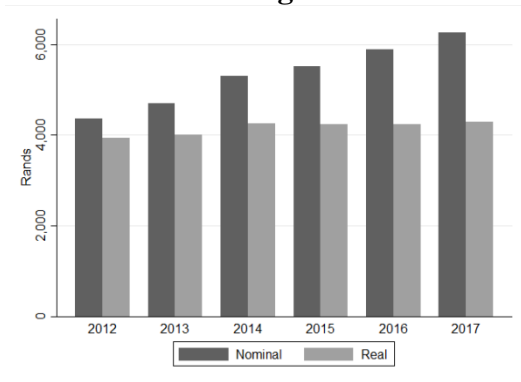


Figure C8: Nominal and real average minimum wages - Textiles

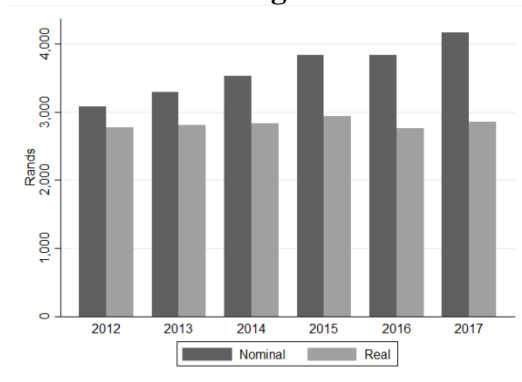
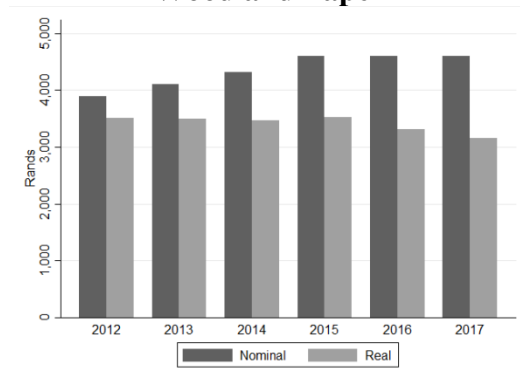


Figure C9: Nominal and real average minimum wages - Wood and Paper



APPENDIX D: DESCRIPTIVES BY FIRM SIZE

Figure D1: Real labour productivity growth (2005 to 2008) and 2005 labour productivity by firm size

