Farm-Worker Sectoral Determination: An Analysis of Agricultural Wages in South Africa 2015

A report by the

Bureau for Food and Agricultural Policy (BFAP)

24 September 2015

The Bureau for Food and Agricultural Policy (BFAP)

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Purpose of the report

A new Sectoral Determination for the agricultural sector is due in 2016. The introduction of a minimum wage in the sector in 2003 and an increase of the minimum wage in excess of 50% in 2013 have had a substantial impact on the sector. The purpose of this report is to analyse the impacts of the wage increases in 2003, and 2013 in order to inform the process leading up to the new minimum wage determination for 2016.

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Executive summary

The South African government is simultaneously pursuing the objectives of creating employment and increasing wages. Given the current South African reality, the relevance of these objectives cannot be disputed but they are often in conflict. A fine balance has to be struck between paying workers a fair wage but also ensuring the long term financial sustainability of agribusinesses and maximum employment. This study has evaluated three objectives in order to contribute to this debate.

The *first objective* was to gain a better understanding of impacts of earlier minimum wage increases. The analysis focussed on the period after the inception of agricultural minimum wages in 2003 and the more recent 51.2% increase in 2013. This study constructed a time series of the self-reported wages of entry-level agricultural workers in order to evaluate how wages responded over the longer term. Average self-reported wages showed a steep increase shortly before and after the implementation of the minimum wage in 2003 but the increase still fell 20% short of the legislated minimum. This deficit could have been the result of under-reporting; which can be especially large in the agricultural sector given the legal provision for a total of 20% that can be deducted from the remuneration of farm workers for food and housing; or due to non-compliance. Average self-reported real wages continued to trend upward in subsequent years, eventually exceeding the statutory prescribed minimum by 2009, where it stabilised. At this point some entry-level workers earned more than the minimum wage (up to 70% of workers in some provinces), depending on the level of under-reporting. The upward trend in wages over the longer term is a result of the structural adjustments towards greater productivity. Possible examples of such adjustments include the consolidation of farms (increased farm sizes), mechanisation and the production of alternative crops.

The analysis shows a steep increase in self-reported wages immediately before and after the 2013 minimum wage adjustment, even though these wages remained below the minimum level. Self-reported wages have continued to trend upwards, indicative that the structural adjustments within the agricultural sector are still in progress. A closer look at the impact on entry-level workers of the 51.2% increase reveals that the average self-reported wage of these workers increased by 29.2%. The shortfall between the legislated and the reported increases can be attributed to some workers already earning more than the minimum wage before the increase; possible under-reporting of wages and increased use of non-wage benefits by employers; or decreased compliance levels by employers. The data also indicated that the number of hours worked declined by 1.2 hours, on average, with the hours of permanent workers showing the greatest decline.

A difference-in-difference econometric analysis was used to test the short term impact of the 2013 wage increase on the employment of entry-level workers. The analysis showed that the wage increase had a statistically insignificant impact on the employment of entry-level workers as a group (permanent and seasonal) but had a statistically significant impact on the employment of permanent workers, which declined by 1.8% as a result of the increase. The decline in permanent workers and not seasonal workers as was the case in 2003, could be indicative of the fact that a maximum employment threshold has been reached in the sector and that total employment would continue to decline in response to structural changes.

Given the empirical results one could argue that the 2013 increases in minimum wages did not have a negative impact on employment, resulting only in increased wages, a reduction in hours worked and an increase in benefits. This would be incorrect given the fact that total agricultural employment declined by an estimated 60 000 workers after the increase. An important caveat applies as follows:

- *Structural adjustments in response to increased wages take time to come into effect. It took 7 years for self-reported wages to equalise the minimum wage following the 2003 increase.*
- *The sector is currently still adapting to the 2013 increase given the gap between self-reported wages and the legislated minimum, hence the structural properties of the sector are not similar to those that existed before the 2013 increase:*
    - *Some workers were earning more than the minimum wage before the 2013 increase (up 75% of workers in some provinces)*
    - *Producers had the ability to increase non-wage benefits and/or reduce working hours.*

These short term adaptive measures have been exhausted and the sector is still making the necessary longer term structural adjustments towards greater productivity levels. A strong argument can therefore be made that the longer term impact of the 2013 wage increase has not fully materialised as yet and the disemployment impact of another major increase could be much larger.

