

**A DEMAND ANALYSIS OF LABOUR IN SOUTH
AFRICAN AGRICULTURE: THE EFFECTS OF
LABOUR LEGISLATION**

BY

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MASTER OF AGRICULTURAL MANAGEMENT

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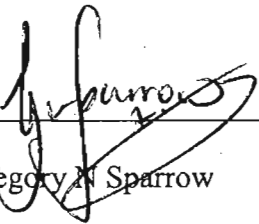
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DECLARATION

I hereby certify that, unless specifically indicated to the contrary in the text, this dissertation is the result of my own original work and has not been submitted for a degree at any other university.



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I hereby certify that the statement is correct.



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ABSTRACT

Labour legislation was introduced into agriculture in the early 1990s with the Basic Conditions of Employment Act (BCEA) being gazetted in 1992. Since the mid-1990s “new” labour legislation pertaining to agriculture has been implemented in South Africa, and includes the Basic Conditions of Employment Act 75 of 1997 (amended), the Unemployment Insurance Act 63 of 2001 (amended), the Labour Relations Act (LRA) 66 of 1995, the Land Reform (Labour Tenants) Act 3 of 1996, the Extension of Security of Tenure Act 62 of 1997, the Employment Equity Act 55 of 1998, the Skills Development Levies Act 9 of 1999, and the Sectoral Determination (an amendment of the BCEA 75 of 1997) which includes the imposition of minimum wages. This study examines the legislation in detail as well as the implications of this legislation for agricultural labour employment in South Africa. A relative increase in the cost (transaction and wage) and risk associated with labour motivates farmers to replace labour with machinery, machinery contractors, labour contractors or new technologies that are labour-saving. This results in a decrease in the demand for unskilled workers and higher levels of poverty and unemployment in South Africa.

This study estimates long-run price elasticities of demand for regular labour in South African (SA) agriculture using both Ordinary Least Squares (OLS) regression and a Two-stage Least Squares (2SLS) simultaneous equations model. The 2SLS model includes a labour supply equation. Secondary data obtained over a 43 year period (1960–2002) from Statistics South Africa and the Abstract of Agricultural Statistics were used in this study. Both models were estimated for the period 1960-2002, and included a piecewise slope dummy variable for wages with the threshold year taken as 1991 to reflect expected changes in farm labour legislation. Study results show that the estimated long-run price elasticity of demand for

labour for the pre-1991 (i.e., 1960-1990) period was -0,25 for the OLS model and -0,23 for the 2SLS model suggesting that the demand for regular labour was inelastic during this period. For the post-1991 period (1991-2002), the long-run elasticity was estimated as -1,32 for the OLS model and -1,34 for the 2SLS model. This shows a structural change in demand that questions the appropriateness of minimum wage and other labour legislation that has raised the cost of regular farm labour in South Africa.

Labour legislation introduced in the early 1990s encouraged farmers to substitute casual workers for regular workers. However, the inclusion of all casual workers in minimum wage legislation from 2006 is expected to slow the casualisation of agricultural labour as farmers turn to labour contractors, chemicals and machinery as the next best substitutes. The study found that an increase (decrease) in the price of chemicals (pesticides and herbicides for crops, and labour saving dips and sprays for animals) result in an increase (decrease) in the demand for regular labour. The demand for labour is also sensitive to changes in real interest rates (used as a proxy for machinery costs). The cost of capital would decrease (increase) as interest rates fall (rise), resulting in farmers adopting more (less) machinery and equipment, causing a decrease (increase) in the demand for regular labour, *ceteris paribus*.

In order to reverse the regular labour unemployment trend in SA agriculture, government could choose to adopt more flexible labour market regulations (i.e., legislation regarding the hiring and dismissing of farm workers, and increases in wages and benefits for the farm worker could be based on the individual performance of each worker as opposed to increasing the wages of the entire workforce through minimum wages) which would reduce labour costs and encourage farmers to employ more labour.

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INTRODUCTION

Agriculture is a major employer of South African (SA) labour with about 9,8% of the total labour force directly involved in agricultural production (Statistics South Africa, 2005). The supply of labour to agriculture in South Africa is relatively price elastic due to the high percentage of unemployed people (Nieuwoudt, 1984) - the formal unemployment rate in South Africa was about 26,5% in 2005 (Statistics South Africa, 2005). The demand for labour is also expected to be price elastic as there are many substitutes for farm labour, such as machinery and contractors (Goedecke and Ortmann, 1993).

Since the mid-1990s “new” labour legislation pertaining to agriculture has been implemented in South Africa, and includes the Basic Conditions of Employment Act (BCEA) 75 of 1997 (amended), the Unemployment Insurance Act 63 of 2001 (amended), the Labour Relations Act 66 of 1995, the Land Reform (Labour Tenants) Act 3 of 1996, the Extension of Security of Tenure Act 62 of 1997, the Employment Equity Act 55 of 1998, the Skills Development Levies Act 9 of 1999 and the Sectoral Determination (an amendment of the BCEA 75 of 1997) which provides for the imposition of minimum wages. A relative increase in the cost of labour encourages farmers to replace labour with machinery, machinery contractors, labour contractors or new technologies that are labour-saving. Significant unemployment will result if demand for labour is very price elastic (Lianos, 1972; Conradie, 2005) and output will fall due to an increase in production costs (Burton et al., 1970). Labour legislation was introduced in South Africa with the objective of improving labour productivity and stability in the economy. More recently, however, minimum wages have been used as a poverty alleviation tool among farm workers (Vink and Tregurtha, 2003).

Expectations of changes to labour legislation as part of political reform in South Africa may have resulted in reduced labour employment prior to the mid-1990s. Higher rates for overtime work, shortened working hours, lengthened maternity leave, UIF contributions, higher transaction costs owing to regulations governing dismissal and leave benefits, increased risk of industrial action, and more recently (2003) increases in minimum wages in real terms have led to an increase in labour cost and, therefore, substitution of regular farm labour in South Africa.

The number of paid workers employed by the formal agricultural sector decreased by 174 545 (15,7%) from 1 115 365 in 1991 to 940 820 in 2002*. Casual workers (i.e., seasonal and domestic workers employed on farms) accounted for 36% of agricultural employees in 1991 (Statistics South Africa, 2004). This proportion increased to 49% in 2002, highlighting the casualisation of farm labour over the past decade. Bhorat and Lundall (2004) suggest that the shift to part-time employment across most sectors in South Africa has been both significant and rapid.

Previous studies have estimated the demand for farm labour in South African agriculture. However, no studies have been conducted on a national scale for some time. Latt and Nieuwoudt (1985) estimated the long-run price elasticity of demand and supply for agricultural labour in KwaZulu-Natal to be -1,39 and 5,18, respectively. Conradie (2005) conducted a localised study in the Breërivier Valley of the Western Cape where she estimated the short-run price elasticity of demand for farm labour as -0,3.

* Latest census of commercial agriculture conducted in 2002.

This study aims to obtain a reliable estimate of the long-run price elasticity of demand for regular agricultural labour in South Africa in order to assess the appropriateness of labour legislation that has increased the cost of farm labour since the early 1990s. Both single equation (Ordinary Least Squares (OLS)) and simultaneous-equation (Two-stage Least Squares (2SLS)) demand models are estimated using secondary data obtained for 43 years (1960–2002) from Statistics South Africa (2004 and 2005) and the Abstract of Agricultural Statistics (2005). The 2SLS model includes a labour supply equation.

Chapter 1 provides a brief description of the agricultural labour market in South Africa, followed by Chapter 2 which contextualises recent labour legislation. Chapter 3 deals with the impact of legislation on agriculture with particular reference to the effects of minimum wage legislation. The data and techniques used to estimate the single equation and simultaneous equation demand models are introduced in Chapter 4. The results of these models are presented and discussed in Chapter 5. The study ends with a presentation of policy implications and conclusions.

CHAPTER 1

FARM LABOUR IN SOUTH AFRICA

This chapter provides a brief background to the farm labour market in SA agriculture, including agriculture's contribution to GDP, the casualisation of farm labour and information on the demand for, and the supply of, farm labour in South Africa.

1.1 Background to the farm labour market in South Africa

Primary commercial agriculture contributes less than 4% to the Gross Domestic Product (GDP) of South Africa (Statistics South Africa, 2005). However, there are strong backward and forward linkages into the economy so that the agro-industrial sector is estimated to comprise about 15% of GDP. Agricultural products account for more than 30% of the total job opportunities in the manufacturing sector and represent 25% of manufacturing's contribution to the GDP (Statistics South Africa, 2005). Bhorat and Hodge (1999) noted that the previous 25 years of economic development have been marked by a decline in the share of primary sectors in the GDP. Figure 1.1 shows the trends in employment of regular and seasonal farm workers since 1960, and emphasises the recent casualisation of the labour force in SA agriculture. Casual labour refers to labour whose employment is intermittent, sporadic or extends over short periods. Labour of this kind is normally recruited from the nearest available source (Department of Labour, 2005). Any person who is employed for 24 hours or more per month enjoys the protection afforded by the BCEA 75 of 1997. This means that the provisions regarding working hours, overtime and meal intervals would apply. The employee may even qualify for annual leave, sick leave, family responsibility leave, etc. (Department of Labour, 2005).

Regular labour is the most common form of employment. A person is employed on an indefinite basis and, in some circumstances, is subject to a probationary period that is reasonable with reference to the nature of the job (normally not more than six months) (Department of Labour, 2005). According to the LRA 66 of 1995, the employee enjoys similar protection to any other ("permanent") employee regarding security of employment. In terms of dismissing labour, different procedures have to be followed, depending on whether the intended termination is due to misconduct, poor work performance, medical incapacity or operational requirements. These procedures are rather cumbersome and the employer's failure to follow them could result in a claim for reinstatement or compensation (Department of Labour, 2005).

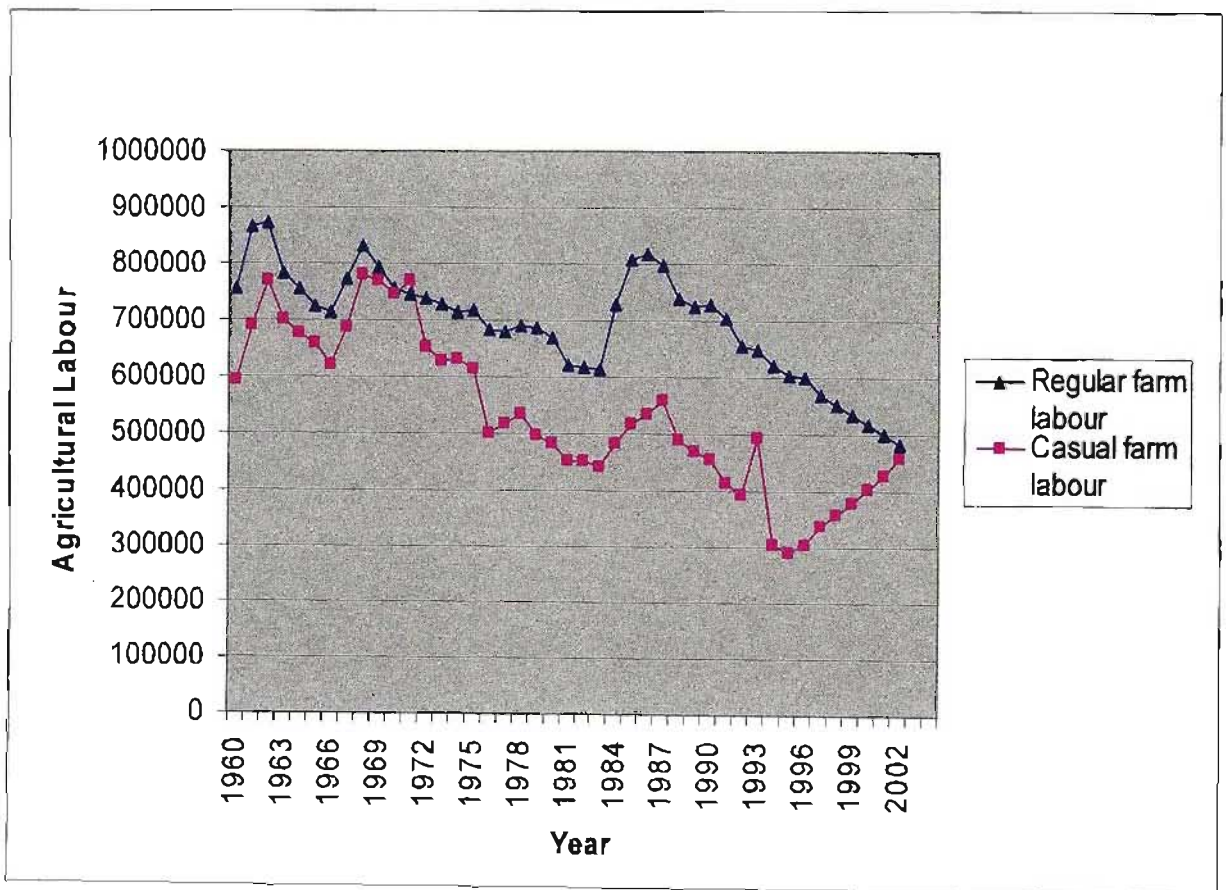


FIGURE 1.1: Trends in employment of regular and casual farm labour in South Africa, 1960 – 2002 (Statistics South Africa, 2005)

1.2 Demand for labour in South Africa

The law of demand suggests that quantity demanded of a product will decrease when the product's (in this case labour's) own price rises, *ceteris paribus*. A change in demand is caused by a change in the demand shifters or *ceteris paribus* conditions, such as prices of substitutes (e.g., machinery and labour contracting) (Parkin, 1996; Petersen and Lewis, 1999). The demand for a factor of production, such as labour or capital, may be considered as being derived from the demand for the final product. It is therefore a function of the price of the final product, the price of the input in question, the prices of all other inputs and the level of technology (Friedman, 1962). The slope of the derived demand curve is determined by two factors: its share of the producer's budget and the availability of substitutes and complements (McConnell and Brue, 1999:47). Goedecke and Ortmann (1993) suggest that as the relative cost of labour increases it is substituted with machinery (capital) and machinery and labour contractors. Friedman (1962) contends that demand analysis is further complicated by simultaneous reactions of all firms to resource price changes. Individual value of marginal product (VMP) curves will change in such a way as to make the industry (agricultural) labour demand curve less elastic than the sum of the individual demand curves. This study attempts to estimate the industry demand function for labour. Lewis *et al.* (1996) found that prior to the implementation of minimum wages in the SA agricultural sector in 2003, employment was already declining due to new labour legislation and consequential increases in transaction costs and risk carried by farmers.

