Continuity and Change: shifts and continuities in South African regulation of Labor Market since 1994 and the comparative analysis of the impact of selected labor market policies on employment.

How has the Employment Equity Act of 1998 impacted on employment strategies of firms?

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Contents

1. Introduction

1.1 Background

After the fall of apartheid in 1994, the legislative and regulatory environment of the South African labour market was radically transformed, with a key focus of 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 (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. These cost, however, are presumably more burdensome for smaller firms and firms that are trying to compete in the global market (Rankin, 2006).

This paper aims to explore the shifts in labour market regulation and legislation in South Africa from 1994 onwards, and will investigate the impact of one particular labour market policy – that of the Employment Equity Act of 1998 – on employment and production strategies of South African firms.

The paper provides an empirical investigation of firm responses to changes in labour market regulation. 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.

1.2 Core research question

What is the impact of the Employment Equity Act of 1998 on firm dynamics for firms that fall just around the policy threshold of 50 employees?

1.3 Research objectives

This paper will investigate the impact of the Employment Equity Act on firm dynamics for firms that fall just around the policy threshold of 50 employees. This investigation will be conducted using a Regression Discontinuity Design (RDD) in order to fully understand the effects this size dependent regulation has had on South African firms.

2. Literature review

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 (RDP[1]) 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 modernize the existing labour regulations to become more inclusive, especially since under the apartheid regime, many rights of workers that were not white were ignored. The second was the role which organized 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 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 acts[2] that were 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

[1] The Reconstruction and Development Plan (RDP) of 1994 was the first major policy plan of South Africa 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.
[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.

Arbitration (CCMA). This act covered all workers apart from those employed by the South African defense force, secret services, and essential services[3].

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 defense 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 excess of 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.

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

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 the international standards (Black & Rankin, 1998). Since this paper has its primary focus on the Employment Equity Act of 1998, it is imperative that more detail is given surrounding this particular policy.

[3]Almost twenty 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).

2.2 The Employment Equity Act of 1998

The Employment Equity Act was enacted by President Nelson Mandela, and the Parliament of South Africa in 1998. The act recognized 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 paper is primarily concerned with the aspects that deal with designated employers[4] and designated employees[5], which mainly appears in Chapter 3 of the act – 'Affirmative Action'.

Affirmative action measures are those that 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;

[4] A designated employer refers to an employer that employees 50 or more employees. May also be referred to as a 'designated firm'.
[5] 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'.

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;
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 endeavors.

The rationale of introducing the EEA in South Africa was to enforce transformation on the basis that organizations would not empower sufficient numbers of Black employees of their own free will (Leonard & Grobler, 2006). Leonard & Grobler (2006) go on further 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 prevailing 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 nature[6], and has often relied on a

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

survey-type basis in which the researcher utilizes various techniques in order to draw meaning from open-ended questions posed to the subjects. When research surrounding the EEA has been more quantitative, it has been focused on the upper echelons of employment, namely the executive and management positions within firms – work that is clearly not representative of the greater population of South Africa, and often criticized by South African labour unions as being "pointless" and "meaningless" within the context of true transformation. This paper 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 the population of South Africa.

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 paper will move on to discuss threshold policies, their impact on firms, and methodologies for their investigation.

2.3 Threshold Effects 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 face. 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 paper, the threshold effect being investigated is that of compliance with the Employment Equity Act which applies to firms with 50 or more employees.

Table 1: Divisions among small, and medium enterprises as defined by the National Small Business Act

Enterprise Size	Number of Employees	Annual Turnover (in South African rands)	Gross Assets, excluding fixed property
Medium	Fewer than 100 to 200. Industry dependent.	Less than R4 million to R50 million. Industry dependent.	Less than R2 million to R18 million. Industry dependent.
Small	Fewer than 50.	Less than R2 million to R25 million. Industry dependent.	Less than R2 million to R4.5 million. Industry dependent.
Very Small	Fewer than 10 to 20. Industry dependent.	Less than R200 000 to R500 000. Industry dependent.	Less than R150 000 to R500 000. Industry dependent.
Micro	Fewer than 5.	Less than R150 000.	Less than R100 000.

Source: The National Small Business Act 102 of 1996

As the preceding table shows, consideration of firms around the 50 employee threshold implies that the act could directly affects firms that can be considered small, medium enterprises (SMEs), and that the EEA is not a policy that is 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 South African economy.

Bearing in mind the afore mentioned divisions, it is important to ascertain what proportion of the South African business environment these divisions represent. The following table obtained from Wittenberg, Arrow and Kerr (2013), is based on figures gathered from the Quarterly Employment Survey of Statistics South Africa. The table shows the composition of the business sector in accordance with how many employees a firm had.

Table 2: Composition of the business sector in accordance with the number of individuals employed

