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Provincial Variation in the Effects of Minimum Wage Laws in South Africa, 2000-2007

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Declaration

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ABSTRACT

Minimum wage laws are one of the most common forms of labour market legislation used internationally. Such laws were first implemented in South Africa in 2001, with the mandated wage differing across sectors. However, existing research on this topic tends to analyse the law's effects at a national level, which does not allow for geographical variation in effectiveness. The overall objective of this research is to estimate and compare the effect of minimum wages on employment and wages in three provinces in South Africa, following the Bhorat, Kanbur and Mayet (2013) methodology. This study also considers the extent of compliance with the law. The provinces considered for analysis are KwaZulu-Natal, Gauteng and the Western Cape, which contain the largest urban centres and the bulk of economic activity in South Africa. The sectors which are included are domestic workers, retail and private security, all of which are predominately located in urban areas. The research shows that non-compliance within the security sector, across all three provinces are high, whereas, the non-compliance to the law for the retail and domestic sector, reduced substantially between the years of analysis. The results from the employment probability models showed that there was an overall decreased likelihood of employment in the domestic and security sectors, for all three provinces. KwaZulu-Natal and Gauteng saw significant increases in real wages between periods, for the domestic sector. Western Cape retail workers felt an increase in real wages but a negative effect in KwaZulu-Natal. The security sector in KwaZulu-Natal faced higher real wages, whereas a lower wage effect was found in Gauteng. It is apparent from the estimated results that the law has different effects in different provinces, which therefore provides support for the analysis of minimum wage effects at the provincial level.

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CHAPTER 1. INTRODUCTION

Central to the entire discipline of labour economics is the concept of minimum wages and its relation to employment and poverty alleviation. The execution of the minimum wage policy is intended to safeguard low-paid workers, who generally earn lower than subsistence income. Minimum wages were first implemented in South Africa in 2001, but unlike the single minimum wage that is in place in most countries, the minima differ by sector and area. A growing number of studies have sought to evaluate the effects of minimum wages on the South African labour market (Hertz, 2005; Millea, 2012; Dinkelman and Ranchhod, 2012; Bhorat, Kanbur and Mayet, 2013). However, the nature of the South African labour market differs enormously across geographical areas, and thus it might also be expected that the extent of enforcement and compliance with the law, and the effects on employment and working conditions, might differ by region. The goal of this dissertation is therefore to evaluate the effects of minimum wages across three provinces that comprise the bulk of South Africa's economic activity, but that have different political, demographic and economic structures.

The announcement of sectoral determinations, which set out specific minimum wage for eleven particular sectors, was brought about in 2002 by the Basic Conditions of Employment Act (BCEA). The majority of the covered sectors are characterized as low-paid and employees who have attained low levels of education and therefore are living in poverty, and include farm workers, taxi operators, forestry workers, domestic workers, security workers and retail workers.

There exists an extensive literature on minimum wage effects in South Africa, but most studies have been conducted either on an economy-wide level or within a particular district council. Additionally, there exists a large body of studies which evaluate the law in several sectors or in an individual sector. This leaves a gap in the field of study for a provincial comparison of the effects of the law, in sectors in which people are predominately employed in these geographical areas. This study thus aims to investigate one aspect of the effectiveness of minimum wage laws, by comparing how the laws have affected employment and wages in South Africa's three largest provinces.

Additionally, compliance with the minimum wage laws by employers will be estimated in order to deduce whether or not the law is effectively monitored and implemented. Many studies assume that employers comply with the law; however, in most developing countries, this assumption has been shown to be false (Ronconi, 2010). The main reason for low compliance is a lack of incentives for employers to comply. Rational employers choose to obey the law based on their assumptions about the probability of being caught and the monetary value of the penalty (Ronconi, 2010). Geographic variation in violations and compliance can be explained by the varying number of inspectors in a province as well as spatial differences between sectors of analysis (Bhorat, Kanbur and Mayet, 2012a). Furthermore, since each province is governed by its own provincial government, political priorities and efficiencies will directly impact the amount of enforcement of the law.

The overall objective of the research is therefore to estimate the effect of minimum wages on employment status and reported wages in three provinces of South Africa, whilst considering compliance issues within sectors and provinces. The provinces considered for analysis are KwaZulu-Natal, Gauteng and the Western Cape, which contain the largest urban centres and the bulk of economic activity in South Africa. The sectors which are included are domestic workers, retail and private security, all of which are predominately located in urban areas.

The following questions are intended to be answered through this research:

1. How does compliance with minimum wage legislation within affected sectors differ between provinces?
2. Do minimum wages affect the provincial probability of employment in the sectors in which they are implemented?
3. Does the minimum wage law affect the wages earned in each sector, and how does this differ between provinces?

The remainder of the dissertation is set out in the following way. Chapter 2 contains a literature review, which begins with a brief history and theoretical frameworks regarding minimum wages in the labour market. Next, previous studies conducted in developed and developing countries are reviewed. Thereafter the theoretical background of compliance with minimum wage laws, and a brief literature review of the extent of compliance, is presented. In chapter 3, the Labour Force Survey data

used in the study are described in detail, followed by a motivation of why the study uses KwaZulu-Natal, Gauteng and Western Cape as the areas of focus. A brief description of the sectors of study, analysis of employment characteristics and the respective control groups are outlined. Chapter 4 forms the bulk of the empirical analysis of the dissertation. It first provides descriptive statistics for workers in each province. The chapter goes on to outline the method of assessing compliance issues, and provide results by province and sector. Finally, the econometric models for employment and wage effects are estimated and discussed. Chapter 5 concludes by providing an overall summary of the research and stating the significance of the study.

CHAPTER 2. LITERATURE REVIEW

Developing countries which adopt policies to regulate their labour markets have gained a great amount of attention in recent decades. Rigid labour markets in these countries, which implement strict labour policies, are widely believed to cause unemployment (Cahuc and Zylberberg, 2004). The objective of this chapter is to achieve an understanding of the connection between the minimum wage policy and the labour market responses.

The chapter begins by providing a brief description of the history of minimum wage laws, and the overall workings of the minimum wage laws in South Africa. Thereafter, this chapter relates labour economic theory to the implementation of the minimum wage law. Section 2.2 outlines how the effect of the minimum wage law is largely dependent on the labour market characteristics in which it is implemented in (Cahuc and Zylberberg, 2004). The standard perfectly competitive labour market model is described first, which then leads to a model that combines covered and uncovered sectors. Thereafter, an alternative model of a monopsonistic labour market is explained in terms of the minimum wage effects. The hypothetical results of the minimum wage law may be supported or contradicted by empirical research. The results of key studies in this literature are reviewed in section 2.3. Thereafter, compliance with the law is presented first as theory in 2.4 and is followed by a review of the minimum wage compliance studies in 2.5. Finally, section 2.6 concludes the chapter.

2.1 Minimum wage laws

The birth of minimum wage considerations was brought about primarily by the Industrial Revolution, which substantially changed the nature of the world economy. The conversion of agricultural activities to manufacturing and industrial development led to the rapid growth of economies, and hence a greater level of living standards. However, this also brought along with it income inequality and increased costs of living. Development economists put forward that the fast pace of industrialization increased pressure on firms to reinvest earnings which resulted in wages being lowered. This led to problems of increased wage inequality and increased levels of poverty. In order to ensure a minimum living standard and to suppress pressure from

trade unions, minimum wage laws were first implemented in New Zealand (1894), Australia (1896), U.K (1909) and U.S (1912) (Belser, 2013).

There are several reasons as to why many policy makers advocate the implementation of minimum wage laws. The goal of the law is to help the poorest groups of society as it prevents this vulnerable group from labour exploitation. Macroeconomic support for the law comes from the fact that such laws should reduce government expenditure on welfare programs since the poorest are supplemented with higher incomes from work (Bakshi, 2015). Conversely, many economists have emphasized the existence of weaknesses of this type of legislation. Increases in wages may result in a decrease in labour demand, or a decrease in the employment rate. This imposes a contradiction to the main goal of the law as it may further harm the poorest and/or the least productive individuals. Firms facing the minimum wage law, if previous wages were below the minimum, will ultimately face larger costs of labour, and hence, a fall in profits. In response, producers may raise prices which may lead to inflation in a country (Bakshi, 2015).

The current challenges faced by the South African economy, such as poverty and unemployment, are deeply rooted in the Apartheid regime. Under this system, the South African economy was largely supported by the racist state and promotion of large businesses. The economy was primarily dependent on cheap Black labour and the restriction of the abundant Black labourers to own land and receive income in other ways. The minimum wage law, in particular, is supported on the basis that the 'apartheid wage' has persisted in the newly democratic country. Furthermore, the pronounced trade union movement in the country, post-apartheid, led to the strong pursuit of the law. This policy is used as a tool to reduce income inequality and potentially decrease the number of people who are in poverty (Rethink Africa/South Africa Network on Inequality, 2014).

In the South African economy, there exist eleven sectors which are identified as vulnerable and are protected, to an extent, via the minimum wage law. These sectors are Forestry, Agriculture, Contract Cleaning, Children in the Performance of Advertising, Artistic and Cultural Activities, Taxi Operators, Civil Engineering, Learnerships, Private Security, Domestic Workers, Wholesale and Retail, and Hospitality. Within a sector, wages are differentiated by occupation type, location and

hours worked. A policy paper, 'Sectoral Determination' sets out specific conditions for employers and employees in the covered sectors. The minimum wage laws are adjusted for inflation through the government gazettes (DPRU, 2008).

The Department of Labour (DoL) is a state body that is responsible for matters relating to employment and labour (ILO, 2016). The DoL, in 1998, replaced the Wage Board with The Employment Conditions Commission (ECC) due to the announcement of the Basic Conditions of Employment Act, No 75 of 1997 (BCEA) (DoL, 2003). There are four branches that serve the DoL, among which is the Service Delivery Branch which is then separated into Directorates. The Directorate of Inspection and Enforcement Services (IES) is accountable for assessments of compliance with labour regulations, defending vulnerable employees, supporting equity and skills training at their place of work and for Sector and Hazard Specific Advocacy. (ILO, 2016). The mandate for inspectors in the IES is to investigate areas of work to ensure labour legislations are enforced; employees are compliant with the laws and promote good labour practices. Inspectors are also authorised to provide education of labour regulations and advisory services (DoL, 2011).

Labour inspectors are authorised to conduct either a proactive or re-active inspection. There are also blitz inspections which occur predominantly in sectors that have worrying Injury on Duty statistics. Re-active inspections are conducted on the basis of minimum wage violations which are prompted by complaints from workers. The inspector will start the investigation which contains several steps. First, an inspection will be conducted and if the employer is found to be in violation of the minimum wage law, the inspector will issue a written undertaking. The employer then has 21 days to comply with the terms of the undertaking and a follow-up inspection is done. A compliance issue is ordered if the employer is still non-compliant with the law and is given 21 days to adhere to the terms of the compliance order. After 21 days, if the employer still has not adhered to the laws, the inspector will follow relevant legal procedures to present the case to the Labour Court (Bhorat et al., 2012b).

2.2 Economic theory of minimum wages

The minimum wage can be regarded as a price floor. It is the legal lowest wage an employer is mandated to pay employees, in sectors in which the minimum wage law is applied. The textbook model of a perfectly competitive labour market in a sector that is covered by the minimum wage law is depicted using a simple labour supply and demand graph, which plots wages against the quantity of labour. Using Figure 2.1 below, in a covered sector, the labour supply curve depicts the labour market participants according to their reservation wage. The demand for labour curve depicts the employer's willingness to remunerate a worker. The equilibrium wage will occur when the demand and supply curve intersect at W*and equilibrium employment occurs at E*.In the textbook context, it is assumed that the minimum wage set by governments is above equilibrium wage, as labelled, which results in an increase in the quantity of labour supplied (E2), but a decline in the quantity demanded (E1) (Cahuc and Zylberberg, 2004).

Figure 2.1 Minimum wages in a covered, perfectly competitive market
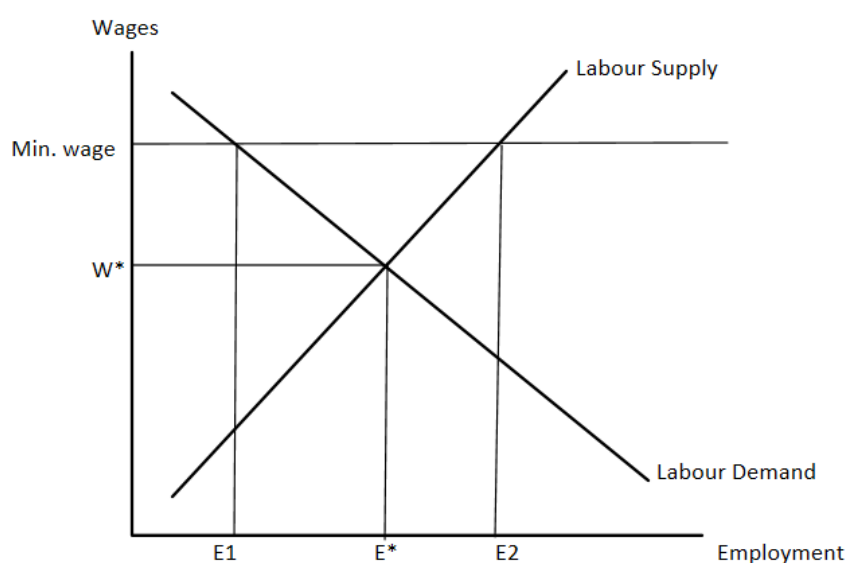
Source: Adapted from Cahuc and Zylberberg (2004, pp.719)

As a result, classical unemployment (the difference between E1 and E2) occurs and re-employment of these workers, in this sector, can only occur if there is a fall in minimum wages (Cahuc and Zylberberg, 2004).

The previous figure depicts the law's effect in a covered sector. This means that the sector is required to adhere to the law. As shown, unemployment may be a result of the law, and this would lead to those that have been dismissed to seek employment elsewhere. Employment opportunities may possibly be found in uncovered sectors of the economy. These uncovered sectors are unaffected by the law and so they are allowed to set wages according to the equilibrium of the amount of labour supplied and demanded. The amount of labour supply in uncovered sectors may increase as a result of the movement of the unemployed (from the covered sector) to the uncovered sector. This potential spill-over effect forms the basis of the Welch-Gramlich-Mincer two sector model. Figure 2.2, below, shows the rightward shift of the labour supply curve (from LS_1 to LS_2) as a result of the increase in the number of workers willing to be employed at every wage. The equilibrium wage then falls from w_1 to w_2 to adjust for the increase in labour supply. This lower wage creates an incentive for employers to increase employment (between E_1 and E_2). However, the number of workers that are employed in the uncovered sector is dependent on the elasticity of demand for labour in the two sectors. If demand for labour in the uncovered sector is elastic relative to a less elastic labour demand in the covered sector, then all unemployed (from the covered sector) individuals will be employed in the uncovered sector. In such a case, there will be no net unemployment created by the law. The only factor that would change is the wage, whereby the covered sector workers will receive higher wages and the uncovered workers will receive lower wages (Watchel, 1984). However, depending on the relative elasticities, it is also possible that net unemployment may result.

Figure 2.2 Uncovered perfectly competitive market effects of minimum wage
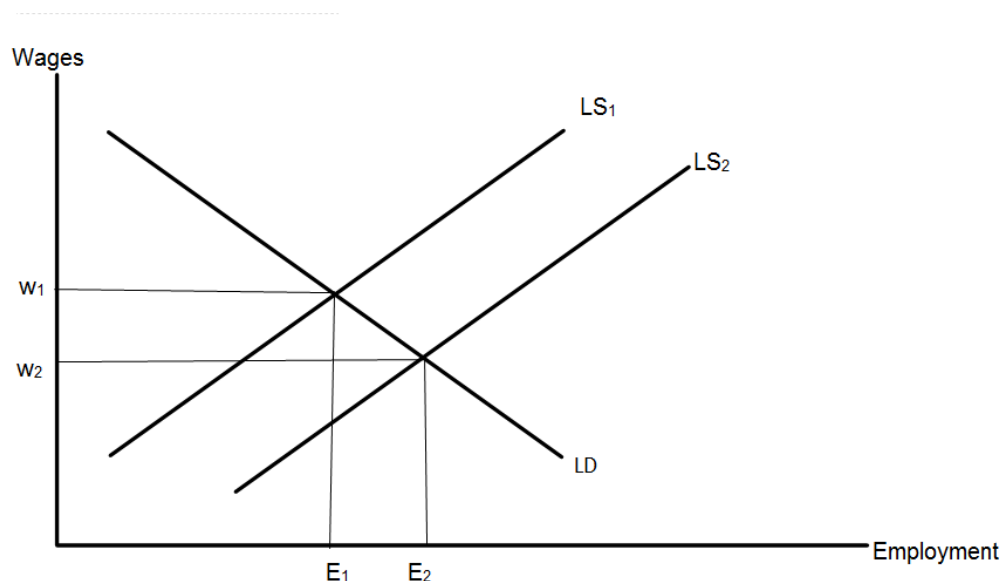
Source: Adapted from Watchel (1984, pp.464)

A negative employment effect can be seen for the matching model, when wages are negotiated between employer and employees. If the negotiated wage (w*) is lower than the minimum wage, unemployment occurs, using Figure 2.1. The only difference between the matching model and the perfectly competitive model is that, in the former, the minimum is compared to the negotiated wage and the latter; minimum wage is compared to the competitive equilibrium wage (Cahuc and Zylberberg, 2004).

Overall, negative employment effects are noticeable when using the perfectly competitive model of the labour market and the matching model to assess the minimum wage law. The next model provides a contrast to these results, by showing a possible positive employment effect due to the law.

A monopsony model of the labour market occurs when there is a sector of the market that is defined by one buyer of labour in that particular market. The employer knows the labour supply offered and directly affects wages by determining the amount of employment he/she desires to meet targeted output at the minimum cost. Labour supply thus determines the amount of employment that a firm would choose to have. The simple model explains that the firm hires 'L' number of workers, with an increasing concave production function. Labour supply is denoted as $L^s(w)$ and

Figure 2.3, below, shows that if the wage paid is equal to w**, then the firm will employ L**number of workers. Profit-maximisation conditions for wages and labour supply are found by differentiating the profit function with respect to wages. The wage paid by a monopsonist is below the marginal cost of labour, as the elasticity of labour supply with respect to wages is positive. This means that, ceteris paribus, an additional worker would be paid less than his/her productivity (Cahuc and Zylberberg, 2004). Figure 2.3 show that the wage paid by a monopsonist is less than the equilibrium wage (w^c) that would equate supply and demand of labour.

Figure 2.3 Minimum wages and a monopsony
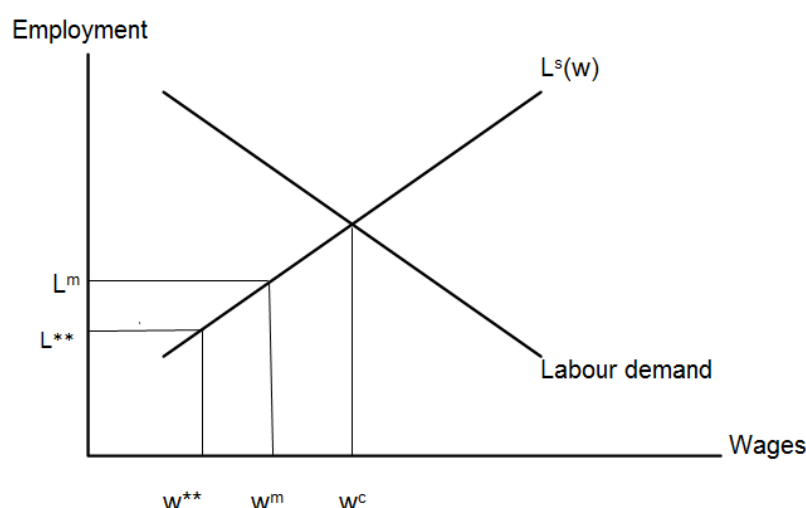
Including the minimum wage law in this setting would increase employment only if it is set at a wage between (w^{**}) and (w^c). In contrast, if it is higher than (w^c) then the monopsonist will no longer stay on the labour supply curve. There are three factors that need to be considered before stating that a monopsonistic model increases employment in response to the minimum wage law. A first factor is that this type of labour market model is prevalent only in locations where there are a small number of firms and where there is low mobility of labour. Secondly, increases in employment are only found when the wage is set below the competitive wage level and finally, higher employment due to the minimum wage law occurs only when the wage elasticity of labour supply is high. However, empirical evidence states that the elasticity of labour is low, on average (Cahuc and Zylberberg, 2004).

With the introduction of a minimum wage, there are thus many hypothesized employment outcomes. In general, wages are expected to rise in the covered sector, although they may fall elsewhere. Unemployment may arise due to the increase in the quantity of workers supplied at the new higher minimum wage. However, there may also be movement of workers between covered and uncovered sectors, and employment may even rise under certain monopsony conditions. There can also be a fall in long term demand for labour because employers will adjust their business to compensate for the minimum wage. The next section reviews some of the empirical literature on the wage and employment effects due to the law.