There are very few documented empirical estimates of the price elasticity of demand for agricultural labour in South Africa. Latt and Nieuwoudt (1985) estimate the price elasticity of demand for labour in KwaZulu-Natal as -1,39 over the period 1972-1978. Conradie

(2005) suggests that the price elasticity of demand for farm labour in the Breërivier Valley of the Western Cape is -0,3. Mazumdar and van Seventer (2002) estimated the price elasticity of demand for unskilled labour in the manufacturing sector as -0,9 for the 1980s and -1,15 for the 1990s. Also in the manufacturing sector, Behar (2004) estimated the price elasticity of demand for unskilled and semi-skilled workers as -0,65 and -0,8 respectively. Lianos (1972) estimated the price elasticity of demand for hired farm labour in the United States (US) as -1,37, while Gardner (1972) also estimated the price elasticity of demand for hired farm labour in the US as -1,4.

1.3 Supply of labour in South Africa

Approximately 41% of the SA population live in rural areas (Statistics South Africa, 2005). Many unskilled rural workers commute and migrate to jobs in non-farm sectors, such as mining, which generally offer higher wages, thus decreasing the supply of regular labour to the agricultural sector. De Wet and Van Heerden (2003) argue that because unemployment seems to be a phenomenon that is so prevalent among the unskilled labour force, it seems plausible to assume that the supply of unskilled and informal sector labour in South Africa is highly elastic, and could verge on perfect elasticity.

A major constraint to faster GDP growth and thus greater labour absorption in South Africa is the shortage of skilled labour (De Wet and Van Heerden, 2003). The SA government has recognised the critical need to improve the quality of school education, particularly in maths and science, and is prioritising technical and quantitative skills (Paton and Singh, 2005, cited by Ortmann, 2005). Hertz (2002:12) notes that SA policy recommends that “absolute priority” be given to introducing ten years of free and compulsory general education, and to

ensuring that this new compulsory education be of high quality, especially in “disadvantaged townships, farms, villages, informal settlements and rural areas.” Transforming this right into practical reality, however, is difficult.

The supply of highly skilled and semi-skilled labour tends to be price inelastic. There seems to be very little (if any) unemployment in these two groups in South Africa, and wages tend to adjust as the demand for this type of labour increases or decreases (De Wet and Van Heerden, 2003). Borat and Hodge (1999) suggest that increases in the capital intensity of production would lower the demand for unskilled and low-skilled labour that is being replaced by new capital equipment, but increase the demand for more skilled labour that are required to operate and maintain the new capital equipment.

HIV/ AIDS is a fatal disease of the immune system transmitted through blood products especially by sexual contact or contaminated needles. The disease impacts directly on human resources and indirectly on the operations of commercial agriculture (Topouzis, 1998). Agricultural productivity, labour turnover rates, and production costs on commercial farms are adversely affected by the premature death and ill-health of workers infected by the disease. Ortmann (2005) suggests that employers have to invest more time in recruiting and training replacement workers at considerable expense to their businesses. Infected workers are too weak to perform farming tasks and those workers with skills become less productive and eventually die, crippling the supply of labour to SA agriculture.

There are very few published estimates of the supply elasticities for farm labour in South Africa. Latt and Nieuwoudt (1985) estimated the price elasticity of farm labour supply in KwaZulu-Natal as 5,18, while Behar (2005) estimated the price elasticity of supply for

unskilled labour in South Africa as 4,1. Internationally, a study conducted by the National Food and Agricultural Policy Project (NFAPP, 2003) estimates the price elasticity of supply for farm workers in California as 0,75. Domeij and Floden (2002) state that if the econometrician ignores borrowing constraints, the price elasticity of labour supply will be biased downwards. The study, conducted in Sweden, estimated labour supply elasticity to be 0,55. Salhofer (2000) estimates the price elasticities of labour supply for farm labour in Germany, Denmark and the United Kingdom as 0,16, 0,28 and 0,5 respectively. The price elasticity of supply for farm labour is expected to be much higher in South Africa where there is a large pool of unemployed people, as the studies by Latt and Nieuwoudt (1985) and Behar (2005) indicate.

CHAPTER 2

LABOUR LEGISLATION IN SOUTH AFRICA

The chapter begins with a study of the labour legislation introduced in SA agriculture in the early 1990s, labour legislation introduced from the mid-1990s, as well as problems associated with the legislation.

2.1 Labour legislation affecting agriculture in the early 1990s

In the past, labour in SA agriculture had very little protection in the way of legislation. The main form of protection was through common law which was based on legal precedents set on past judgments (Newman, 1996). Common law always allowed for a service contract between employer (farmer) and employee (farm worker). According to Newman (1996) and Lewis *et al.* (1996), farmers started adjusting to labour legislation introduced in the early 1990s before the country's first democratic elections in 1994. The following legislation affected agriculture prior to 1994:

- (1) The Basic Conditions of Employment Act (BCEA) 104 of 1992
- (2) The Unemployment Insurance Amendment Act (UIA) 130 of 1992
- (3) The Agricultural Labour Act (ALA) 147 of 1993.
- (4) Occupational Health and Safety Act 85 of 1993.

2.2 An overview of labour legislation introduced post-1994

Agricultural labour legislation was introduced because common law was inadequate in regulating the relationship between labourer and farmer (de Jager and Wild 1993, cited by Newman 1996:12). The following legislation affected agriculture after 1994:

- (1) The Basic Conditions of Employment Act 75 of 1997 (amended)
- (2) The Unemployment Insurance Act 63 of 2001 (amended)
- (3) Labour Relations Act 66 of 1995
- (4) The Land Reform (Labour Tenants) Act 3 of 1996
- (5) The Extension of Security of Tenure Act 62 of 1997
- (6) Employment Equity Act 55 of 1998
- (7) Skills Development Levies Act 9 of 1999
- (8) The Sectoral Determination (an amendment of the BCEA 75 of 1997) which includes the imposition of minimum wages.

2.2.1 The Basic Conditions of Employment Act 75 of 1997 (amended)

“The Basic Conditions of Employment Act (BCEA) 75 of 1997 was introduced to advance economic development and social justice by fulfilling the primary objectives of this Act, which are –

- (a) to give effect to and regulate the right to fair labour practices conferred by section 23 (1) of the Constitution, namely (i) by establishing and enforcing basic conditions of employment; and (ii) by regulating the variation of basic conditions of employment; and

(b) to give effect to obligations incurred by the Republic as a member of the International Labour Organisation” (Department of Labour, 2003).

The BCEA stipulates the maximum number of hours worked weekly, the daily ordinary working hours and the maximum number of hours an employee may work in a 24 hour period. The Act also provides for the extension of working hours, meal intervals and overtime. In a study conducted by the Department of Labour (2001) it was shown that many farmers did not comply with the conditions of employment, particularly in respect of working hours. In terms of the minimum wage legislation, a worker should work a minimum of 27 and a maximum of 45 hours a week to qualify for the minimum wage. However, the minimum of 27 hours per week now only applies to domestic workers and not all farm workers who will receive the full monthly wage in their specific regions (Department of Labour, 2006). In the Department of Labour (2001) study, half of the workers interviewed indicated that there are times in the year in which they work 55 hours or more a week. One in ten said that they sometimes work for more than 72 hours a week. The Act stipulates the payment for overtime and work on Sundays and Public holidays. The Act deals with annual leave, sick leave and termination of service contracts. In the study conducted by the Department of Labour (2001), many respondents did not receive their legal entitlements in terms of annual leave, sick leave, maternity leave, UIF membership and overtime pay. Children of 14 years and younger were reported to be working on nearly a quarter of the farms in the study (15 years being the minimum). Children of 15 to 17 years were reported to be working on nearly 40% of the surveyed farms.

The BCEA also requires that farmers display the Act where employees can read it in their own language in order to understand their rights and obligations. The remuneration process

that must be followed by the employer is described, including the keeping of records, and deductions and payment of contributions to benefit funds. The Act stipulates the role of labour inspectors and their responsibilities. If a farmer is found guilty of contravening the Act he/she can be fined, imprisoned or both.

Barker (2003) states that the Act increases direct and indirect costs of labour. Transaction costs, in terms of time, money and effort spent by farmers dealing with labour are increased. The reduction of hours worked increases the cost of labour and production costs in general owing to fixed labour costs, variable labour costs and capital costs. Since fixed labour costs and capital costs do not change in proportion to the decrease in the number of hours worked, the cost of employment is spread over fewer hours, thus increasing the hourly cost of labour. With regards to variable costs of labour, if the labour is paid hourly then the cost of labour per hour remains constant. But if the labourers are paid weekly or monthly and the wage rate remains constant with a decrease in the number of hours worked, the reduction in hours worked will increase the hourly cost of labour. As the cost of labour increases, so farmers will tend to substitute capital for labour (Barker 2003).

2.2.2 The Unemployment Insurance Act 63 of 2001 (amended)

The purpose of the Unemployment Insurance Act (UIA) is to establish an unemployment insurance fund to which employers and employees contribute and from which employees who become unemployed or their beneficiaries are entitled to benefit. The Act is therefore intended to alleviate the harmful economic and social effects of unemployment (Department of Labour, 2003). Goedeke (1993:17) suggests that the fund ensures that contributors will be insured against the loss of wages following dismissal, illness or pregnancy. The Act applies

to all employers and employees, other than employees employed for less than 24 hours a month with a particular employer (Department of Labour, 2003).

The contributor to the fund can receive the following benefits:

- unemployment benefits
- illness benefits
- maternity benefits
- adoption benefits (e.g., only one contributor of the child adopting parties is entitled to the adoption benefits in respect of each adopted child).

The Act also makes allowance for the role of labour inspectors and includes a list of offences in terms of the Act; for example, failure of an employer to contribute to the Unemployment Insurance Fund.

2.2.3 Labour Relations Act 66 of 1995 (LRA)

The Agricultural Labour Act 147 of 1993 (ALA) allowed for the creation of an agricultural labour court. The court dealt mainly with unfair labour practices. The Act set out procedures for dismissal of a labourer and dealt with labour unionisation. In 1995, the LRA was adopted and the ALA was amended. The LRA gives employees the right to freedom of association, i.e., to join any trade union. It also allows employees to organise and collectively bargain with regards to trade unions. The Act allows for trade union members to take time off work to attend meetings or strikes, as trade unions that are registered now have the right to strike and also have organisational rights. The LRA provides the procedures that must be followed when taking a dispute to the Council for Conciliation, Mediation and Arbitration (CCMA) or

the Labour Court. Unfair labour practices and unfair dismissals are dealt with in the LRA. Finally, the LRA provides a guideline or a 'Code of Good Practice' for employers to follow when dealing with labour issues (Labour Relations Act 66 of 1995).

2.2.4 The Land Reform (Labour Tenants) Act 3 of 1996

The Act is based on the principle that the existing system of labour tenancy was the result of racially discriminatory laws and practices that denied tenants access to land. It gives labour tenants and their families the right to acquire land and security of tenure in their places of residence. Beneficiaries can access a range of grants (R20 000 to R100 000) depending on the amount of their own contribution in kind, labour and/or cash. Beneficiaries must provide an own contribution of at least R5 000 (Department of Land Affairs, 2006). The Act was passed in March 1996 but was retroactive since June 1995 (Land Reform Act 3 of 1996).

The Act makes a distinction between labour tenants and farm workers. Labour tenants work for the owner or lessee of a farm, and are paid in terms of land use (grazing, cultivation, etc.) and housing use. Unlike farm workers they do not receive a cash wage. All labour tenants, who meet the requirements of the definition, are assumed to have legal rights to live on and use the land on the farm on which they currently stay. It is also assumed that, in return for these rights, the labour tenants, or a member of the labour tenant's family, will continue to provide labour to the farm owner as has been the case in the past (Land Reform Act 3 of 1996).

2.2.5 The Extension of Security of Tenure Act 62 of 1997 (ESTA)

Many South Africans do not have secure tenure of their homes and the land which they use and are therefore vulnerable to unfair eviction leading to great hardship, conflict and instability. It is suggested that this situation is in part the result of past discriminatory laws and practices conducted during the apartheid era (Extension of Security of Tenure Act 62 of 1997). According to the Department of Labour (2001), the Act provides for measures to facilitate long-term security of land tenure where possible through the joint efforts of occupiers, landowners and government bodies. The Act further regulates the conditions of residence on certain land, as well as the conditions on and circumstances under which the right of persons to reside on land may be terminated. ESTA regulates the conditions and circumstances under which persons, whose right of residence has been terminated, may be evicted from land. The law regulates the eviction of vulnerable occupiers from land in a fair manner, while recognising the right of land owners to apply to court for an eviction order in appropriate circumstances to ensure that occupiers are not further prejudiced (Extension of Security of Tenure Act 62 of 1997).

2.2.6 Employment Equity Act 55 of 1998 (EEA)

The EEA obliges employers to reduce 'disproportionate' income differentials. There is substantial income inequality between economic sectors; the lowest paid sector is by far the agricultural sector. The EEA was created to try and decrease the inequality within the SA agricultural sector as well as between sectors. Discrimination is illegal according to section 6 of the Act. It states that no employer may discriminate against employees, "on one or more grounds, including race, gender, sex, pregnancy, marital status, family responsibility, ethnic

or social origin, colour, sexual orientation, age, disability, religion, HIV status, conscience, belief, political opinion, culture, language and birth.” The Act also deals with Affirmative Action measures and procedures that employers must follow. Affirmative Action makes sure that qualified designated groups (black people, women and people with disabilities) have equal opportunities to acquire a job (Employment Equity Act 55 of 1998).

2.2.7 Skills Development Levies Act 9 of 1999 (SDLA)

The purposes of the SDLA are to develop the skills of the SA workforce by:

- improving the quality of life of workers, their prospects of work and labour mobility;
- improving productivity in the workplace and the competitiveness of employers;
- promote self-employment; and
- improve the delivery of social services

The Act further aims to increase the levels of investment in education and training in the labour market and to improve the return on that investment (Skills Development Levies Act 9 of 1999). The Act encourages employers to:

- use the workplace as an active learning environment;
- provide employees with the opportunities to acquire new skills;
- provide opportunities for new entrants to the labour market to gain work experience; and
- employ persons who find it difficult to be employed

Furthermore, the SDLA aims to assist work-seekers to find work, retrenched workers to re-enter the labour market, employers to find qualified employees, and to provide and regulate

employment services (Skills Development Levies Act 9 of 1999). These purposes are achieved by:

(a) establishing an institutional and financial framework comprising:

- the National Skills Authority;
- the National Skills Fund;
- a skills development levy-grant scheme as contemplated in the Skills Development Levies Act;
- SETAs (Sector Education and Training Authorities);
- labour centres; and
- the Skills Development Planning Unit

(b) encouraging partnerships between the public and private sectors of the economy to provide education and training in and for the workplace.