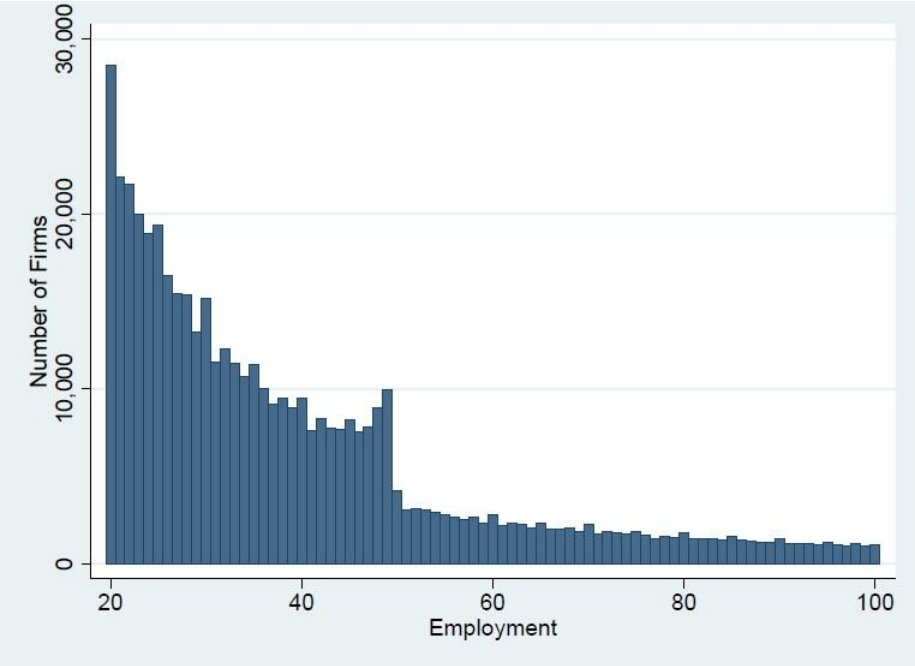
	Waves		
Size Category Proportions	Wave 1	Wave 2	Wave 3
1-19	0.395	0.324	0.295
20-49	0.207	0.201	0.207
50-99	0.150	0.171	0.176
100-249	0.141	0.161	0.171
250-499	0.055	0.074	0.078
500-999	0.027	0.037	0.038
1000-2499	0.014	0.019	0.022
2500-4999	0.006	0.007	0.008
5000+	0.005	0.006	0.005
Total	1	1	1

Source: Wittenberg, Arrow & Kerr (2013)

All the waves shown in the preceding table highlight the fact that firms employing 20-49, or 50-99 employees account for on average, 36% of the business sector - these are firms that could directly encounter the threshold effects of the EEA. This fact highlights the placement of the EEA with regard to the current labour market structure in South Africa.

Almeida & Carneiro (2008) studied the effects of labour regulation in Brazil; utilizing data on employment, output, capital, and regulations at specific levels, it was established that labour regulation constrains firm size. Almeida & Carneiro (2008) went on further to state 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) which 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 (as shown in figure 1 below), with a large contingent of firms having exactly 49 employees in order to avoid tighter regulation. The paper went on further 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.

Figure 1: Distribution of French firm employment



Source: Gourio & Roys (2012)

Ramaswamy (2013) further solidifies the idea that threshold effects can be a hindrance to firm size by claiming that there is a "missing middle[7]" 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 intensity, which supports the proposition that firms utilize 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.

[7] 'Middle' is in reference to medium-sized firms.

As stated before, 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 paper will attempt to fill a vital gap in the literature by unpacking potential threshold effects of the Employment Equity Act, and seeing how South African firms respond.

3. Hypothesis

This paper hypothesizes that there will be a noticeable decrease in firms with employment numbers just above the 50 employee threshold, and an increase in the number of firms with employment numbers just below the threshold after the Employment Equity Act was passed.

It is hypothesized that firms will adjust their mix of inputs in the production process by substituting capital for labour. Especially, it would be anticipated that firms will try to move just below the 50 employee threshold by reducing its workforce. Consequently, it would expected that firms would employ higher capital expenditure, higher labour productivity and average wages to increase for firms below the 50 employee threshold compared to firms just above the 50 employee threshold, especially for firms that moved from above the 50 employee threshold to below the 50 employee threshold

4. Data and methodology

4.1 Data

This paper will make use of one primary dataset. This dataset is 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 paper has matched firms from the 1996 census to the 2001 LSS according to firm identification numbers – as a result, 1471 firms were matched. The dataset captures variables such an 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.

4.2 Methodology

This paper will employ a Regression Discontinuity Design (RDD), and descriptive statistics as its primary methodologies for analysis.

4.2.1 Descriptive approach

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

4.2.2 Regression Discontinuity Design

This paper makes use of a sharp regression discontinuity design Utilization of the RDD methodology allows for the causal effects of interventions by assigning a cutoff or threshold above or below which an intervention is assigned to be elicited. By comparing observations on either side of this threshold, it is possible to estimate the local average treatment effect (LATE).

In this paper, the intervention that is considered is that of the introduction of the Employment Equity Act; as a result, the threshold that will be utilized is that of 50 employees; furthermore, the running variable in question will always be employment.

This paper 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 paper 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 paper uses 50 employees as the policy threshold, this paper 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 threshold.

4.2.2.1 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 and 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:

$$Y_i = \alpha + \beta_1 X_i + \beta_2 X_i^2 + ... + \beta_p X_i^p$$
$$= \gamma d_i + \delta_1 d_i X_i + \delta_2 d_i X_i^2 + ... + \delta_p d_i X_i^p, \qquad \textbf{(1)}$$

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

Following the argument of Gelman & Imbens (2014), higher order polynomial regression models were avoided – instead, the paper begins by overfitting the model with more polynomial and interaction terms than deemed necessary, then eliminating insignificant orders (moving from higher order to lower order). After proceeding in this fashion, it was established that a second-degree polynomial provided the best fit for the available data. These results are also supported by descriptive graphs.

4.2.2.2 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 a complement, rather than a substitute for parametric estimation (Lee & Lemieux, 2009). It is for this reason that the non-parametric approach is also utilized by this paper.

As mentioned above, this paper 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):

$$I = (y^+ - y^-)/(s^+ - s^-), \qquad \textbf{(2)}$$

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[8].

After testing for optimal bandwidth according to the proposals of Imbens & Kalyanaraman (2009) for each outcome variable under consideration, it emerged that a bandwidth of five units[9] is optimal. This approach is designed to minimize mean squared error (MSE) in a sharp RD design.