2.3 Empirical studies on the effects of minimum wages

The employer's response to minimum wages has been a topic studied by authors extensively over many decades. Traditionally, the paper by Stigler (1946) sparked interest in the furtherance of studies on this aspect of the labour market. Stigler's paper aimed to address two important questions of whether minimum wage laws diminish poverty and whether there are efficient alternatives to minimum wage laws. Stigler (1946) subscribed to the belief that in a competitive market, there is a negative relationship between employment and minimum wages. This concept was challenged by studies such as Lester (1960) and Card and Krueger (1993), who found that the negative relationship is not evident.

There is no consensus on the overall employment effects of such laws. Different authors can find different effects of the law, even when using the same data. Katz (1973) found that a previous study by Kalachek (1969), which found little or no negative effects on teenage employment resulting from the minimum wage law, to be interpreted wrongfully. Katz (1973) stated that the unemployment effect from such a law is equal to the product of the demand elasticity for teenage employment and the average change in wages due to the law. The models used to review Kalachek's results included an aggregate supply and demand function of labour and a behavioural relationship which indicated the employers' response to the law, with a dummy variable used to indicate the existence of the minimum wage law. He used the same time-series dataset as Kalachek and found a negative teenage employment effect due to the implementation of the law.

A re-evaluation of the effect of minimum wages on employment was called for in the US in the 1980s and 1990s since there had been many such contradicting findings. Neumark and Wascher (1992) made use of an econometric technique with nation-wide time series data including geographic differences in minimum wages for the years 1977-1989. Their results showed that a ten percent increase in minimum wages would cause employment to fall by 1-2 percent and 1.5 percent for teenagers and young adults respectively. A distinctive difference between this study and prior research such as Katz's (1973) study is the inclusion of fixed state and fixed year effects due to the use of panel data. The use of time-series data by Katz (1973) brought about a criticism that the estimated effects are only reflective of state average effects, and not minimum wage effects (Neumark and Wascher, 1992). The justification for using a fixed state model is that it allows for the identification of differences between each state's economic conditions, and for the fixed year effects model that it controls for changes in, for example, business cycles.

The research conducted by Card and Krueger (1993) explored the income distributional impact of the 1990-1991 increase in the US minimum wage. They also used state specific minimum wages but included overall levels of wages in their study. Their model presented results that showed that states with higher numbers of minimum wage paid employees had significantly decreased wage dispersion. The results were based on a natural experiment using the differences in the proportion of minimum wage workers affected by the law, across the different states. Furthermore, the increase in minimum wages led to a narrowing of the family income dispersion which consequently decreased poverty for those families who were labour force participants. However, the results from the minimum wage and poverty relationship can be said to be imprecise. A comparison study by Addison and Blackburn (1999) used a 'reduced form' approach to predict a relationship between the increases in minimum wage and coexistent changes in poverty measures. The authors used state-level panel data retrieved from the United States, March Current Population Survey for the years 1984-1997. The analysis focused on the three groups which were considered to be most affected by the law; namely, teenagers, young adults and junior school dropouts. The study found that for the three groups, a 25 percent increase in the minimum wage should see a fall of nine percent in the 1996 poverty rate. Additionally, there is evidence of increased employment from the higher

minimum wage laws for all three groups over the study period. However, the rise in the minimum wage in the 1990s reduced poverty, whereas the rise in the minimum wage for the 1980s did not see a reduction in poverty rates. The authors state that, after empirical investigation, they are unclear as to the reason for this difference.

A labour market with monopsony power is critically evaluated by Dickens, Machin and Manning (1999). This allows for minimum wages to have various impacts on employment; namely, negative, neutral or positive impacts. The study addressed the gap in the research by allowing a division between the elasticity of labour supply to an individual firm and to the whole labour market, as well as allowing for different firms in the same market to be affected differently by the legislation. The authors draw fine distinctions between two main aspects of the minimum wage effects, namely, the minimum wage effect on the wage distribution and the minimum wage impact on employment. The former aspect is studied using a first differenced regression and the results show that the effect of the minimum wage on earnings is most distinct at the lowermost end of the distribution. The latter aspect is determined by a first differenced measure using three types of unemployment. The main result is that employment levels are unaffected by minimum wage laws, which is consistent with Lester (1960) and Card and Kruger's (1993) papers.

Studies in developing countries tend to support Stigler's hypothesis. Costa Rica first implemented national minimum wage laws in 1938 which then was amended to contain several different minima for each industry, and was studied by Gindling and Terrell (2002). Costa Rica is a relevant comparator country to South Africa as it had several applicable wages for different occupations and industries set according to different categories of workers. Employment and minimum wage relationships were analysed for the years 1988 to 2000, using individual level pooled cross-sectional data. Several sensitivity analyses were conducted such as the issue of compliance, the effects of minimum wages in the public sector and the effects of minimum wages according to skill categories. The authors focus on the effects of minimum wages on employment and hours worked. A probit model estimated the impact of minimum wages on employment and a regression using Ordinary Least Squares was used to determine the effect of minimum wages on hours worked. They found that a ten percent increase in minimum wages would lead to a drop in employment by 1.09

percent and a drop in hours worked by just about 0.6 percent. Furthermore, their results show that minimum wages affect unskilled workers the most. They conclude by stating that employees who are dismissed from work in the minimum wage sectors turn to the uncovered sectors for employment.

Another comparator country to South Africa is Brazil, in which minimum wage polices were implemented in 1940 in an attempt to combat high levels of income inequality. Some studies which were conducted in Brazil focused on the simulated employment effects due to the law, whereas Neumark, Cunningham and Siga (2006) used minimum wages to assess the income distribution before and after the law. The before-after model was estimated using data obtained from Brazilian Monthly Employment Surveys for six metropolitan areas for the period 1996 to 2001.The econometric model used cross-sectional and time series data to examine whether the law was binding. The time series data were used to account for increases in the legislated wage, while the cross-sectional data were used to determine differences in wage-levels in metropolitan areas that had equal increases in the nominal legislated minima.

In Brazil, the minimum wage is set nationally. Perfectly competitive labour market theory states that minimum wage laws decrease employment which suggests that there are losers and winners in the labour market. However, the income distribution effects resulting from the law are dependent on the size of the gains and losses and the position of where they occur in the income distribution. Overall, their findings, which used a framework that found direct causal estimates of the law's effects, do not show a firm prediction of minimum wage effects on the income distribution. The minimum wage benefits workers at the low income end, but did not compress the overall income distribution since minimum wages decreased family income at the low income end through negative employment effects. The authors therefore provide evidence that minimum wages do not necessarily produce positive income distribution effects for low income families based on their results.

A study that attempted to fill the gap in the minimum wage literature for Brazil by the presentation of wage and employment effects of the law independently for the informal and formal sectors of the labour market was done by Lemos (2009). The application of the study used panel data from the Brazilian Monthly Household

Survey for the years 1982 to 2004, to determine the effects of the minimum wage law on wages and employment. The basis of the empirical model was the Welch-Gramlich-Mincer Two Sector Model outlined briefly in section 2.2. The hypothesized outcome in this model was that the labour income received in uncovered sectors would fall as unemployed workers from the covered sectors would flow into uncovered sectors. The informal and formal sectors of the Brazilian labour market were analysed. The model used was a reduced form equation, controlling for regional and macro-economic shocks. The empirical results found that while there was no effect on employment due to minimum wages, wage effects were large and significant. In other words, there was evidence of the compression of wage distributions in the formal and informal sectors. A segmented market, in theory, hypothesizes that workers will choose to be employed based on unobservable characteristics, and not on job characteristics. Brazil's informal and formal sectors are integrated as employment opportunities have distinct characteristics from which heterogeneous workers can choose from (Maloney, 1999).Telles (1993) found that there is easy labour mobility between the two sectors. This gives support to the statement that Brazil is characterized by a segmented and integrated competitive market. The author concludes by stating that the empirical results are not coherent with the theoretical model predictions because of the underlying assumption about the labour market (Lemos, 2009).

Minimum wage legislation in South Africa is relatively new when compared to other countries. However, several attempts have been made to evaluate the effect of minimum wages on employment and hours worked (Hertz, 2005; Millea, 2012; Dinkelman and Ranchhod, 2012).

As outlined in section 2.1, South African minimum wage legislation is implemented for a segmented labour market, with separate minima for different sectors, geographical areas and working hours. The effect of sectoral wage minima on employment, wages and hours of work was the topic of a comprehensive study by Bhorat, Kanbur and Mayet (2013). Five of the twelve sectors where the law applied were used to describe the impact of the law. The chosen econometric method was the difference-in-difference approach with quasi-experimental application. The data were obtained from the Labour Force Survey from September 2000 to September

2007, a period which included the implementation of the law. Each examined group, for whom the law was binding, was compared to a control group. This control group had similar demographic characteristics as the treatment group; however, this group was not employed in sectors where the law was imposed. The regression results showed that there were no negative employment effects at the extensive margin of labour demand. However, the results are suggestive that there was an increase at the intensive margin. The authors show evidence of an increase in real hourly wages in the post law period. The methodology of this Bhorat, Kanbur and Mayet (2013) study will be closely followed in this dissertation, but with the effects of the law disaggregated by province.

Millea, (2012) has written the most complete synthesis of the minimum wage law effects which emphasizes a segmented market, whereby the minimum wage impacts on earnings and employment in the formal and informal sectors are analysed. This was a broad examination of the law in covered formal, uncovered formal, covered informal and uncovered formal sectors. A two-step approach to evaluate the influence of minimum wage laws was undertaken. The first step made use of a probit model to evaluate employment changes. The subsequent step used estimated Mincerian wage equations, controlling for selection into employment. The Labour Force Survey provided the data for the authors for the years 2000 to 2007. The results for employment show that an individual is less likely to be employed in the formal sector after the law is implemented, and that the increase in average wages corresponds with the timing of the law. Moreover, the increases in wages are the largest for industries and workers who are most affected by the law. The author finds that high paid workers are unaffected and that covered formal workers have a higher wage and less negative employment effects than workers in an informal sector. In contrast, uncovered and informal low-earning workers experience an increase in wages and employment. The author reiterates that in a developing economy which is segmented by characteristics such as race, gender, occupation and formal and informal sectors, the minimum wage is a policy which is beneficial for workers in the informal sectors. These workers are recognized as the most vulnerable in the economy. The law had no substantial impact on higher income groups.

In addition to these general studies, the domestic worker sector in the country has been explored intensively by Dinkelman and Ranchhod (2012) as well as by Hertz (2005).This sector is typically comprised of low wage earners who are female and have no tertiary, or sometimes no secondary, schooling. Hertz (2005) used wages per hour, average per-month earnings and total earnings of domestic workers in periods prior and post law to determine the law's effect. An econometric model using before-after comparisons concludes that average hourly wages rose by 20 percent after the introduction of the law. The study also implies that the increase in wages resulted in a five percent fall in average hours worked per week. Domestic workers therefore experienced a 15 percent increase in average real monthly earnings according to the model. The study supported the introduction of the law.

A comparative study of the domestic worker industry done by Dinkelman and Ranchhod (2012) explored the effects of the law on the previously informal sector of domestic workers. The study conducts several sensitivity analyses which describe the impact of enforcement (or lack thereof). The assumption of no penalties for non-compliance is a starting point to describe the law's impact on employment, wages and hours worked. Before-after comparisons showed that there was a large increase in wages in the wake of the law. However, the intensive and extensive margins of work were not affected, which opposes Hertz's (2005) conclusion. This study showed that employers respond voluntarily to increase wages. Evidence of formalisation of a previously informal market is shown by the increased contract coverage enforced by labour regulations.

It was noted by Dinkelman and Ranchhod (2012) that the extent of compliance by employers with the law can have a large impact on wages and employment. Given the importance of compliance, the next section provides a model of the economics of compliance.

2.3 Economic theory of compliance

Neoclassical labour economics describes employers as profit maximising. Profits are determined by selling their output at a price (p) and subtracting the costs of production. Output is produced by employing factors of production such as labour and capital, which are paid by wages (w) and rent (r) respectively. Assuming that the

market is perfectly competitive, firms will operate where the marginal product of labour is equal to the price of labour (w) and the marginal product of capital is equal to the price of capital (r). This ensures that the factors of production are being optimally used to enable the firm to maximise profit. Holding output constant, profit increases as prices increase and decreases when wages and/or rent increases. Implementing the idea of minimum wage (M) being higher than the market wage, ceteris paribus, the profits of firms should theoretically fall by $\pi(w,r,p) - \pi(M,r,p) > 0$. This introduces the implication that firms may not voluntarily comply with minimum wage laws unless there are inspections or penalties for noncompliance with the law (Ashenfelter and Smith, 1979).

An employer that chooses to not comply with the law knows that there is a probability of being caught, λ, that is linked to a penalty payment of D. The following equation shows that the expected profits are:

$E(\pi) = (1-\lambda) \pi(w, r, p) + \lambda \pi(M, r, p) - \lambda D$

The profit obtained if the employer complies with the law is equal to $\pi(M, r, p)$. Therefore, he/she will not comply if:

$E(\pi) - \pi(M,r,p) = (1-\lambda)[\pi(w,r,p) - \pi(M,r,p)] - \lambda D > 0$

Without going through the second order Taylor series derivations for the terms in the brackets, it then follows that:

$\frac{\partial \pi}{\partial w} = -L$

$\frac{\partial^2 \pi}{\partial w^2} = -\frac{\partial L}{\partial w}$

Which then gives: $\pi(w, r, p) - \pi(M, r, p) \approx L(M-w) - \frac{1}{2}(\frac{\partial L}{\partial w})(M-w)^2$

Employers will decide not to comply with the law if:

$L(M-w) - (\frac{L}{w})[\frac{1}{2}(M-w)^2 e] > [\frac{\lambda}{(1-\lambda)}] D$

Where the elasticity of the demand for labour $e = \frac{\partial L}{\partial w}(\frac{w}{L}) < 0$ and $\frac{\lambda}{(1-\lambda)}$ is the odds of being caught.

The above inequality shows that an employer will choose not to comply with the law if the expected penalty is small, either because it is easy to escape detection or that the monetary value of the penalty is small. Overall, the incentive to comply is lower when the market wage is far below the minimum or if there is a large elasticity of demand for labour. Firms that employ a large number of low-wage employees, and for which changes in wages result in large employment changes, have the greatest incentive not to comply with the law (Ashenfelter and Smith, 1979).

Even though it is not possible to estimate the probability of violation, it is possible to provide an indication of the incentives to violate the law. The expected cost of violation is equal to λD, and the expected saving of the labour costs if the firm does not comply with the law is equal to $(1-\lambda)L(M-w)$. It can then be shown that it would be better to violate the law, for firms, if:

$$-\frac{1}{2}e\frac{(M-w)}{w} > \frac{[\lambda D - (1-\lambda)L(M-w)]}{(1-\lambda)L(M-w)}$$

The above equation is explained as violation occurs if employment losses are greater than two times the proportional excess of penalties over the expected wage-bill savings. If the elasticity of demand is set equal to zero, then the incentive to violate the law would be the expected monetary value of violation which is smaller than the expected wage bill savings (Ashenfelter and Smith, 1979).

A commonly used measure of compliance in the literature is the Kaitz Index which measures the toughness of the set minimum wage (Bhorat, Kanbur and Mayet, 2012a). The index can be calculated as the ratio of the minimum wage relative to average wage or median wage of the economy. The Kaitz Index used by Andalón and Pagés (2008) is the ratio of the minimum wage relative to the median wage as they suggest that the median wage is a better measure compared to average wage in countries with high income inequalities, or where the minimum wage could affect average wages. By comparing the value of this measure across sectors, it may be used to investigate possible determinants of non-compliance with the minimum wage law (Bhorat, Kanbur and Mayet, 2012a).

Similarly, Chuang (2006) used the widely used formula, given below, as an input to the model used to determine employment effects of the law.

Kaitz Index $= \sum_i \frac{MW_i}{AW_i} \times \frac{E_i}{TE} \times C_i$;

Where: i is the industry subscript; MW_i is the minimum wage applicable to industry i; AW_i is the average wage for industry i; E_i is the number of employed individuals in industry i; TE is total employment in the economy and C_i is the rate of coverage in industry i.

The first model of compliance, described by Ashenfelter and Smith (1979) shows when there are incentives to violate the law, whereas the Kaitz Index measures the rigidity of the minimum wage that is set. The index can also be used as an input to employment models to determine the changes in employment due to the adoption of the law in industries and economies. The next section gives a brief summary of empirical research on the relationship between compliance and minimum wage laws in several countries.

2.5 Empirical studies of compliance and minimum wage laws

The motivation for studying compliance is that if, in practice, the law only affects a small number of the workers whom it targets, and then its overall effectiveness is reduced. Therefore if it is found that the law has a limited effect on wages or employment it may be due to a lack of compliance, rather than a real lack of effect. This makes the case for compliance with the law to be reviewed.

North America was one of the first regions to implement minimum wage laws, which led to Ashenfelter and Smith (1979) to investigate the extent to which the US federal minimum wage law was adhered to. Labour market regulations, to be effective, need an active government enforcement policy such as random firm inspections and/or penalties. The authors noted that the assumption of full compliance is unrealistic and therefore examined whether profit-maximising firms were responsive to the law by using government inspection as a measure of compliance. Data were collected from the May Current Population Survey in the US for the years 1973 and 1975. The number of compliance officers in 1973 amounted to 880, and increased in 1975 to one thousand. Previous evidence showed that inspections were not random, but were concentrated in sectors where non-compliance was more probable. This can be supplemented by the fact that only 37 percent employees earning less than the

federal minimum were located in the southern, low-wage-region but 50 percent of compliance officers were assigned to this region.

The econometric estimation was separated into three broad analyses. Firstly, compliance was estimated individually for age, region, race and gender. Compliance for the country was estimated at 69 percent overall, but with variation in compliance for each group. Secondly, leaving age aside, it was found that the highest compliance estimate was among workers whose wages would be lowest in the absence of the law. This implies that the incentive to violate the law is reduced by the increased probability of inspection by government enforcement agencies. Thirdly, a comparison between age group compliance estimates was determined. Younger workers faced lower employer-compliance estimates than their older counterparts. The reasoning behind this is that inspections are carried out on the basis of complaints. Taking into consideration that younger workers have a low job attainment, the number of complaints by the young may be relatively small compared to the amount of complaints by the older workers, hence a smaller probability of inspection and lower incentive for these firms to comply. Additionally, these results were compared to the results from estimating the same equation using 1975 data. Compliance levels were concluded to be stable over the two years as the estimates were similar (Ashenfelter and Smith, 1979).

Overall, the paper showed that wages of the covered and uncovered sectors are affected even when there is incomplete compliance with the regulation. The authors emphasized that the low-wage sectors of the labour market cannot be understood to the full extent unless interactions between the legal and economic behaviour of firms are taken into account (Ashenfelter and Smith, 1979).

The motivation for the study put forth by Ronconi (2010) suggests that workers who provide labour in developing countries are subject to poor working conditions. These conditions are the result of low compliance with labour regulations because of the absence of incentives for employers to comply. Non-compliance with labour regulations is of importance because it distorts the allocation of resources and distorts the notion that the law is applied equally to all workers. In a broader, macroeconomic view, failing to comply with the regulations can affect the state's capacity to implement redistribution policies. The theoretical argument that firms are

responsive to regulations if the probability of inspection is high is the basis of the research question. The purpose of the research was to estimate the effect of the variation in enforcement on the likelihood that employers violate labour regulations in Argentina. The study period was 1995-2002, and made use of panel data and estimating methods of Ordinary Least Squares and two-stage-least squares. Ronconi acknowledges that there are two challenges in estimating the causal effect of enforcement on compliance. Firstly, measures of enforcement are inadequate and not easily available. He uses a proxy for enforcement which is the number of labour inspectors per one hundred thousand workers. The second challenge is the potential simultaneous relationship between enforcement and compliance, which is addressed by using the existence of the electoral cycle in labour inspector staff as an instrument. Descriptive statistics showed that overall compliance and enforcement decreased over time from more than 50 percent in 1995 to less than 40 percent in 2002. Furthermore, the number of labour inspectors decreased by approximately 30 percent. The theoretical predictions were supported by evidence from the research, whereby there was a positive relationship between the number of labour inspectors and the level of compliance (Ronconi, 2010).