2.2.8 The Sectoral Determination (published by the BCEA)

In terms of the Sectoral Determination, which is included in the Basic Conditions of Employment Act 75 of 1997, farmers were required to pay the prescribed minimum wages of R650 and R800 per month in defined areas (B and A respectively) from March 2003. In addition, the Act sets conditions of employment for farm workers.

2.2.8.1 Wage rate

Originally in 2001, the minimum monthly wage level proposed ranged between R400 in the poorer areas to R700 in the wealthier regions of the country (Barker, 2003). The wages were prescribed for two areas, namely Area A (cities and major towns) and Area B (the rest of South Africa). Municipal boundaries were used to distinguish between the two areas (Department of Labour, 2003). On 1 March 2003 the minimum wage legislation came into effect and by law farmers had to pay their employees a minimum monthly wage of R800 in Area A and R650 in Area B. These wages were only applicable to those who worked for more than 27 hours per week. The Act permits a maximum of 45 hours of work per week. This comprises nine hours on any day if the worker works for five days or less in a week; or eight hours in any day if the farm worker works for more than five days in any week. The Act allows for 15 hours of overtime per week. Those who work less than 27 hours per week would receive a minimum of R4.10 per hour in Area A and R3.33 in area B. These minimum wage levels increased on 1 March 2004 to R880 in Area A and R715 in area B (Department of Labour, 2003). As from the 1 March 2005 the wages increased to R950 per month in Area A and R786 per month in Area B or an hourly rate of R4.87 and R4.03 respectively. The wage rate increased again on 1 March 2006 to R994 per month in Area A and R885 per month in Area B or an hourly rate of R5.10 and R4.54 respectively. The minimum of 27 hours per week now only applies to domestic workers and not all farm workers, who will receive the full monthly wage in their specific regions (Department of Labour, 2006). The Act prohibits the employment of children under the age of 15 years and defines four types of leave which the farm worker is entitled to; namely, annual leave, sick leave, family responsibility leave and maternity leave (Department of Labour, 2005).

2.2.8.2 Deductions

The Sectoral Determination Act stipulates that a farmer may only deduct money from wages if the farm worker agrees. These deductions may include: savings, provident and related funds, repayment of a loan to a financial institution and trade union subscriptions. The farmer may not deduct for tools and equipment provided at the workplace, uniforms, meals taken during working hours, or any accidental damages (Department of Labour, 2005).

2.2.8.3 Payments in kind

Newman (1996) notes that labour in commercial agriculture normally receive a cash wage and payments in kind from the farmer. Employers may reduce or even eliminate perquisites if they are not considered part of the minimum wage. Newman (1996) found that most farmers would pay labourers a cash wage and charge for perquisites if the minimum wages exceed their current payments. Payments in kind generally comprise a combination of food rations, grazing rights, cultivation rights and accommodation on the farm. The Department of Labour (2005) suggests that payments in kind must be valued on the basis of the cost to the employer of supplying goods and services to workers subject to these restrictions:

- a. The total payment in kind may not be deemed to constitute more than 20% of the total wage.
- b. No additional deduction may be made from the worker's cash wage for a payment in kind.
- c. Housing may be considered to constitute payment in kind only if no rental is charged for the house in which the worker is resident.

- d. A deduction, not exceeding one-tenth of the wage due to the farm worker on the pay-day concerned, towards the repayment of any amount loaned or advanced to the farm worker by the farmer.

According to the Minister Mdladlana, “We recognised that farm workers more often than not are dependent on the provision of rations as a result of the relative isolation of farms and farm workers. To this extent, we have allowed a deduction of 10% from wages for food and a further 10% where accommodation is provided if it meets certain requirements” (Department of Labour, 2003:17). A national survey published by the Department of Labour (2003) shows that 83% of farm workers lived on farms and that four out of five paid rent. In three out of four cases, the owner pays for the maintenance of the worker cottages. Some of the services, like housing, are free of charge while others, like medical costs, carry a 50% employer subsidy. The survey shows that employers are beginning to reduce handouts and make workers pay for services (Department of Labour, 2003).

2.2.9 Problems with the labour legislation

The introduction of labour legislation to agriculture is a contentious issue among farmers when it increases costs. The BCEA and UIA increase the time, money and effort spent by farmers dealing with labour (i.e., transaction costs), while the Labour Relations Act increases the risk of industrial action on farms. The Skills Development Levies Act results in further costs for the farmer in terms of providing training and education for the workers. Moreover, the Land Reform (Labour Tenants) Act and Extension of Security of Tenure Act expose farmers with more on-farm labour to greater risk of land claims. According to Vink and Tregurtha (2003) and Goedeke and Ortmann (1993), the increase in labour costs (including transaction costs and risk) has led to the substitution of own machinery, contract machinery

or contract labour for own labour. However, Hertz (2002) contends that disemployment caused by higher wages could aggravate poverty even if demand for labour is not price elastic. The enforceability of the law is also problematic as there are few inspectors and it is hardly likely that all farmers will be visited to see if they comply with the law. Newman (1996) suggested that incentives could be introduced to ensure that farmers comply with the law. Currently, the Land Bank has introduced various incentives such as discounted loans, easier access to loans and equity finance for farmers who do comply with the law (Department of Labour, 2005).

CHAPTER 3

IMPACT OF LABOUR LEGISLATION ON SA AGRICULTURE

The minimum wage was originally proposed as part of a broad labour market policy aimed at increasing labour productivity and achieving stability throughout the country. However, minimum wages are progressive in that the lowest paid workers receive the largest income increases but, at the same time, there are a large number of job losses which create losses in income that may force many households into poverty (Hertz, 2002). This chapter presents the implications of labour legislation for SA agriculture, with particular reference to the likely impacts of minimum wages.

3.1 Agricultural employment in South Africa

The effect of minimum wages in agriculture has to be viewed against the background of substantial labour shedding across the country in the last 30 years. Payne *et al.* (1990) report an annual decline of 1.15% between 1970 and 1990. One in five workers lost their jobs between 1990 and 1992 (Department of Labour, 2005). Between 1993 and 2002, when the last agricultural census was conducted, agricultural employment in South Africa fell by 13,9% (from 1 093 265 to 940 815 workers) (Statistics South Africa, 2005). A loss of employment in agriculture due to increases in labour costs (and accompanied by depressed agricultural economic conditions) is an important push factor driving the least skilled labour out of the agricultural sector (Nieuwoudt and Groenewald, 2003). Farm workers will move to urban areas to seek employment because jobs are unavailable in rural areas.

In comparison with other countries, South Africa has one of the highest levels of unemployment in the world. In 1994, according to comparative estimates made by the International Labour Organisation (ILO), only Reunion (33%) and Macedonia (31%) had rates of unemployment as high as or higher than South Africa (Vink and Tregurtha 2003). Hertz (2002) suggests that unofficial estimates of unemployment were as high as 47% in some rural areas. In 2005, the official unemployment rate in South Africa was 26,5%, while unofficial unemployment estimates were around 41% (Statistics South Africa, 2005).

Figure 3.1 shows employment trends in SA agriculture from 1980 to 2002. The graph also shows the real average cash wage (including cash salaries and bonuses) per month throughout the period as well as total remuneration. The base year for real wages is 2000. Total employment is divided into regular (or permanent) employment and casual employment. It is evident from the graph that the real wage rate increased and employment fell over time, particularly since 1990. The graph shows the real average wage rate declined from 1996 to 2002. From Appendix 1 it is evident that this decline is due to a decrease in the real wage for casual labour and an increase in the proportion of casual labour in total farm labour.

Figure 3.1 shows total employment amounting to approximately 1.15 million in 1980 compared to 0,94 million in 2002. This is a decrease of 18,3% in agricultural labour employment over a 22-year period. This has, in part, been caused by deregulation of agricultural product markets, subsidies being slashed and import tariffs all but eliminated (Hertz, 2002). From the early 1990s, when labour legislation first impacted on agriculture, farmers would have reacted to the legislation due to a perceived increase in labour costs, resulting in a decrease in total labour employment. The average total wage in 2002 was just

over R600 per month throughout the country. In March 2003 this wage increased to an average of R725 (R593,77*) (R800 in Area A and R650 in Area B), due mainly to the imposition of minimum wages. The average increased again to R797,50 (R644,10*) in March 2004 and R868 (R678,10*) in March 2005. As at 1 March 2006, the average wage was set at R940 (R714,20*) (R994 in Area A and R885 in Area B) (Department of Labour, 2006). An Agricultural Census was conducted throughout the country in 1996 and then again in 2002. No employment data were collected between these census dates.

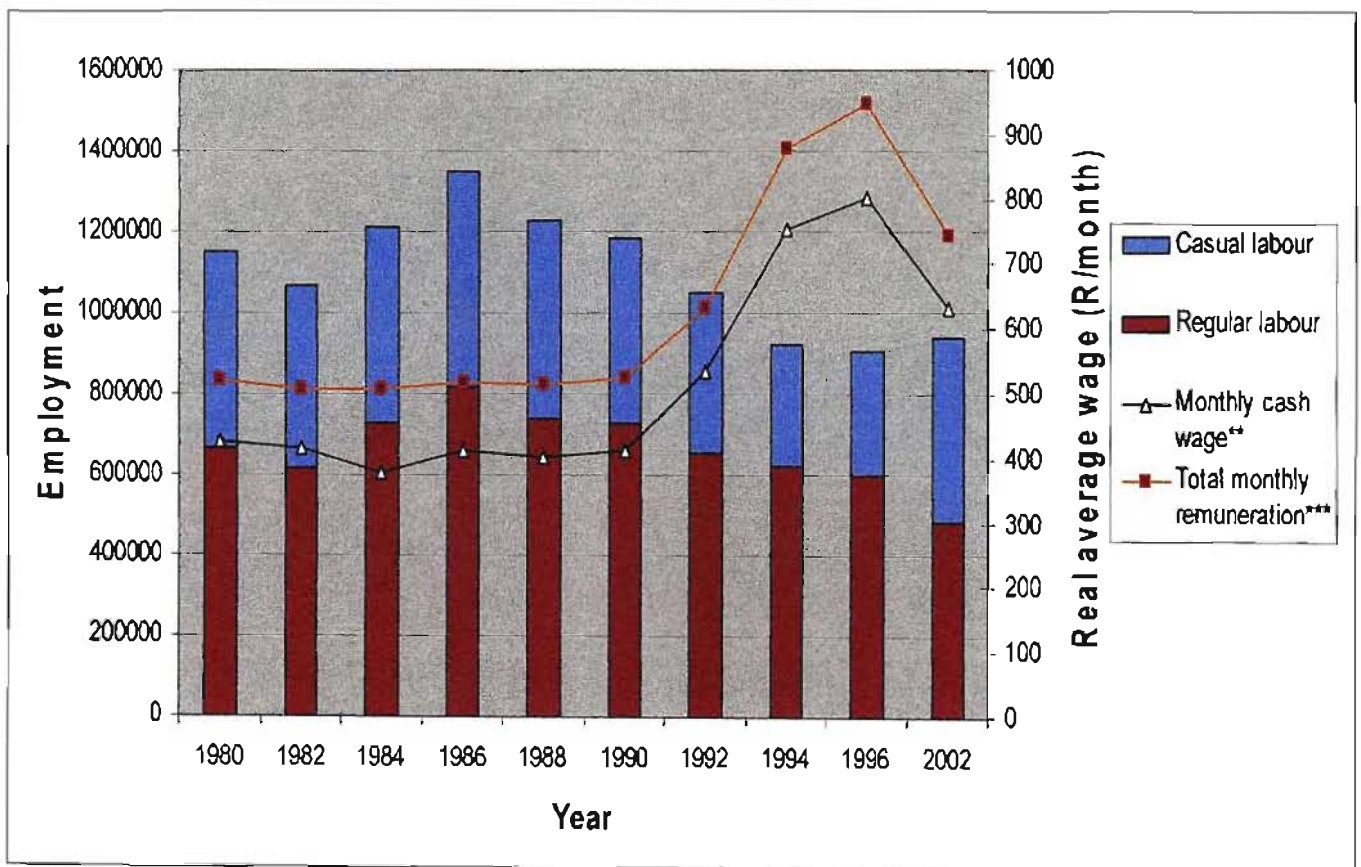


FIGURE 3.1: Employment and real average wages in South African agriculture, 1980-2002 (Statistics South Africa, 2005)

* Wage rate expressed in real terms (base year = 2000)
 ** The monthly cash wage includes the cash wage payable to the labourer on a monthly basis
 *** Total monthly remuneration includes cash wages plus payment in kind, benefits, bonuses, etc.

Conradie (2003) states that only half of South Africa's potential labour force is able to find employment in the formal economy. Men in full-time permanent positions are the most important and clearly defined labour category. All farmers employ them, and many think of their permanently employed (regular) men as their "real" workforce (Conradie, 2003:10). Many women work on farms alongside their partners, yet never share the benefits of full-time employment such as UIF, provident funds, etc. (Department of Labour, 2001). According to Stoltz (2003, cited by Conradie, 2003:7), farmers say that they "make work" to keep women busy so as to secure them for the critical harvest season but also to raise household income. Women who already work short hours are probably more vulnerable to legislated wage increases than those working full-time year round. The Department of Labour (2001) reports that women, the less skilled and those who live in the rural areas are more likely to be poor and less likely to find formal sector employment. In this regard, the agricultural labour force sits at the junction between the formal and informal economies. Farm workers earn more than those engaged in informal activities in urban and non-urban areas, yet they earn less than other workers in the formal economy.