5. The Response to EEA – Analysis of 1996/2001 data.

This section of the paper will deal exclusively with the LSS 96/01 sample, and will utilize descriptive methods as well as a regression discontinuity design 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 had managed to adjust to the threshold effects that were imposed by the act, before the act was passed. Figure 1 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.

[8] This paper treats the RD design as strict, as a result $s^+=1$, and $s^-=0$.
[9] This implies five employees above and below the 50 employee assignment threshold.

Figure 1: Number of firms per employment bracket in 1996, and 2001

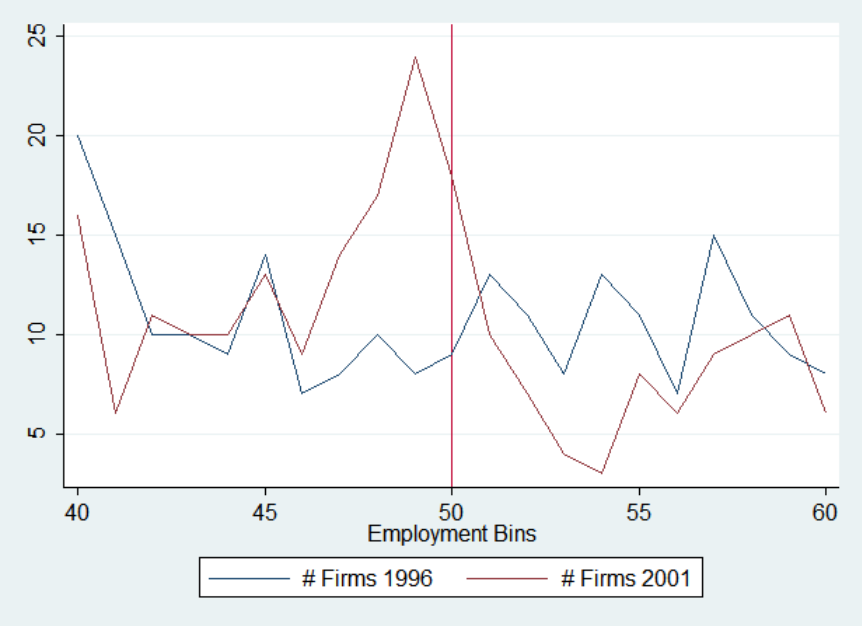


Table 3 illustrates the preceding graph in numerical terms. There is an obvious increase in the number of firms falling below the 50 employee threshold, and a clear decrease in firm numbers above the threshold. As expected, the employment bracket showing the greatest increase is that of 49 employees – 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.

Table 3: Number of firms per employment bracket in 1996, and 2001

	1996		2001		
Number of employees	**Number of firms**	**Percentage**	**Number of firms**	**Percentage**	**Net change (2001-1996)**
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.

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, electricity expenditure, 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 summarized in table 4.

Table 4: 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 values)	Average level for firms with 50-60 employees (1996 values)	Average level for firms with 40-49 employees (2001 values)	Average level for firms with 50-60 employees (2001 values)	Average change for firms with 40-49 employees (2001 – 1996)	Average change for firms with 50-60 employees (2001 – 1996)
Capital Expenditure on new assets	265.4681	216.7538	309.977	230.3706	54.211256	-5.7424328
Asset Value	1212.596	1305.6	1528.055	1787.88	360.72127	417.1754
Labour Productivity	5.111052	5.193901	5.174962	5.281476	.08063195	.19788532
Output	9816.191	11492.62	11905.52	13976.99	2867.2637	2752.082
Average wages per employee	42.21912	43.19852	44.41662	44.45528	1.9614941	3.0425716

Note: All figures quoted in 1996 Rands.

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).

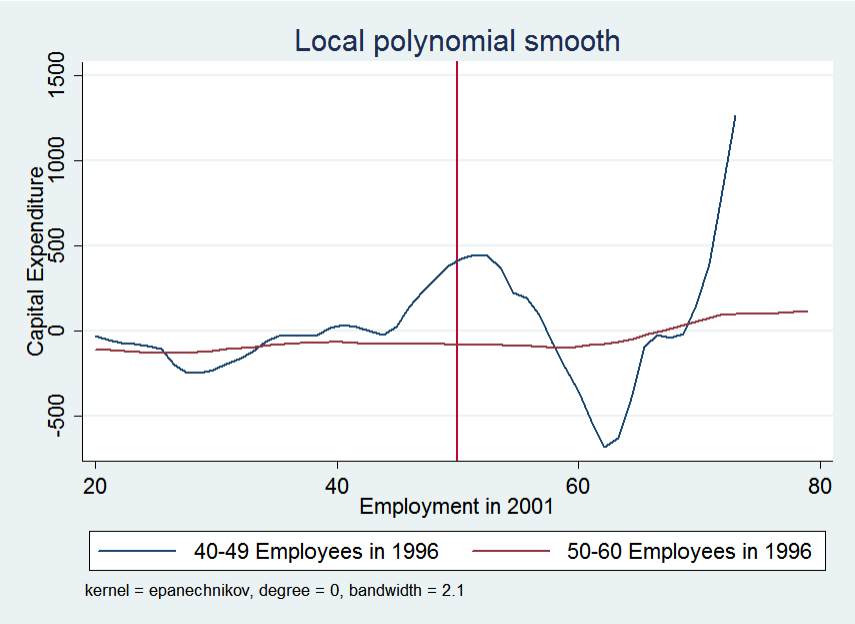
The first figure to stand out is that of the average change on capital expenditure on new assets for firms with 40-49 employees. This figure stands at an average of R54211, which elicits the idea that these firms are becoming more capital intensive in order to avoid hiring of additional labour. Consequently, their 50-60 employee counterparts showed a negative average difference of R5742, showing a slowdown in capital expansion.