The empirical model comprised of two simultaneous equations of enforcement and compliance, each containing vectors of provincial fixed effects. The two-stage-least-squares estimation included the instrumental variable of electoral years as an exogenous determinant of enforcement, since elections affected compliance through government control of the resources of enforcement agencies. Furthermore, working conditions and employment protection of the workers directly affect the electoral position of candidates. In the Ordinary Least Squares estimates, provinces with higher enforcement tended to have higher levels of compliance. Inclusion of fixed effects showed that within-provincial variation in enforcement is not correlated with compliance. This means that even if there are extra inspectors employed by enforcement agencies, it does not mean that compliance with the law will increase, because these labour inspectors may not be competent enough to ensure compliance. Ronconi (2010) performed a Hausman test for endogeneity and rejected the hypothesis that enforcement is exogenous in the compliance equation, and thus the Ordinary Least Squares estimates were inconsistent. The estimated effects of enforcement from two-stage-least-squares regressions were larger than the Ordinary

Least Squares estimates. Overall, the results were interpreted as meaning that an increase of one labour inspector hired led to an increase in minimum wage compliance by 0.04 percent, ceteris paribus. This research paper thus filled a gap where evidence is scarce in developing countries on the effects of enforcement on compliance.

A study conducted by Bhorat, Kanbur and Mayet (2012a) added to the South African labour market literature by exploring the extent to which the law was violated. The goal of the paper was to measure the violation of the law, corresponding to the level, depth and severity of non-compliance. The authors matched data from the 2007 Labour Force Survey to corresponding sectors and the locations of these sectors as specified by the legislated minima. The results were obtained by using a model which included parameters such as the applicable minimum wage for each sector and location, actual wages received and an index which represents the depth of violation. The index of violation measures the percentage of covered workers that are paid the stipulated wage and the average difference between the lawful wage and actual wage. The main findings were that employees in minimum wage sectors were on average, receiving wages that were 44 percent below the required rate. The sectors which produced the highest non-compliance figures were the security, farming and forestry sectors. The authors state that the types of occupation, as well as location of work are factors which affect non-compliance.

In a follow-up paper, the same authors went on to estimate the underlying relationship between government enforcement and compliance with the minimum wage law (Bhorat, Kanbur and Mayet, 2012b). As their previous study concluded, South Africa has high estimates of non-compliance to the law, which led the authors to examine the determinants of the probability of violation using a probit model, as well as the depth of the violation using the index of violation from the previous study. The number of labour inspectors is used as a proxy for enforcement; however, enforcement data is limited in South Africa, so they use the number of labour inspectors per million workers reported in 2007 at a provincial level. Noting the potential simultaneity between enforcement and compliance, the authors also use an instrumental variable, which is the number of non-inspectors. Non-inspectors are described by the authors to be those that are employed by the Department of Labour

at labour centres, but do not form part of the body of inspectors. This is used as an instrumental variable for the number of labour inspectors as the number of non-inspectors is regarded as an indication of the size of the body of inspectors but not related to the compliance with the minimum wage law.

With regards to the likelihood of individual violation, the estimates showed that race and gender play an important role in determining whether an individual receives lower than stipulated wages, with African and female workers being at the largest disadvantage. Furthermore, the sector of employment and the size of the firm in which an individual is employed also played a role in predicting violation. Turning to the depth of violation, the Kaitz index was found to be negative and significant. This implied that minimum wages that are higher than the median wage result in a larger depth of the violation. A one percent increase in the Kaitz ratio would lead to an increase in the depth of violation per individual of 0.7 percent. The depth of violation is determined by the age and education levels of an individual. Furthermore, firm-level and contractual factors, as well as local labour market conditions, affect the depth of violation (Bhorat, Kanbur and Mayet, 2012a).

2.6 Conclusion

Economic theories show different effects of minimum wage laws on wages and employment, of depending on the assumptions of the underlying labour market models. In a perfectly competitive setting, covered sectors may experience unemployment which causes the affected workers to seek employment in uncovered sectors. This in turn lowers the wages received by workers in the uncovered sectors. However, whether employment occurs in the uncovered sectors depends on the elasticity of labour demand. In contrast, in a monopsony-type labour market, the minimum wage law may increase employment, but this statement should be interpreted with respect to the location of this labour market, the minimum wage being set relative to the monopsony wage and with respect to the wage elasticity of labour.

It is apparent from the reviewed empirical studies that a minimum wage policy may have ambiguous, adverse or beneficial effects on labour market outcomes. In developed countries, a negative relationship with employment is debated, whilst in

developing countries, there is typically a positive effect on wages as shown by Hertz (2005) and Millea (2012). The negative employment effect is shown by Neumark and Wascher (1992) and Gindling and Terrell (2002), whereas Lester (1960), Lemos (2009) Card and Krueger (1993) find no clear negative effect on employment.

In South Africa, the minimum wage law is of importance as there is a large proportion of the population which are earning low wages, combined with poor working conditions. The implementation of the law, as measured by employers' compliance, is of utmost importance if the law is intended to benefit those who are vulnerable. In theory the incentives for non-compliance are higher when the market wage is far below the stipulated wage and when the absolute value of the elasticity of the demand for labour is large (Ashenfelter and Smith, 1979). In developing countries, it is common that the law is violated. Combining compliance with the law with the employment and wage effects will provide a more comprehensive picture of the effectiveness of the minimum wage law.

It is also clear from the work of Bhorat, Kanbur and Mayet (2012a, 2012b) that the location of work and the characteristics of local labour markets are important for both compliance and the effects of minimum wages. The empirical component of this dissertation therefore aims to contribute to this understanding of the geographical variation in minimum wage effects. The subsequent chapter gives a detailed description of the dataset, sectors and provinces that are analysed econometrically in Chapter 4.

CHAPTER 3. DATA

Chapter 2 illustrated that there is an extensive international literature on the effects of minimum wage laws. In South Africa, studies have been carried out either at a national level, or by focusing on an individual sector. There is therefore currently a gap in knowledge about how minimum wage laws might affect different geographical regions in varied ways. This chapter describes in detail the dataset used for the empirical estimation of wages and employment at a provincial level, which was obtained from the Labour Force Survey (LFS).

The remainder of the chapter is structured as follows. It also includes a brief description of the LFS and the methods of allocating workers to the respective sectors of employment in section 3.1. The sectors of interest, namely the domestic worker, retail and security sectors are described in section 3.2. In addition to this, descriptive statistics are also included in the description of the respective sectors. Motivations for using the Gauteng, KwaZulu-Natal and Western Cape provinces as geographical locations are presented in section 3.3. Thereafter, section 3.4 provides a summary of the overall sample used for the dissertation.

3.1 Dataset

The pooled dataset used for this research paper is derived from the Labour Force Survey (LFS) conducted by StatsSA for the years 2000 to 2007, bi-annually. The reason for this time period is that it can provide an insight into the labour market of the chosen sectors before and after the law. It can also provide evidence of whether the law was harmful or beneficial to the chosen sectors.The labour markets, both formal and informal, of the country are surveyed at a household level in the LFS. Participants in the survey comprise of the members of 30 000 households across the country, which include approximately 65 000 working aged individuals (15-65 years). The LFS is designed as a rotating panel sample, which is a survey which reports outcomes from the "same dwellings on a number of occasions and replacing a proportion of these dwelling units each round" (StatsSA, 2000b). The reason for adding new dwellings is to substitute those dwellings that are removed. This type of survey design has an advantage in terms of being able to track changes in the labour market whilst studying individual employment changes in the same household

over time (StatSA, 2000b). This adds to the reliability and validity of the dataset used. However, only the September 2001 to March 2004 rounds of the LFS were released as a matched panel dataset, which does not provide a long enough time period to study the effects of the minimum wage laws. For this study, the dataset therefore consist of eight waves of the LFS from September 2000 to September 2007. Only the September rounds of the survey will be used to avoid seasonal variations in employment. These waves were pooled and treated as repeated cross-sections over time, since the same individuals were not interviewed or matched in every survey.

The survey is made up of seven sections with a total of ninety-seven questions which address several aspects of the labour market. The seven sections are namely; demographic, biological, activities of work in the past week, unemployment and non-economic activity, main work in the past week, job creation proposals and uncompensated agricultural activity in the past six months. Specifically, section two provides questions relating to employment status and section four provides questions relating to the amount of wages received. Section one allows individuals to answer questions based on their skills and educational levels (StatSA, 2000b). Since the questions throughout the period of the LFS survey had not changed, the responses can be pooled into a single dataset and correctly compared across time. Throughout the analysis, the sample estimates are weighted to population levels using weights provided by StatsSA.

In each LFS wave, individuals in minimum wage sectors are identified using the combination of the SASCO occupation codes and the ISIC industry codes. Following the methodology of Bhorat et al (2013), the self-employed and union members are excluded from the analysis. Wages which are reported monthly are converted to hourly earnings using the average number of hours worked per week. Additionally, to allow for a comparison across time, wages used in the following empirical analysis are deflated using the Consumer Price Index (CPI) which is reported by StatSA (2009), so that all wage figures are presented in 2008 prices.

The specification of control groups for each sector is imperative in order to establish effects unique to each sector due to the law. Each control group has similar characteristics to the treatment groups but they are employed in sectors where

minimum wage is not compulsory. Overall, for the wage analysis, the control groups were restricted to low-earning individuals of working age who did not obtain more than twelve years of schooling, following the methodology of Bhorat et al (2013). Additionally, a control group is established to determine the employment effects of minimum wages, which includes working age individuals with similar characteristics to those in minimum wage-affected occupations. The selection of these groups is outlined in sections 3.3 and 3.4.

3.2 Geographic locations

The provinces of study are the Western Cape, KwaZulu-Natal and Gauteng. The minimum wage laws in South Africa vary across geographical areas as the living costs vary from one region to another (Cottle, 2015). The reason for varying living costs is due to the level of urbanisation being different in provinces across South Africa. The DoL demarcates areas for the purpose of setting minima, which is based on the average household income reported in municipal areas on the basis of the 1996 census. In general, areas are categorized as follows: A – Average income greater than R24,000 per annum; B – Average income between R12,000 and R24,000 per annum; C – Average income less than R12,000 per annum (DoL, 2003). Provincial differences in the wage and employment effects due to the law are of interest, since KwaZulu-Natal, Gauteng and the Western Cape collectively contribute to about 66 percent of the country's GDP (StatsSA, 2014). Employment and wages directly contribute to this and therefore the differential effects of the law in these provinces may provide insight to the law's effect on the economy as a whole. However, unlike previous studies which estimate the overall national effect, focusing on specific provinces allows for the effects of the law to vary spatially.

There are some substantial differences in economic characteristics across these three provinces. In 2001, Western Cape had a narrow unemployment rate of 17.7 percent whereas KwaZulu-Natal and Gauteng had rates of 33.8 percent and 30.4 percent respectively. However, by 2007, Gauteng's and Western Cape's unemployment rate fell to 17.4 percent and 15.7 percent respectively, While KwaZulu-Natal's unemployment remained substantially higher than the other two provinces, at 30 percent (StatsSA, 2007). The large decrease in unemployment for Gauteng and the relatively higher rate for KwaZulu-Natal further motivates the choice

of these provinces to be analysed, since the different economic climates may have differential relationships with the law.

An additional factor which supported the choice of these three provinces was the differences in the racial composition of each province. The Western Cape population of coloureds is approximately 52 percent, whereas KwaZulu-Natal and Gauteng's population is dominated by African individuals (87 percent and 75 percent respectively) (StatSA, 2014). Different racial compositions between provinces are associated with different historical and political developments, as well as different educational attainments, and thus may provide a more nuanced assessment of the law within each province.

Average income levels between the 2006 and 2011, as measured by StatsSA (2011), show that Western Cape had the highest initial average income although this fell by 13.7 percent by 2011. In contrast, KwaZulu-Natal's average income grew by approximately 27 percent between the periods, and Gauteng's average income increased by approximately 16.8 percent (StatSA, 2011). The provincial differences in income levels show that the law may have a different impact in each province and each sector.

Provincial differences in the wage and employment effects due to the law are of interest as there is an ongoing debate regarding the possible implementation of a uniform national minimum wage to support an acceptable living standard (Cottle, 2015). An examination of the provincial differences in the current law's effects would then provide an insight into whether a uniform wage or a sectoral wage, that differs according to areas of work, is beneficial to those affected by the laws.There are several sectoral determinations which vary according to geographical areas with different economic conditions. The different economic climates of each province relates to the level of urbanisation. Higher levels of urbanisation are usually associated with higher levels of business activity, which will then affect the retail and security sector in a positive manner. However, within the urban areas, average household income varies from upper-income levels to upper-middle income, which then affects domestic worker employment.

The levels of compliance with the law and enforcement methods are also likely to be different in these provinces because of the distribution of enforcement agencies, which adds to the case whereby the law may have different impacts in each province. According to 2006 figures, there were a total of 706 inspectors that were employed by the IES. There were 42 inspectors in Mpumalanga, 69 in Limpopo, 159 in Gauteng (49 in Gauteng North and 110 in Gauteng South), 58 in the Free State, 133 in KwaZulu-Natal, 33 in the Northern Cape, 53 in the North West, 95 in the Western Cape, and 64 in the Eastern Cape (Godfrey, Maree and Theron, 2006). According to Godfrey et al. (2006), there were approximately 1 006 500 employers and 3 445 726 employees that were covered by the sectoral determinations in 2006. It can be seen that there are relatively few inspectors when compared to the number of employees and employers covered by the law, and that the number of inspectors varies by geographical location.

3.3 Sample

The choice of the sample and definitions of treatment and control groups follow the methodology of Bhorat et al (2013), where it was applied at a national level. For the wage analysis, the sample of individuals for the research are aged between 15 and 65 who are full time workers and are working in urban areas in the Western Cape, KwaZulu-Natal or Gauteng. Furthermore, employees who work for more than fifteen hours per day, those who earn within the top one percent of earners in each sector are regarded as workers who are earning very high wages and therefore are excluded, as they are not affected by the law. Those who state zero or missing wages are not included in the sample. Wage information provided by workers in the LFS is either in the form of point estimates or monthly brackets. Monthly brackets were converted to point estimates using the bracket midpoints. Workers may provide wage information in the LFS as either point estimates or in monthly brackets (Bhorat et al., 2012a). It is important to note that if the bracket midpoint lies below the minimum wage, then all people reporting a wage in that bracket would be classified as earning less than the minimum wage, when in fact some fraction of them may well be above the minimum. In such a case, this method would overstate the extent of non-compliance. However, if the bracket midpoint lies above the minimum wage, then the reverse would be true. For the employment and wage analysis, the control

group is made up of working age individuals who were either employed or looking for employment (according to the narrow definition of unemployment) and who had no more than a matric level of education. This less restrictive control group allows for unemployed persons or those who have switched jobs between waves, to be accounted for.

According to StatsSA (2014), those in skilled occupations include managers, professionals and technicians; semi-skilled occupations include clerks, sales and services, skilled agriculture, craft and machine operators and unskilled occupations are those that are elementary in nature and domestic workers. Table 3.1 shows each skill group and the occupations that are included in each group.

Table 3.1 Skill Groups and Occupations

Skill Category	Occupations
Skilled	Legislators, senior officials and managers (including legislators and senior officials; corporate managers; and general managers); professionals (including physical, mathematical and engineering science professionals; life science and health professionals; teaching professionals; and other professionals); technicians and associate professionals (including physical and engineering science associate professionals, life science and health associate professionals; teaching associate professionals; and other associate professionals)
Semi-skilled	Clerks (including office clerks; and customer service clerks); sales (including personal and protective services workers; and models, salespersons and demonstrators); craft and related trade workers (including extraction and building trades workers; metal, machinery and related trades workers; precision, handicraft, printing and related workers; and other craft and related trades workers)
Unskilled	Skilled agricultural and fishery workers (including market-oriented skilled agricultural and fishery workers; and subsistence agricultural and fishery workers); plant and machine operators and assemblers (including stationary-plant and related operators; machine operators and assemblers; and drivers and mobile-plant operators); elementary occupations (including sales and service elementary occupations; agricultural, fishery and related labourers; labourers in mining construction, manufacturing and transport); domestic workers

Source: Liebenberg and Roefs (2001)

3.4 Sectors

The Basic Conditions of Employment Act of 2002, is applicable to all workers in South Africa, with the exception of the Defence Force and secret service agencies. The amended Act stipulates minimum requirements of working conditions to which all employers must adhere to. The Act covers topics such as hours of work, overtime limits, overtime rates of pay, annual leave, sick leave, maternity and paternity leave, family responsibility leave, notice periods and records required to be kept by

employers. There are also methods contained in the Act that allow for these conditions to be varied. It is important to note that there is no mention of minimum wage settings as these are contained in another legislative document, termed the sectoral determinations. In addition to this, it introduced the Employment Conditions Commission (ECC) which provides advisory and reporting services for determination of sectoral minimum wages. There is also a notable difference in minimum wages for those who are categorised as full-time and part-time workers, where part-time workers have a higher minima compared to full-time minima. The analysis done in this research project only accounts for full-time workers, whereby the observed results of employment and wage differences may be accounted for by changes to part-time employment and wages (BCEA, 2002)

A sectoral determination is a legal document which states basic employment conditions in a sector and geographical area. In order for a minimum wage to be set, the ECC is required to report, provide advice and make recommendations to the Minister of Labour of results from an investigation into the specific sector. The most important outcome of a sectoral determination is that it provides the legal minimum wage, that varies by occupation and location, which needs to be adhered to for the sector (Godfrey et al., 2006). Each year the wage is regularly updated for inflation through a formal government gazetting process. It is usually calculated based on the Minimum Wage for the sector, + CPIX/CPI + 1% (My Wage, 2016).

The research focuses on three key sectors: retail/wholesale, domestic work, and security. These sectors were chosen for the analysis because they are predominantly located in urban areas which provide a large quantity of employment for individuals. This is likely to provide an informative measure of the law's impact, as the majority of the individuals employed in these sectors are from low-income households who have low educational levels. According to Cosatu (2015), two out of three workers who are covered by the sectoral determinations are living in poverty. It can be seen from Tables 3.2, 3.3 and 3.4 that domestic workers have an average of seven years of schooling and the private security and retail sector have an average of ten years of schooling. The law is said to be in place to protect these vulnerable workers, and therefore these sectors were selected. Furthermore, the domestic worker sector in South Africa has been explored extensively (Dinkelman and

Ranchodd, 2012), and hence the inclusion of this sector may provide results that support or oppose previous studies. The retail sector has the most diverse employment composition which can be seen below in the discussion of retail workers. Inclusion of this sector may provide a less streamlined view of the law's impact. Finally, the security sector was added to the analysis because this sector has gained importance in urban areas due to the increase in crime. It also employs a large proportion of young African males, who make-up 80.3 percent of the South African population (StatsSA, 2014), and from Table 3.5, the average age for the national private security sector is 32 , with 90 percent employment of males and 84.4 percent of African employment. Therefore assessing the law on this sector may provide a broader picture of usefulness of the law.

Table 3.2 details the date of implementation for each of the analysed sectors, along with hourly initial minima and changes thereof. As mentioned, there are several minima for each of the sectors as it varies on a national, regional and occupational. This being said, Table 3.2 only shows the minima for sectors in urban areas (Area A) and for those who are considered to be full-time workers (those who work more than 27 hours per week).. Full-time domestic workers (those who work more than 27 hours per week) in an urban area were entitled to R4.10 per hour at the date of implementation. February 2003 saw the introduction of the retail sector minima which can be seen to vary according to occupation shown by the initial wage at R14.87 per hour for managers but R6.76 per hour for forklift drivers. The security sector contains five grades of security workers, however, Table 3.2 shows the initial minima for only grade A security workers as it overlaps with the security occupations identified using the ISIC codes. The wage for these workers was set at R12.18 in November 2001, when it was introduced. Each legislated wage was then adjusted upward, annually, by a factor of approximately CPIX/CPI+1% (My Wage, 2016) through a formal gazetting process and is shown below.

Table 3.2 Sectoral minima and introduction dates

Sector	Occupation	Date of Implementation	Hourly Minimum Wage						
			2001	2002	2003	2004	2005	2006	2007
Domestic worker	N/A	August 2003	-	-	R4.10	R4.42	R4.77	R5.11	R5.47
Retail	Managers	February 2003	-	-	R14.87	R16.18	R17.61	R18.61	R19.73
	Clerks		-	-	R9.39	R10.21	R11.11	R11.74	R12.44
	Salespersons		-	-	R9.39	R10.21	R11.11	R11.74	R12.44
	Drivers		-	-	R10.38	R11.29	R12.28	R12.98	R13.76
	Fork-lift operators		-	-	R6.76	R7.35	R7.98	R8.43	R8.94
	Cashiers				R7.93	R8.62	R9.38	R9.91	R10.50
Security	Grade A	November 2001	R12.18	R12.66	R13.14	R13.14	R13.14	R13.72	R14.29

Source: Adapted from Bhorat et al. (2013)

The control group identified for each sector follows the methodology of Bhorat et al. (2013).Descriptions the demographic characteristics of each sector, as well its control group, are presented below in Tables 3.2 to 3.4. For each table, the figures represent the mean age and number of years of completed education, as well as the proportion of individuals who are male and who fall into each population group. The estimates are presented separately for each province of interest. Finally, the last column in the table shows the estimates for the country as a whole, including all nine provinces, for comparison purposes.