One of the major constraints to faster GDP growth and thus greater labour absorption in SA is the shortage of skills. Importantly, government has recognised the critical need to improve the quality of school education, particularly in maths and science, and is prioritising technical and quantitative skills. Gallasch and Gardner (1978) stated that a higher level of schooling and/or an increase in a minimum wage would increase the average wage and decrease employment on farms due to a decreased supply of farm labour. Currently in South Africa, the availability of schooling to the average rural child is better today than it was 30 years ago. This suggests that the average level of education and skills is higher among rural teenagers and young adults than the older generation, forcing an increase in the wage and a decrease in

employment. In the agricultural sector, in the period 1996 to 2002, the proportion of skilled labour (10%) remained the same, while the percentage of semi-skilled labour increased (from 22% to 47%) and unskilled labour decreased (from 68% to 43%) because retrenchments are selective (Statistics South Africa, 2004). Ortmann (2005) argues that the demand for appropriate skills will increase as the economy grows, and it may be necessary to import appropriate skills in the short to medium term in order to augment existing skills. Government, however, would have to liberalise its immigration policies. While general economic growth in the non-farm sector increases the farm wage rate and reduces farm employment, better skilled workers who leave the farm sector in response to the pull of this “invisible hand” are more likely to find satisfactory employment than are less skilled workers displaced from agriculture by the “invisible foot” of the minimum wage (Gallasch and Gardner, 1978:267).

The farming sector has been subjected to extensive market deregulation over the past decade and a major reform of labour legislation. There is a clear bias toward capital using technology in SA agriculture (Department of Labour, 2001).

3.2 Minimum wage

Lianos (1972) states that a decline in employment is to be expected with the imposition of a minimum wage. This is the result of two negative effects: a direct effect as employers tend to substitute non-labour inputs for labour, which becomes relatively expensive, and an indirect effect through substitution in consumption as the good produced by the labour receiving the minimum wage becomes relatively expensive.

Competitive labour market models suggest a negative relationship between employment and wages. If a statutory minimum wage causes large wage increases, significant unemployment might result if the unit cost of labour rises (Conradie, 2003). Gallasch and Gardner (1978) report on a study by Gardner which estimated that a minimum wage increase of 13% above the average wage would decrease employment by 18% in the long-run, while a study by Gallasch (reported by Gallasch and Gardner, 1978) found that a minimum wage which increased the average wage by 3% would reduce employment by 15% in the long-run.

The Department of Labour (2001) reports that the primary goal of a minimum wage should be to address income inequalities within the agricultural sector. To this end, the minimum wage has to be accompanied by enforcement of basic conditions of employment, including UIF and other measures, to protect the interest of women, who consistently earn less than men, and who are less likely to be employed as permanent workers. Barker (2003) suggests that a minimum wage is used to help those workers in the labour force who do not have their conditions of employment determined by a fair collective bargaining process and, in addition to this, may help those employees with low personal leverage to have more security in their employment contract.

The standard model of a unified and perfectly competitive labour market predicts that setting minimum wages above the market equilibrium will reduce employment and the elasticity of this response depends on the level at which the minimum is set, the low-wage labour share, and the elasticity of substitution between low-wage labour and other inputs (Hertz, 2002). Reduced employment will occur in sectors where a minimum wage is set higher than the equilibrium wage rate. However, when the minimum wage is set below the average wage rate in the industry, a minimum wage could compress the wide range of wage rates found in a

sector (Vink and Tregurtha, 2003). Conradie (2003) states that prior to minimum wage implementation, South Africa experienced a wide range of wages throughout various regions of the country; for example, in 2002 grape farmers in the Western Cape paid higher wages than any other region of the country. Hertz (2002) states that the effects of a minimum wage will vary according to income and will only be of any crucial economic significance depending on the stringency of enforcement and the changes of employment brought about by the minimum wage.

Figure 3.2 shows the traditional effects of a minimum wage in a market for unskilled labour. Assuming the market is allowed to work freely, then L_0 unskilled workers are employed at a wage of W_0 . A fixed factor of production, say, entrepreneurship, earns a surplus denoted by areas A, C, and E. Workers earn rent in the amount denoted by areas B, D, and F. Notably, workers who hold these jobs are those who earn the most rent (Ippolito, 2003). Those unskilled workers on the bottom portion of the supply are high-rent workers and those further up, low-rent workers. If the government enacts a minimum wage of W_1 , then $L_0 - L_2$ unskilled workers would be unemployed. The L_2 workers still employed earn more rent, denoted by area C. Areas A + B measure the deadweight cost imposed by the wage regulation. This describes the well-known first-round effect of a minimum wage.

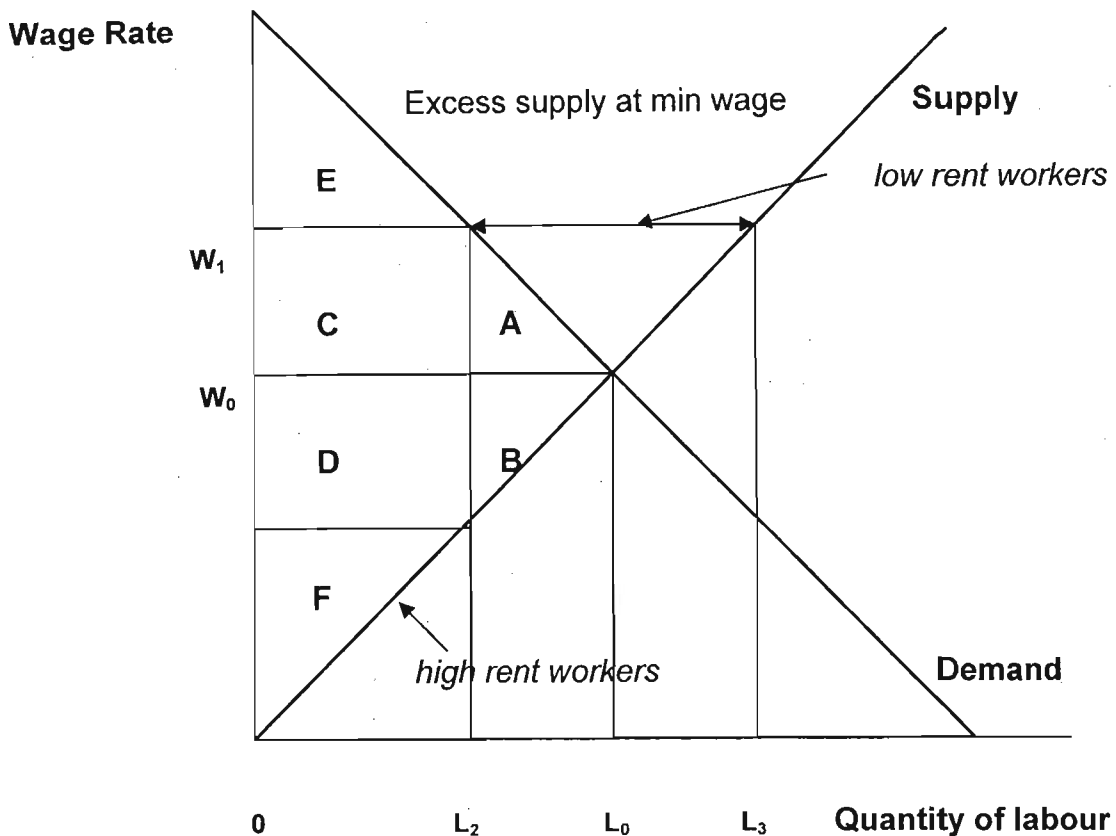


FIGURE 3.2: Effects of a minimum wage (Ippolito, 2003)

In the second-round effect, more workers enter the market at the regulated wage. There is an excess supply for the now-scarce jobs for low-skilled workers: L_3 workers are now searching for L_2 jobs. The workers all look alike from the perspective of firms hiring from the applicant pool. The additional social cost of the minimum wage comes about because employers prefer to hire low-rent workers instead of high-rent workers. The cost can be high in relation to the loss described in the first round (Ippolito, 2003).

Burton *et al.* (1970) state that under conditions of a perfectly competitive labour market, an effective minimum wage will have the following outcomes: the size of the workforce will be reduced as the value of the worker's services is lower than the minimum wage and the

productivity of those workers remaining is increased. The lower the value of their services is below the minimum wage, the more elastic is the demand for output the workers produce, and the higher the available substitution possibilities are for the workforce services.

Vink and Tregurtha (2003) state that the aim of a minimum wage should be clearly set out and from an economic point of view, it may be better to provide direct income transfers to the poor rather than to manipulate market prices (wages) or price supports as a mechanism of farm subsidies. Politicians, however, have preferred the latter. The Department of Labour (2001) argue that their research has shown that economists have traditionally favoured lump-sum transfers as the most efficient form of subsidisation. However, the minimum wage is expedient as the mechanisms for its implementation are already in place (Department of Labour, 2003).

Hertz (2002) states that the most important issue around the minimum wage is whether a single wage can be set for the whole of the agricultural sector. Lianos (1972) suggests that the overall effect on the agricultural sector is a decrease in employment, especially of unskilled, females and younger workers, if the minimum wage is set too high. Although a single minimum wage may be easier to implement and place less of a burden on implementation structures, it would have to be set so low in order to accommodate the interests of workers in the extensive livestock sector as to be meaningless; or alternatively so high to accommodate the needs of workers on fruit and wine farms, that the rest of the sector will not be able to pay such wages (Hertz, 2002). The Sectoral Determination (see section 2.2.8) also deals with the demarcation of the agricultural sector in South Africa into A and B districts which define the level of minimum wages.

3.2.1 Macroeconomic and microeconomic considerations of minimum wages

The Department of Labour (2001) found that although the agricultural wage rate in South Africa grew at a faster rate than in many other sectors of the economy, the gap between the wage rate in agriculture and the rest of the formal economy continues to increase. The agricultural wage is important for rural households as it constitutes, on average, 39% of rural incomes (Department of labour, 2001). A net decrease in employment may also lead to an increase in total employment if the upstream and downstream employment effects of the increased spending by those whose wages increase is larger than the direct and indirect disemployment of the decreased spending by those rendered unemployed by the minimum wage (Vink and Tregurtha, 2003).

On a microeconomic scale, a 1979 survey of economists working at universities, in government and in the business sector in the United States (Kearl *et al.*, 1979:34) showed that 90% of them generally agreed that “A minimum wage increases unemployment among young and unskilled workers.” This statement can be supplemented by arguments that also include the losses that occur when the high productivity firms cannot hire the lowest-wage workers and when firms with a high ability to evade minimum wages displace firms with a low ability, even though the latter may be more productive. In the case of perfect competition, however, some poor people gain higher wages, but losses are borne by those who become unemployed and by employers. Further, those who lose jobs will seek employment in sectors where there are no minimum wages. This will depress wages in those industries as well (Lang and Khan, 1998).

Nevertheless, there have always been differing views concentrating on issues such as:

- **The effects of different relative capital/labour ratios.** For example, if the sector covered by the minimum wage were more capital intensive than the rest of the economy, and the demand for its goods fairly elastic, a minimum wage would cause its labour employment to fall. Both capital and labour would move to relatively less capital-intensive parts of the economy. The added capital would make these sectors more capital intensive and thus wage rates would be higher (Johnson, 1990, cited by Vink and Tregurtha, 2003).
- **The long-term positive growth effects occasioned by improved human capital.** Vink and Tregurtha (2003) suggest that this model is very close to human capital theory. It states that, in an overlapping generations model with endogenous growth, high minimum wages can have positive effects on growth rate and welfare by increasing the proportion of skilled workers.

3.2.2 Minimum wages abroad

Krueger (1994:12) finds evidence of increased managerial efficiency and higher levels of worker effort with higher minimum wages in Puerto Rico, and no significant disemployment. However, he finds that this “induced technological innovation” argument cuts both ways: management may also discover new labour-saving ways of maintaining output in response to higher wages.

India is one of the few countries with a long experience in the implementation of minimum wages. There seems to be a consensus that the minimum wage is one of the instruments required to alleviate poverty among farm workers (together with land reform, unionization

and other social security measures), largely because there is a close correlation between the caste system and farm labourers (Thangaraj, 1995).

There was a period during the early 1990s in the United Kingdom (UK) when only the agricultural sector was covered by a minimum wage (Vink and Tregurtha, 2003). However, a later study showed that the average earnings of farm workers were consistently higher than the minimum wage. Econometric tests show that the level of the minimum wage is “caused” by the average wage (Vink and Tregurtha, 2003:54). Thus, the Agricultural Wages Boards in the UK have been reactive and minimum wages have had no impact on average earnings (Tiffin and Dawson, 1996, cited by Vink and Tregurtha, 2003), but may have had a positive effect on total employment (Dickens *et al.*, 1995, cited by Vink and Tregurtha, 2003).

Perloff (1986, cited by Hertz, 2002) shows that in the USA, wages in agriculture rise significantly with the number of hours worked per week. Kabede and Gan (1999) evaluate the potential of vegetable production to enhance the declining farm income of limited resource farmers in the USA. As vegetable production is labour intensive and sensitive to changes in labour costs, an increase in the minimum wage might adversely affect the return from vegetable production for these vulnerable farmers.

3.3 Machinery contracting and technology

The demand for labour in South Africa is expected to be price elastic due to the availability of various substitutes, such as machinery or labour contracting (Goedecke and Ortmann, 1993). As the relative cost of labour increases it is substituted with machinery (capital). This will occur until the price ratio of labour and capital is equal to the ratio of the marginal

product of labour to the marginal product of capital. Borat and Hodge (1999) suggest that the process of long-run economic growth is driven by either increasing the stock of factor inputs (investment to increase capital or population growth to increase labour) or by improving the productivity of these factor inputs through technological change. These forces will influence the level of labour demand, but they will only influence the structure of demand if they favour one set of skills over another. According to the World Bank (1994), the negative real interest rates for agricultural loans available from the Land Bank and co-operatives largely explained over-investment in mechanisation in the 1970s and 1980s in South Africa.

As the price of unskilled labour increases, unskilled labour is replaced with more skilled (productive) labour, which becomes relatively cheaper (Newman, 1996). Borat and Hodge (1999) stated that increases in capital intensity is expected to lower the demand for unskilled and low-skilled labour that is being replaced by the new capital equipment, but increase the demand for more skilled labour who are required to operate and maintain the new capital equipment. Transaction costs would also increase as more time is spent maintaining labour records and arbitrating wage disputes with permanent labour. Newman (1996) states that high transaction costs lead farmers to change their factor mix, for example, by substituting labour with machinery, contractors or other inputs (Figure 3.3).