Both groups of firms showed growth in terms of output, both of which came close to the R2800000 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 1. It can be

concluded that the capital expenditure on new assets was the driving force behind not only maintaining output, but increasing it.

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 differences[10] that occurred for firms that fell within the 40-60 employee bracket in 1996 for all of the afore mentioned variables, plotted against employment in 2001.

Figure 2: 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

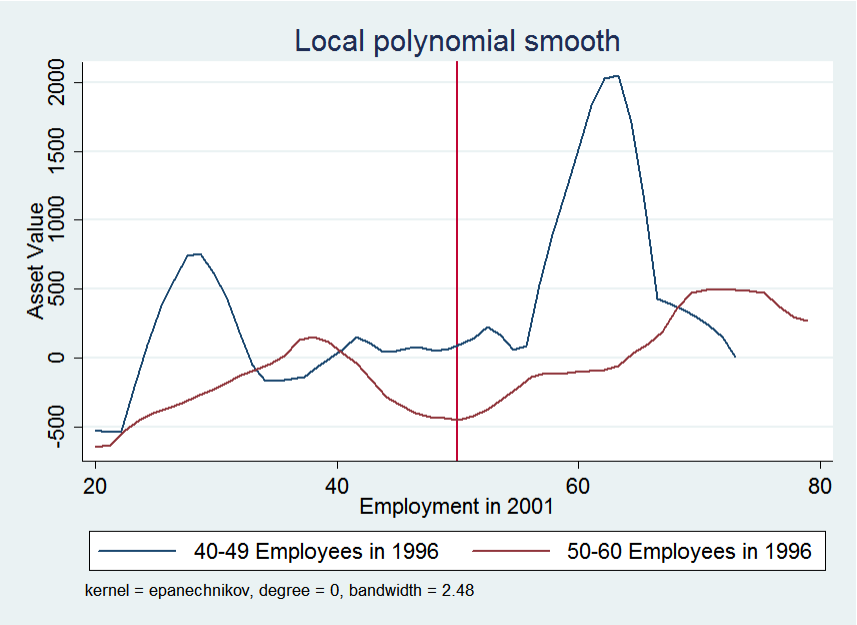


The first major finding to emanate from figure 2 is that capital expenditure on new assets for firms that were below the threshold in 1996 outstrips that of firms that were above the threshold in 1996, when looking at the 50 employee mark in 2001. This prompts the idea that these firms were intent on keeping employment levels below the threshold, and instead substituting away from labour towards capital. Furthermore, firms that were below the threshold in 1996 and 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

[10] All average differences were calculated as the mean of the 2001 value less the 1996 value.

consequently started spending less on capital expansion. However, it is not only the capital expenditure on new assets that is of interest to this paper, hence the following graph will illustrate the average difference in asset values for firms that were above and below the threshold in 1996.

Figure 3: 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.

Figure 4: Average difference in average wages per employee of firms above and below the 50 employee threshold in 1996, in terms of 2001 employment

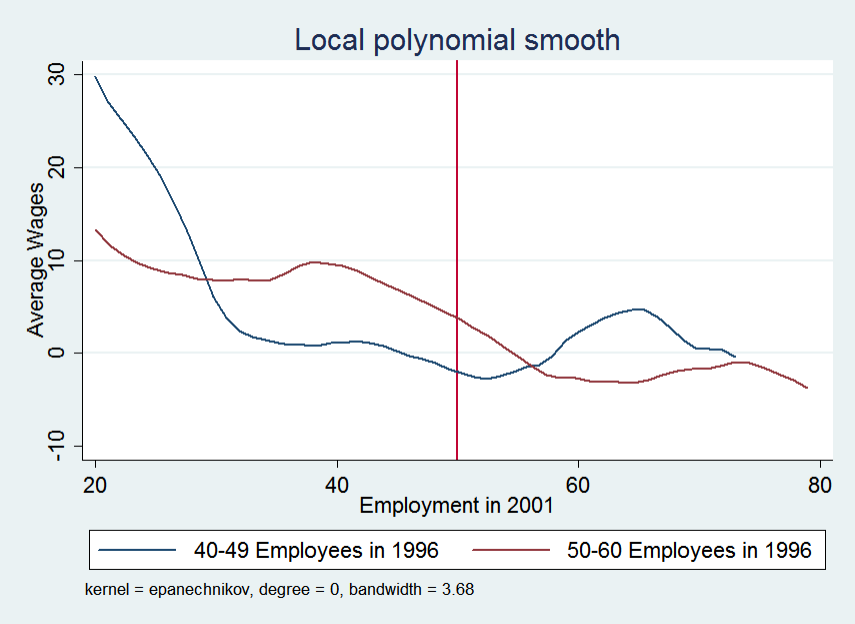
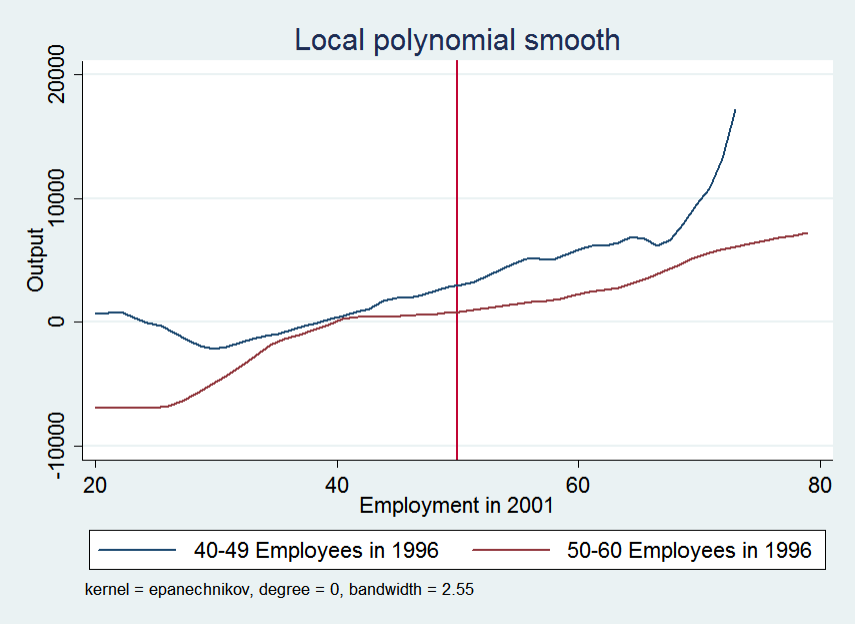