3.4.1 Domestic Workers

The minimum wage law for domestic workers was introduced in August 2002. In their national-level study, Bhorat et al. (2013) found that domestic workers are predominately African and Coloured females with less than twelve years of education. Urban areas provide the majority of employment for this sector. Therefore, the control group for this sector contains females who are African or Coloured who are employed in unskilled occupations that are not affected by the law.

Table 3.3 below shows that the domestic worker sector largely comprises of females, with a grade seven levelling of education, aged between 38 and 41 years in each of the analysed provinces, as well as nationally. The lowest probability of 2.6 percent male employment in this sector is found in Western Cape; however, across the

provinces and across the nation, there is a very low male employment probability which then leads to the control group being restricted to females only. The summary statistics also show that the majority of the domestic worker sector is African in race and then followed by Coloureds in KwaZulu-Natal, Gauteng and nationally. In contrast to this, the Western Cape domestic worker sector is more or less split between these two races, with a somewhat higher proportion of Coloured than African workers. The domestic worker control group shows that the racial employment in KwaZulu-Natal and Gauteng is very similar to the treatment group. That is, the control group employment is largely African in race. The Western Cape also employs Coloureds and Africans; however, when compared to the treatment group, there are a larger percentage of Coloured workers. The control group attained a slightly higher average number of years of schooling than the treatment group, at eight years, with the difference being particularly large in Gauteng.

Table 3.3 Mean sample characteristics of treatment and control groups: domestic work sector

Variables	Western Cape		KwaZulu-Natal		Gauteng		National	
	Domestic	Control	Domestic	Control	Domestic	Control	Domestic	Control
Age	39.312	32.981	37.888	36.873	40.969	37.091	40.265	36.099
	(0.510)	(0.358)	(0.366)	(0.419)	(0.369)	(0.487)	(0.200)	(0.231)
Male	0.026	0.000	0.038	0.000	0.066	0.000	0.048	0.000
	(0.006)	(0.000)	(0.008)	(0.000)	(0.007)	(0.000)	(0.004)	(0.000)
African	0.409	0.266	0.993	0.986	0.978	0.971	0.907	0.810
	(0.021)	(0.019)	(0.002)	(0.006)	(0.004)	(0.007)	(0.004)	(0.007)
Coloured	0.589	0.734	0.002	0.014	0.016	0.029	0.088	0.190
	(0.021)	(0.019)	(0.001)	(0.006)	(0.003)	(0.007)	(0.004)	(0.007)
Indian	0.000	0.000	0.003	0.000	0.002	0.000	0.002	0.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
White	0.001	0.000	0.002	0.000	0.005	0.000	0.003	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)	(0.000)	(0.001)	(0.000)
Years of schooling	7.704	8.225	7.186	7.482	7.219	9.066	6.925	8.273
	(0.131)	(0.103)	(0.111)	(0.157)	(0.131)	(0.129)	(0.067)	(0.071)
Sample	1241	1299	1738	1060	2072	762	7589	3977
Population	343870	306847	883257	418041	1328510	503695	3246459	1467677

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week)

3.4.2 Retail/ Wholesale Sectors

As shown in Table 3.2, the minimum wage law for this sector was implemented in February 2003, whereby various wages were set at a minimum according to job type, hours worked and areas of employment. Workers in the retail sector are typically located in metropolitan areas with higher levels of education when compared to the domestic worker sector (Bhorat et al, 2013). Furthermore, semi-skilled workers are the majority in this sector. Using the ISIC occupation codes, it is

possible to identify salespersons, shop assistants, cashiers, and drivers and forklift operators as the treatment group. The control group for this sector compromises of semi-skilled workers who are not affected by the law.

Table 3.4 below shows the mean sample characteristics of individuals in the retail sector treatment and control groups for the wage analysis, by province. The mean age of retail workers is approximately 33 across all provinces. In the Western Cape, there is an almost equal probability that males and females are employed in this sector, but the sector is more male-dominated in KwaZulu-Natal and Gauteng. With regards to racial composition of employment, in KwaZulu-Natal and Gauteng this sector is African dominated whereas it is coloured dominated in Western Cape. in the Western Cape. The average number of completed schooling years, for both the treatment and control groups, is approximately equivalent to grade ten.

Table 3.4 Mean sample characteristics of treatment and control groups: retail sector

Variables	Western Cape		KwaZulu-Natal		Gauteng		National	
	Retail	Control	Retail	Control	Retail	Control	Retail	Control
Age	31.786	34.024	33.098	35.234	34.061	34.566	33.372	34.944
	(0.469)	(0.251)	(0.439)	(0.206)	(0.350)	(0.178)	(0.209)	(0.106)
Male	0.499	0.651	0.598	0.630	0.621	0.703	0.578	0.670
	(0.025)	(0.011)	(0.019)	(0.009)	(0.017)	(0.008)	(0.010)	(0.005)
African	0.178	0.255	0.631	0.707	0.793	0.744	0.636	0.656
	(0.020)	(0.011)	(0.019)	(0.009)	(0.014)	(0.008)	(0.010)	(0.005)
Coloured	0.675	0.584	0.039	0.033	0.050	0.048	0.142	0.125
	(0.024)	(0.012)	(0.009)	(0.004)	(0.009)	(0.003)	(0.007)	(0.003)
Indian	0.007	0.004	0.284	0.188	0.032	0.025	0.103	0.063
	(0.003)	(0.001)	(0.017)	(0.007)	(0.005)	(0.003)	(0.006)	(0.002)
White	0.140	0.157	0.046	0.072	0.125	0.183	0.119	0.156
	(0.018)	(0.010)	(0.008)	(0.005)	(0.011)	(0.008)	(0.006)	(0.004)
Years of schooling	9.997	9.449	10.159	9.397	9.988	9.846	10.006	9.523
	(0.121)	(0.063)	(0.091)	(0.054)	(0.103)	(0.048)	(0.054)	(0.028)
Sample	848	3561	1060	4750	1272	5210	4427	18317
Population	293862	1251856	633180	2544821	897605	3951624	2217069	9371475

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week)

3.4.3 Security

November 2001 saw the introduction of the minimum wage for the private security sector. Within this sector, there are five area types and several categories which distinguish the minimum wage which is applicable to an individual (BCEA, 2002).The private security sector is of high importance in urban areas. According to the Institute for Security Studies since 1994, the major cities in South Africa experienced an increase in crime rates. In particular, Johannesburg recorded the highest amount of serious crimes, followed by Pretoria, Cape Town and Durban during the period of

1994-1999. The study also showed that wealthy urban residents have a higher probability of becoming a victim of property crimes (Schönteich and Louw, 2001) .The private security sector has grown since 2001, where there has been an increase by 111.30 percent of private security officers and an increase of 66.7 percent of private security companies. A main reason that has been put forward by the South African Institute of Race Relations is that citizens do not rely on the police for their safety. The growth in this sector is due to urbanization, people and firms purchasing their own security which is driven by the dramatic increase in crime rates for South Africa (Maritz, 2012). This provides support for an analysis for the security sector in urban areas. Therefore it may provide evidence on whether the law is harmful or beneficial to society. The security sector is dominated by African males with less than twelve years of education (Bhorat et al., 2013). The treatment group for the security sector is those individuals who are security guards, protective service workers and night watchmen. The control group for this sector, following the Bhorat et al (2013) methodology, is African and Coloured males in semi-skilled jobs where the law is absent, with no more than twelve years of education.

Table 3.5 below shows that the security sector employs a large proportion of men with an average of ten years of schooling, with a composition ranging from 84 percent to 90 percent, and thus, the control group for the security sector is restricted to males with no more than twelve years of schooling.. Also, this sector employs the youngest individuals, when compared to the retail and domestic worker sectors. The mean age for the security control sector is two to three years older than the treatment group. The security sector in KwaZulu-Natal has a diversified employment between the races. Here, 86 percent employed are African, and the second largest race group employed is Indians. Gauteng and the country statistics show that the African race is largely employed in this sector. In contrast, the security sector in the Western Cape employs about 40 percent of Africans compared to 55 percent of Coloureds. In each province, there is a small but notable proportion of workers who are white. In contrast, the control group is dominated by Africans in KwaZulu-Natal and Gauteng, and in the Western Cape, it shows larger Coloured employment, relative to African employment. Therefore the racial make-up of the control group does not match the treatment group as closely as for other sectors. In addition, the security control group has approximately 1.5 fewer years of completed education

than the control group, on average. The sample size for the security treatment group is the smallest of the three sectors, especially so for the Western Cape, which may prove problematic for later analysis.

Table 3.5 Mean sample characteristics of treatment and control groups: security sector

Variables	Western Cape		KwaZulu-Natal		Gauteng		National	
	Security	Control	Security	Control	Security	Control	Security	Control
Age	31.041	34.611	32.636	34.653	31.858	35.058	32.171	35.129
	(0.741)	(0.320)	(0.523)	(0.295)	(0.359)	(0.214)	(0.261)	(0.134)
Male	0.847	1.000	0.905	1.000	0.895	1.000	0.895	1.000
	(0.036)	(0.000)	(0.017)	(0.000)	(0.016)	(0.000)	(0.010)	(0.000)
African	0.397	0.337	0.864	0.955	0.905	0.954	0.844	0.854
	(0.047)	(0.015)	(0.023)	(0.007)	(0.016)	(0.004)	(0.012)	(0.004)
Coloured	0.548	0.663	0.023	0.045	0.020	0.046	0.068	0.146
	(0.047)	(0.015)	(0.012)	(0.007)	(0.007)	(0.004)	(0.007)	(0.004)
Indian	0.000	0.000	0.068	0.000	0.003	0.000	0.022	0.000
	(0.000)	(0.000)	(0.018)	(0.000)	(0.003)	(0.000)	(0.006)	(0.000)
White	0.056	0.000	0.045	0.000	0.072	0.000	0.066	0.000
	(0.021)	(0.000)	(0.012)	(0.000)	(0.014)	(0.000)	(0.009)	(0.000)
Years of schooling	10.464	8.673	10.261	8.943	10.489	9.002	10.385	8.767
	(0.164)	(0.081)	(0.139)	(0.080)	(0.12)	(0.069)	(0.079)	(0.040)
Sample	166	2382	383	2356	499	3470	1314	11259
Population	60108	809811	229154	1338386	400663	2538631	784532	5692447

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week)

3.5 Conclusion

This chapter provided a detailed description of the Labour Force Survey dataset used for the empirical component of this dissertation. Three provinces, namely Gauteng, Western Cape and KwaZulu-Natal, are chosen for the analysis. The differences between provinces, such as racial composition and unemployment rates, make an argument to assess the law's impact separately for each province. The specific sectors, namely domestic work, retail and private security, are chosen

largely due to their relevance as sources of employment in urban areas in these provinces. For the analysis, the workers in each separate sector have a corresponding control group in order to determine whether other factors, besides the law, affected wages and unemployment. The sample was determined by the use of Bhorat et al. (2013) methodology for the treatment and control groups. The summary statistics show that the control groups are a fairly close match for the treatment groups across most sectors and provinces, although small sample sizes in the security sector may be a challenge.

The following chapter discusses the empirical estimation models used to determine the wage, employment and compliance estimates, using the above described data. It then presents and discusses the findings of these models, comparing the effectiveness of the law across provinces.

CHAPTER 4. EMPIRICAL ANALYSIS OF PROVINCIAL VARIATIONS IN MINIMUM WAGES

The preceding chapters provided a detailed description of the effects resulting from the minimum wage laws, as well as how the laws came into being. The results from previous studies showed that employment and wages adjust, to a certain extent, to the law, but that the employment changes can be negative or positive depending on the nature of the labour market. Compliance with the law also plays a crucial role in determining the outcomes of the law. Chapter 3 gave a description of the dataset used in the study as well as motivations for the sectors and provinces of analysis. Therefore, the aim of this chapter is to explain the empirical models used and to discuss the results from these models.

The chapter begins by evaluating the potential effects of the law at a descriptive level, by comparing the pre and post law periods. The second section contains the results of kernel density graphs as well as the results of the Kolmogorov-Smirnov tests. This is used to assess wage effects across the full distribution. Section 4.3 outlines the methodology of compliance, following Bhorat et al. (2012a), and presents the results. Thereafter, the difference-in-difference methodology used, adapted from Bhorat et al. (2013), is explained. In section 4.5, the results from the wage and employment models are presented. Finally, section 4.6 discusses the meaning of the findings, while 4.7 concludes the chapter.

4.1 Descriptive analysis of the impacts of minimum wage laws

The empirical analysis begins by presenting estimates of how the average labour market outcomes have changed between the pre- and post-law periods for the treatment and control groups. Descriptive statistics are presented for four labour market outcomes: the percentage of workers who are employed full-time, average weekly hours worked, and average real and nominal hourly wages. Monthly wages were converted to hourly wages using reported hours worked per week, based on the assumption that workers work every week in a month. Full-time workers as defined by Bhorat et al. (2013) are those who work at least 27 hours per week. Furthermore, nominal hourly wages were adjusted using the 2008 CPI to obtain real hourly wages. Differences between these labour market variables were estimated for each province, as well as for the country as a whole. A t-test to determine whether

the pre-law mean for each labour outcome was significantly different to the post-law mean was conducted. One, two and three asterisks in the tables below refer to the pre-post differences to be significantly different at the ten, five and one percent significance levels respectively.

Recall from Chapter 2 that economic theory suggests, in a perfectly competitive covered market (treatment sectors), that full-time employment will decrease as a result of the law, in sectors were the minimum wage set was higher than the actual wage paid. However, in an uncovered sector (control group sectors), full-time employment is said to increase as the newly unemployed seek employment in this market, which ultimately leads to a reduction in their wage received. Also, the law is implemented in order to ensure an appropriate wage is received for those employed in these vulnerable sectors, which would lead to a prediction of higher wages. Additionally, one of the other objectives of the law is to keep employment levels more or the less the same, between periods, in these sectors, which would lead to the hypothesis of the full-time employees to not experience a significant change between periods. However, the minima stipulated for part-time workers and full-time workers differ. Therefore, a potential effect that may result from the law is that employers may tend to decrease working hours offered to employees. This could have the effect of lowering the number of full-time workers, but increasing the number of part-time workers. The analysis done in this research is restricted to full-time workers and therefore, does not consider the part-time and full-time types of general equilibrium effects. The estimates of the fall in employment resulting from the law may therefore overstate the full effect.

The following section discusses the main results found for these mentioned variables for each sector and their respective control groups between periods.

4.1.1 Domestic work sector

Table 4.1 shows that there were no significant changes in hours worked throughout the comparison of pre and post periods for any region with the exception of Western Cape, where it increased significantly by approximately 2.4 hours per week. There were no significant changes in the proportion of domestic workers who were employed full-time. Nominal hourly wages faced a sizeable and significant increase across two provinces, KwaZulu-Natal and Gauteng, as well as nationally. The

KwaZulu-Natal real hourly wage increased from R4.65 to R5.22, which was significant at the ten percent level. However, after converting wages into real terms, a significantly lower real hourly wage was found in the Western Cape with no other significant changes.

Table 4.1 Mean characteristics: Domestic and Control group

Variables	Western Cape				KwaZulu-Natal				Gauteng				National			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	Domestic	Control	Domestic	Control	Domestic	Control	Domestic	Control	Domestic	Control	Domestic	Control	Domestic	Control	Domestic	Control
Hours per week	31.745	42.755	34.189**	42.638	43.211	45.492	43.133	42.712*	40.084	40.942	38.987	42.610	39.018	43.342	39.350	42.791
	(1.032)	(0.644)	(0.681)	(0.442)	(0.887)	(1.369)	(0.492)	(0.632)	(0.649)	(1.280)	(0.505)	(0.468)	(0.366)	(0.521)	(0.277)	(0.278)
Full-time	0.656	0.938	0.696	0.924	0.880	0.920	0.893	0.870	0.818	0.882	0.806	0.947**	0.793	0.906	0.808	0.908
	(0.033)	(0.014)	(0.024)	(0.011)	(0.023)	(0.028)	(0.012)	(0.014)	(0.017)	(0.028)	(0.015)	(0.012)	(0.010)	(0.011)	(0.008)	(0.007)
Nominal hourly wage	6.351	6.003	6.507	6.919**	2.997	5.076	4.256***	6.524***	4.601	6.044	6.204***	7.612***	3.926	5.304	5.143***	6.713***
	(0.323)	(0.244)	(0.215)	(0.266)	(0.176)	(0.436)	(0.110)	(0.265)	(0.202)	(0.312)	(0.272)	(0.244)	(0.097)	(0.148)	(0.123)	(0.131)
Real hourly wage	9.821	9.295	8.270***	8.714	4.648	7.845	5.216*	7.850	7.133	9.349	7.531	9.370	6.083	8.209	6.337	8.258
	(0.498)	(0.378)	(0.274)	(0.347)	(0.274)	(0.677)	(0.135)	(0.315)	(0.317)	(0.483)	(0.298)	(0.303)	(0.151)	(0.229)	(0.136)	(0.160)
Sample	327	271	910	1019	434	128	1304	922	777	242	1289	517	2902	1084	5415	3519
Population	119890	111741	224120	193591	196067	63028	687519	352403	377250	122081	945204	380407	1024936	407137	2350464	1157732

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). Post-law means, for each variable which is significantly different from the pre-law means, at the 1 percent (***), (**) 5 percent and (*) 10 percent levels are shown.

Hours worked for the control group did not show significant changes for the Western Cape and Gauteng provinces, but showed a 2.8 hour per week decrease in KwaZulu-Natal which was significant at the ten percent level. The control group, similar to the treatment group, saw significant increases in nominal hourly wages for all provinces, as well as nationally. Real hourly wages, for all three provinces and nationally, did not experience significant changes between periods.

At a descriptive level, the minimum wage laws in the domestic sector appear to have benefited employees' of this sector in KwaZulu-Natal by the significant real wage increase but harmed these workers in Western Cape by significantly lowering real wages received. The control group experienced significant nominal hourly wage changes but no other significant changes between periods.

4.1.2 Retail/Wholesale Sector

Table 4.2 shows that hours worked across provinces varied, increasing significantly by 2.2 hours per week in the Western Cape, but remaining more or less constant in Gauteng and KwaZulu-Natal. However, the proportion of workers who are employed full-time increased significantly in all three provinces, by 7.3, 2.7 and 4.8 percentage points respectively. This led to an increase in national full-time employment of retail workers of 5.1 percent. Although nominal wages increased significantly throughout, real hourly wages for retail workers remained similar to that of pre-law real hourly wages.

Table 4.2 Mean characteristics: Retail and Control group

Variables	Western cape				KwaZulu-natal				Gauteng				National			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	Retail	Control	Retail	Control	Retail	Control	Retail	Control	Retail	Control	Retail	Control	Retail	Control	Retail	Control
Hours per week	41.374	43.285	43.586**	43.689	47.097	45.855	46.899	43.719***	44.934	45.173	45.561	45.405	45.014	44.570	45.960*	44.379
	(0.762)	(0.411)	(0.550)	(0.313)	(0.695)	(0.395)	(0.530)	(0.281)	(0.607)	(0.294)	(0.456)	(0.205)	(0.335)	(0.172)	(0.279)	(0.135)
Full-time	0.857	0.921	0.930***	0.940	0.941	0.942	0.968*	0.900***	0.908	0.943	0.956***	0.972***	0.900	0.923	0.951***	0.933***
	(0.021)	(0.010)	(0.014)	(0.007)	(0.013)	(0.010)	(0.007)	(0.005)	(0.014)	(0.006)	(0.010)	(0.003)	(0.008)	(0.004)	(0.005)	(0.003)
Nominal hourly wage	9.468	13.548	11.433***	12.459*	8.135	11.037	9.647***	10.346*	10.204	13.444	11.368**	14.058	8.913	11.919	10.305***	11.925
	(0.446)	(0.520)	(0.465)	(0.313)	(0.374)	(0.349)	(0.340)	(0.223)	(0.391)	(0.377)	(0.433)	(0.297)	(0.200)	(0.191)	(0.223)	(0.154)
Real hourly wage	14.302	20.388	14.573	15.819***	12.249	16.512	11.732	12.629***	15.304	20.088	14.049	17.294***	13.404	17.877	12.743	14.748***
	(0.671)	(0.758)	(0.602)	(0.397)	(0.572)	(0.533)	(0.399)	(0.272)	(0.570)	(0.549)	(0.541)	(0.356)	(0.297)	(0.281)	(0.274)	(0.185)
Sample	321	1346	526	2208	356	1370	703	3354	559	2039	711	3171	2047	7721	2783	12301
Population	146355	614012	144797	638972	183285	743615	449963	1794761	335198	1291232	561058	2659225	905493	3577756	1388902	6166656

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). Post-law means, for each variable which is significantly different from the pre-law means, at the 1 percent (***), (**) 5 percent and (*) 10 percent levels are shown.

A key result in this sector is that the retail control group saw a significant increase in full-time workers only in Gauteng, whereas the treatment group in all provinces saw an increase in full-time employment. Another result to take note of is that the real hourly wage for the control group significantly decreased for all three provinces. The largest decline in real hourly wages was for the Western Cape, where pre-law real hourly wage mean was R20.39 compared to post-law mean wage of R15.82.