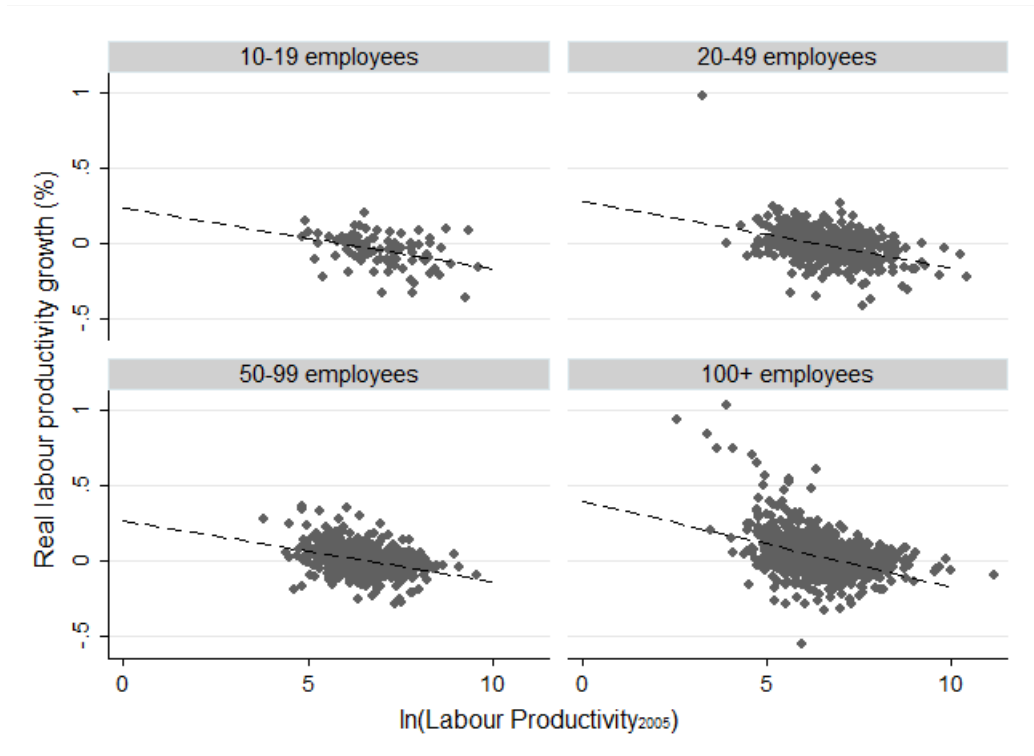


Figure D2: Real wage growth (2005 to 2008) and 2005 real wages by firm size

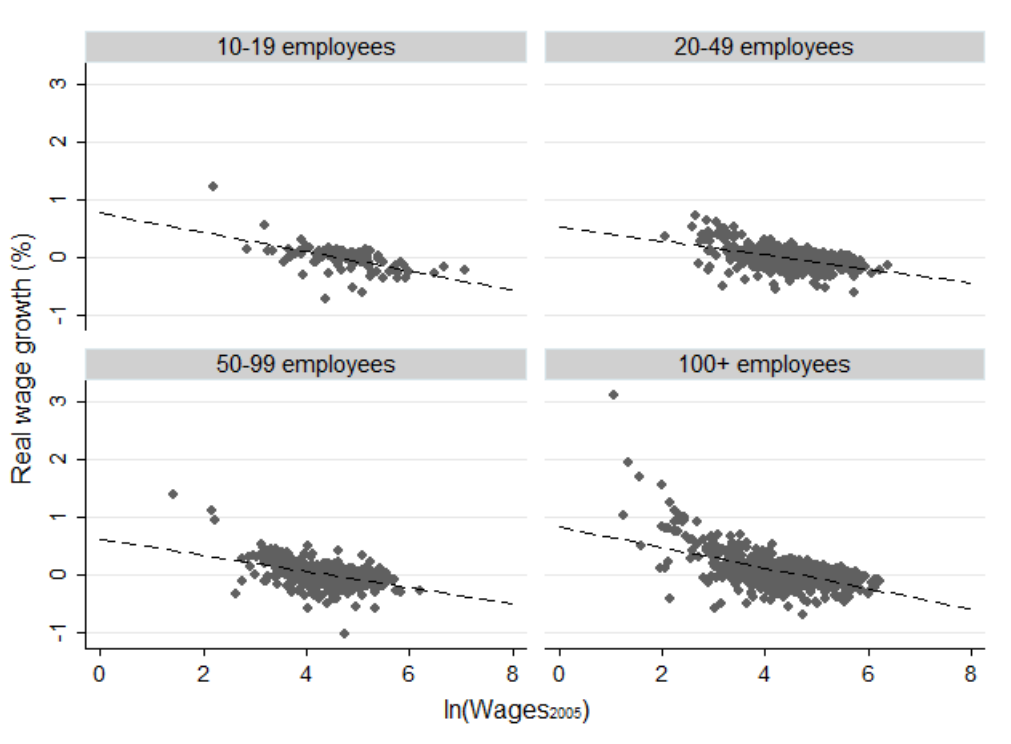
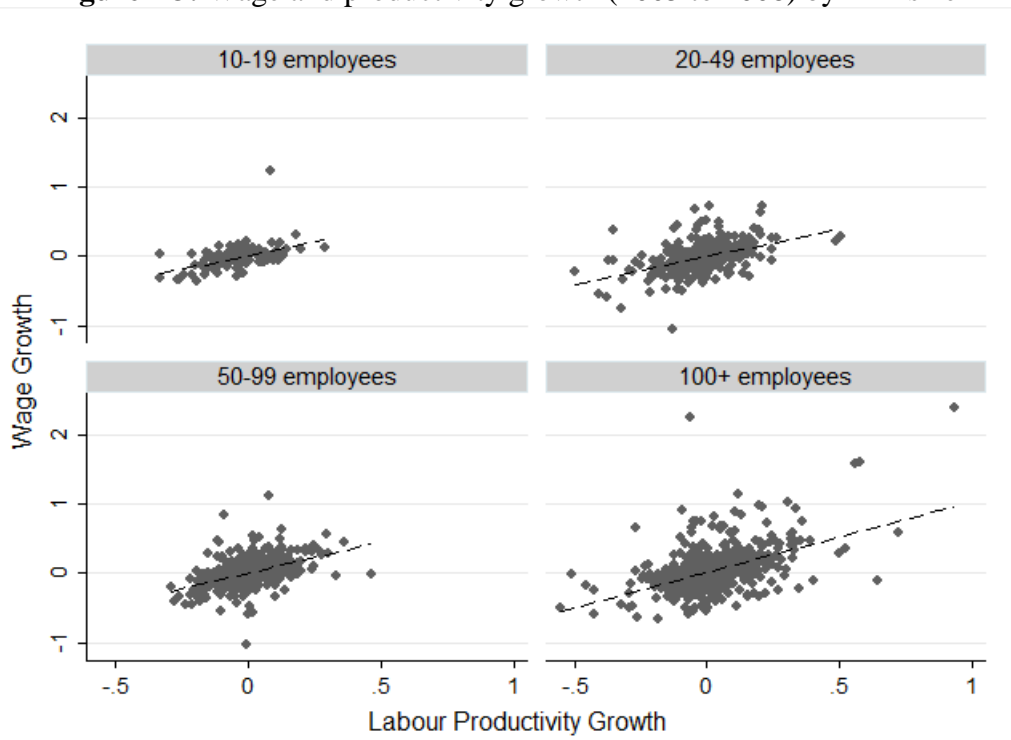