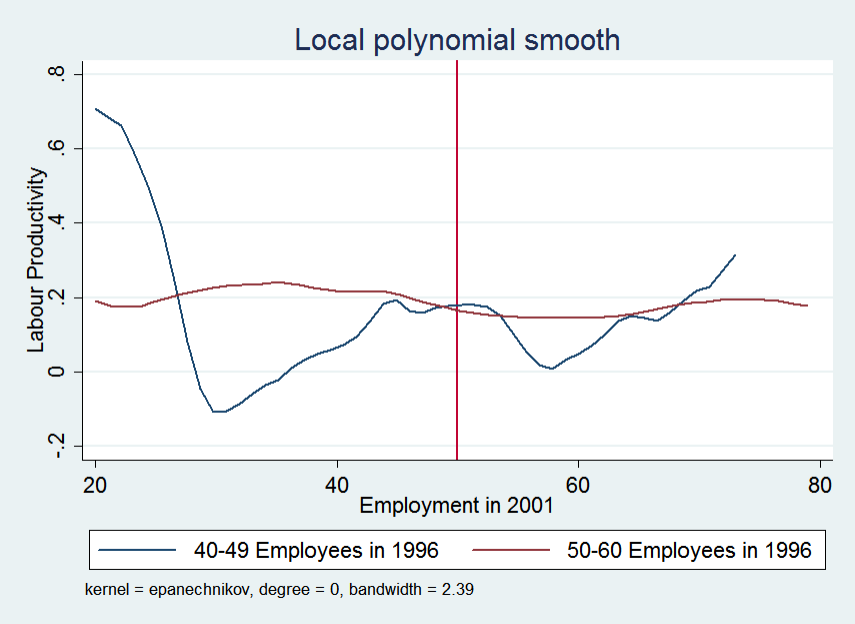
Figure 4 shows the average difference in average wages per employee; it is easily recognizable that firms that were above the threshold in 1996, and subsequently below in 2001 had a higher average difference in wages than those that had remained below the threshold. This is indicative of firms choosing to pay higher wages in order to retain skilled, and efficient labour in order 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 5: 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 5 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, showed a positive average difference, showing 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 6: 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 4. 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 paper 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, electricity expenditure, output, capital expenditure on new assets, asset value, and labour productivity for firms falling either just above the threshold, or just below it.

Table 5: Mean characteristics of firms above/below 50 employee threshold in 1996

	45-49 employees (R '000)	50-55 employees (R '000)			
	Mean	**Mean**	**Bartlett's statistic**	**t-stat**	**Pr(|T|>|t|)**
Asset value	1212.596	1305.6	0.342	-0.7901	0.4312
Capital Expenditure On New Assets	265.4681	216.7538	0.302	0.0371	0.9705
Output	9816.191	11492.62	0.169	-1.0985	0.2744
Average Wages	42.21912	43.19852	0.923	-0.2493	0.8036
Labour Productivity	5.111052	5.193901	0.238	-0.6565	0.5129

Table 6: Mean characteristics of firms above/below 50 employee threshold in 1996

	40-49 employees (R '000)	50-60 employees (R '000)			
	Mean	**Mean**	**Bartlett's statistic**	**t-stat**	**Pr(|T|>|t|)**
Asset value	1167.333	1370.704	0.551	-0.9300	0.3534
Capital Expenditure On New Assets	255.7658	236.113	0.126	0.8917	0.3743
Output	9038.261	11224.9	0.804	-2.3783	0.0182
Average Wages	42.45513	41.41271	0.856	0.3794	0.7048
Labour Productivity	5.09433	5.083591	0.942	0.1181	0.9061

Via basic inspection 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 – in order to establish the condition of equal variances, Bartlett's statistic was generated (as shown in the preceding table).

As it has been shown in the table 5 and table 6, Bartlett's statistic for each of the variables of concern is greater than 0.05[11] [12], thus we may not reject the null hypothesis of equal variance, and consequently accept that each sample exhibits equal variance. Since the condition of equal variance is met, it is acceptable to continue to use the t-test.

As the Student's t-test reveals in table 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 paper may continue on to use them within the intended RDD analysis[13].

5.1 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; due to this similarity, this allows the paper to proceed with its parametric analysis of the impact that the EEA may have had on firms in 2001.

Table 7 below illustrates the results of estimating equation **(1)** 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 60 employees in 1996.

[11] Note: Log transformations were applied to capital expenditure on new assets in table 5 in order to satisfy Bartlett's condition.
[12] Note: Log transformations were applied to capital expenditure on new assets, and output in table 6 in order to satisfy Bartlett's condition.
[13] As it is seen in table 6, 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 regression discontinuity may also make use of the band of 40-49, and 50-60 employees.