The minimum wage legislation can thus be said to be beneficial to retail sector workers in two ways, one being that they are more likely than the control group to work full-time after the law was implemented, and two, their real wages remained constant while those of the control group fell, meaning that the law appeared to protect them against falling wages.

4.1.3 Security sector

Security workers worked less hours in the post law period, relative to the pre law period, in all provinces and nationally, as shown in Table 4.3. This may be interpreted in accordance to the minimum wage law where the legislation stipulates the legal amount of working hours per week. Prior to the law, on average, the security sector worked approximately 55 hours per week and the introduction of the law, made it unlawful to work more than 48 hours per week. However, even post-law, all provinces displayed weekly hours of work exceeding 48 hours, but was lower compared to the pre-law time frame. Along with this, nominal hourly wages increased in Western Cape by R0.77 and KwaZulu-Natal by R2.12 but declined in Gauteng by R0.82. A peculiar result is that real hourly wage was lower in post law period compared to pre law period. The proportion of security workers working full-time in the Western Cape and KwaZulu-Natal decreased by 1.4 percent and 0.3 percent respectively. However, full-time employment in Gauteng increased by 2.3 percent and by 1.2 percent nationally.

Table 4.3 Mean characteristics: Security and Control group

Variables	Western Cape				KwaZulu-Natal				Gauteng				National			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	Security	Control	Security	Control	Security	Control	Security	Control	Security	Control	Security	Control	Security	Control	Security	Control
Hours per week	56.300	43.829	49.747	44.377	55.838	48.079	52.844	46.032***	54.337	45.571	52.770	45.557	54.514	45.447	52.526**	45.305
	(1.511)	(0.576)	(1.273)	(0.369)	(1.333)	(0.575)	(0.788)	(0.369)	(1.095)	(0.403)	(0.644)	(0.228)	(0.687)	(0.242)	(0.428)	(0.159)
Full-time	1.000	0.922	0.986***	0.950*	0.982	0.965	0.979*	0.937***	0.962	0.937	0.985	0.977***	0.972	0.922	0.984	0.948***
	(0.000)	(0.014)	(0.010)	(0.008)	(0.014)	(0.008)	(0.012)	(0.005)	(0.017)	(0.008)	(0.008)	(0.003)	(0.009)	(0.005)	(0.005)	(0.003)
Nominal hourly wage	8.057	10.496	8.839	10.831	6.659	8.063	8.780**	9.556***	9.459	9.242	8.639	11.492***	8.088	8.426	8.458	10.202***
	(0.839)	(0.415)	(0.694)	(0.288)	(0.674)	(0.335)	(0.545)	(0.251)	(0.801)	(0.279)	(0.348)	(0.227)	(0.452)	(0.153)	(0.250)	(0.130)
Real hourly wage	12.402	16.214	11.238	13.852***	10.341	12.439	10.844	11.687	14.605	14.303	10.718***	14.275	12.502	13.031	10.514**	12.711
	(1.315)	(0.635)	(0.880)	(0.372)	(1.066)	(0.518)	(0.661)	(0.305)	(1.244)	(0.427)	(0.463)	(0.285)	(0.703)	(0.235)	(0.319)	(0.162)
Sample	50	719	116	1651	84	510	301	1828	163	1212	334	2250	438	4057	963	8329
Population	21137	326617	38970	480739	52243	272910	177692	1059040	105426	704410	293879	1829286	218500	1765180	584582	4169524

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). Post-law means, for each variable which is significantly different from the pre-law means, at the 1 percent (***), (**) 5 percent and (*) 10 percent levels are shown.

The control group for the security sector faced an increase in full-time employment, post-law, in the Western Cape and Gauteng. The increase in the Western Cape security control group full-time employment may be due to the inflow of workers from the treatment group who have suffered a lower full-time employment rate. KwaZulu-Natal full-time employment declined in post law periods. However, hours worked rose in Western Cape and Gauteng by a minimal amount and fell in KwaZulu-Natal by two hours per week. Additionally, nominal hourly wages increased across the three provinces but real wage rate decreased between pre and post periods, although only significantly so for the Western Cape.

Workers in the security sector, as well as the accompanying control group, therefore appear to be harmed by the legislation of minimum wages. However, more detailed analysis is required before any strong conclusions are drawn.

4.2 Distributional analysis

The tables in the previous section indicate changes in mean characteristics between the period before and after the implementation of minimum wage laws. However, such averages may obscure changes that occur across the full distribution. This section therefore conducts an analysis of the distribution of wages around the minimum wage and the variation in the wage distribution over time, using kernel density plots. The figures indicate the distribution of the logged nominal and logged real hourly wage for each province, with the solid line indication the pre-law distribution and the dotted line the post-law distribution. As previously, each treatment group is matched with its respective control group. The vertical line serves as an indication of the natural logarithm of the value of the real and nominal hourly minimum wage when it was first introduced. A spike in the distribution of wages at the minimum wage is indicative that the law was binding. In addition to this, the Kolmogorov-Smirnov test is performed to test for distributional wage differences which indicate whether the post-law distribution of wages was significantly different from that of pre-law wage distributions. The null hypothesis of this test is that there is equality of wage distributions.

The domestic worker sector and the respective control group's nominal and real hourly wage, for all three provinces are shown in Figure 4.1 and 4.2 respectively. The treatment group for all three provinces reveal that for periods after the law, there

were a significant number of individuals who did not earn the lawful real and nominal wage, at the ten percent level. Furthermore, there is a slight rightward shift of the pre-law to post-law nominal wage distribution in Western Cape and Gauteng. KwaZulu-Natal, however, shows a large rightward shift in the pre- to post-law nominal wage distribution. The results of the equality of nominal wage distribution test, displayed in Table 4.4 below, shows that for Western Cape treatment group and the control group, the null hypothesis that there was no significant shift of the nominal wage distribution between pre- and post-law periods can be rejected at the ten percent level of significance. Turning to the real hourly wage distribution, pre-post periods, and the treatment group for KwaZulu-Natal saw a big rightward shift, a small shift in Gauteng, and a leftward shift with more clustering around the minimum wage for Western Cape. For real wages, the treatment group changes significantly for Gauteng. The control group doesn't, at the five percent level, but neither does it for KwaZulu-Natal at any level. This can be seen graphically by the real wage distribution remaining relatively similar between periods.

Figure 4.1 Kernel density plots of log of nominal hourly wages: Domestic and control
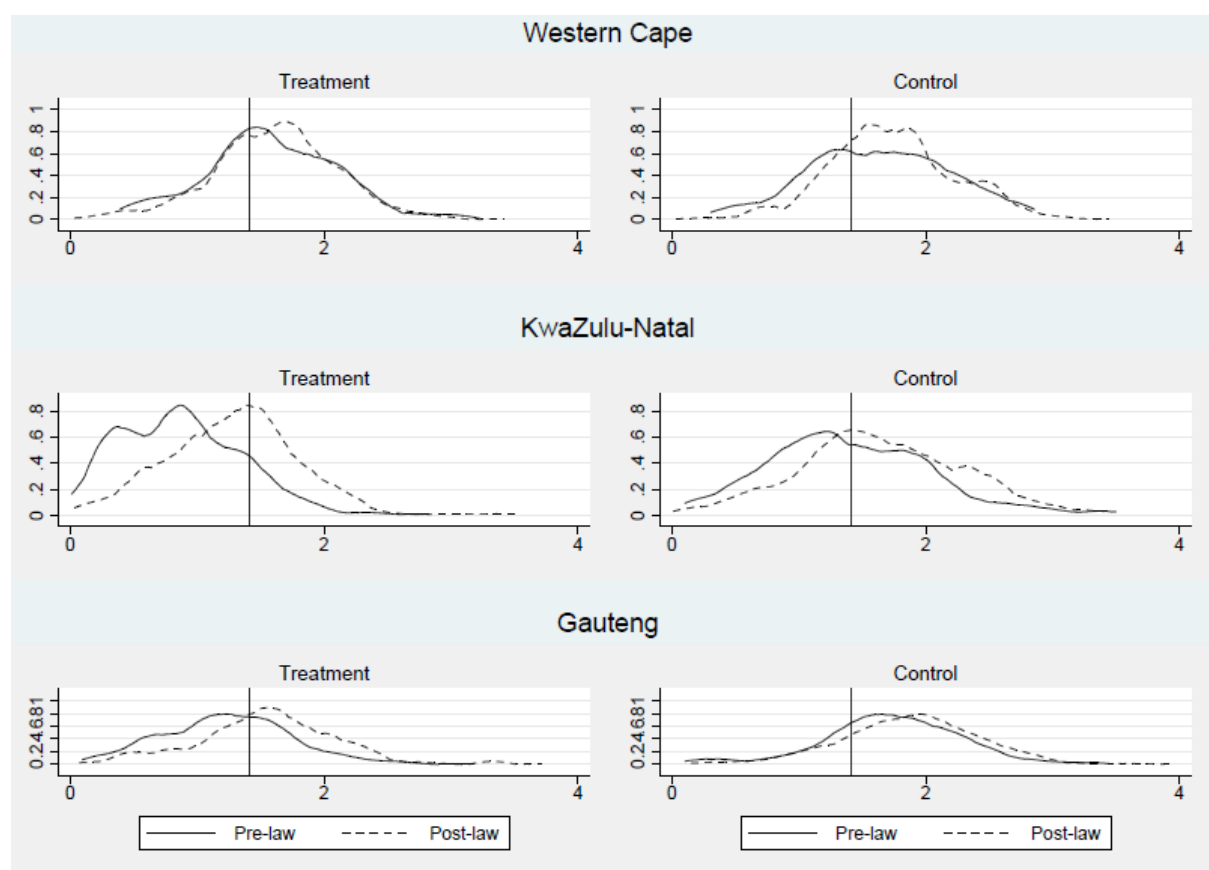
Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). The vertical line represents log of the nominal hourly minimum introduced in the sector (2008 prices) at the time of introduction.

Figure 4.2 Kernel density plots of log of real hourly wages: Domestic and control
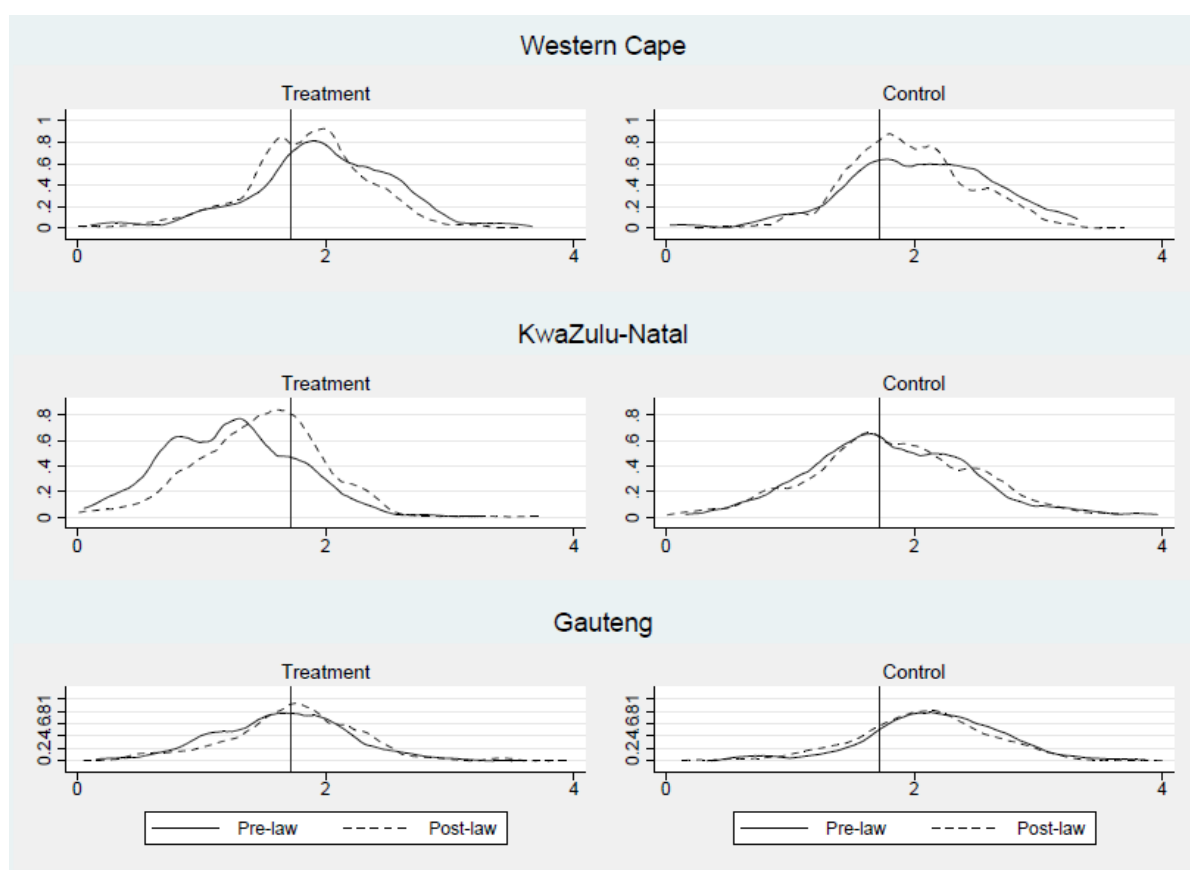
Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). The vertical line represents log of the nominal hourly minimum introduced in the sector (2008 prices) at the time of introduction.

Table 4.4 Kolmogorov-Smirnov tests of equality of distributions (p-values)

		Nominal Wages	Real Wages
Domestic Sector			
Western Cape	Domestic	0.092	0.000
	Control	0.002	0.000
KwaZulu-Natal	Domestic	0.000	0.000
	Control	0.000	0.798
Gauteng	Domestic	0.000	0.000
	Control	0.011	0.063
Retail Sector			
Western Cape	Retail	0.005	0.544
	Control	0.051	0.000
KwaZulu-Natal	Retail	0.000	0.343
	Control	0.003	0.000
Gauteng	Retail	0.003	0.021
	Control	0.000	0.000
Security Sector			
Western Cape	Security	0.177	0.051
	Control	0.047	0.000
KwaZulu-Natal	Security	0.000	0.043
	Control	0.000	0.111
Gauteng	Security	0.089	0.000
	Control	0.000	0.010

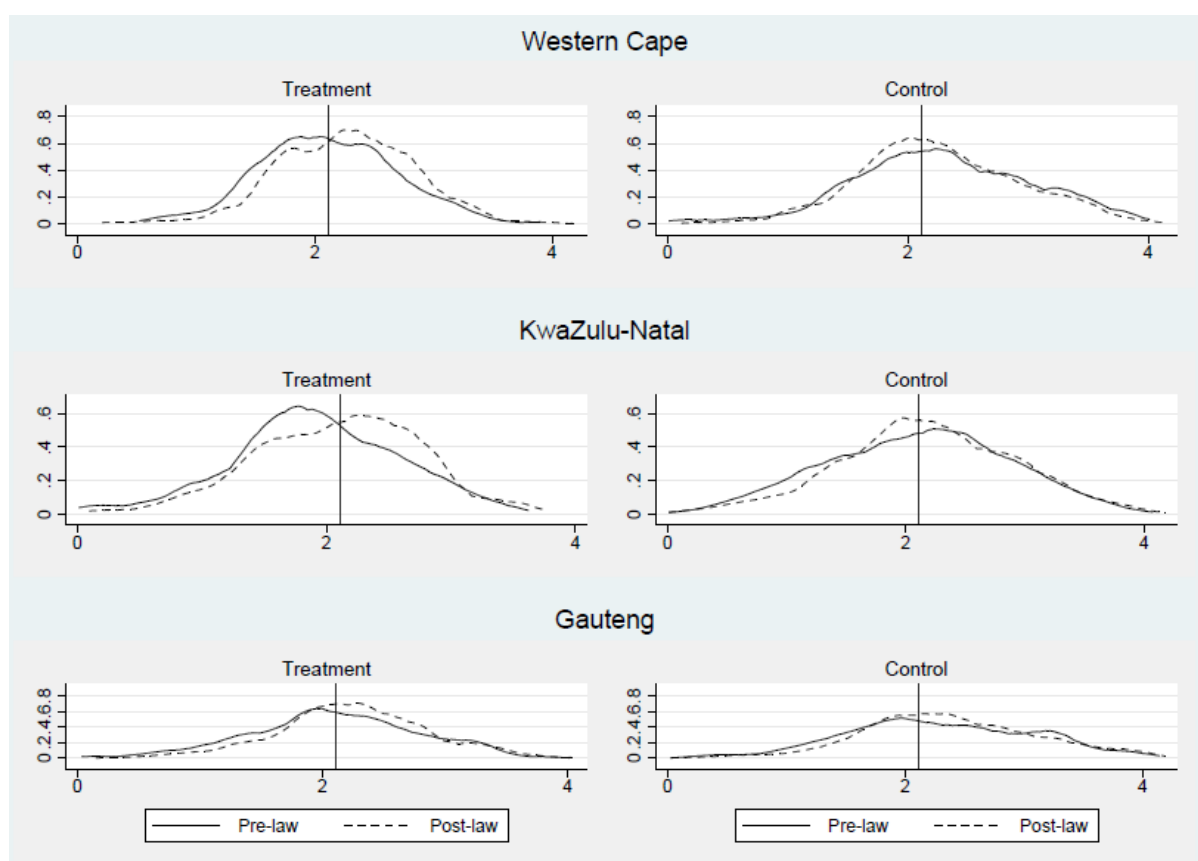Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. Standard errors are in parentheses. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week).

The wage distributions for the retail treatment and control groups for all three provinces are shown below in Figures 4.3 and 4.4. The kernel density plot for the

nominal hourly wages, Figure 4.3, for the retail sector in KwaZulu-Natal shows a large shift to the right for post-law wage distributions and is supplemented by the rejection of the equality of wage distributions. The real hourly wage distributions, Figure 4.4, for this sector and province saw a large leftward shift and an upward shift of the control group's wage distribution. The test of equality for real wage distributions for the treatment group cannot be rejected at all conventional levels of significance, but can be rejected for the control group at all levels of significance. However, Gauteng and the Western Cape treatment groups' wage distribution between periods remain fairly similar. The nominal wage distribution for retail workers in Gauteng shows a fairly similar pattern between the periods and therefore, the null hypothesis cannot be rejected at the one percent significance level. Retail workers in Western Cape, according to the Kolmogorov-Smirnov test, experience no significant real hourly wage distribution change between periods. The real hourly wage distribution narrows slightly for Gauteng and hence, the equality of wage distribution is rejected at the five and ten percent significance levels. For the retail control group's real hourly wage distribution, for all three provinces, the equality of real wage distribution is rejected at all conventional significance levels, with the kernel density plots showing a rightward shift with a slight narrowing in the wage distribution.

Figure 4.3 Kernel density plots of log of nominal hourly wages: Retail and control

Notes: The data are weighted. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). The vertical line represents log of the nominal hourly minimum introduced in the sector (2008 prices) at the time of introduction.
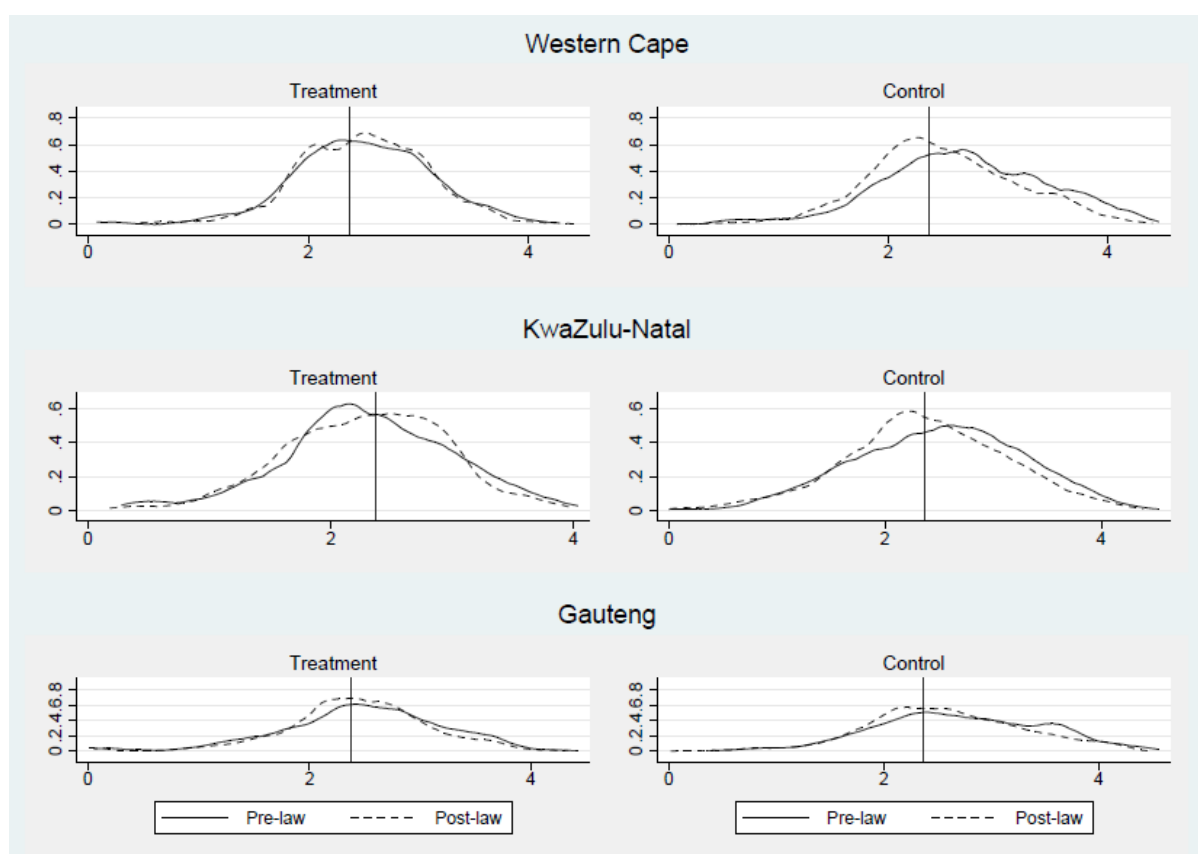
Figure 4.4 Kernel density plots of log of real hourly wages: Retail and control

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). The vertical line represents log of the nominal hourly minimum introduced in the sector (2008 prices) at the time of introduction.