The *second objective* of this study was to evaluate the possible impact of minimum wage increases on the long term financial sustainability of farming businesses. The analysis of the labour impact was contextualised within the broader economic environment as producers face a host of biophysical and economic uncertainties. This includes the effects of climate variability, unfavourable commodity price movements, exchange rate movements and rising input costs.

The current economic environment is characterised by low margins on field crops given a declining commodity price cycle and increasing production costs. Parts of the country are also facing uncertainties relating to droughts or untimely rainfall patterns. Export-orientated crops enjoy somewhat better prospects given current demand levels and support from the depreciation of the rand against major currencies. Generalisations on the possible impacts of increased labour costs are difficult given the structural differences between sub-sectors and the variations between individual farms therein, particularly in relation to size and labour cost shares. It is evident from the analysis that increased wages will have a negative impact on the profitability of farming businesses. This would necessitate increased productivity levels through structural adjustments such as increased mechanisation, consolidation of farming units or changes in crops produced.

The *third objective* of this study was to determine the wage income needed by a farm worker household to be able to afford a balanced diet whilst not spending more than 40% of their household income on food. For this analysis the cost of a balanced starch-rich diet as recommended by the *Guidelines for Healthy Eating* by the *Department of Health (DoH)* was calculated for the respective household members. The food groups and calories specified by the *DoH* were then correlated to the main food items consumed as indicated in Statistics South Africa's *General Household Survey.*

The results show that an individual male who earns the current minimum wage of R120.3 per day would be able to afford a balanced diet, whilst spending less than 40% of his income on food. The situation is less positive for the four and six person households, as they would have to spend more than 40% of their combined income (wages, pensions and grants) on food to obtain a balanced diet: these households fall short of calculated threshold by R41 and R57 per day respectively.

Recommendations: Real farm wages in South Africa have increased rapidly since 1994, particularly since the introduction of the minimum wage in 2003. Producers have come to anticipate wage increase, and have grown adept at managing the impact of these wages. However, there are limits to their ability to adapt, especially in the short term. This study showed that another substantial shortly after the 2013 increase could have a significantly detrimental impact on the sector. The study however also found that the current minimum wage is not sufficient to afford a family of four or more a recommended balanced diet whilst spending 40% or less of their household income on food.

In this regard the new minimum wage should

a) *signal to producers and farm workers the levels of productivity that will be required to afford the new wage;*
b) *set out the time frame for implementation of a wage that is sufficient to afford workers a decent standard of living; and*
c) *make provision for safety nets for workers that may become unemployed.*

This, together with investments in infrastructure and well-designed policy will enable the strengthening of an internationally competitive highly labour productive economy.

1 Introduction

The creation of employment is one of the main policy objectives of the South African Government, given the current unemployment rate of 25.1% (Stats SA, 2014). Within this context the *National Planning Commission* identified the agricultural sector in its *National Development Plan* as one of the major potential contributors to this goal. The Plan envisions the creation of a million additional jobs by means of the expansion of intensive agricultural production through expanded irrigation and more efficient water use; greater production on under-utilised land and increased smallholder production (NPC, 2011). The emphasis placed on the importance of the sector as an employment creator is justified given its relatively high labour intensity – agriculture in South Africa employs more people per unit of value created than the mining and manufacturing sectors. Concurrently with this objective, the government has also pursued an agenda for the redistribution of income in the sector through the implementation of minimum wages since 2003.

Yet these objectives, as economic theory dictates, tend to be in conflict. In a free market, an increase in wages results in a reduction in employment since an increase in wages would require a matching increase in productivity per worker. Productivity, measured as physical output divided by the physical quantity of inputs (farmers can't affect the prices of outputs or inputs), can be raised by increasing the amount of output using the same amount of inputs; by reducing the amount of inputs used to produce the same level of outputs; or by some combination of these. Thus, if current total employment is to be kept constant, an increase in the level of minimum wages will have to be accompanied by at least an equal increase in output, i.e. an increase in productivity. This can potentially be achieved by increasing the productivity of land through irrigation infrastructure; through the increased utilisation of under- or unused land; or by the application of technologies that increase the productivity of land. However, these strategies can only work in the longer term, since they require investments in infrastructure or in research and development and technology adoption, or they require substantial policy changes (BFAP 2011). Thus, if output cannot increase sufficiently, an increase in wages requires a reduction in inputs in order to achieve the necessary productivity increases. Unless it is possible to reduce the use of other inputs (e.g. fertiliser or borrowed capital) farmers have to address the cost of labour. In this regard, possible strategies include increased use of technologies that augment labour productivity; increasing farm sizes in order to carry input costs over a larger area; or removing marginal land or crops from production – all of which could result in a decline in total employment.