Figure 3.3 shows that as labour costs increase with new labour regulations, the farm will reduce the employment of labour. E_1 was the initial equilibrium; the new equilibrium is E_3 , the point of tangency between the isoquant I_2 and the isocost line KL_2 . It can be shown, therefore, that the quantity of labour employed drops from OW_1 to OW_3 and production drops from isoquant I_1 to I_2 . Production falls as the farm's purchasing power has been

reduced and the farmer is, therefore, unable to produce on isoquant I_1 . An imaginary isocost line (MM) is introduced which compensates the firm for any change in real purchasing power (increase in the cost of labour). The change in purchasing power reduces the farm's production possibility; this imaginary isocost compensates the farmer for this and shows the factor input combination at the old level of production, but with new relative prices. If the firm maintains production at the old level then employment will fall from OW_1 to OW_2 and the use of capital will increase from OC_1 to OC_2 (substitution effect).

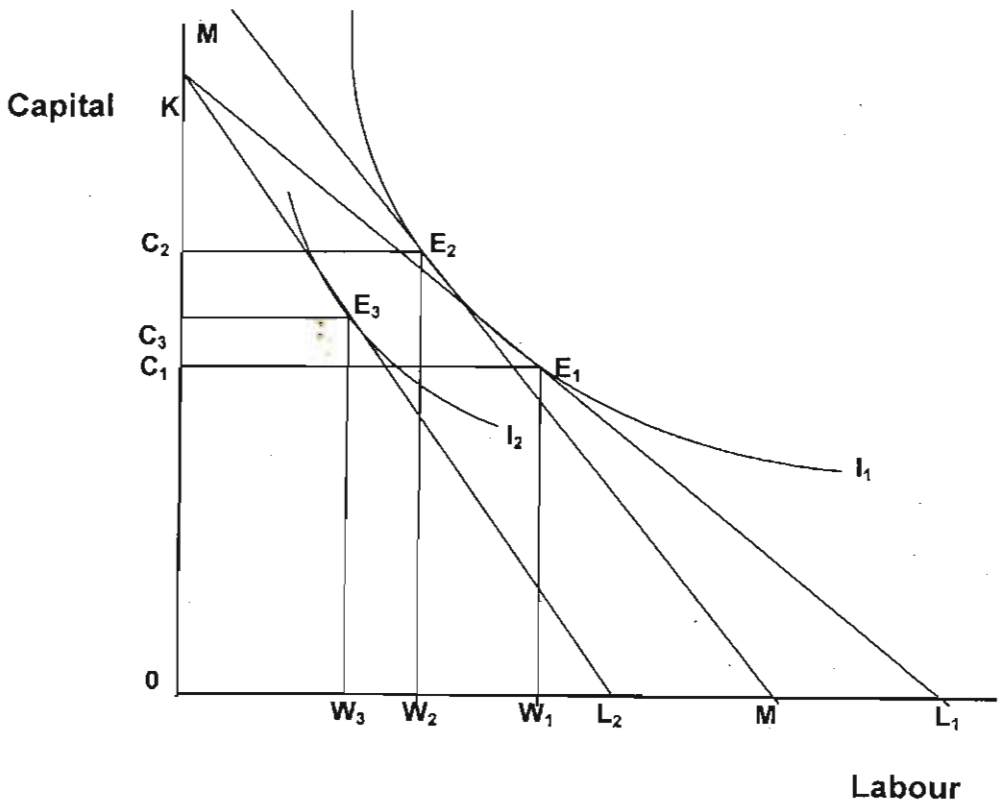


FIGURE 3.3: The effect of a change in the cost of labour on the new composition of factor inputs on the farm (Griffiths and Jones, 1980:85)

Lyne and Ortmann (1996) note that fixed costs introduce economies of size and make the choice of production technique dependent upon farm size. For example, machines may

substitute for labour on larger farms where fixed costs can be spread over greater volumes of output. Errington and Bennet (1994, cited by Newman 1996:28) maintain that as machines become larger and more sophisticated they need to cover a greater area to reach and surpass the break-even point. Newman (1996:40) suggests that machinery contractors may have a competitive advantage over some farmers, in that they are able to spread their fixed costs over a greater number of farms. Due to this cost advantage it is expected that use of machinery contracting will increase on smaller farms where the costs of mechanisation may result in over-capitalisation (Newman and Ortmann, 1996). The advantage of using a machinery contractor is that it should be able to save the farmer repair costs, time, labour training, housing costs and also improve his cash flow (Goedeke, 1993:80).

As new technologies were developed during the 1960s and 1970s, many industries in South Africa, including agriculture, chose to increase their capital stock by investing in sophisticated machinery and employing few skilled technicians rather than adopt labour intensive methods that would require training and managing a large workforce. This trend resulted in lower unit labour costs and increased productivity. At the same time, it contributed to the country's soaring unemployment and spreading poverty, which fuelled resentment and raised the costs to the government of preserving apartheid (Walker, 1992).

Technological change has been a major contributor to the increases in capital-labour ratios. The labour market consequences of this change have been to increase the demand for highly skilled workers, combined with large-scale attrition at the bottom-end of the labour market (Bhorat, 2004). Batz *et al.* (1999) suggested that farmers who evaluated the new technologies available and compared them to their traditional alternatives adopted the new technologies if their characteristics promised a higher utility than the traditional technology.

In their study, the effects of new technologies on management complexity, risk reduction, and farmers' relative risk bearing capacities could explain the past process of adoption. Empirical evidence presented by Binswanger (1980, cited by Lyne and Ortmann, 1996) suggests that differences in investment behaviour among farmers facing similar technologies and risks cannot be explained by differences in their attitudes to risk, but rather by differences in their constraint set.

3.4 Labour contracting and hiring

Labour costs in SA commercial agriculture are increasing, both in terms of higher wages and costs of transacting with labour due to labour legislation. Labour contractors are independent intermediaries who, for a fee, recruit, hire, and supervise seasonal farm workers (Vandeman *et al.*, 1991). Labour contractor usage is expected to increase as a way of reducing the risk of labour action. Contractors are more easily replaced than permanent labour from the farmer's point of view (Newman and Ortmann, 1996). Both labour and machinery contracting are expected to be used more intensively in crop production as opposed to livestock production which requires a broader range of skills (Newman and Ortmann, 1996). Vandeman *et al.* (1991) argue that the contracting system is advantageous to growers precisely because it preserves the casual nature of farm work. They further argue that contractors possess an advantage in recruiting workers for seasonal jobs because they can spread their recruitment costs over a number of short-term contracts.

In Figure 3.4 the effect of a change in the cost of labour is evident. The vertical axis shows the ratio of the marginal product of labour to the marginal product of capital, while the ratio of labour to capital is measured along the horizontal axis. Assume that the initial ratio of

labour to capital is OZ , then $OZVX$ measures the share of labour relative to capital in the total expenditure on capital and labour. Therefore, if the cost of labour rises (due to increased wage and transaction costs) and the ratio of labour to capital falls to OY , $OYUW$ is formed. The elasticity of substitution measures how responsive the factor mix is to responses to changes in the cost of labour. It is an indication of the extent to which one input substitutes for another, in this case more expensive labour for capital. This provides an indication of the shape of an isoquant (Griffiths and Jones, 1980:97).

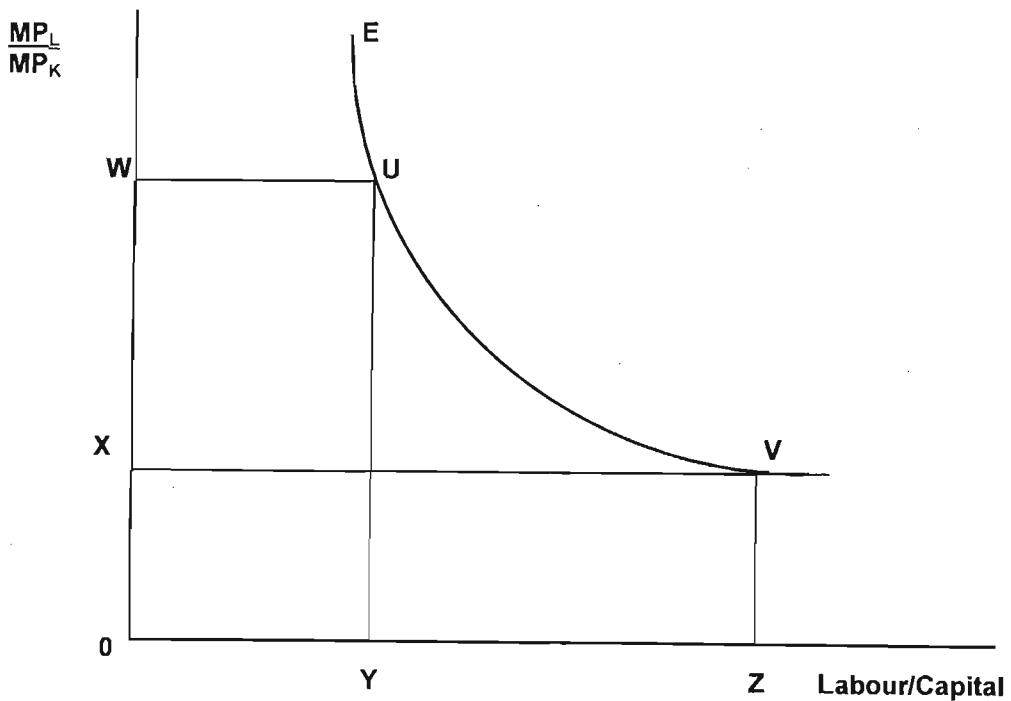


FIGURE 3.4: Elasticity of substitution between labour and capital (Griffiths and Jones, 1980:97)

With the increasing costs and risks of hiring labour, there is an increase in the capital/labour ratio. Many small farmers cannot spread the fixed costs of capital adequately over their area of land and thus resort to contract work on their farms, once again reducing the amount of labour. Polopolus and Emerson (1991, cited by Newman, 1996:29) suggest that labour

contracting decreases the transaction costs, as the farmer does not have to apply the new labour legislation because the labour is hired and is not directly employed, thus transferring the operation cost from the farmer to the contractor. However, the contractor is paid for providing that service.

CHAPTER 4

RESEARCH METHODOLOGY AND DATA COLLECTION

The purpose of this chapter is to describe the research approach to be followed in analysing labour demand using secondary data on labour employment in South Africa from 1960-2002. Both single equation and simultaneous equation labour demand models are presented later in this chapter.

4.1 Data collection

Most of the data collected for SA farm labour were obtained from Statistics South Africa. The Agricultural Census Reports (published by Statistics South Africa) are an important source of agricultural data in South Africa. In the past, these Reports were published on an annual basis. However, this has now changed. The latest Agricultural Census was conducted in 2002 and prior to that in 1993. There are, however, annual data available up to 1996. Missing observations for quantity and remuneration of farm labour between 1996 and 2002 were estimated with SPSS (version 11.5) using non-linear interpolation. Data obtained from the Abstract of Agricultural Statistics (2005) and Population Census Reports (published by Statistics South Africa) were also used in this study. The consumer price index (CPIX) (Statistics South Africa, 2005) with a base year of 2000 was used to deflate nominal values to real values for each of the independent price variables considered in the empirical models. Appendix 1 summarises the data used in this study.

4.2 Methodology

In this study, both Ordinary Least Squares (OLS) and Two-stage Least Squares (2SLS) regression are used to estimate the labour demand model. The variables for the labour supply model are used as instrumental variables to estimate the labour demand model using 2SLS regression.

4.2.1 Ordinary Least Squares (OLS) regression

Regression analysis is the most frequently used method to estimate demand relationships. It explains changes in one variable, the dependent variable, as a function of changes in other variables, the independent variables (Studenmund, 2001:115). Price and quantity of goods are jointly determined at the intersection of the supply and demand curves. In this study, where the wage rate represents the price of labour and the number of regular workers represents the quantity of labour, the demand model is estimated using both OLS and 2SLS regression. In theory, OLS should not be applied to estimate a single equation embedded in a system of simultaneous equations as, generally, one or more of the stochastic explanatory variables may be correlated with the stochastic disturbance term in that equation resulting in the estimators obtained being inconsistent (Gujarati, 2003:770).

4.2.2 Two-stage Least Squares (2SLS) regression

Two-stage Least Squares regression is a method of extending regression analysis to cover models which violate the OLS assumption that the disturbance term of the dependent variable is uncorrelated with the independent variables (Bollen, 1996). An equation in a

system of simultaneous equations is said to be exactly identified if there is a unique estimate for each of its parameters. Two-stage Least Squares regression can be applied to exactly identified equations and to over-identified equations where there may be more than one value for one or more structural parameters (Gujarati, 2003:740-748). Two-stage Least Squares replaces the (stochastic) endogenous explanatory variable with an estimated proxy variable that is a linear combination of all the predetermined variables in the model (that is uncorrelated with the stochastic disturbance term) and uses this combination as the explanatory variable in lieu of the original endogenous variable (Gujarati, 2003:762). A problem associated with the 2SLS method is that the standard errors of the estimates in the second stage are not necessarily the correct estimates of the true standard errors (Gujarati, 2003:763).

4.2.3 Piecewise linear regression

Both the OLS and 2SLS demand models estimated in this study include a piecewise slope dummy to allow for a structural change in demand for regular labour following labour reform. The dummy variable measures the difference between the observed wage rate (X_i) and the wage rate in a threshold year (X^*) when $X_i > X^*$, and 0 otherwise. In this study, 1991 was used as the threshold year as significant policy changes were anticipated in the early 1990s with the Basic Conditions of Employment Act gazetted in 1992. Piecewise linear regression splits the function into two linear segments that allow for a change of slope at the threshold value.

The theoretical piecewise linear model is specified as follows:

$$Y_t = \alpha_1 + \beta_1 X_t + \beta_2 (X_t - X^*) D_t + u_t$$

where: Y_t = regular labour demanded
 X_t = wage rate
 X^* = threshold value of wage rate
 $D_t = 1$ if $X_t > X^*$
 $= 0$ if $X_t < X^*$

Assuming $E(u_t) = 0$, then

$$E(Y_t | D_t = 0, X_t, X^*) = \alpha_1 + \beta_1 X_t$$

which gives the mean regular labour up to the target level X^* , and when

$$E(Y_t | D_t = 1, X_t, X^*) = \alpha_1 - \beta_2 X^* + (\beta_1 + \beta_2) X_t$$

which gives the expected mean regular labour quantity demanded beyond the target level X^* .