Figure D3: Wage and productivity growth (2005 to 2008) by firm size



APPENDIX E: ADDITIONAL FIRM LEVEL QUANTILE REGRESSIONS

Table E1: Quantile regressions with no interaction between firm size and BCA

Log of labour productivity	Quantile 0.1	Quantile 0.25	Quantile 0.5	Quantile 0.75	Quantile 0.9
BCA_t (0 omitted)					
BCA _t =1	0.352** (0.125)	0.408* (0.159)	0.447*** (0.0912)	0.690*** (0.161)	0.671*** (0.190)
Employment (10-19 omitted)					
20-49 Employees	0.0570 (0.0403)	0.0697 (0.0401)	0.0605 (0.0468)	-0.00926 (0.0834)	-0.197 (0.137)
50-99 Employees	0.206*** (0.0385)	0.124*** (0.0254)	0.0266 (0.0479)	-0.0422 (0.0816)	-0.252 (0.129)
100+ Employees	0.0829 (0.0460)	0.0239 (0.0310)	0.00830 (0.0469)	-0.0425 (0.0841)	-0.248 (0.133)
Ln(capital)	0.0818*** (0.00522)	0.0978*** (0.00457)	0.0950*** (0.00451)	0.0950*** (0.0108)	0.102*** (0.0161)
Ln(real wage)	0.948*** (0.0236)	0.810*** (0.0171)	0.724*** (0.0178)	0.657*** (0.0274)	0.619*** (0.0508)
Sector (Food is omitted)					
Beverages and tobacco	0.135 (0.0947)	0.201 (0.149)	0.0635 (0.0382)	0.524* (0.209)	0.549 (0.329)
Textiles	0.491* (0.203)	0.551*** (0.159)	0.506*** (0.0653)	0.754*** (0.116)	0.791*** (0.168)
Wearing apparel	0.442*** (0.128)	0.529*** (0.0766)	0.555*** (0.136)	0.563*** (0.133)	0.839** (0.284)
Leather	-0.203 (0.149)	-0.245*** (0.0688)	-0.304** (0.0989)	-0.381** (0.134)	-0.400* (0.161)
Footwear	0.274*** (0.0450)	0.370* (0.154)	0.354*** (0.0457)	0.571*** (0.129)	0.776*** (0.155)
Wood and wood products	-0.0987 (0.155)	-0.351*** (0.0638)	-0.629*** (0.125)	-0.593 (0.316)	-0.645 (0.558)
Paper and Paper Products	-1.442*** (0.407)	-0.654 (0.426)	-0.658*** (0.122)	-0.819*** (0.140)	-1.008*** (0.230)
Printing and recorded media	-0.326** (0.125)	-0.456** (0.158)	-0.583** (0.183)	-0.523 (0.392)	-0.419** (0.143)
Coke, petroleum and nuclear fuel	-0.506*** (0.0343)	-0.179 (0.181)	-0.261*** (0.0476)	0.0837 (0.340)	0.103 (0.352)
Basic chemicals	0.0514 (0.0560)	0.105 (0.151)	0.00848 (0.0207)	0.188 (0.129)	0.168 (0.173)
Other chemical products	-0.252* (0.125)	-0.317** (0.104)	-0.352*** (0.107)	-0.219 (0.191)	0.0558 (0.249)
Rubber products	0.182*** (0.0320)	-0.0780 (0.151)	-0.143*** (0.0290)	0.384 (0.498)	0.746 (0.842)
Plastic products	0.126 (0.129)	0.159 (0.149)	0.0725 (0.0456)	0.177 (0.130)	0.304 (0.180)
Glass and glass products	-0.207 (0.155)	-0.153 (0.0891)	-0.0896 (0.0995)	-0.213 (0.122)	-0.167 (0.167)