Minimum wages were introduced in the agricultural sector of South Africa for the first time in 2003, and the available evidence suggests that this introduction led to an increase in unemployment, at least in the short term. Bhorat, Kanbur and Stanwix (2014) show that wage increases resulted in a significant reduction in total agricultural employment, with a decrease in the employment of seasonal workers, an increase in the employment of permanent workers and a rise in the use of non-wage benefits in order to reach compliance.

On the 22nd of November 2012, violent protests erupted in the De Doorns area of the Hex River Valley of the Western Cape Province. The most immediate demand of the striking workers was an increase in the minimum wage to R150.00 per day from its level of just shy of R70 per day. In reaction, the Department of Labour decided to revisit the Sectoral Determination for Agriculture, the most recent having been concluded in March 2012. An investigation at the time by BFAP (2012) found that there was some scope to increase the minimum wage but that an increase of more than R20/day (i.e. to anything upwards of around R90.00 per day) would put the profitability of most farms under pressure, resulting in structural adjustments to the sector towards larger farming units and increased mechanisation. From an employment perspective the study found that permanent workers would not be severely affected given the fact that they generally earned more than the minimum wage, but the same could not be said for seasonal workers (BFAP, 2012).

Following consultation with stakeholders the Department of Labour decided to increase the agricultural minimum wage by 51.2% to R105/day from the 1st of March 2013 and thereafter by the lowest quartile CPI inflation plus 1.5% in 2014 and 2015.

Now, almost three years later, the Sectoral Determination for agriculture has to be revisited. Hence the objectives of this study are thus threefold: 1) Establish the employment and other impacts of the 2003 minimum wage implementation and the 51.2% minimum wage increase in 2013. 2) Evaluate the possible impact of increased wages on the long term financial sustainability of farming enterprises. 3) Establish the wage income needed by a farm worker household to be able to afford a balanced diet whilst not spending more than 40% of their income on food.

The first section provides an overview of the short- and long term historical trends in South African agricultural employment. This is followed by descriptive statistics on the self-reported wages of entry-level agricultural workers as well as on recent employment trends. Section Three provides a sector-wide econometric analysis that estimates the employment and other impacts of the 2013 minimum wage increase, while in Section Four the farm level impacts of the different wage scenarios on pome fruit, grain and oilseed, potato, sugarcane and wine grape subsectors are assessed. In Section Five the attention is turned to the farm worker. Here a cost-of-living analysis is provided that estimates the wage income needed to afford a healthy diet for farm workers. The final section concludes with a synopsis of the results.

2 Agricultural employment trends

2.1 Long term trends

Figure 1 shows total agricultural employment and real value added per worker in commercial farming in South Africa for the period 1949/1950 to 2009/10 (Liebenberg, 2012)[1]. It shows that agricultural employment reached its highest level of just over 1.9 million during the early 1960s and declined thereafter to just above 0.8 million in 2009/10. This declining trend has continued since, with total agricultural employment estimated at 680 000 in 2014 (DAS, 2015).

Agricultural employment pre-1994 is characterised by two distinct periods, i.e. pre- and post-1970, in an era when field crop production dominated employment numbers. These periods and other labour related structural trends have been the subject of substantial research (e.g. Van Zyl, Vink & Fenyes 1987). In short the pre-1970 period is characterised by an increase in agricultural employment and area planted due to the replacement of draft oxen with tractors. During this period most of the maize was still harvested by hand and hence an increase in area resulted in an increase in employment, with capital and labour as complements. During the 1970s the South African economy started to experience labour shortages that put upward pressure on wages, especially in the mining and agricultural sectors. Favourable real interest rates, together with subsidised agricultural loans and tax incentives on capital items lowered the relative cost of capital to labour. This, together with the desire of farmers to have greater 'control' over the harvesting process resulted in a rapid rise in mechanised combine-harvesting and a full transition to bulk grain handling: De Klerk (1984) studied a number of districts in the north-western maize production region for the period 1968 to 1981 and found that at the start of this period only 30% of maize in the district was harvested by combine and 54% handled in bulk but by 1981 this had increased to 95% and virtually 100%, respectively.