Thus, β_1 gives the slope of the regression line in segment I, and $\beta_1 + \beta_2$ gives the slope of the regression line in segment II of the piecewise linear regression (Gujarati, 2003:317-319). A log model was not considered appropriate as it imposes a condition of constant elasticity and, therefore, excludes the possibility of a change in the estimated price elasticity of labour demand.

4.2.4 Partial adjustment model

Both OLS and 2SLS models use an autoregressive scheme to account for time lags in adjustments made by farmers to the size of their regular labour force following a change in the expected cost of farm labour. In particular, the labour demand equations take Kyock's approach to distributed lags by including the lagged value of the dependant variable as an explanatory variable (Gujarati, 2003:665). Given the following expression:

$$Y_t^* = \beta_0 + \beta_1 X_t + u_t \quad \dots (1)$$

where the desired number of regular farm workers is Y_t^* and X_t is the wage rate, the partial adjustment model postulates that:

$$Y_t - Y_{t-1} = \delta(Y_t^* - Y_{t-1}) \quad \text{or} \quad Y_t = \delta Y_t^* + (1-\delta)Y_{t-1} \quad \dots (2)$$

where δ is the coefficient of adjustment that equates the actual change with the desired change (Gujarati, 2003:677). It is expected that δ will be less than unity owing to rigidities in the farm labour market that prevent farmers from achieving the desired change in their regular labour force in the space of one time period (a single year in this study). Some of these rigidities are the result of labour legislation. For example, the Labour Relations Act prevents farmers from dismissing workers without first showing that the reason for dismissal is related to the worker's conduct or capacity, or is based on the operational requirements of the business. The farmer should consult the relevant trade unions to settle the dispute and issue the worker with prior warnings before dismissal (Labour Relations Act 66 of 1995).

Substituting (1) into (2) yields the partial adjustment model:

$$Y_t = \delta\beta_0 + \delta\beta_1 X_t + (1 - \delta) Y_{t-1} + \delta u_t \quad \dots (3)$$

from which the parameters of the long-run demand function in expression (1) can be computed once the parameters of the expression (3), the short-run demand function, have been estimated. The parameters of (3) can be estimated using OLS regression (Gujarati, 2003:678).

4.3 Single equation labour demand model

Equation (4) presents an economic model for estimating the demand for regular labour in SA agriculture, while section 4.3.1 presents the economic rationale for the specified variables.

$$\begin{aligned} \text{REMPLOY}_t = & \beta_0 + \beta_1 \text{RWAGE}_t + \beta_2 \text{CWAGE}_t + \beta_3 \text{CONTRAC}_t + \beta_4 \text{INT}_t + \\ & \beta_5 \text{CHEM}_t + \beta_6 \text{FARMOUT}_t + \beta_7 \text{POLICY}_t + \beta_8 \text{REMPLOY}_{t-1} + \\ & \varepsilon_t \quad \dots (4) \end{aligned}$$

where:

REMPLOY_t = Number of regular farm labourers demanded / annum

β_0 = Constant term

$\beta_1 \dots \beta_8$ = Slope parameters to be estimated

RWAGE_t = Real annual wage of regular farm labour

CWAGE_t = Real annual wage of casual farm labour

CONTRAC _t	= Real annual price of contractors
INT _t	= Real annual prime interest rate (proxy for the cost of capital)
CHEM _t	= Real annual price of chemicals
FARMOUT _t	= Real annual value of farm output (gross income)
POLICY _t	= Piecewise slope dummy variable for real annual regular farm wages (specified as $[RWAGE_t - RWAGE^*_{1991}]D_t$, where $D_t = 1$ for 1991-2002 and 0 otherwise)
REMPLOY _{t-1}	= Lagged number of regular farm labourers
\mathcal{E}_t	= Error term
t	= 1.....43

4.3.1 Choice of variables and expected coefficient signs in the demand model

(i) *Regular farm labour employment (REMPLOY_t) and real regular farm labour remuneration (RWAGE_t)*

Data concerning the number of regular labourers employed in SA agriculture were obtained from Agricultural Census Reports and Labour Force Surveys for 43 years (1960-2002). The data do not differentiate between sexes, but this was thought to be of little consequence because much of the work undertaken in agriculture allows for both male and female employment. No attempt was made to consider different skills categories because SA farm labour is predominantly unskilled (Department of Labour, 2005).

Remuneration estimates for regular labour were computed from expenditure data gathered in the Agricultural Census and Labour Force Surveys (Statistics South Africa, 2005). Annual expenditure on wages included payments in kind, and were expressed in real terms with 2000 as the base year. The real average annual wage per worker ($RWAGE_t$) was estimated by dividing total real annual expenditure on regular wages by the number of regular employees per year. The hypothesis of a negatively sloped demand curve for regular labour suggests that $\beta_1 < 0$. The price elasticity of demand for regular labour is computed from β_1 prior to 1991 (the threshold year) and from $\beta_1 + \beta_7$ since 1991.

(ii) Real annual casual farm labour wage rate ($CWAGE_t$)

Casual labour in South Africa is considered to be a substitute for regular farm labour. Whether for reasons of increased risk exposure or higher wages and transaction costs associated with regular labour, the casualisation of farm labour is likely to continue (Du Toit and Koekemoer 2003). In this study, the average real annual wage of casual labour was calculated by dividing the real annual remuneration of seasonal labour per annum by the total seasonal employment for each year. These data were obtained from the Agricultural Census Reports (Statistics South Africa, 2005). *Ceteris paribus*, an increase in the real wage rate of casual labour, which is a substitute for regular labour, should result in a decrease in the quantity of casual labour demanded and an increase in the demand for permanent (regular) labour, i.e. $\beta_2 > 0$ is expected.

(iii) *Real annual price of labour contractors (CONTRAC)*

Farmers are expected to use more labour contractors as a way of reducing exposure to the risk of industrial action. Contractors may be more easily replaced than permanent labour from the farmer's point of view (Newman and Ortmann, 1996). Contractors are considered as a substitute for regular farm labour. *Ceteris paribus*, an increase (decrease) in the price of contractors should result in a decrease (increase) in the quantity of contractors demanded and an increase (decrease) in the demand for permanent (regular) labour, i.e. $\beta_3 > 0$ is expected. Unfortunately, time series data for prices charged by contractors were not available; this variable was thus omitted from the empirical model.

(iv) *Real annual interest rate (INT)*

The real prime overdraft interest rate was used as a proxy for the cost of capital (Pehkonen, 2003), including machinery and new technologies (Holly, 1999). An increase in the real interest rate is expected to decrease investment in machinery and equipment, thus causing an increase in the demand for labour, *ceteris paribus*. Therefore, β_4 and the cross-price elasticity of demand for labour with respect to real interest rates should be positive. Nominal interest rates were obtained from the South African Reserve Bank (2004) and converted into real terms using the following formula (Watts and Helmers, 1979):

$$r' = \left(\frac{1 + r}{1 + f} \right) - 1$$

where: r' = real interest rate, r = nominal interest rate, and f = inflation rate (CPIX)

(v) Real annual price of chemicals (CHEM_t)

Pesticides and herbicides for crops, and certain dips and sprays for animals, are considered labour-saving technologies. Chemical prices were based on the price index for chemicals and obtained from the Abstract of Agricultural Statistics (2005). These index values were converted to real indices by dividing by the relevant CPIX indices (2000 = 100). Chemicals are considered to be a substitute for regular labour, therefore, a decrease (increase) in the price of chemicals should result in an increase (decrease) in the use of those chemicals and a decrease (increase) in demand for labour, *ceteris paribus*. Thus, β_5 and the cross-price elasticity of demand for labour with respect to chemical prices are expected to be positive.

(vi) Real annual value of farm output (FARMOUT_t)

Data on the real value of farm output were obtained from the Abstract of Agricultural Statistics (2005) in the form of farm gross income. Annual nominal values were converted to real values using CPIX (2000 = 100). An increase in the real value of output is expected to increase demand for regular labour, *ceteris paribus* (Latt and Nieuwoudt, 1985). Thus, FARMOUT_t is expected to have a positive estimated regression coefficient ($\beta_6 > 0$).

(vii) Labour legislation in SA agriculture (POLICY_t)

Lewis *et al.* (1996) found that employment was already declining prior to the implementation of new labour legislation in the farm sector in the early 1990s, and consequential increases in risk, transaction and wage costs. For this reason, a piecewise slope dummy variable for wages (POLICY_t) was computed (see section 4.2.3). The price elasticity of demand for

labour for the post-1991 period (1991-2002) is estimated using the piecewise slope dummy variable. It is anticipated that $\beta_7 < 0$ as labour legislation has raised the cost of labour, making farmers more sensitive to further increases in these costs.

(viii) Lagged regular farm labour employment (REMPLOY_{t-1})

The cost of farm labour is expected to increase as a result of labour legislation introduced into SA agriculture (Vink and Tregurtha, 2003). Therefore, farmers are expected to adjust the size of their regular labour force and an auto regressive scheme is used to account for time lags in these adjustments made by farmers. For the lagged regular employment variable (REMPLOY_{t-1}) $\beta_8 > 0$ is expected.

4.3.2 Empirical OLS demand model

Equation (5) presents the structural demand model for regular labour in SA agriculture estimated using OLS regression. CONTRAC_t is omitted because no time series data for prices charged by contractors were available.

$$\text{REMPLOY}_t = \beta_0 + \beta_1 \text{RWAGE}_t + \beta_2 \text{CWAGE}_t + \beta_4 \text{INT}_t + \beta_5 \text{CHEM}_t + \beta_6 \text{FARMOUT}_t + \beta_7 \text{POLICY}_t + \beta_8 \text{REMPLOY}_{t-1} + \varepsilon_t \quad \dots (5)$$

4.4 Simultaneous equation demand model (2SLS)

Wages are determined by the intersection of the labour demand and supply curves. A labour supply function therefore needs to be included in a simultaneous equation demand model as wages are determined endogenously. A simultaneous equation (2SLS) economic model to estimate the demand of regular labour in SA agriculture is postulated as:

$$\begin{aligned} \text{REMPLOY}_t = & \beta_0 + \beta_1 \text{RWAGE}_t + \beta_2 \text{CWAGE}_t + \beta_3 \text{CONTRAC}_t + \beta_4 \text{INT}_t + \\ & \beta_5 \text{CHEM}_t + \beta_6 \text{FARMOUT}_t + \beta_7 \text{POLICY}_t + \beta_8 \text{REMPLOY}_{t-1} \\ & + \varepsilon_t \end{aligned} \quad \dots (4)$$

$$\text{RSUPPLY}_t = \beta_0 + \beta_9 \text{RWAGE}_t + \beta_{10} \text{LIFEXP}_t + \beta_{11} \text{UEMPOP}_t + \varepsilon_t \quad \dots (6)$$

where:

RSUPPLY_t	= Number of regular farm labourers supplied / annum
β_0	= Constant term
$\beta_9 \dots \beta_{11}$	= Slope parameters to be estimated
RWAGE_t	= Real annual wage rate of regular farm labour
LIFEXP_t	= Life expectancy of farm labour in years
UEMPOP_t	= Unemployment rate (unemployed / population size)
ε_t	= Residual error term
t	= 1.....43

4.4.1 Choice of variables and expected coefficient signs in the supply equation

(i) Real annual wage rate for regular farm labour (RWAGE_t)

This variable was defined in section 4.3.1 (i). A positive sloping supply curve for regular labour implies that $\beta_9 > 0$.

(ii) Labour morbidity (LIFEXP_t)

Statistics South Africa (2005) and de Waal (2003) report that in the past 15 years average life expectancy in South Africa has fallen from 63 (1989) to 48 years of age in 2004. Since the onset of HIV/AIDS in the 1980s, the epidemic has spread rapidly across South Africa. According to Statistics South Africa (2005), one in four South Africans is HIV positive and as many as 5000 people die every week of AIDS and related diseases. Moreover, the incidence of HIV/AIDS is higher amongst the rural poor who supply most of the country's agricultural labour (de Waal, 2003). For this reason, the supply equation includes life expectancy (LIFEXP_t) (measured in years) as a proxy for labour morbidity in South Africa. Decreasing life expectancy reduces the supply of labour to agriculture, suggesting that $\beta_{10} > 0$.

(iii) Unemployment rate (UEMPOP_t)

The burden of unemployment falls most heavily on labour force participants who lack job skills. A high unemployment rate, as is the case in South Africa, suggests that the supply of

unskilled labour to agriculture would increase as the availability of jobs nationwide decreases. An increase in the aggregate rate of unemployment indicates fewer alternative job opportunities and should therefore increase the supply of labour to agriculture. The rate of unemployment is computed as the annual proportion of unemployed people in the total population. *A priori*, β_{11} is expected to be positive.

4.4.2 Empirical simultaneous-equation demand model (2SLS)

An empirical simultaneous equations demand model for estimating the demand of regular labour in SA agriculture is postulated as:

$$\text{REMPLOY}_t = \beta_0 + \beta_1 \text{RWAGE}_t + \beta_2 \text{CWAGE}_t + \beta_4 \text{INT}_t + \beta_5 \text{CHEM}_t + \beta_6 \text{FARMOUT}_t + \beta_7 \text{POLICY}_t + \beta_8 \text{REMPLOY}_{t-1} + \varepsilon_t \quad \dots (5)$$

$$\text{RSUPPLY}_t = \beta_0 + \beta_9 \text{RWAGE}_t + \beta_{10} \text{LIFEXP}_t + \beta_{11} \text{UEMPOP}_t + \varepsilon_t \quad \dots (6)$$

where equations (5) and (6) are estimated using 2SLS to account for the endogenous variable RWAGE_t , determined by the intersection of REMPLOY_t and RSUPPLY_t .

CHAPTER 5

EMPIRICAL RESULTS AND DISCUSSION

This chapter presents and discusses the results of the single equation and simultaneous equation models proposed in chapter 4. Section 5.2 shows a piecewise demand function for regular agricultural labour for the period 1960-2002.

5.1 Labour demand model

The reported *t*-values for the estimated structural coefficients were estimated using the corrected standard errors. Estimated regression coefficients were tested at the 90%, 95% and 99% levels of confidence. The parameter estimated for $FARMOUT_t$ scored a *t*-value less than unity and was thus omitted from the results. The estimated labour demand equations, for OLS and 2SLS, are presented in Table 5.1.