Table 7: Mean characteristics of firms above/below 50 employee threshold in 1996

	Linear	Quadratic
Capital Expenditure		
γ	3.970177	-277.9208***
	(6.133528)	(18.06684)
Constant	-.6909828	60.26668***
	(1.791633)	(16.1159)
Asset Value		
γ	-.8990428	-111.7181***
	(2.9348)	(17.46655)
Constant	7.240641***	17.31153
	(.5902529)	(12.09094)
Output		
γ	3.341027	-104.6331***
	(2.198607)	(30.47717)
Constant	8.565286***	51.05368
	(1.405755)	(29.97031)
Average Wages		
γ	.8672872	-43.66616**
	(1.084828)	(16.57485)
Constant	4.485758***	32.88657**
	(1.033475)	(11.72359)
Labour Productivity		
γ	2.50211*	-48.12117**
	(1.203754)	(20.51556)
Constant	5.155515***	26.42106*
	(.9753015)	(13.74828)

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

The most noticeable result is that all 5 regressions in the second-degree polynomial exhibit impacts that are significant at, at least the 5% level. 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. However, when considering the estimation of the polynomial regression in the first-degree, it is apparent

that none of the treatment effects (except on labour productivity) show any form of significance; furthermore, these coefficients are also positive (except for the coefficient on asset value), which is the complete opposite of what is offered up by the quadratic model. This is not too concerning as these coefficients do not exhibit any reasonable significance, and are thus not all that useful. However, irrespective of the fact that the linear coefficient estimates are not significant, a non-parametric approach will be utilized in the following section in order to follow the suggestion of (Lee & Lemieux, 2009) whereby non-parametric estimation should complement parametric RD design.

These results of the preceding parametric analysis are depicted graphically in figures 7 through 11 in order to further illustrate the prevailing discontinuity.