During the 1980s the South African economy fell on harder times due to product boycotts in key markets, international sanctions, the fall in the gold price and the depreciation of the local currency. This, together

[1] More recent data is available but this represents the most consistent and complete long term dataset. Sources differ in terms of their inclusion of domestic workers on farms and seasonal labour.

with rising interest rates, increased the relative cost of imported agricultural machinery and resulted in a short-lived four-year increase in total employment and a decline in output per worker that persisted until the mid-1990s (Figure 1). During this period the policy objective of transferring labour to the rest of the economy was reversed, with scholars highlighting the importance of the sector as a labour-intensive employer (e.g. Van Zyl, Nel & Groenewald, 1988).

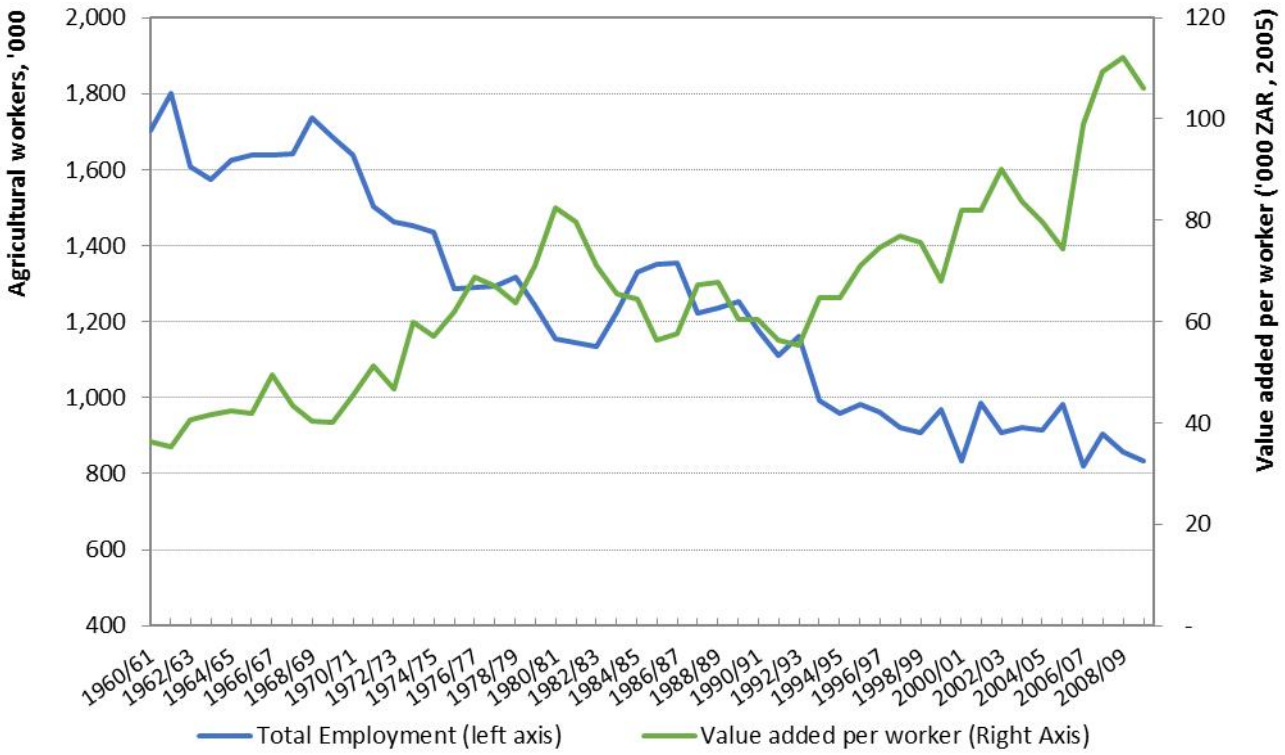


Figure 1: Total agricultural Employment and Real Value Added per Worker

Source: Liebenberg, (2012)