**TABLE 5.1: OLS and 2SLS regular farm labour demand model results, SA agriculture,
1960 - 2002**

MODEL	OLS		2SLS	
	B	Beta	β	Beta
CONSTANT (β_0)	321649,458*** (3,245)	---	281441,631** (2,441)	---
RWAGE_t	-17,764*** (-3,951)	-0,508	-15,317*** (-2,669)	-0,437
REMPLOY_{t-1}	0,511*** (4,558)	0,481	0,552*** (4,351)	0,518
CWAGE_t	14,557** (2,319)	0,225	12,777* (1,876)	0,197
INT_t	4096,961*** (2,884)	0,201	4039,615*** (2,827)	0,198
CHEM_t	75214,751*** (2,521)	0,144	76541,611*** (2,55)	0,146
POLICY_t	-18,091*** (-2,611)	-0,259	-18,316*** (-2,629)	-0,262
Adj. R²	90,4%		90,1%	
F	65,291***		63,348***	
d.f.	36		36	

Notes: *t*-values in parentheses

- β = Regression coefficients
 Beta = Standardized regression coefficients
 * = Significant at 10% level of probability
 ** = Significant at 5% level of probability
 *** = Significant at 1% level of probability

Table 5.1 shows that the adjusted R^2 values are relatively high, i.e. 90,4% and 90,1% for OLS and 2SLS respectively. Both OLS and 2SLS demand equations are highly significant at the 1% level of probability. The $RWAGE_t$ variable is endogenous while the remaining variables are exogenous to the function resulting in the instrumental variables having one more variable than the explanatory variables, making the model over-identified. The Runs (or Geary) test was statistically significant for regular labour at the 5% level of probability; therefore, the null hypothesis of randomness was not rejected.

The estimated coefficients for $RWAGE_t$ are statistically significant at the 1% level of probability, with t values of -3,951 and -2,669 for OLS and 2SLS, respectively. The negative coefficient estimates (-17,764 for OLS and -15,317 for 2SLS) show that an increase in the wage rate of regular (permanent) farm labour would reduce the quantity of regular farm labour demanded in South Africa, *ceteris paribus*. The standardized Beta coefficients for $RWAGE_t$ (-0,508 and -0,437 for OLS and 2SLS respectively) are relatively high, signifying the relative importance of this variable in the models. The estimated long-run wage (price) elasticity of demand for regular farm labour for the pre-1991 period is -0,25 for the OLS model and -0,23 for the 2SLS model. For the post-1991 period (identified by the piecewise slope dummy variable, $POLICY_t$), the long-run elasticity was estimated as -1,32 for the OLS model and -1,34 for the 2SLS model. Likewise, the estimated short-run price elasticity of demand for regular farm labour for the pre-1991 period was estimated as -0,12 and -0,11 for the OLS and 2SLS models respectively. For the post-1991 period, the short-run price elasticity of demand for regular farm labour was estimated as -0,64 and -0,61 for the OLS and 2SLS models respectively. The coefficient for $POLICY_t$ is statistically significant at the 1% level of probability for both the OLS and 2SLS models. Conradie (2005) suggests that the price elasticity of demand for farm labour in the Breërivier Valley of the Western Cape is

-0,3, but her demand model did not allow for a structural change in demand following labour reform. Latt and Nieuwoudt (1985) estimated the price elasticity of demand for farm labour in KwaZulu-Natal as -1,39 over the period 1972-1978.

The coefficient of the $CWAGE_t$ variable is statistically significant at the 5% level of probability for the OLS model and at the 10% level for the 2SLS model. The positive Beta suggests that casual labour is a substitute for regular labour. The cross-price elasticity of demand for casual wages is 0,05, which implies that a 1% increase in the price of casual labour would cause a 0,05% increase in the demand for regular labour. The INT_t (a proxy for the cost of capital) coefficient estimate is statistically significant at the 1% level for OLS and 2SLS. The positive coefficient of INT_t suggests that capital is a substitute for labour. The cross-price elasticity of demand is 0,02, which indicates that a 1% increase in the real interest rate would cause a 0,02% increase in the demand for regular labour. The coefficient estimate for the $CHEM_t$ variable is significant at the 1% level of probability for both OLS and 2SLS models. The positive coefficient suggests that chemicals are a substitute for regular labour. The cross-price elasticity of demand is 0,13, which implies that a 1% increase in the real price of chemicals would cause a 0,13% increase in the demand for regular labour, *ceteris paribus*.

The Normal Probability Plot of the regression standardized residuals showed no outliers or abnormalities. Some multicollinearity was expected between $POLICY_t$ and $RWAGE_t$, where data in $RWAGE_t$ accounted for most of $POLICY_t$. The Variance Inflation Factors (VIFs) for $RWAGE_t$ and $POLICY_t$ were 7 and 4 respectively, with a VIF value of 10 considered to be the maximum. The remaining VIF values for the variables in the demand model were

relatively low (less than 4), suggesting that little or no collinearity existed between them using OLS and 2SLS regression.

Table 5.2 provides a summary of the long-run price elasticities of demand for regular labour for the periods pre-1991 and post-1991 for OLS and 2SLS regression.

TABLE 5.2: Demand elasticities for regular farm labour using 1991 as the threshold year, OLS and 2SLS, SA agriculture, 1960 - 2002

REGR.	OLS		2SLS	
	PRE *	POST **	PRE *	POST **
ELASTICITY				
LONG-RUN E_{ii}	-0,25	-1,32	-0,23	-1,34
SHORT-RUN E_{ii}	-0,12	-0,64	-0,11	-0,61

Notes:

E_{ii} = own-price elasticity of demand for regular labour

* = pre-threshold period: 1960-1990

** = post-threshold period: 1991-2002

Table 5.3 summarises the cross-price elasticities of demand for labour for $CWAGE_t$, INT_t and $CHEM_t$ in the demand model.

TABLE 5.3: Estimated long-run cross-price elasticities (E_{ij}) of demand for labour for selected explanatory variables, OLS and 2SLS, SA agriculture, 1960 – 2002

VAR.	CWAGE _t		INT _t		CHEM _t	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
E_{ij}	0,05	0,04	0,02	0,02	0,13	0,13

5.2 Piecewise demand function

Figure 5.1 shows the relationship between the real regular wage rate and regular agricultural labour employment in South Africa for the period 1960-2002 in the form of a piecewise demand function. An overall increase in the wage rate is associated with a decrease in labour employment. However, farmers may have adjusted the size of their labour force according to their expectations of future changes in the cost of labour which may result in the elasticities of demand for labour estimated in this study over-estimating the true elasticity of demand for labour. Segment A-B shows the effect of rising wages on agricultural employment in South Africa after labour reform. Point A shows predicted labour employment at the 2002 real wage rate (R10 826,54), while point B shows predicted labour employment at the 1991 real wage rate (R7 305,92). Point D represents the mean real wage (R9 794,21) and mean quantity predicted (542 621) for the period 1991-2002. The demand curve (A-B) is price elastic (-1,34) during this period. Segment B-C traces the demand for regular farm labour for the period prior to 1991. Point E represents the mean real wage (R4 992,54) and mean

quantity predicted (723 622) for the period 1960-1990. The graph shows an inelastic demand curve (-0,23) for this period.

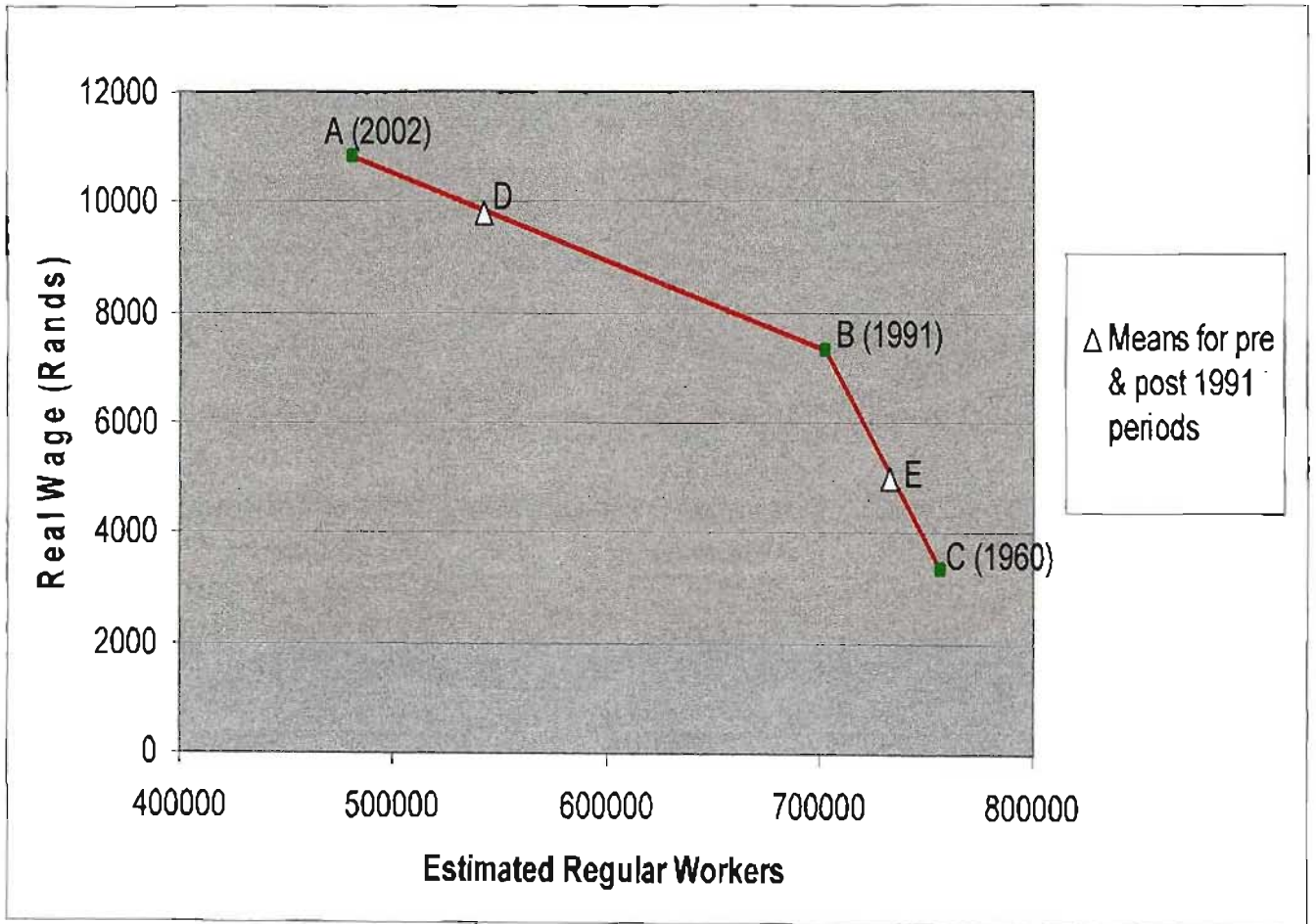


FIGURE 5.1: Piecewise demand function estimated for regular agricultural labour in South Africa, 1960 – 2002.

CONCLUSIONS AND POLICY RECOMMENDATIONS

There are many role players in the agricultural labour field in South Africa who wish to promote better living standards for agricultural labour, including labour unions and government. Labour legislation was introduced into SA agriculture for this purpose. New labour legislation, however, has contributed to higher wage, risk and transaction costs for farmers in South Africa. Farmers, therefore, consider substitutes (such as machinery, contract machinery and casual/contract labour) to reduce costs.

Labour demand models estimated by OLS and 2SLS generated similar long-run price elasticities of demand. In the pre-1991 period, the estimates ranged from -0,25 to -0,23, and in the post-1991 period from -1,32 to -1,34 for OLS and 2SLS respectively. Clearly, demand for regular farm labour has become more price elastic since 1991. In the mid 1990s, farmers may have adjusted the size of their labour force according to their expectations of future changes in the cost of labour which may have result in the elasticities of demand for labour estimated in this study over-estimating the true elasticity of demand for labour. Other things being equal, it can be concluded that further increases in the real cost of labour will result in substantial job losses for regular farm workers. In order to reverse the regular labour unemployment trend in SA agriculture, the government could adopt more flexible labour market regulations that would reduce labour costs and encourage farmers to employ more labour.

Previous studies have also estimated the demand for farm labour in SA agriculture. Latt and Nieuwoudt (1985) estimated the price elasticity of demand and supply for agricultural labour in KwaZulu-Natal to be -1,39 and 5,18, respectively. Conradie (2005) conducted a localised

study in the Breërivier Valley of the Western Cape where she estimated the price elasticity of demand for farm labour as -0,3. Unlike these earlier studies, this study used piecewise linear regression to allow for a structural change in demand for regular labour following labour reform. It also uses an auto regressive scheme to account for time lags in the adjustments made by farmers to higher labour costs, resulting in a dynamic model.

The results of this study show that wages paid to casual workers have had a significant impact on the quantity of regular farm labour demanded. Labour legislation introduced in the early 1990s has encouraged farmers to substitute regular workers with casual workers because they command lower wages, incur lower transaction costs and expose farmers to less risk. However, the inclusion of all casual workers in minimum wage legislation from 2006 is expected to slow the casualisation of agricultural labour as farmers turn to labour contractors, chemicals and machinery as the next best substitutes. This study found that a relative increase (decrease) in the price of chemicals (pesticides and herbicides for crops, and labour saving dips and sprays for animals) results in an increase (decrease) in the demand for regular labour. The demand for labour is also sensitive to changes in real interest rates (used as a proxy for the cost of capital). A relative decrease in the cost of capital encourages farmers to adopt more machinery and equipment, causing a decrease in the demand for regular labour.

The fact that farmers are adjusting to relatively higher labour costs by reducing labour employment on their farms means that unskilled workers lose jobs and poverty deepens in South Africa. The demand for unskilled labour, which makes up the bulk of the agricultural workforce, is likely to decrease as farmers replace this labour with new capital equipment and /or contractors. By making use of contractors farmers are able to reduce regular labour

on the farm which reduces transaction costs as they are now able to negotiate with one party instead of with many labourers.