Figure 7: Parametric RDD of the log of Capital Expenditure in 2001

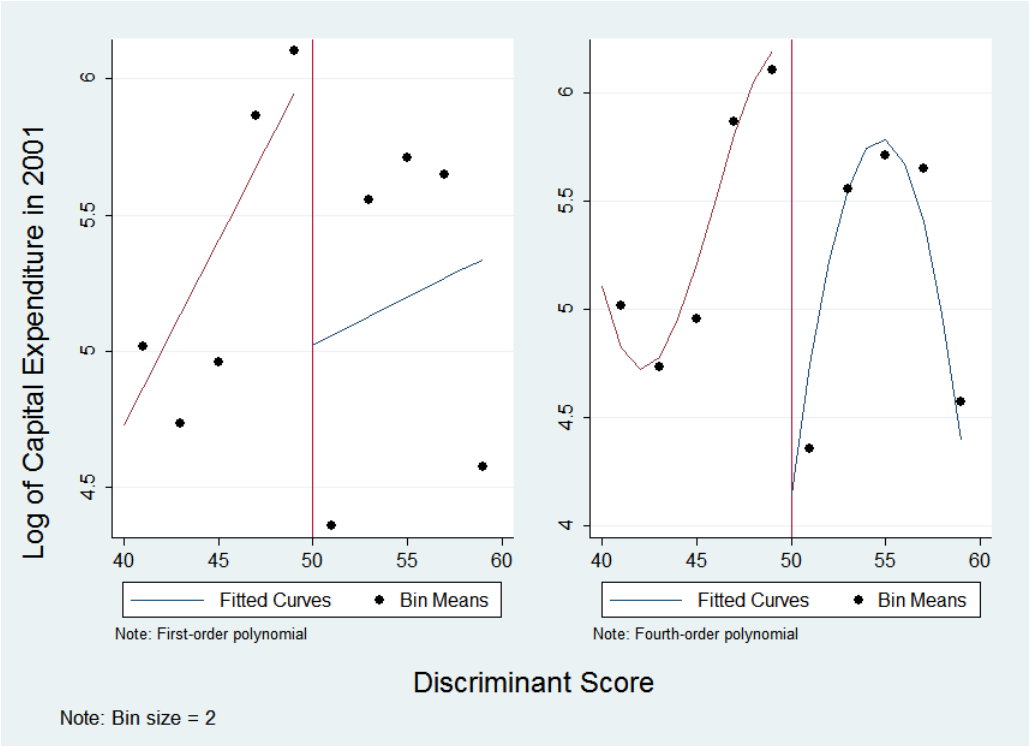


Figure 8: Parametric RDD of the log of Asset Value in 2001

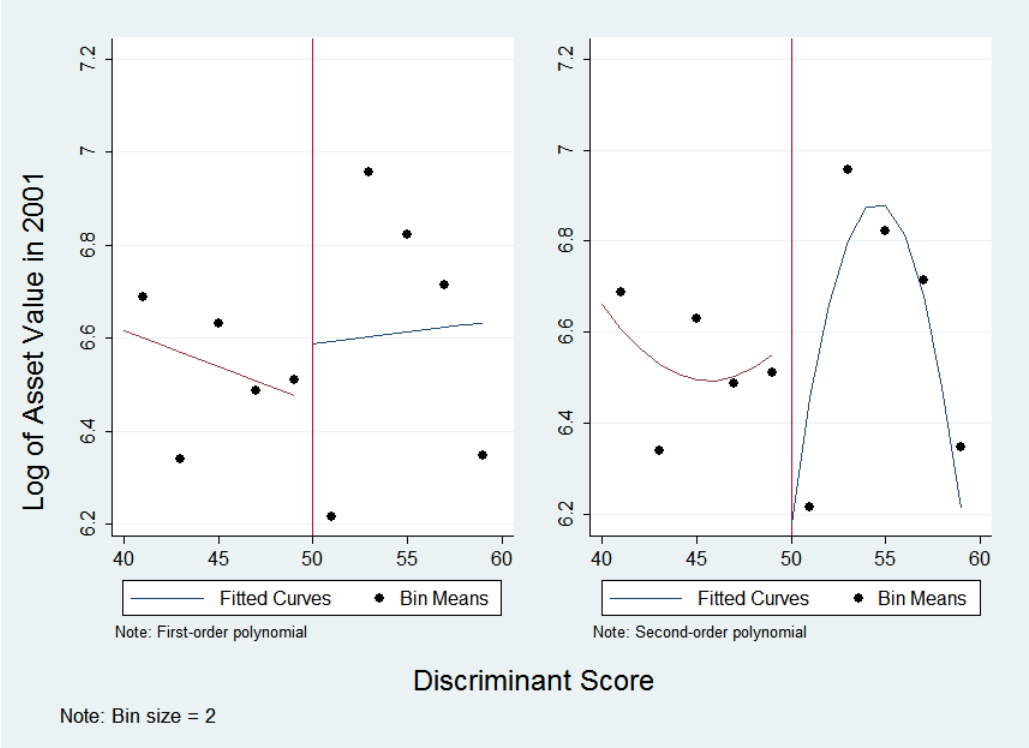


Figure 9: Parametric RDD of the log of Output in 2001

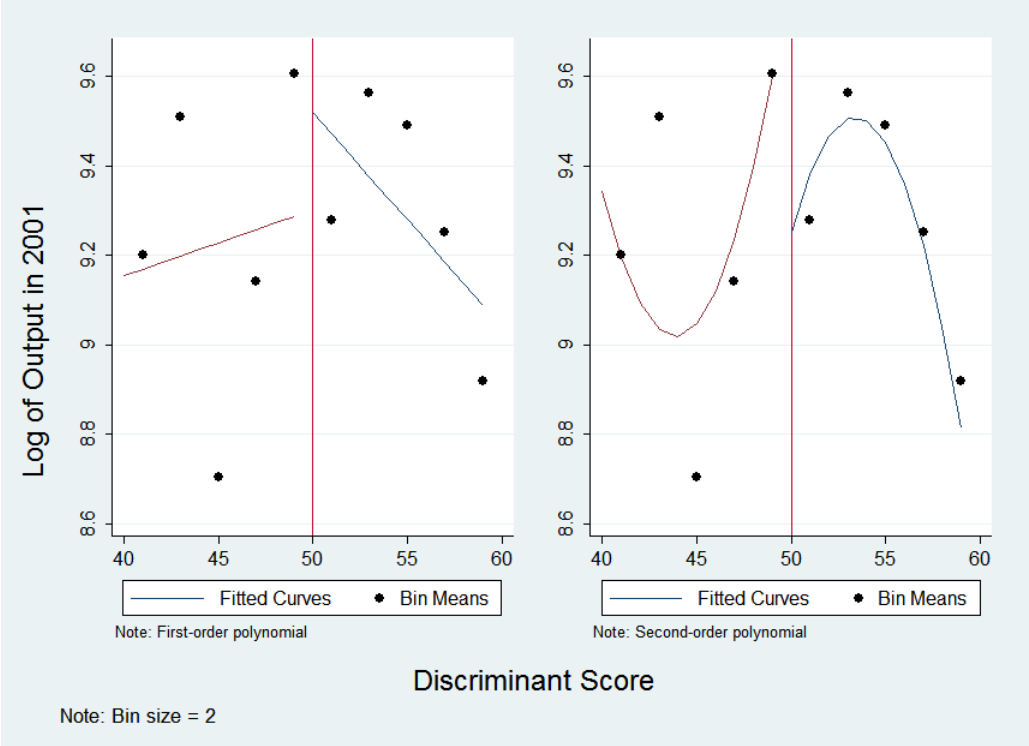


Figure 10: Parametric RDD of the log of Average Wage in 2001

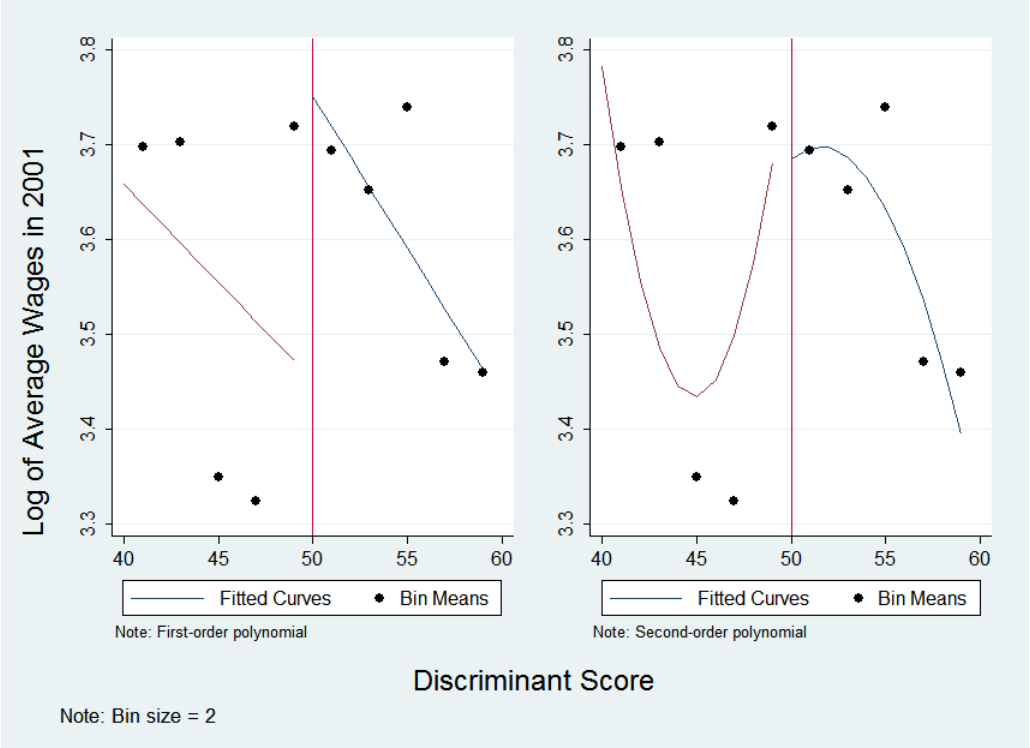
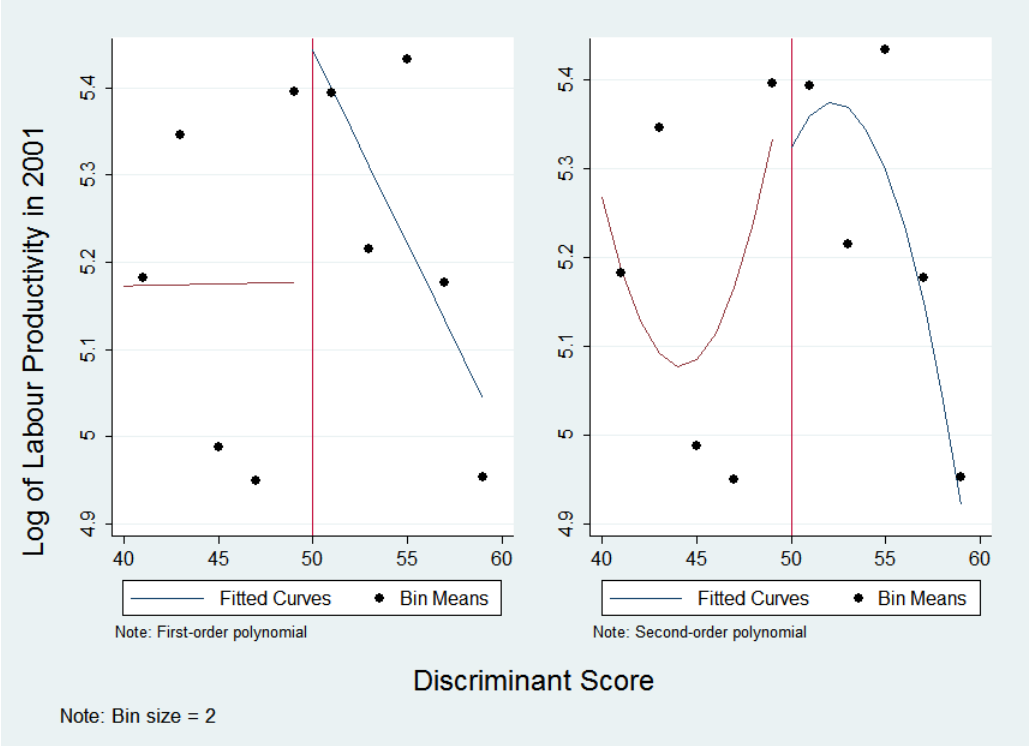


Figure 11: Parametric RDD of the log of Labour Productivity in 2001



5.2 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 utilization of a non-parametric approach is heavily useful in this paper, especially since there were conflicting results in the parametric analysis when comparing first-degree and second-degree results. The ultimate benefit of the non-parametric approach is that it no functional form is assumed, 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)**, 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 8: Strict regression discontinuity design results of various outcome variables

	Observed	Bias	Std. Error	t-stat
Employment	-5.914425	.0342483	6.058983	-.97614168
Output	-755.6215	-583.6873	3037.546	-.24876054
Asset Value	-666.7376*	-66.81001	532.7327	-1.2815426
Capital Expenditure	-476.5906***	-11.8256	198.0553	-2.4063516
Average Wages	1.007074	-.5762075	6.5723	.15322999
Labour Productivity	.1229248	-.0178253	.1577116	.77942786
Δ Employment	-11.16147**	-.0181452	6.035587	-1.8492767
Δ Output	-1471.169	-358.2883	1738.149	-.84639965
Δ Asset Value	-544.4146**	-48.08121	277.2988	-1.9632777
Δ Capital Expenditure	-331.4376***	-3.803306	136.5166	-2.4278182
Δ Average Wages	1.779144	-.3308028	4.919605	.36164367
Δ Labour Productivity	.0897217	-.0128861	.1051092	.85360454

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

Following the results shown in the parametric case, asset value and capital expenditure are significant once again, and both exhibit negative signs. This clearly reinforces 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 result makes intuitive sense due to the fact that these would constitute firms that had grown their employment base, and had switched towards labour and away from capital.