Finally, Figures 4.5 and 4.6, respectively, show the nominal and real wage distributions for the security sector. The data here for the treatment group are quite sparse, especially for the pre-law period. Graphically, the security treatment and control group for Western Cape and Gauteng's treatment group do not reflect any significant shift of post-law nominal wages. This is supplemented by the non-rejection of the null hypothesis of wage distribution equality at the five percent significance level. In contrast, KwaZulu-Natal security workers and control group workers experience a rightward shift of the post-law nominal wage which leads to the rejection of the equality of distribution hypothesis at all conventional significance levels, with a smaller rightward shift for the control group. The security control group in Gauteng also saw a slight rightward shift in the post-law nominal wage distribution

at all conventional levels of significance. The real hourly wage for the security treatment group for KwaZulu-Natal rejects the null hypothesis of the equality of post-law distributions at the five percent level, and it can be seen that the wage distribution curve becomes less spread out. The corresponding control group in KwaZulu-Natal shows no significant change in the post-law wage distribution. Both the treatment and control groups for the security sector in Gauteng have a downward shift of the post-law real wage distribution, although it is a very small shift for the control group. The null hypothesis is rejected at all levels of significance. The security sector in Western Cape saw a leftward shift and flattening of the post-law real wage distribution, at the ten percent level, and the related control group had a similar, but more significant change in their real wage distribution between the periods.

Figure 4.5 Kernel density plots of log of nominal hourly wages: Security and control
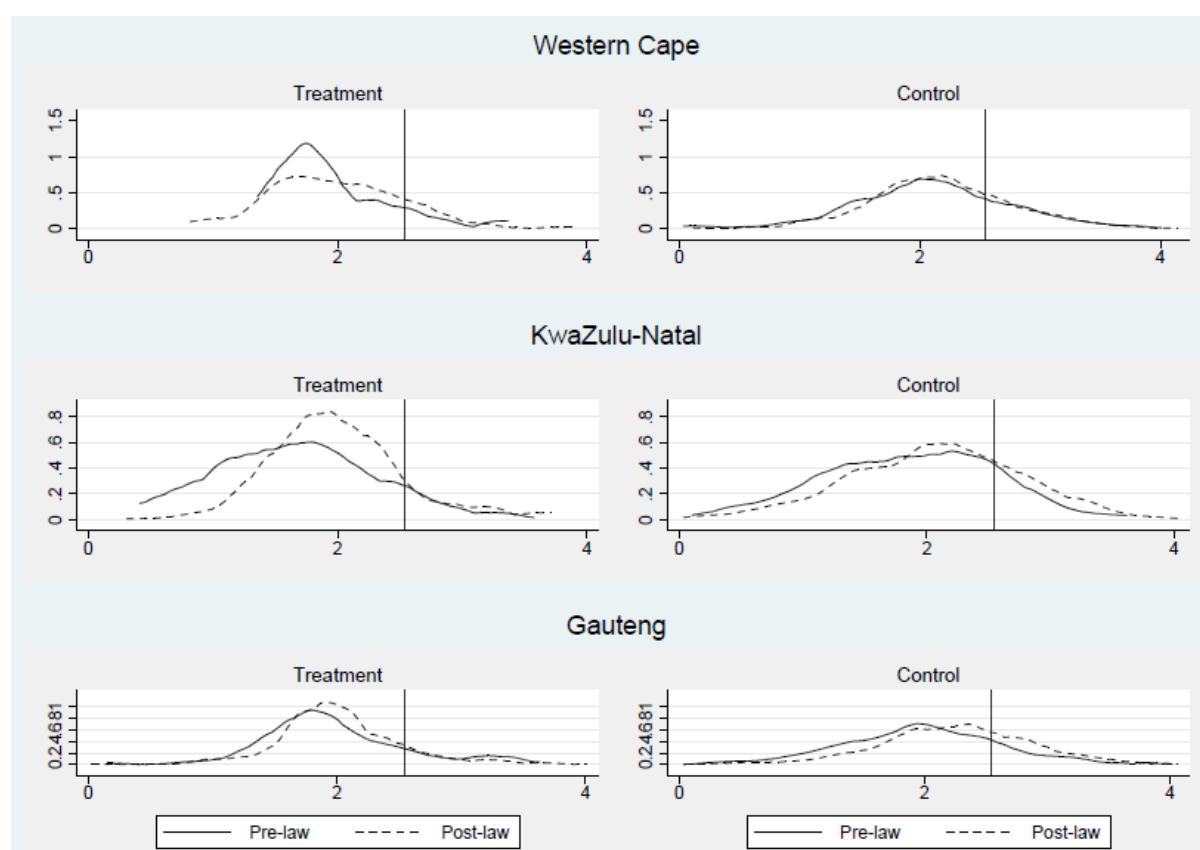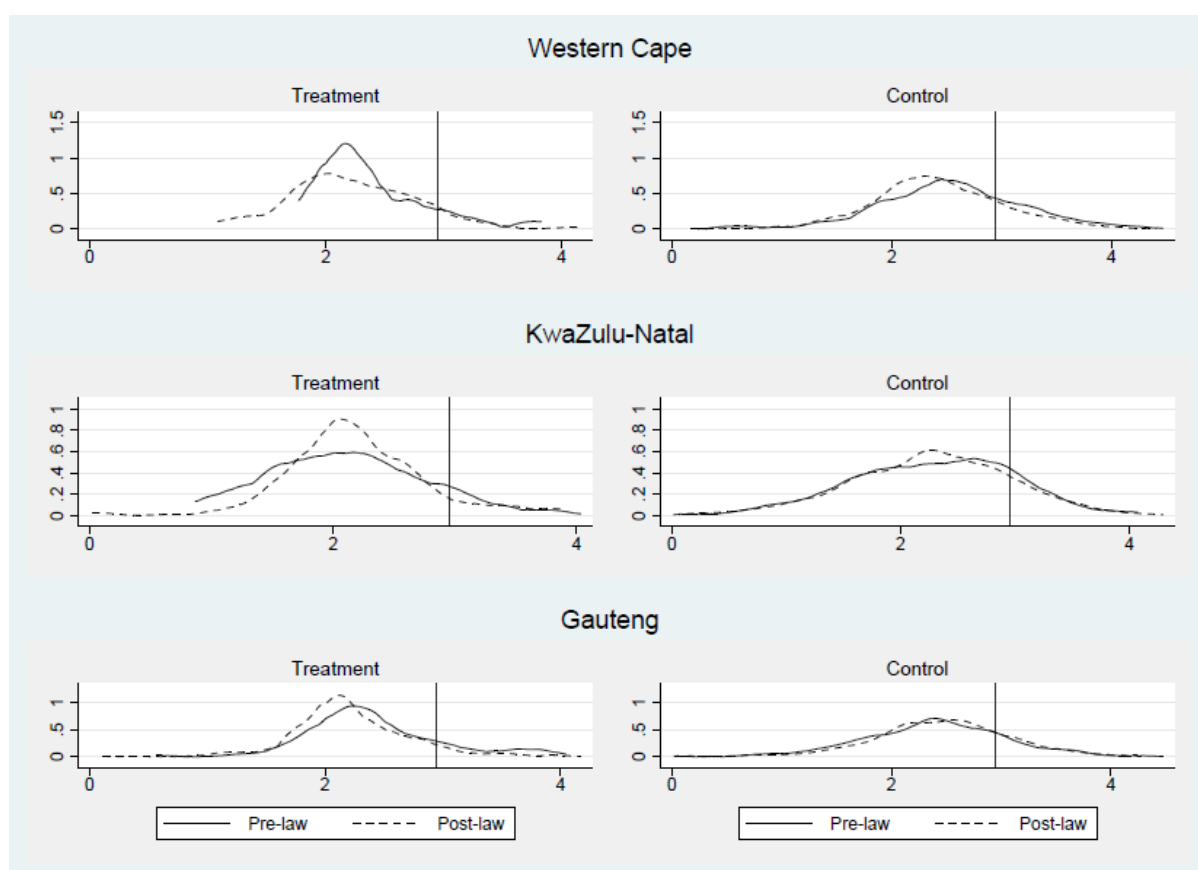

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). The vertical line represents log of the nominal hourly minimum introduced in the sector (2008 prices) at the time of introduction.

Figure 4.6 Kernel density plots of log of real hourly wages: Security and control

Notes: The data are weighted. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week). The vertical line represents log of the nominal hourly minimum introduced in the sector (2008 prices) at the time of introduction.

Overall, therefore, in the Western Cape, each control group, with the exception of the domestic worker sector, saw significant decreases in post-law nominal and real wages reported in the descriptive statistics. The results presented by the Kolmogorov-Smirnov tests support the results obtained from Table 4.4 by showing that pre-post wage distributions were different. The KwaZulu-Natal treatment and control groups showed significant nominal changes between pre-post periods which are shown in Table 4.4and are again supported by the results of the Kolmogorov-Smirnov tests. The real hourly wage distribution in KwaZulu-Natal was significantly different for the domestic worker sector and the retail control group, as supported by the kernel density graphs. Nominal wage differences between periods, as shown by the test of equality and descriptive statistics, were significantly different for the

domestic and retail treatment groups, and for the control groups for the security and domestic sector. Evidence for the province's retail control and security treatment group real hourly wage differences between periods is given by the rejection of equal wage distributions hypothesis. Therefore it must be concluded that the same wage changes were not observed consistently across provinces or across sectors, which provides further motivation for the disaggregated analysis conducted in this research.

4.3 Analysis of compliance

As discussed in the literature review chapter, South Africa is not short of employment legislation, but rather, experiences problems such as a lack of compliance. This dissertation follows the study undertaken by Bhorat, Kanbur and Mayet (2012a) in estimating an index as a measure of violation of the law, but does so separately for the three sectors as well as for each province.

Compliance with the law may be visually inspected using kernel density plots or by a numerical estimation. Graphically, full compliance can be seen when there is a single spike in the wage distribution and no workers that are covered by the law to lie to the left of the vertical line, which represents the corresponding lawful wage. It is clear from the kernel density plots presented in the previous section that this is not the case for South Africa. Instead, large proportions of workers receive wages in violation of the law.

Estimating enforcement/compliance of the law can be done by adopting the Bhorat, Kanbur and Mayet (2012a) family of violation indices. This is given by:

$$V_\alpha = E\left\{[(w^m - w)/w^m]^\alpha\right\} \qquad (1)$$

In this equation, w represents wages and w^m is the respective minimum wage in a sector. The index, α, denotes the depth of noncompliance with the law, which is the difference between lawful minimum wage and actual wage. Lastly, the expectations operator, E, is with respect to wage distribution in the sector to which w^m applies. The standard measure of violation is when $\alpha = 0$, which is simply the percentage of employed and covered individuals who earn below minimum wages.

The violation estimates of the minimum wage law are shown in Table 4.5. The values in the table show the proportion of workers who are earning below the legal hourly rate in each year after the implementation of the law, by sector and province. The reported values are based on calculations using the log of real hourly wages and the log of real minimum wages for each year per sector.

Table 4.5. Non-compliance estimates by sector and province

Sector	Year	Western Cape	KwaZulu-Natal	Gauteng
Domestic	2002	0.371	0.820	0.604
	2003	0.356	0.683	0.415
	2004	0.214	0.666	0.358
	2005	0.352	0.651	0.424
	2006	0.188	0.557	0.437
	2007	0.241	0.570	0.271
Retail	2003	0.335	0.601	0.431
	2004	0.560	0.497	0.473
	2005	0.390	0.481	0.448
	2006	0.403	0.541	0.361
	2007	0.394	0.447	0.418
Security	2002	0.905	0.960	0.917
	2003	0.921	0.909	0.926
	2004	0.948	0.867	0.889
	2005	0.803	0.802	0.949
	2006	0.877	0.874	0.918
	2007	0.898	0.964	0.947

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The figures show the proportion of workers earning below legal minimum wage, for each province and sector, in periods after the law. The sample includes non-self-employed workers aged 15 to 65 in urban areas, who work full time (at least 27 hours per week).

The legal minimum wage for the domestic sector came into effect in 2002. In that year, Western Cape employers of domestic workers were more compliant compared to the KwaZulu-Natal and Gauteng provinces. The proportion of employees in this sector earning below the stipulated wage was 37 percent in Western Cape, 60 percent in Gauteng and 82 percent in KwaZulu-Natal. This indicates that employers were slow to react to the introduction of the law, or that enforcement of the law was weaker in the earlier years of implementation. However, there was a large decrease over time, in non-compliance, from 82 percent in 2002 to 57 percent in 2007, in KwaZulu-Natal. In 2007, a larger portion of domestic workers were paid the legal wage, as the percentage of individuals earning below the legal wage decreased substantially for all three provinces. Stronger enforcement agencies or the employers' decision to comply with the law may be the main influences of the change. However, there remain very wide disparities in compliance across the three provinces, with Western Cape employers of domestic workers being the most complaint for all years.

The year 2003 saw the retail sector minimum wage law being implemented. For this year, 60 percent of retail workers in KwaZulu-Natal earned less than the minimum, whereas in the Western Cape, only 33.5 percent were underpaid. The extent of non-compliance decreased substantially in the first year, especially in KwaZulu-Natal. In the Western Cape, higher proportions of workers in this sector were underpaid for the years 2004 to 2007 compared to 2003. This could be an indication that there was an inflow of workers who were willing to earn less than the minimum. It could also suggest that enforcement in this sector and province was weak. KwaZulu-Natal and Gauteng, in contrast to the Western Cape, showed that employers' increased their compliance with the law, as 44.7 percent of workers in KwaZulu-Natal and 41.8 percent of workers in Gauteng, earned below the legal wage in 2007.

Overall compliance in the security sector for all three provinces was very low, as illustrated in the kernel density plots. Even though the Western Cape security sector showed that in 2005, a 10.2 percentage point greater proportion of security workers earned the minimum wage compared to 2002, the majority of workers did not earn the legal wage. Approximately 89.2 percent of security workers in the Western Cape, over the six year period, were underpaid. A similar pattern is seen for KwaZulu-Natal in 2005 and Gauteng in 2004, where there was an increase in the portion of workers

earning the minimum relative to 2002. Non-compliance in the security sector was largest for KwaZulu-Natal and Gauteng, in 2007, where 96.4 percent and 94.7 percent respectively, of the employed security sector received sub-minimum wages. However, these estimates must be treated with some caution due to small sample sizes. Nonetheless, these non-compliance estimates are suggestive that there are very weak enforcement agencies and that employers in this sector are less willing to comply with these laws. Moreover, seeing that the security sector employs younger workers relative to the retail and domestic sectors, and that the youth unemployment rate in South Africa has been increasing over time, it is perhaps not very surprising if workers in this sector are reluctant to report non-compliance of employers. In addition to this, young African less-educated males contribute largely to the sectors employment, and due to these individuals being seen as providers to their households, they may be willing to receive lower than legal wage in order to secure income.

In general, the compliance estimates presented here indicate that there are fairly low levels of compliance across all sectors and provinces. According to Bhorat (2014) compliance is dependent on several factors that are specific to each labour market. In particular, developing countries have low levels of compliance to the minimum wage laws. These countries are generally constrained in terms of resources and therefore, a measure that simultaneously protects employees and incentivizes firms to comply with the law is needed. Factors identified to influence enforcement are: institutional factors, individual characteristics of inspectors, firm characteristics and local labour market characteristics. Institutional factors relate to number of minima in the labour market, the structure of penalties, resource allocation to enforcement agencies and awareness of the law. The importance of these factors varies in each country. Education, experience and age of inspectors are also key in determining the level of enforcement. Firm characteristics regarding firm size, number of previous violations, distance from enforcement agencies and if there is foreign ownership also have an effect on compliance of employers. Labour market characteristics, such as unemployment rates, levels if unionisation and wages relative to the minima are also said to determine the level of enforcement.

In South Africa, there are several sectoral minima that vary according to area of work, occupation and hours worked. This makes the minimum wage laws

complicated and negatively affect the level of enforcement. Stanwix (2013) notes that there are limited penalties regarding non-compliance of the minimum wage laws, which then shows that the penalty structure is not effective to encourage compliance. The IES training roadmap (2011) reveals that only 60 percent of inspectors have a matric qualification. Therefore, there are inspectors with less than a matric which then could negatively affect their ability to conduct inspections accurately. There are relatively a few number of labour centres in the country, 127 in 2007 (Bhorat et al, 2012b). This increases the likelihood that firms are located far from these agencies, which then also contributes to the lower levels of compliance and enforcement. It is known that South Africa has a high level of unemployment that that increased from 22 percent in 1994 to 25 percent in 2014 (StatsSA, 2014). This could influence employers to pay lower than the lawful minimum as there is an oversupply of available workers willing to accept less than the legal wage.

The estimates presented are not out of line with those presented in Bhorat et al (2012a, 2012b). However, this research adds to the understanding of compliance by indicating that there is large geographical variation in the extent of compliance, with particularly low compliance rates being present in KwaZulu-Natal.

4.4 Econometric Approach

The application of Card and Krueger (1995) has been widely used throughout economic research on minimum wages. This dissertation specifically employs the Bhorat, Kanbur and Mayet (2013) econometric model which is adapted from Card and Krueger's (1995) methods and is described below. The two specifications of the econometric model are as follows:

$$Y_{ikt} = \beta_0 + \beta_1 POST_t + \beta_2 SECTOR_k + \beta_3 POST_t * SECTOR_k + \varphi_j + \varepsilon_{ijkt} \qquad (2)$$

The above equation represents the intended equation of use for the analysis of wages. The dependent variable, $Y_{ikt,}$ is used to evaluate outcomes of wages for an individual (i) for time period t, who is in a district council k. A time dummy, $POST_t,$ is included to differentiate between periods before the law and after the law's implementation. The assumption is that the published date in the legislation is the date at which the law became binding. Another dummy variable, $SECTOR_k,$ is used to differentiate between the control group and the sector which is affected by

minimum wage. If an individual is in the control group, $SECTOR_k=0$ and if the individual is in the actual sector, $SECTOR_k=1$. The average change in the post-law period for the employment or wage dependent variable, for the treatment and control group is captured by the β_1. The coefficient, β_2, captures the outcome variable differences between the control and treatment groups over the period of analysis. The difference-in-difference term is given by $POST_t*SECTOR_k$, which estimates the effects on the sectors of analysis. The inclusion of this term is based on determining if changes in the minimum wage sectors were due to the law, by testing whether or not the control groups experienced similar shocks to the treatment group. If the control group and sector groups experienced similar effects, then the minimum wage cannot be the reason for changes in wages. The coefficient of this term, β_3, estimates the difference in wages, after the law, between the control group and the sector of interest. Additionally, φ_j represents district level controls where j represents the district council.

Two versions of equation 2 will be estimated. The first will consider the law's effect on the probability of employment in relevant sectors. Here, the dependent variable would be equal to one if the individual is employed in the law-affected sector and 0 otherwise, and the sample will include both currently employed and searching unemployed working age individuals. The second version of equation 2 will be estimated with the dependent variable being the log of real wages (deflated at the 2008 CPI) for the control and treatment groups, with both groups being employed.

In comparison to Bhorat et al (2013), this study will modify equation 2 in order to assess the law and its impact across provinces. This is done by estimating the equation separately for each province. This will allow for the effect of each variable to differ in each province and therefore provide results which are unique to each province.