Non-metallic mineral products	0.0221 (0.0852)	-0.0180 (0.155)	-0.108* (0.0463)	0.00471 (0.155)	0.268 (0.281)
Non-ferrous metal products	-0.233* (0.118)	-0.197 (0.162)	-0.187* (0.0902)	-0.0756 (0.145)	-0.119 (0.170)
Basic iron and steel	0.00461 (0.0441)	0.0395 (0.162)	0.146* (0.0589)	0.376* (0.169)	0.346 (0.217)
Structural metal products	-0.206*** (0.0370)	0.0696 (0.155)	-0.0337 (0.0838)	0.234 (0.162)	0.426 (0.276)
Other metal products	0.203** (0.0749)	0.175 (0.177)	-0.00808 (0.0618)	0.148 (0.144)	-0.0565 (0.152)
Machinery and equipment	-0.0714 (0.0590)	-0.105 (0.150)	-0.248 (0.137)	-0.164 (0.131)	-0.227 (0.167)
Electrical machinery	0.0704 (0.219)	-0.000356 (0.153)	-0.152*** (0.0456)	-0.0771 (0.139)	-0.256 (0.134)
Radio, television and communication apparatus	-0.388** (0.124)	-0.447*** (0.0845)	-0.470** (0.178)	-0.250 (0.176)	0.00337 (0.383)
Professional equipment	-0.104 (0.148)	-0.0540 (0.207)	-0.116** (0.0392)	0.126 (0.164)	0.231 (0.180)
Motor vehicles, parts and accessories	0.288** (0.0879)	0.287 (0.184)	0.119 (0.0759)	0.367 (0.188)	0.329 (0.194)
Other transport equipment	-0.548** (0.175)	-0.494*** (0.0666)	-0.601*** (0.125)	-0.645*** (0.133)	-0.606* (0.262)
Furniture	-0.485 (0.618)	-0.582* (0.269)	-0.718*** (0.0965)	-0.808*** (0.242)	-0.319 (0.612)
Other manufacturing	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
Constant	0.497*** (0.104)	1.343*** (0.170)	2.164*** (0.0923)	2.748*** (0.179)	3.491*** (0.272)
Observations	7468	7468	7468	7468	7468