What is of more interest in this set of results in 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, asset value, and capital expenditure all produce significant results. Relative to firms below the threshold of 50 employees, firms above the threshold would have 11 employees less; i.e. if firms below the threshold (non-treated) grew their employment base, the treated firms would have grown by 11 employees less than the firms below them. A similar interpretation may be applied to the results of capital expenditure and asset value. Ultimately these results reveal 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.

6. Conclusion

This paper 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 paper to utilize Regression Discontinuity Design in order to analyze the effect of the 50 employee threshold that was imposed by the Act.

As a result of the Act, what was seen was a clustering effect of firms under the 50 employee threshold – whereby firms were actively shedding employment in order to not have to comply with the act – firms that did choose to grow, and accept the Act as a sunk cost tended to grow more explicitly, investing more in capital expenditure and asset value in order to drive up their output.

The parametric regression discontinuity revealed that the Employment Equity Act of 1998 does indeed create a discontinuity at the 50 employee threshold level; with firms above the threshold having significantly less employment, asset value, and capital expenditure relative to firms that

fell beneath the threshold. These effects were reiterated through the non-parametric analysis which revealed similar results.

These results create a sense of concern surrounding the South African labour market. Due to this threshold, it is possible that the distortion in employment that has been created can be labeled as an inefficient allocation of resources. 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 SMMEs to deliver on their potential for the South African economy.

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