A further model specification is used to assess the probability of employment outcomes while taking into account the variation across district councils in the intensity of the law, based on the initial wage of workers in the pre-law period. Therefore, equation 3 will produce results that show whether employment probabilities have increased in district councils where there was a large pre-law wage gap.

$$Y_{ijkt} = \alpha_0 + \alpha_1 POST_t + \alpha_2 GAP_{jk}*SECTOR_k + \alpha_3 POST_t*GAP_{jk}*SECTOR_k + \chi_{ijkt} + Y_{ijkt} \quad (3)$$

Where: $\quad GAP_{jk} = (w^t_{mjk} - w^{t-1}_{jk})/w^{t-1}_{jk}$ \quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad (4)

The above equation is used for persons in an individual sector of analysis, which is again intended to be estimated for each province separately. Equation 3 is an extension of the Bhorat, Kanbur and Mayet (2013) study, who estimated the equation at a national level. The control group is excluded in the above equation. Additionally, this specification does not control directly for district councils. Instead, the intensity of the law's impact is estimated via the term GAP_{jk}, where j represents the district council of work and k represents the sector of work. The coefficient α_1, provides information about the average changes in the outcome variable after the implementation of the minimum wage law. The term GAP_{jk} is used to obtain deviations of geographic locations of self-reported wages of workers before the law was implemented. The α_2 coefficient on the GAP_{jk} term measures the outcome differences between low GAP and high GAP areas, for each sector, in the post-law period. The difference-in-difference coefficient, α_3, estimates the outcome changes that are due to the law in areas where the GAP term was the largest. Finally, since control groups with similar characteristics are not isolated here, worker characteristics may vary substantially between individuals in the model, and therefore the term χ_{ijkt}, is used to control for age, gender, education and race.

The determination of the GAP_{jk} variable is given by equation 4. The term: w^t_{mjk} shows the initial implementation at time (t) of minimum wages, m, in a sector (k) in a given district council (j). Average wages in a sector in a given location one year before the law was implemented are given by the term w^{t-1}_{jk}. In areas where average wages prior to the law are above average minimum legal wages, GAP_{jk} is set to 0. The GAP term is constructed by the use of real, full-time hourly wages. Furthermore, the GAP_{jk} variable shows the proportional increase that is necessary for initial wage to equate with the minimum wage. It also measures the distinct differences across district councils.

In addition to the mentioned specifications of the estimating equations, an additional regression is included in order to test the wage and employment results that were retrieved from equation 2 and 3 respectively. This is given as equation 5 below.

$$Y_{ijkt} = \alpha_0 + \alpha_1 POST_t + \alpha_3 POST_t * GAP_{jk} * SECTOR_k + \chi_{ijkt} + Y_{ijkt} \qquad (5)$$

The control group is again excluded from the analysis. The robustness check is done by including controls for district councils, which were excluded from equation 4. The coefficient of interest in this equation is the one on the difference-in-difference variable, $POST_t * GAP_{jk} * SECTOR_k$. This is used to examine the impact of the minimum wage law on wages. Bhorat et al. (2013) note that this is their preferred estimating equation, perhaps because it allows for each district council's outcome to differ, rather than assuming that all of the district effects operate through the wage gap.

In conclusion, the wage response to the law is estimated using equation 2 and equation 5, estimated separately by province. This study will attempt to examine the response of the probability of employment to the minimum wage law using provincially-disaggregated estimations of equation 3 and equation 5. The choice of these particular equation specifications is for purposes of comparison with the findings of Bhorat et al. (2013).

4.5 Econometric results

The econometric methods described above, with two difference-in-difference specifications, are used to examine the effects of the minimum wage law on the relevant sectors. Two potential outcomes of the law are evaluated, namely the employment probability and wage level effects.

4.5.1 Probability of employment

The results of the difference-in-difference empirical model for the probability of employment are shown in Tables 4.6, 4.7 and 4.8. Each sector analysed in each of the three provinces is estimated by equation 3 and equation 5, which are presented in the table as specification I and II respectively. Equation 3 shows the estimates of the employment equation, for each sector in each province, with the inclusion of individual level controls and the gap variable. For the second equation, the individual level controls as well as district council level controls are included, but the gap variable is omitted. For both models, the dependent variable is a dummy variable which is equal to 1 if the individual is employed in the covered sectors and equal to 0 otherwise, and is estimated using a probit model. Additionally, the sample used for

the employment regression includes those individuals who are demographically similar to those in the treatment group, and those who are of working-age and seeking employment. In other words, the sample contains employed individuals who are covered by the law in the specific sector, those employed in other sectors and those who are looking for work but currently unemployed.

The first employment model specification for domestic, retail and security workers in all three provinces, shows that the post law coefficients are large, positive and significant at the one percent level. This can be interpreted as there being a higher probability of employment in all of the respective sectors, across all three provinces, after the implementation of the law. The GAP_{jk} coefficients for the domestic worker sector in KwaZulu-Natal and Gauteng are positive and significant at the one and ten percent levels respectively. This is an indication that there was a higher likelihood of employment in the domestic worker sector, in KwaZulu-Natal and Gauteng, in those district councils where wages earned were far below the stipulated minimum. However, the wage gap coefficient for the domestic worker sector in the Western Cape yields an insignificant result. Similarly, the Western Cape wage gap variable for the security and retail sectors also show insignificant results. In contrast, the GAP_{jk} coefficient for KwaZulu-Natal retail and security workers reflect a large, positive and significant result, at the ten percent level. The security wage gap in Gauteng was also large and significant at the ten percent level. This is also an indication that the probabilities of employment in these two sectors were higher, in district councils that had the lowest wages compared to the minimum wage set. In Gauteng, the coefficient for the retail workers wage gap variable was negative. The negative gap coefficient suggests that there was a lower employment probability in those district councils that faced lower pre-law wages than the post-law wages. However, this result is not significant.

The interaction term between the wage gap and post-law variable measures the law's effect in periods after the law in district councils where the law was most binding. The domestic worker sector in Western Cape showed a negative and significant result at the five percent level, but a positive and significant result at the ten percent level for KwaZulu-Natal and an insignificant result for Gauteng. The negative coefficient implies that security workers in district councils in the Western Cape where the pre-wage gap was larger faced a lower probability of employment in

post law periods, relative to those in district councils with a lower pre-law wage gap, with the opposite effect in KwaZulu-Natal.

The second specification of the probit model for the employment response to the minimum wage law shows a positive coefficient for the post-law variable across all three provinces and across all three sectors, which is significant at the one percent level. Controlling for the district council in which someone resides, this again means that in periods after the law was implemented; there was a higher chance of employment in the domestic, retail and security sector in Western Cape, KwaZulu-Natal and Gauteng than in the pre-law period. The coefficients of the interaction term, of the post and the gap variable, for the domestic worker group in Western Cape and Gauteng are insignificant, whereas it is negative in KwaZulu-Natal. This negative coefficient is significant at the five percent level and indicates that domestic workers in district councils where the pre-law gap was larger faced a lower probability of employment in post law periods, relative to those in district councils with a lower pre-law wage gap. The security sector in the Western Cape, KwaZulu-Natal and Gauteng resulted in similar negative coefficients on the interaction terms. In contrast, the retail sector post-law wage gap interaction terms were insignificant for all provinces.

The F-statistic indicates the result of the overall significance of the empirical model. The null hypothesis is that all regression coefficients are equal to zero. The p-values of 0.00 for all of the sector-province employment probability models indicate that all of the models have a significant degree of explanatory power.

Table 4.6 Probability of employment: Domestic sector

Variables	Western Cape		KwaZulu-Natal		Gauteng	
	Specification I	Specification II	Specification I	Specification II	Specification I	Specification II
Postlaw	0.340***	0.450***	0.284***	0.849***	0.351***	0.512***
	(0.073)	(0.089)	(0.068)	(0.087)	(0.047)	(0.049)
Gap_Domestic	0.134		0.259***		0.398*	
	(0.252)		(0.097)		(0.231)	
Post_Gap_Domestic	-0.827**	-0.441	0.413***	-0.359**	0.134	0.007
	(0.407)	(0.421)	(0.144)	(0.159)	(0.403)	(0.401)
Constant	0.674***	1.181***	-0.014	-0.094	0.862***	0.723***
	(0.121)	(0.195)	(0.080)	(0.113)	(0.076)	(0.109)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	No	Yes	No	Yes	No	Yes
Sample	9500.00	9494.00	10949.00	10936.00	11653.00	11646.00
Population	2978383.41	2975186.50	5827408.80	5824450.26	8629918.31	8616022.06
F Statistic	62.09	13.05	135.84	29.40	136.88	35.60
P-Value	0.00	0.00	0.00	0.00	0.00	0.00

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The dependent variable is a dummy variable equal to 1 if the person is working in the relevant sector and equal to 0 if not. The sample consists of working-age persons, with no more than a matric level of education, in employment or in search of work. Standard errors are in parentheses. ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls for individual characteristics include controls for race, years of education and gender. The wage gap determines the relative rise in the real wages in district council i at time t-1 required to meet the minimum wage at time t. The F-statistic refers to the test for the null hypothesis that the regression coefficients are equal to zero.

Table 4.7 Probability of employment: Retail sector

Variables	Western Cape		KwaZulu-Natal		Gauteng	
	Specification I	Specification II	Specification I	Specification II	Specification I	Specification II
Postlaw	0.246***	0.364***	0.509***	0.640***	0.250***	0.434***
	(0.055)	(0.058)	(0.049)	(0.047)	(0.040)	(0.038)
Gap_Domestic	0.139		0.659***		-0.125	
	(0.163)		(0.173)		(0.216)	
Post_Gap_Domestic	0.055	0.117	-0.418	-0.523	-0.109	-0.156
	(0.279)	(0.335)	(0.346)	(0.356)	(0.378)	(0.356)
Constant	-2.338***	-2.359***	-2.387***	-2.490***	-1.895***	-2.257***
	(0.123)	(0.172)	(0.091)	(0.103)	(0.080)	(0.107)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	No	Yes	No	Yes	No	Yes
Sample	9522.00	9467.00	10949.00	10903.00	11653.00	11653.00
Population	2987359.04	2925016.91	5827408.80	5807329.89	8629918.31	8629918.31
F Statistic	12.35	5.55	33.58	10.94	10.93	8.47
P-Value	0.00	0.00	0.00	0.00	0.00	0.00

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The dependent variable is a dummy variable equal to 1 if the person is working in the relevant sector and equal to 0 if not. The sample consists of working-age persons, with no more than a matric level of education, in employment or in search of work. Standard errors are in parentheses. ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls for individual characteristics include controls for race, years of education and gender. The wage gap determines the relative rise in the real wages in district council i at time t-1 required to meet the minimum wage at time t. The F-statistic refers to the test for the null hypothesis that the regression coefficients are equal to zero.

Table 4.8 Probability of employment: Security sector

Variables	Western Cape		KwaZulu-Natal		Gauteng	
	Specification I	Specification II	Specification I	Specification II	Specification I	Specification II
Postlaw	0.549***	0.939***	0.552***	1.061***	0.570***	0.734***
	(0.110)	(0.161)	(0.073)	(0.087)	(0.069)	(0.076)
Gap_Domestic	0.216		0.140***		0.406***	
	(0.198)		(0.029)		(0.083)	
Post_Gap_Domestic	-0.438	-1.734***	-0.055	-1.112***	-0.495**	-0.869**
	(0.286)	(0.569)	(0.075)	(0.256)	(0.213)	(0.397)
Constant	-3.962***	-3.383***	-3.488***	-4.167***	-3.510***	-3.773***
	(0.235)	(0.311)	(0.153)	(0.170)	(0.164)	(0.191)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	No	Yes	No	Yes	No	Yes
Sample	9500.00	8501.00	10949.00	10618.00	11653.00	11584.00
Population	2978383.41	2389660.24	5827408.80	5640526.37	8629918.31	8572566.56
F Statistic	13.34	7.13	30.22	15.48	25.47	10.52
P-Value	0.00	0.00	0.00	0.00	0.00	0.00

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The dependent variable is a dummy variable equal to 1 if the person is working in the relevant sector and equal to 0 if not. The sample consists of working-age persons, with no more than a matric level of education, in employment or in search of work. Standard errors are in parentheses. ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls for individual characteristics include controls for race, years of education and gender. The wage gap determines the relative rise in the real wages in district council i at time t-1 required to meet the minimum wage at time t. The F-statistic refers to the test for the null hypothesis that the regression coefficients are equal to zero.

4.5.2 Wage regressions

The second outcome of interest is the response of wage levels to the minimum wage law. Two difference-in-difference models were estimated in order to determine the law's effect on wages. This empirical estimation method is used for two purposes. First, it aims to determine if the law had an impact on workers who were covered by the legislation relative to those who were not, and secondly, to compute the differential effect of the stipulated wage in district councils where pre-law wages of the corresponding sector were further below the minimum. The dependent variable for both specifications was the log of real hourly earnings, adjusted for inflation to 2008 prices. Following the recommendations of Bhorat et al (2013), both specifications include individual level and district controls. The first model includes the treatment group and the control group for the relevant sectors. The results obtained from this model compare the wages of workers in the covered sector to wages of workers in the corresponding control group. The second estimation equation includes only covered workers, and therefore excludes the sector dummy and wage gap variable. The interaction term of the post law and gap variable remains as an important factor that indicates whether wages increased more in district councils where the pre-law wage gap was the biggest.

Tables 4.9, 4.10 and 4.11shows the results of the log of real hourly wages for each province and sector, according to these two alternative wage equations. From the first specification, the post law variable for the domestic worker sector in Western Cape and Gauteng has a negative coefficient which is significant at the five percent level. This implies that real hourly wages for workers in the domestic work and control group decreased by 11.49 percent and 13.41 percent (converting from log points) for the Western Cape and Gauteng respectively, after the law compared to before the law. KwaZulu-Natal workers also show a decrease of real hourly wages in the post-law period; however, this result is insignificant. Post-law coefficients for the retail sector are negative and insignificant in the Western Cape and KwaZulu-Natal but zero for Gauteng. Western Cape and KwaZulu-Natal security and control group workers also experienced a decline in their post-law real hourly wages, by 8.15 percent and 9.70 percent respectively, compared to their pre-law wages, significant at the one and five percent levels, respectively.

Retail workers in all three provinces had lower real hourly wages, by an average of 15.90 percent, compared to the respective control group, at the one percent significance level. Similarly, security workers in all three provinces also had significantly lower wages by an average of 23.49 percent relative to their control groups. Domestic workers in KwaZulu-Natal and Gauteng also had significantly lower wages than the control group. For domestic workers, the difference–in-difference estimator, interaction term is positive and significant at the ten percent level only in Gauteng. This implies that the domestic worker group in post law periods experienced an increase in real hourly wages, compared to the pre-law wage of their corresponding control group. A similar result is found for the retail group in Western Cape and the security sector in KwaZulu-Natal, significant at the five and ten percent level respectively. In contrast to this, security workers in Gauteng were estimated to experience a significantly lower real hourly wage, at the five percent level, compared to pre-law wages of their control group.

As discussed previously, the second specification for the wage level effect of the minimum wage law excludes the sector dummy variable and the interaction term of the post-sector variable, and instead restricts the sample to the treatment group only and includes the interaction term of the post-wage-gap variable. The domestic worker and retail worker groups for all three provinces reflect no significant change in real wages for pre-post periods. However, for the security sector, the post-law coefficient is large and negative for KwaZulu-Natal and Gauteng, at the one and five percent significance levels respectively. This implies that the real hourly wage declined by 49.44 percent for security workers in KwaZulu-Natal between periods, and decreased by 24.57 percent for security workers in Gauteng. This further supports the results from the first wage equation, which estimates that real hourly wages for the sector declined between pre and post law periods. However, as discussed previously, the security sector results should be treated with caution due to small sample sizes. The province of KwaZulu-Natal showed significant and positive coefficients on the interaction term for the domestic, retail and security sectors. This is suggestive that district councils with larger wage-gaps experienced larger increases in real hourly wages in periods after the law. In contrast, this interaction term was positive but insignificant for the Western Cape domestic, retail

and security sectors. Gauteng's interaction term between the post and wage gap variables showed insignificant results for all three sectors.

As was the case for the employment models, the p-values for the sector-province wage models, for both specifications I and specification II, are indicative that the wage models have a significant degree of explanatory power.

Table 4.9 Log of real hourly earnings: Domestic sector

Variables	Western Cape		KwaZulu-Natal		Gauteng	
	Specification I	Specification II	Specification I	Specification II	Specification I	Specification II
Postlaw	-0.122**	-0.117	-0.112	-0.105	-0.144**	-0.059
	(0.054)	(0.075)	(0.080)	(0.084)	(0.060)	(0.041)
Domestic	-0.036		-0.522***		-0.392***	
	(0.060)		(0.074)		(0.056)	
Post_Domestic	-0.009		0.128		0.129*	
	(0.071)		(0.086)		(0.067)	
Post_Gap_Domestic		0.255		0.291**		-0.004
		(0.326)		(0.125)		(0.297)
Constant	1.882***	1.796***	1.937***	2.195***	2.134***	1.830***
	(0.121)	(0.173)	(0.075)	(0.208)	(0.118)	(0.119)
R-Squared	0.106	0.125	0.154	0.081	0.101	0.069
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	2498.00	1215.00	2749.00	1725.00	2775.00	2037.00
Population	641330.81	338628.60	1285988.30	878734.11	1789526.78	1303374.98
F Statistic	5.65	2.60	8.56	10.10	10.25	5.38
P-Value	0.00	0.00	0.00	0.00	0.00	0.00

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The dependent variable is the log of the real hourly wage for full-time employees. Full-time employees are those who report working no less than 27 hours per week. The sample consists of working-age persons who are not self-employed. Specification I uses a sample that includes the treatment and the control group. Specification II uses a sample which consists of workers that are employed in the relevant sector. Standard errors are in parentheses. ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls for individual characteristics include controls for race, years of education and gender. The wage gap determines the relative rise in the real wages in district council i at time t-1 required to meet the minimum wage at time t. The F-statistic refers to the test for the null hypothesis that the regression coefficients are equal to zero.

Table 4.10 Log of real hourly earnings: Retail sector

Variables	Western Cape		KwaZulu-Natal		Gauteng	
	Specification I	Specification II	Specification I	Specification II	Specification I	Specification II
Postlaw	-0.043	0.038	-0.046	-0.000	0.000	-0.019
	(0.036)	(0.062)	(0.036)	(0.074)	(0.028)	(0.059)
Retail	-0.213***		-0.159***		-0.149***	
	(0.047)		(0.045)		(0.039)	
Post_retail	0.140**		0.058		0.050	
	(0.063)		(0.058)		(0.058)	
post_gap_retail		0.044		-0.372*		-0.655
		(0.416)		(0.208)		(0.435)
Constant	1.895***	2.073***	1.798***	1.900***	2.607***	2.418***
	(0.088)	(0.150)	(0.201)	(0.127)	(0.166)	(0.252)
R-squared	0.286	0.186	0.260	0.207	0.251	0.196
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	4314.00	817.00	5065.00	1020.00	6377.00	1229.00
Population	1513515.37	278200.89	2935722.09	608039.04	4781773.29	870959.77
F statistic	23.91	3.47	37.26	6.39	41.74	7.90
p-value	0.00	0.00	0.00	0.00	0.00	0.00

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The dependent variable is the log of the real hourly wage for full-time employees. Full-time employees are those who report working no less than 27 hours per week. The sample consists of working-age persons who are not self-employed. Specification I uses a sample that includes the treatment and the control group. Specification II uses a sample which consists of workers that are employed in the relevant sector. Standard errors are in parentheses. ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls for individual characteristics include controls for race, years of education and gender. The wage gap determines the relative rise in the real wages in district council i at time t-1 required to meet the minimum wage at time t. The F-statistic refers to the test for the null hypothesis that the regression coefficients are equal to zero.

Table 4.11 Log of real hourly earnings: Security sector

Variables	Western Cape		KwaZulu-Natal		Gauteng	
	Specification I	Specification II	Specification I	Specification II	Specification I	Specification II
Postlaw	-0.085*	-0.260	-0.102**	-0.682***	0.011	-0.282**
	(0.044)	(0.187)	(0.052)	(0.210)	(0.032)	(0.123)
Security	-0.403***		-0.266***		-0.150**	
	(0.083)		(0.079)		(0.062)	
Post_Security	0.069		0.154*		-0.175**	
	(0.104)		(0.090)		(0.071)	
Post_Gap_Security		0.543		1.484***		0.436
		(0.721)		(0.441)		(0.382)
Constant	2.229***	1.615***	0.813***	2.812***	1.890***	2.460***
	(0.166)	(0.385)	(0.147)	(0.260)	(0.142)	(0.076)
R-Squared	0.213	0.231	0.124	0.206	0.082	0.240
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	2505.00	162.00	2531.00	383.00	3927.00	492.00
Population	854805.09	58735.28	1497080.17	229153.77	2912030.51	396310.60
F Statistic	55.14	1.65	27.77	2.29	234.13	3.08
P-Value	0.00	0.0407	0.00	0.00	0.00	0.00

Source: LFS September 2000 – September 2007, own calculations

Notes: The data are weighted. The dependent variable is the log of the real hourly wage for full-time employees. Full-time employees are those who report working no less than 27 hours per week. The sample consists of working-age persons who are not self-employed. Specification I uses a sample that includes the treatment and the control group. Specification II uses a sample which consists of workers that are employed in the relevant sector. Standard errors are in parentheses. ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Controls for individual characteristics include controls for race, years of education and gender. The wage gap determines the relative rise in the real wages in district council i at time t-1 required to meet the minimum wage at time t. The F-statistic refers to the test for the null hypothesis that the regression coefficients are equal to zero.