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.05$

*** $p < 0.001$

Table E2: Quantile regressions without firm size as an independent variable

Log of labour productivity	Quantile 0.1	Quantile 0.25	Quantile 0.5	Quantile 0.75	Quantile 0.9
BCA_t (0 omitted)					
BCA _t =1	0.361***	0.420**	0.486***	0.704***	0.615**
	-0.0624	-0.157	-0.0884	-0.178	-0.214
Ln(capital)	0.0899***	0.100***	0.0932***	0.0905***	0.0858***
	-0.00701	-0.00479	-0.00434	-0.0101	-0.0165
Ln(real wage)	0.913***	0.811***	0.719***	0.661***	0.638***
	-0.0135	-0.0209	-0.0183	-0.0304	-0.0545
Sector (Food is omitted)					
Beverages and tobacco	0.189	0.145	0.0923	0.547*	0.59
	-0.248	-0.14	-0.0542	-0.227	-0.381
Textiles	0.549**	0.494**	0.505***	0.779***	0.868**
	-0.191	-0.169	-0.0554	-0.129	-0.312
Wearing apparel	0.449***	0.545***	0.516***	0.569***	0.920*
	-0.09	-0.104	-0.138	-0.132	-0.378
Leather	-0.181	-0.249**	-0.325***	-0.403**	-0.359**
	-0.118	-0.0858	-0.0898	-0.145	-0.13
Footwear	0.270***	0.380**	0.380***	0.571***	0.718***
	-0.0746	-0.141	-0.0522	-0.141	-0.195
Wood and wood products	-0.101	-0.353***	-0.668***	-0.611	-0.721
	-0.153	-0.0877	-0.101	-0.349	-0.497
Paper and Paper Products	-1.502***	-0.663	-0.678***	-0.823***	-1.006***
	-0.339	-0.463	-0.114	-0.16	-0.17
Printing and recorded media	-0.195	-0.482***	-0.565**	-0.526	-0.434**
	-0.129	-0.142	-0.175	-0.458	-0.143
Coke, petroleum and nuclear fuel	-0.510***	-0.158	-0.218***	0.0811	0.174
	-0.0438	-0.224	-0.0588	-0.332	-0.36
Basic chemicals	0.107	0.126	0.0402	0.185	0.11
	-0.0957	-0.143	-0.0328	-0.139	-0.213
Other chemical products	-0.221*	-0.315*	-0.366***	-0.224	0.0794
	-0.0989	-0.135	-0.103	-0.198	-0.257
Rubber products	0.160***	-0.0685	-0.101*	0.373	0.648
	-0.0344	-0.152	-0.0401	-0.503	-0.875
Plastic products	0.192	0.168	0.0785	0.174	0.257
	-0.113	-0.141	-0.0439	-0.138	-0.199
Glass and glass products	-0.172	-0.132	-0.113	-0.227	-0.135
	-0.155	-0.108	-0.0958	-0.136	-0.166
Non-metallic mineral products	0.0303	-0.0603	-0.0703	0.0262	0.246
	-0.0277	-0.144	-0.0476	-0.159	-0.347
Non-ferrous metal products	-0.268	-0.198	-0.147	-0.0751	-0.172
	-0.144	-0.149	-0.0994	-0.156	-0.234
Basic iron and steel	0.0108	0.0401	0.181***	0.394*	0.442
	-0.0386	-0.153	-0.0481	-0.184	-0.249

Structural metal products	-0.0768*	0.0801	-0.0138	0.245	0.4
	-0.0301	-0.17	-0.0707	-0.166	-0.234
Other metal products	0.216	0.163	0.0351	0.156	-0.0709
	-0.114	-0.148	-0.0486	-0.147	-0.203
Machinery and equipment	-0.139***	-0.161	-0.238	-0.144	-0.227
	-0.0333	-0.141	-0.136	-0.15	-0.238
Electrical machinery	0.139	0.00974	-0.125*	-0.0783	-0.325
	-0.0847	-0.156	-0.0615	-0.148	-0.194
Radio, television and communication apparatus	-0.341***	-0.457***	-0.480**	-0.273	-0.00477
	-0.0723	-0.107	-0.176	-0.183	-0.407
Professional equipment	-0.0177	-0.0467	-0.0771	0.121	0.173
	-0.213	-0.219	-0.0479	-0.18	-0.242
Motor vehicles, parts and accessories	0.311***	0.281	0.160*	0.362	0.273
	-0.0281	-0.193	-0.0628	-0.191	-0.259
Other transport equipment	-0.445***	-0.523***	-0.640***	-0.672***	-0.584*
	-0.0874	-0.0788	-0.111	-0.145	-0.274
Furniture	-0.46	-0.634*	-0.776***	-0.799***	-0.336
	-0.844	-0.248	-0.0867	-0.24	-0.574
Other manufacturing	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)
Constant	0.665***	1.387***	2.208***	2.732***	3.360***
	-0.0533	-0.171	-0.0877	-0.185	-0.305
Observations	7468	7468	7468	7468	7468

Note: Standard errors are given in parentheses

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$