In the mid-1990s the sector underwent far-reaching changes that accompanied the political changes: the liberalisation of trade and the resulting competition on the global stage, the deregulation of agricultural marketing and the withdrawal of direct subsidies. This resulted in a sharp reduction in the area planted to field crops from a high of more than 9 million hectares during the late 1980s to the current level of just over 5 million hectares. Total production did not decrease, however, due to increasing yields, as shown in Figure 2. Livestock production experienced a substantial increase in production, drawn upwards by rising incomes and hence increased protein consumption, with poultry as the big winner with an 87% expansion in production between 1995/96 and 2013/14. Horticultural production also achieved a substantial increase in output given the opportunities afforded through international market access and deregulation. Exports of these items more than doubled in real terms between 1994 and 2011, thereby expanding their share in total agricultural exports from around 40 to above 50 percent.

During this period agricultural employment continued to decline, albeit at a slower rate. The increased total agricultural output resulted in the significant increase in output per worker, shown in Figure 1. Despite the decline in total employment and increase in productivity, the sector is still relatively labour intensive: in 2010 the sector employed 4.6% of South Africa's total labour force whilst contributing only 2.4% of the GDP, thus resulting in a labour force to GDP ratio of about 2:1. During this year the mining and manufacturing sectors maintained labour force to GDP ratios of 0.2 and 1 respectively (Greyling, 2012). This, however, is indicative

of relatively low labour productivity levels in the agricultural sector – increases in wages are expected to continue to narrow this productivity gap at the expense of total employment following the structural transformation of the sector (see for example Timmer, 1988).

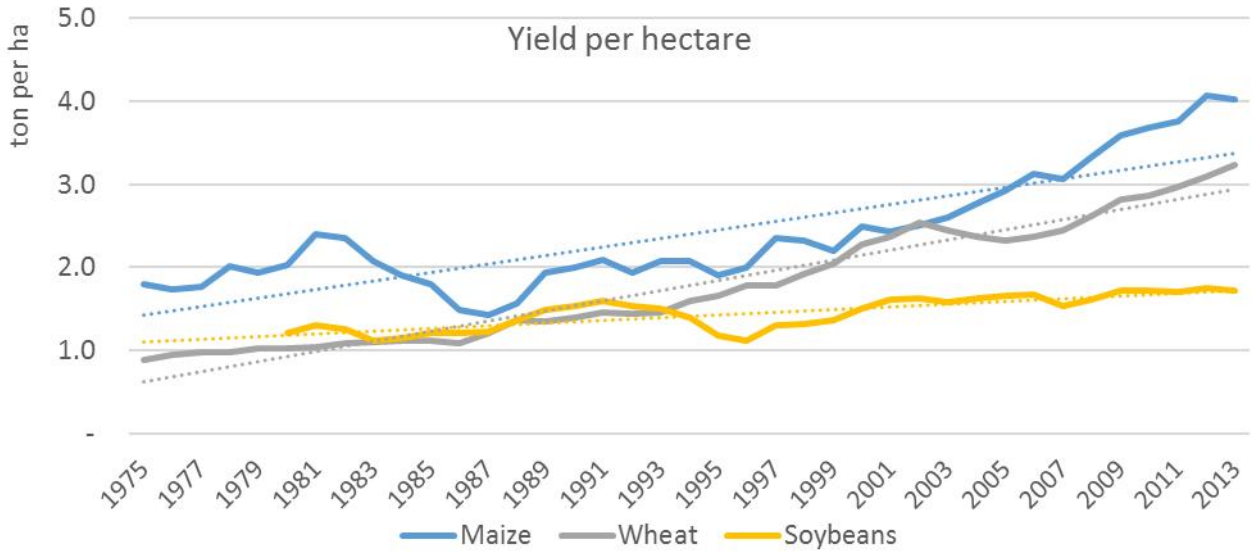


Figure 2: Long term yield trends of select field crops

Source: (DAS, 2015)

2.2 Short term trends

This section turns to short-run trends, where the context of the more recent increases in minimum wages is of importance. Figure 3 shows total employment in agriculture, hunting, forestry and fisheries from 2008 to 2014. It shows that total employment declined by some 140 000 workers from 2008 to 2011 before increasing to a high of 740 000 in 2013 and declining again by an estimated 60 000 to 2014. Total employment therefore declined after the 2013 minimum wage increase.