To counter the trend of declining employment in SA agriculture it is recommended that government allow more flexibility in terms of the legislation regarding the hiring and dismissing of farm workers, thus decreasing the transaction costs and time spent by farmers dealing with labour employment issues. A shift away from the collective bargaining process to accommodate personalised employment contracts and wage negotiations would reduce the risk of industrial action and improve cost efficiency by rewarding more productive workers. Government should also promote a quicker resolution of outstanding labour tenants' claims which would reduce uncertainty for farmers. Minimum wages, if set above the market equilibrium wage, are expected to increase the standard of living for those workers who still have jobs. However, workers with fewer skills, who are inexperienced, or old, may well be left without jobs, creating more unemployment and poverty in South Africa. In addition, with the casualisation of farm labour in South Africa and casual labour being included in the minimum wage legislation in 2006, it is expected that unemployment in the agricultural sector will further rise as a result of increased labour costs. For these reasons, labour legislation for the agricultural sector should be revisited. Minimum wages, in particular, should be scrapped. Instead, government should invest in skills improvement to enhance farm wages through higher productivity and increased competition with more skill-intensive sectors of the economy.

SUMMARY

In the past, labour in SA agriculture had very little protection in the way of legislation. The main form of protection was through common law based on legal precedents set on past judgments. Farmers started adjusting to labour legislation introduced in the early 1990s before the country's first democratic elections in 1994. This legislation included the Basic Conditions of Employment Act 104 of 1992, the Unemployment Insurance Amendment Act 130 of 1992, the Agricultural Labour Act (ALA) 147 of 1993 and the Occupational Health and Safety Act 85 of 1993. Since the mid-1990s "new" legislation pertaining to agriculture has been implemented in South Africa, and includes the Basic Conditions of Employment Act 75 of 1997 (amended), the Unemployment Insurance Act 63 of 2001 (amended), the Labour Relations Act 66 of 1995, the Employment Equity Act 55 of 1998, the Skills Development Levies Act 9 of 1999, the Land Reform (Labour Tenants) Act 3 of 1996, the Extension of Security of Tenure Act 62 of 1997 and the Sectoral Determination (an amendment of the BCEA 75 of 1997) which includes the imposition of minimum wages.

Labour legislation is deemed necessary to enhance the lives of farm workers. Workers that remain in agriculture will be better off as their living and working conditions, as well as remuneration levels, are improved. However, a relative increase in the cost (transaction and wage) and risk associated with labour motivates farmers to replace labour with machinery, machinery contractors, labour contractors or new technologies that are labour-saving, resulting in a decreased demand for unskilled workers. The dismissed workers often move to urban areas to seek employment.

The long-run price elasticity of demand for regular agricultural labour in South Africa was estimated in order to assess the appropriateness of labour legislation that has increased the cost of farm labour since the early 1990s. Both a single equation (OLS) and a simultaneous equation (2SLS) demand model were estimated using secondary data obtained for 43 years (1960–2002) from Statistics South Africa and the Abstract of Agricultural Statistics. The 2SLS model included a labour supply equation. Both the estimated OLS and 2SLS demand models included a piecewise slope dummy variable to allow for a structural change in demand for regular labour following labour reform. In this study, 1991 was used as the threshold year as significant policy changes were anticipated in the early 1990s with the Basic Conditions of Employment Act gazetted in 1992. In addition, an autoregressive scheme was used to account for time lags in adjustments made by farmers to the size of their regular labour force following a change in the expected cost of farm labour.

The estimated long-run wage (price) elasticity of demand for labour for the pre-1991 (i.e., 1960-1990) period was -0,25 for the OLS model and -0,23 for the 2SLS model suggesting that the demand for regular labour was inelastic during this period. For the post-1991 period (1991-2002), the long-run demand elasticity was estimated as -1,32 for the OLS model and -1,34 for the 2SLS model, signifying an elastic demand for regular labour. The results show that labour legislation has encouraged farmers to substitute casual workers for regular workers (due to the fact that they command lower wages, incur lower transaction costs and expose farmers to less risk) and that the demand for regular labour is also sensitive to changes in real interest rates and the price of chemicals.

Policies on health (i.e. HIV/AIDS, etc.) and education need to be enhanced. Farmers, for example, could assist by implementing HIV/AIDS training courses and awareness

programmes on their farms which could benefit the farm business in terms of higher labour productivity. Government should allow more flexibility regarding the hiring and dismissing of farm workers, thus decreasing the transaction costs and time spent by farmers dealing with labour employment issues and possibly counteracting the declining trend in agricultural employment in South Africa. Individual contracts for farm workers, as opposed to a collective bargaining process, would further reduce risk of industrial action to the farmer.

The primary goal of a minimum wage is to address income inequalities across various economic sectors. The benefits of the minimum wage, however, only accrue to those workers who still have jobs. Workers with fewer skills often lose their jobs, which could lead to more poverty in South Africa. Government should, therefore, consider re-evaluating the appropriateness of the minimum wage, particularly in the agricultural sector. Instead, government should invest in skills improvement to improve farm wages through higher productivity and increased competition with more skill-intensive sectors of the economy.

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APPENDIX 1

Empirical Data for Labour Demand Model

Year	Regular labour (Number)	Regular* remuneration (R1 000)	Rwage* (R)	Casual Labour (Number)	Casual* remuneration (R1 000)	Cwage* (R)	Int* (%)
1960	756,397	2,534,040	3,350	591,882	1,085,680	1,834	-2,02
1961	865,408	2,332,851	2,696	688,417	1,056,000	1,534	-0,93
1962	872,784	2,008,310	2,301	769,789	1,206,000	1,567	-1,31
1963	781,539	2,038,593	2,608	699,854	924,000	1,320	-4,39
1964	756,581	2,035,171	2,690	675,489	931,371	1,379	-3,09
1965	725,468	1,944,666	2,681	658,469	903,487	1,372	-3,97
1966	714,568	1,991,560	2,787	621,548	958,146	1,542	2,73
1967	772,568	2,414,977	3,126	684,553	1,253,800	1,832	-1,14
1968	830,068	2,679,369	3,228	778,966	1,272,761	1,634	5,65
1969	792,563	2,562,061	3,233	768,954	725,041	943	1,39
1970	756,548	2,522,294	3,334	745,569	540,137	724	4,25
1971	745,748	3,139,236	4,210	770,265	620,436	805	1,07
1972	736,238	3,132,051	4,254	653,026	635,293	973	2,89
1973	726,768	3,421,163	4,707	627,463	674,328	1,075	2,69
1974	712,892	3,975,095	5,576	631,976	788,206	1,247	6,99
1975	715,863	4,563,907	6,375	615,111	920,723	1,497	7,58
1976	683,449	4,980,750	7,288	500,892	522,235	1,043	7,54
1977	679,193	4,924,486	7,251	517,697	721,803	1,394	0,21
1978	691,017	4,822,940	6,979	535,481	1,062,310	1,984	0,88
1979	685,932	5,112,557	7,453	495,531	1,028,221	2,075	-2,74
1980	669,086	5,104,870	7,630	483,679	950,250	1,965	-3,68
1981	618,990	3,988,528	6,444	450,065	705,880	1,568	-2,8
1982	616,532	4,208,755	6,827	452,631	1,171,916	2,589	2,71
1983	614,649	4,250,006	6,915	441,991	1,063,689	2,407	5,7
1984	728,683	4,428,106	6,077	482,316	1,085,212	2,250	10,18
1985	807,341	3,905,533	4,838	516,411	1,271,861	2,463	6,71
1986	816,660	4,462,963	5,465	534,781	1,849,704	3,459	3,58
1987	795,283	3,921,839	4,931	559,230	1,793,983	3,208	-0,6
1988	738,224	4,386,422	5,942	488,408	1,416,000	2,899	1,87
1989	724,439	5,108,493	7,052	469,872	1,192,787	2,539	3,05
1990	728,414	4,752,004	6,524	456,262	973,658	2,134	4,56
1991	702,323	5,131,112	7,306	413,239	1,393,610	3,372	4,27
1992	656,772	4,766,344	7,257	394,425	1,580,794	4,008	4,03
1993	647,839	4,832,584	7,460	491,588	1,626,232	3,308	4,89
1994	619,888	5,784,806	9,332	301,763	1,538,401	5,098	6,82
1995	601,888	6,425,747	10,676	289,074	1,876,870	6,493	7,86
1996	601,476	6,451,487	10,726	303,997	1,829,161	6,017	11,35
1997	568,531	6,129,406	10,781	337,150	1,827,820	5,305	9,78
1998	550,475	5,937,029	10,785	357,552	1,776,276	4,886	13,69
1999	532,992	5,750,689	10,789	379,188	1,718,896	4,500	14,53
2000	516,065	5,570,198	10,794	402,133	1,731,235	4,144	8,66
2001	499,674	5,395,372	10,798	426,467	1,705,043	3,816	7,85
2002	481,375	5,211,626	10,827	459,445	1,589,836	3,460	6,25

* Real values (CPIX = 2000)

Empirical Data for Labour Demand Model (Cont...)

Year	Nominal Price	Chem*	Farmout*	Policy	Laglab
	Index (chem)				
		(2000=100)	(R1 000)		(Number)
1960	4,8	1,92	34,004,960	0	.
1961	4,8	1,78	32,971,667	0	756,397
1962	4,9	1,69	32,631,724	0	865,408
1963	4,9	1,53	30,239,125	0	872,784
1964	4,9	1,4	28,523,571	0	781,539
1965	5,0	1,28	26,996,256	0	756,581
1966	5,0	1,22	26,248,927	0	725,468
1967	5,0	1,11	29,459,067	0	714,568
1968	5,1	1,11	26,313,696	0	772,568
1969	5,1	1,04	26,124,980	0	830,068
1970	5,3	1,04	25,346,137	0	792,563
1971	5,6	1,02	27,261,091	0	756,548
1972	5,9	1,02	29,850,241	0	745,748
1973	6,2	1,02	29,724,607	0	736,238
1974	7,3	1,16	42,346,841	0	726,768
1975	9,1	1,4	42,892,323	0	712,892
1976	9,6	1,41	43,971,059	0	715,863
1977	10,1	1,33	48,713,434	0	683,449
1978	11,0	1,31	48,043,107	0	679,193
1979	11,4	1,2	47,465,589	0	691,017
1980	12,9	1,19	54,909,861	0	685,932
1981	13,9	1,11	53,197,208	0	669,086
1982	16,7	1,17	53,686,958	0	618,990
1983	18,6	1,16	48,952,329	0	616,532
1984	20,4	1,14	49,019,061	0	614,649
1985	25,4	1,22	52,565,663	0	728,683
1986	31,5	1,27	46,075,538	0	807,341
1987	33,9	1,18	46,508,345	0	816,660
1988	36,3	1,12	49,923,583	0	795,283
1989	41,0	1,11	52,113,749	0	738,224
1990	45,6	1,08	47,637,653	0	724,439
1991	53,2	1,09	44,800,922	0	728,414
1992	56,6	1,02	39,724,154	-48,69	702,323
1993	59,8	0,98	42,032,356	153,63	656,772
1994	64,1	0,96	42,286,462	2026,11	647,839
1995	68,5	0,95	41,355,421	3370,06	619,888
1996	79,0	1,02	46,997,701	3420,17	601,888
1997	97,2	1,15	47,960,496	3475,21	601,476
1998	98,2	1,09	46,282,996	3479,36	568,531
1999	101,6	1,07	46,338,568	3483,53	550,475
2000	100,0	1,0	45,580,721	3487,69	532,992
2001	106,8	1,01	47,728,675	3491,85	516,065
2002	122,3	1,06	57,232,454	3520,62	499,675

Empirical Data for Labour Supply Model

Year	Rwage* (R)	Lifexp (Years)	Unemployment (Number)	Population (Number)	Uempop	CPIX (2000=100)
1960	3,350	49,4	94,038	13,214,369	0,007	2,5
1961	2,696	49,7	102,113	13,985,215	0,007	2,7
1962	2,301	50	101,254	14,625,124	0,007	2,9
1963	2,608	50,3	106,248	14,968,367	0,007	3,2
1964	2,690	50,7	110,268	15,124,021	0,007	3,5
1965	2,681	51,1	118,426	15,892,008	0,007	3,9
1966	2,787	51,5	124,380	16,785,639	0,007	4,1
1967	3,126	51,9	168,432	17,627,145	0,010	4,5
1968	3,228	52,3	193,267	18,471,912	0,010	4,6
1969	3,233	52,7	234,021	19,021,306	0,012	4,9
1970	3,334	53,1	251,430	19,211,124	0,013	5,1
1971	4,210	53,5	284,621	19,640,965	0,014	5,5
1972	4,254	53,9	342,061	20,080,487	0,017	5,8
1973	4,707	54,3	365,402	20,524,932	0,018	6,1
1974	5,576	54,7	398,624	20,980,124	0,019	6,3
1975	6,375	55,1	424,518	21,447,958	0,020	6,5
1976	7,288	55,5	498,621	21,921,015	0,023	6,8
1977	7,251	55,9	498,526	22,410,415	0,022	7,6
1978	6,979	56,3	512,497	22,907,982	0,022	8,4
1979	7,453	56,7	524,129	23,434,201	0,022	9,5
1980	7,630	57,1	540,213	23,994,309	0,023	10,8
1981	6,444	57,5	541,907	24,591,801	0,022	12,5
1982	6,827	57,9	547,354	25,215,014	0,022	14,3
1983	6,915	58,4	552,130	25,887,306	0,021	16,1
1984	6,077	59	567,507	25,564,958	0,022	17,9
1985	4,838	59,5	632,154	27,241,987	0,023	20,8
1986	5,465	60	756,204	29,874,210	0,025	24,7
1987	4,931	60,5	978,402	31,257,269	0,031	28,7
1988	5,942	61	1,161,237	33,248,874	0,035	32,4
1989	7,052	61,5	1,345,872	34,652,302	0,039	37,1
1990	6,524	63	1,689,021	35,873,316	0,047	42,4
1991	7,306	62	2,154,876	36,199,834	0,060	49,0
1992	7,257	61	2,654,879	36,992,951	0,072	55,7
1993	7,460	60,5	2,769,584	37,802,128	0,073	61,2
1994	9,332	59	2,903,154	38,631,506	0,075	66,6
1995	10,676	58,3	3,102,940	39,477,087	0,079	72,4
1996	10,726	57,4	3,302,618	40,342,892	0,082	77,7
1997	10,781	56,2	3,452,800	41,227,934	0,084	84,4
1998	10,785	55	3,163,000	42,131,078	0,075	90,2
1999	10,789	53,6	3,526,000	43,054,987	0,082	94,9
2000	10,794	52	3,706,571	43,686,124	0,085	100,0
2001	10,798	51	3,893,502	44,561,968	0,087	105,7
2002	10,827	49,5	4,021,573	45,454,326	0,088	115,4