4.6 Discussion

This section aims to consolidate the findings of the empirical work conducted in this chapter, and draw out the meaning of the key results in each sector and province.

Table 4.12 Summary of regression findings: estimated difference-in-difference effect

		Western Cape		KwaZulu-Natal		Gauteng	
Sector	Model	Employment	Wages	Employment	Wages	Employment	Wages
Domestic	I	Negative	None	Positive	None	None	Positive
	II	None	None	Negative	Positive	None	None
Retail	I	None	Positive	None	None	None	None
	II	None	None	None	Negative	None	None
Security	I	None	None	None	Positive	Negative	Negative
	II	Negative	None	Negative	Positive	Negative	None

Source: LFS September 2000 – September 2007, own calculations

Notes: Summary of results from Tables 4.6 to Table 4.11.The data are weighted.

4.6.1 Employment

The results from two specifications of the empirical models of the probability of employment indicated that there was a higher probability of domestic employment in the post-law periods, across all provinces. According to economic theory, if the legal minimum wage is higher than the actual wage paid, employment in the sector will decrease. However, in the domestic worker sector in South Africa, there was an increase in females being employed into the full-time domestic worker sector. This may be explained by the fact that the full-time wages are lower than part-time wages and employers may respond by increasing the working hours to compensate for the wage paid. This would result in more working hours and hence, more domestic workers being classified as full-time workers. As a result, there was an increase in female domestic worker employment in post-law periods. Another reason for this would be that the law created an incentive for employers to pay higher than pre-period wages, in order to

avoid violation penalties, which may have enticed more females into domestic work. Furthermore, this result may be due to the formalization of the domestic worker sector, whereby it was mandated that employment contracts were drawn up between employer and employee. The first probability of employment equation indicates that there was an increase in the probability of domestic employment for district councils located in KwaZulu-Natal and Gauteng where pre-law earnings were lower than the lawful-minimum. One possible response of employers would be to decrease working hours in response to the wage increase. Perhaps more people are working in domestic work, but their hours have decreased. However, the descriptive statistics presented in Table 4.1 suggested no significant decreases in average hours worked. In KwaZulu-Natal, in large pre-post wage gap district councils, individuals faced a lower probability of being employed in domestic work than in district councils with a low pre-post wage gap. The reasoning behind this may be due to employers' reluctance to hire domestic workers at a much higher wage, since the pre-law wage was significantly lower than legislated minimum.

The probability of employment in the period after the law, for the retail sector, increased compared to the period prior to the law. This holds true for all three provinces analysed. The related control group faced similar increases in full-time employment rates across the Western Cape and Gauteng provinces. An explanation for this may be linked to the lower nominal and real hourly wages, as shown by the kernel density plots. The wage-gap variable from the first specification of the probability of employment model shows that in KwaZulu-Natal, in district councils where pre-law wage was lower than minimum wage, there was an increase in the probability of retail employment. This may be an indication that the demand for retail workers increased after the law, possibly due to the increased amount of disposable income for workers in the area resulting from the increased wage, which stimulated extra consumption of goods and services, and hence, required more retail services.

Turning to the security sector, the probability of employment models showed that there was an increase in the likelihood of security employment in the Western Cape, KwaZulu-Natal and Gauteng. Due to the high unemployment rates, certain individuals

may be willing to accept the wage offered in the post law period and enter the security sector. The wage-gap coefficients were positive in KwaZulu-Natal and Gauteng, which indicates that security employment in areas where pre-law wages were much lower than the legal wage increased by more than in smaller-gap areas. It is most likely that this occurred due to the inflow of young job-seekers to the security sector, some of whom may be willing to receive lower than legal wage. This reasoning is supported by the high non-compliance estimates for all three provinces, which indicate that employers pay below the legal wage, perhaps in order to meet the high demand for security employment. However, the second probit employment model showed that the security workers in high pre-post wage gap areas had a lower chance of employment in post-law periods relative to that of workers in areas with a low pre-post wage gap. Employers in high wage gap areas may be less willing to adjust previous wages because they may not be able to financially afford it. Also, the lower employment probability can be said to be due to the fact that, as there are more employees that earn sub-minimum wages, the chances of the employer being reported to the DoL rises, which then creates a disincentive to employ security workers at sub-minimum wage.

4.6.2 Wage levels

In KwaZulu-Natal, real hourly wages in the post-law period increased, but decreased in the Western Cape. A possible explanation for this is that a much larger proportion of employers of domestic workers in this province paid the above-minimum wage prior to its introduction. The empirical wage model shows that real hourly wages for the domestic sector declined in the post-law period in Western Cape and Gauteng, which may be indicative that employers in these provinces lowered wages in the post-law period because they paid higher than legal minimum for periods before the law. This is supported by the kernel density plots, which show a large part of the pre-law distribution located above the minimum wage in these two provinces. The second wage model shows that areas in KwaZulu-Natal with large domestic real hourly wage gaps were associated with larger post-law wage increases. The post-law wage increases are consistent with attempts at compliance with the law by employers, and are supported by the increased compliance estimates over time in this province.

Real hourly wages in post-law periods for the Western Cape were lower than pre-law wages, while there was little change in KwaZulu-Natal and Gauteng for the control group between periods. The empirical models for wage levels revealed that the domestic worker sector real hourly wage was significantly lower than their respective control group in pre-law periods in KwaZulu-Natal and Gauteng, but increased in Gauteng and remained similar in KwaZulu-Natal in post-law periods. The post-law dummy variable is negative and significant for Western Cape and Gauteng in specification I, which means that the control group wages went down. Examination of the difference-in-difference variable for Gauteng showed that the treatment group in the post-law period felt an increase in their real hourly wage relative to pre-law wages of the domestic control group, which may be a beneficial effect of the law. The law increased earnings for the sector, and therefore met its required objective, but only in this province.

Descriptive statistics for the retail sector showed similar real hourly wages for Western Cape, but lower real post-law wages for KwaZulu-Natal and Gauteng. Due to the lower hours worked for KwaZulu-Natal, retail employees' lower real hourly wage could be due to monthly wages being lowered by more than the decrease in hours worked. Supplemented by the Kolmogorov-Smirnov test, Western Cape and KwaZulu-Natal workers did not experience a significant change in the pre-post wage distribution, perhaps because the minimum wage was set close to pre-law average wages. However, Gauteng retail workers saw a change in the post-law wage distribution and this is likely to be largely due to the increased compliance of employers with the law.

Within the three provinces, the regressions show that the treatment group of retail workers received a lower wage than their control group in pre-law periods, but higher wages in post-law periods which may be a positive side-effect of the law. Additionally, retail workers in the Western Cape saw a rise in real hourly wages, post-law, compared to their control group's pre-law wages, although the same was not true for the other provinces. The wage level equation which contains the interaction the post-law and wage-gap variable suggests that districts in KwaZulu-Natal with large wage-gaps increased their real hourly post-law wages by more than those with smaller gaps. Again,

this can perhaps be attributed to employers' compliance with the law. The retail control group faced lower real and nominal wages in post-law periods. Wage adjustments were minimal in this sector and for the control group; therefore, there was no significant change in the overall wage distribution.

An interesting result is that the real hourly wage for all provinces was lower in post-law periods, which suggests that the law may have harmed the security sector. For the years 2005 and 2006 in Western Cape and KwaZulu-Natal, it is apparent by the non-compliance estimates that fewer security workers, compared to the year 2002, earned less than the minimum. However, for all years and provinces, estimates show that an average of 90 percent of these workers did not receive the legal wage. Security workers in the Western Cape did not show a significant shift of post-law real wage distribution, supported by the non-rejection of the Kolmogorov-Smirnov hypothesis. Kernel density plots of KwaZulu-Natal's and Gauteng's security sector real hourly wage showed significant changes in pre-post real wage distribution. However, these changes do not shift the distribution upwards, and cannot be attributed to compliance of employers as non-compliance estimates are high and do not improve much over time.

Specification I of the wage level equation shows that for all three provinces, the security sector received lower real hourly wages in the period after the law relative to the control group. Thereafter, in the post-law periods, the control group wages decrease in Western Cape and KwaZulu-Natal. However, the security sector in KwaZulu-Natal experienced a decrease in their wages but the sector experienced an increase in Gauteng, which is shown by the interaction term. Specification II of the wage equation suggested that in KwaZulu-Natal, where large wage gaps were observed, and the sector experienced an increase in their real hourly post-law wage. However, the compliance estimates suggest that this increase was not large enough to meet the lawful minimum.

4.7 Conclusion

This chapter conducted the empirical analysis of the effects of minimum wage laws on two economic outcomes, namely employment and wages, across the three provinces and three sectors. The chapter began by showing that there were some significant changes in average outcomes, and in the full distribution of wages, between the pre-law

and post-law periods. However, these changes were not uniform across sectors and provinces, and nor were all of the changes beneficial for workers.

The chapter went on to outline the econometric models for these two outcomes, following the difference-in-difference specifications of Bhorat et al (2013). The employment probability models showed an overall increased likelihood of employment in the analysed sectors, for all three provinces. Areas with large wage gaps, in general, showed an ambiguous effect for each of the provinces and sectors. KwaZulu-Natal domestic workers, and security sector workers in all three provinces, faced a lower chance of employment in areas where there were large differences between pre-post wages. Retail and security sector employment chances increased in periods after the law; however, for the security sector specifically, wages were far below the stipulated minimum which is indicative of low compliance by employers.

The real hourly wage level for post-law periods increased in KwaZulu-Natal but decreased for Gauteng and Western Cape for the domestic sector. The second wage model shows that areas in KwaZulu-Natal with large domestic real hourly wage gaps were associated with larger post-law wage increases. The difference-in-difference variable for domestic workers in Gauteng showed that in the post-law periods, there was an increase in their real hourly wage relative to pre-law wages of the domestic control group, which may be a beneficial effect of the law. The wage level equation which contains the interaction between the post-law and wage-gap variable, suggests that districts in KwaZulu-Natal with larger wage gaps increased their real hourly post-law wages by more than those with smaller gaps. The retail sector for Western Cape and KwaZulu-Natal did not experience real hourly wage changes, whereas the retail workers in Gauteng did experience increases. Security sector real hourly wages in post-law periods were lower when compared to pre-law periods. Additionally, KwaZulu-Natal and Gauteng saw significant improvements between periods, while wage distributions were unchanged in the Western Cape.

It is apparent from the analysis in this chapter that the minimum wage law has different effects for different provinces, and therefore this provides support for the analysis of provincial minimum wage effects. National-level studies are able only to discern the

aggregate outcomes, whereas this dissertation has highlighted some of the provincial variations in compliance, employment and wages. The final chapter gives an overall summary of the objectives that were met in this study, and makes suggestions for further research in this field.

CHAPTER 5. CONCLUSION

The minimum wage policy and its effects have been widely explored by researchers in developing and developed countries. The purpose of the law is said to be to protect the most vulnerable workers in an economy, by making it unlawful to pay lower than subsistence wage. Such laws were initially put into practice in New Zealand, Australia, U.K and the U.S more than a century ago. South Africa introduced a minimum wage law in 2001, with the minima differing by sector and area of employment. The purpose of this dissertation was to examine the law's effects across three provinces which contribute to the majority of economic activity in the country, but have different political, demographic and economic structures.

Specific minimum wages are allocated to eleven sectors which are regarded as vulnerable, as outlined in the Basic Conditions of Employment Act. Workers in these sectors are generally low-paid and low-educated people who are living in poverty. The minimum wage differs for each sector, where it is then further differentiated by job type, location and hours worked. The Employment Conditions Committee was founded to ensure the application of the law.

Economic theory, as outlined in chapter 2, suggests that the minimum wage is regarded as a price floor. A labour market which is perfectly competitive may, in response to the increased mandatory wage, result in unemployment. Unemployed workers may then move into an uncovered sector, which may lower wages in order to accommodate the extra number of workers. However, a monopsony-type labour market shows that there can be increased employment due to the law. A positive effect of the law would suggest that it protects the most vulnerable workers from earning less than a living wage.

Stigler (1946) was one of the first authors to evaluate the minimum wage laws and its effect on wages, employment and poverty. In general, his study put forward that the law

will have negative effects on employment. In contrast, other authors found no such negative relationship (Lester, 1960; Card and Krueger, 1993). Addison and Blackburn (1999) found that an increase in the minimum wage results in a decrease in the poverty rate and positive employment effects. In comparison to the competitive market model, a monopsony market also found no negative relationship between the law and employment (Dickens et al, 1999).

Studies conducted in developing countries can be seen to have some different effects relative to that of the developed countries. Costa Rica's minimum wage had a negative effect on employment and hours worked due to the law, which affected unskilled workers the most (Gindling and Terrell, 2006). However, for Brazil, there was no effect on employment due to the law (Lemos, 2009). Turning to studies conducted in South Africa, a lower employment rate was found due to the law by Bhorat, Kanbur and Mayet (2013), but the law was shown to be beneficial to vulnerable workers in specific sectors (Millea, 2012). Theory relating compliance of employers with the law predicts that, if the lawful wage is above equilibrium wage, then non-compliance by employers is more probable. A US study found that wages in both covered and uncovered sectors are affected when there is incomplete compliance to the laws (Ashenfelter and Smith, 1979). Ronconi (2010) predicted compliance to be positively related to the number of compliance officers and In South Africa, there was evidence of substantial non-compliance by employers (Bhorat et al, 2012a).

For this study, data were pooled from eight waves of the September Labour Force Survey for the years 2000-2007. The sectors analysed were the domestic worker, retail and security sectors. In addition, control groups for each sector were identified. These control groups had similar characteristics to that of the treatment group. The provinces examined were Western Cape, KwaZulu-Natal and Gauteng, as these provinces are the largest urban areas in the country. Using this dataset, empirical models were estimated for compliance, employment probabilities and wages for pre-post law periods.

The first research question of the dissertation was to assess the extent of compliance with minimum wage legislation within affected sectors and how this differs between provinces. Estimates of non-compliance by employers were found using the

methodology of Bhorat et al. (2012a). Non-compliance estimates were largest for the security sector, but employers in the retail and domestic sector increased their extent of compliance with the law over time. Western Cape has the lowest non-compliance estimates for all three sectors analysed, followed by Gauteng and then KwaZulu-Natal.

The second and third research questions involved determining how the law affected employment and wages across sectors and provinces. These questions were answered in chapter 4 using difference-in-difference models adapted from Bhorat et al. (2013). The first specification considered the law's effect on the probability of employment in relevant sectors and the second version of the model was estimated with the dependent variable being the log of wages (deflated at the 2008 CPI) for the control and treatment groups. The models also considered the variation across district councils in the intensity of the law, which was based on the initial wage of workers in the pre-law period.

The results from the employment probability models showed that there was an overall decreased likelihood of employment in the domestic and security sectors, for Western Cape. The two specifications of the probability of employment model, for the KwaZulu-Natal found a positive and negative employment effect due to the law, whereas a negative effect was found for the security sector. In addition to this, only the security sector in Gauteng experienced a negative effect on the probability of employment, with no significant effect for the other two sectors. KwaZulu-Natal and Gauteng saw significant increases in real wages between periods, for the domestic sector, while wage distributions for this sector was unchanged in the Western Cape. Western Cape retail workers felt an increase in real wages but a negative effect in KwaZulu-Natal and no significant change in Gauteng. The security sector in KwaZulu-Natal faced higher real wages, whereas a lower wage effect was found in Gauteng and no significant change in wages for Western Cape. Overall, an ambiguous domestic worker employment effect is found for KwaZulu-Natal however, a negative effect for Western Cape is found, but a positive wage effect for KwaZulu-Natal and Gauteng. This positive wage effect may be linked to the large increase in compliance from employers. The retail sector did not experience a significant change in employment probabilities for all three sectors, although a positive and negative effect on wages was found for Western Cape and

KwaZulu-Natal respectively. Estimates of non-compliance for this sector in Western Cape and Gauteng did not experience a large decrease, as found in KwaZulu-Natal. The law seemed to have decreased employment prospects in the security sector for those situated in the three provinces of analysis. In contrast, KwaZulu-Natal security workers experienced a positive wage effect whereas Gauteng security workers experienced a negative wage effect. However, this being said, non-compliance for this sector, across all three provinces is high. It is apparent from the estimated results that the law has different effects in different provinces, which therefore provides support for the analysis of minimum wage effects at the provincial level.

Previous literature provides no conclusive explanation for the causes of the high unemployment and income inequality in the South African economy. Each sector that is covered by the law is unique, and thus further research should be undertaken to examine patterns in employment and wages at a provincial level so that a deeper understanding can be achieved of the provincial effects of the law. In addition, not enough research has been done on the issue of compliance to the law, which is critical to for the law to achieve its desired objectives. Therefore, more research is also required in this area, particularly on the determinants of enforcement and how these may differ by region. Based on the results of the recommended research, it will be vital to develop an integrated approach relating existing programmes and policies to promote employment and appropriate wage structures to measures of compliance.

Recently, trade unions have called for a national minimum wage and during the state of the nation address in June 2014; President Jacob Zuma stated that the government will explore the possibility of a national minimum wage as a key mechanism to decrease income inequality (Coleman, 2014; Zuma, 2014). Minimum wage policy in South Africa is put in place to battle the challenges of unemployment, poverty and income inequality (Darroll, 2014). Therefore research in this field regarding the role of minimum wage is of great help in supporting or opposing the trade union views. An enforceable and mandated national minimum wage would form a wage floor that does not allow for wages in any sector to fall below this level, and thus eliminates possible spill-over effects between covered and uncovered sectors or areas. However, a national minimum

wage set at a higher level than the current sectoral minimum would probably lead to job destruction, mainly in the tradable sectors, with the outcome that poverty may be greater than before the sectoral minimum wage (Seekings and Nattrass, 2015).

Finn (2015) explored the potential effects of a national minimum wage and found that approximately one third of workers would be covered by this new law if it was set at R2 500 per month and two thirds of workers would be covered if it was set at R5 000 per month. The national minimum wage would affect the various sectors in different ways, with the most sensitive sectors being the domestic and agricultural sectors. However, sectors such as mining and utilities would experience a minimal percentage of workers who would be affected by the law (Finn, 2015).

The majority of the law-covered sectors are non-tradable sectors, i.e. sectors (such as private security, domestic work, and retail) which do not compete with imports. This lowers the chance that wage increases would lead to large employment losses (Seekings and Nattrass, 2015). In contrast, tradable sectors, such as agriculture, evidence points to competition with other global agricultural sectors. Empirical studies produced in different parts of the country (Conradie 2007; Murray and van Walbeek 2007), which analysed national sectoral data, suggest that the first (2002) agricultural minimum wage increased wages reasonably and bettered compliance with wage regulations but also caused significant decline in employment and/or hours worked (Bhorat et al, 2012b).

From this dissertation and previous research, it seems that the ECC's sectoral determinations in the early 2000s in non-tradable sectors, in different provinces, resulted in higher real wages and as a result, the working poor were less poor. An essential point is that the effects of higher minimum wages differ among sectors according to aspects such as their international competition exposure, the potential of mechanisation, and the incomes of employers or customers. In other words, there is more scope for higher minimum wages in some sectors and provinces, than in others (Seekings and Nattrass, 2015). This implies that minimum wages should vary between sectors and provinces.

Minimum wages, at current, are one of the most complex policies pursued by the South African policymakers. Assessing their effects requires careful and in depth analysis of the labour market (Finn, 2015). Given the large geographical variation in the nature of the South African labour market, it is unlikely that legislation can be equally effectively implemented and monitored nation-wide, or that its effects would be identically beneficial everywhere. Therefore, in conclusion, research that allows for provincial or other spatial variation in the effects of the minimum wage and other such laws is key, in order to determine the appropriate labour policy for South Africa.

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Ethical Clearance Letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

02 November 2015

Ms Leshern Devnarain (210506459)
School of Accounting, Economics & Finance
Westville Campus

Dear Ms Devnarain,

Protocol reference number: HSS/1611/015M
Project title: Provincial variation in in the effects of minimum wage laws in South Africa, 2000-2007

Full Approval – No Risk / Exempt Application

In response to your application received on 28 October 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr Claire Vermaak
Cc Academic Leader Research: Dr H Ngalawa
Cc School Administrator: Ms Seshni Naidoo

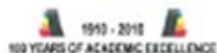Humanities & Social Sciences Research Ethics Committee
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