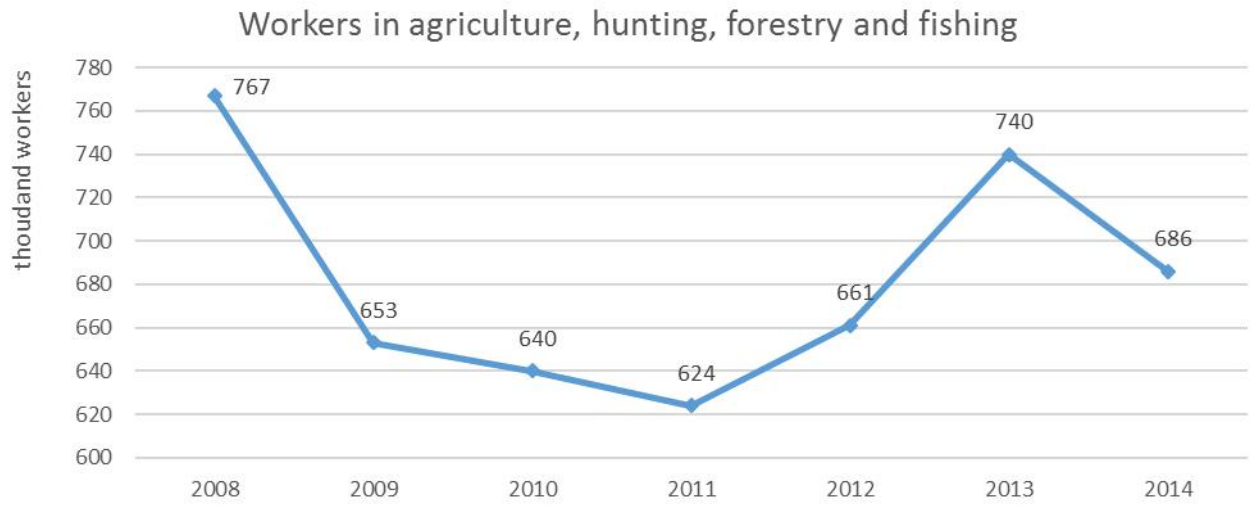


Figure 3: Employment: Agriculture, forestry and fishing

Source: DAS (2015) compiled from StatsSA QLFS

Figure 4 shows average self-reported real wages per hour of entry level (i.e. general) agricultural workers for the period 2001 to 2014 as measured by StatsSA through their respective labour force surveys. The red graph shows the legislated real minimum wage whilst the yellow graph shows the average self-reported real wages of entry-level agricultural workers. Self-reported real wages show a steep increase immediately before and after the implementation of minimum wages in 2003 but still lag more than 20% below the legislated minimum wage. This can be explained through workers not receiving the minimum wage, i.e. non-compliance, but could also be the result of under-reporting by the individuals surveyed.

Under reporting and non-wage benefits

Individuals often do not take deductions into account when reporting their wages in surveys such as the Quarterly Labour Force Survey (QLFS) by Statistics South Africa (StatsSA), thus only reporting their cash income. Benefits often not considered when reporting own wages include: Unemployment insurance, union contributions, savings plans, loan repayments, and housing and food allowances. The extent of the under-reporting is unknown since norms are not available due to sectoral and regional differences. The under-reporting of agricultural wages could also be larger than in other sectors given the legal provision for non-wage benefit deductions of up to 20%[2]; a maximum of 10% for accommodation and food respectively. Hence the blue and grey graphs are added to the figure to allow for possible extent of under reporting by adding 10% and 20% to self-reported wages respectively but this does not imply that all workers received the maximum deductible non-wage benefit and failed to report it. Bhorat, Kanbur and Stanwix (2014) showed that both wages and non-wage benefit payments increased after the implementation of minimum wages.

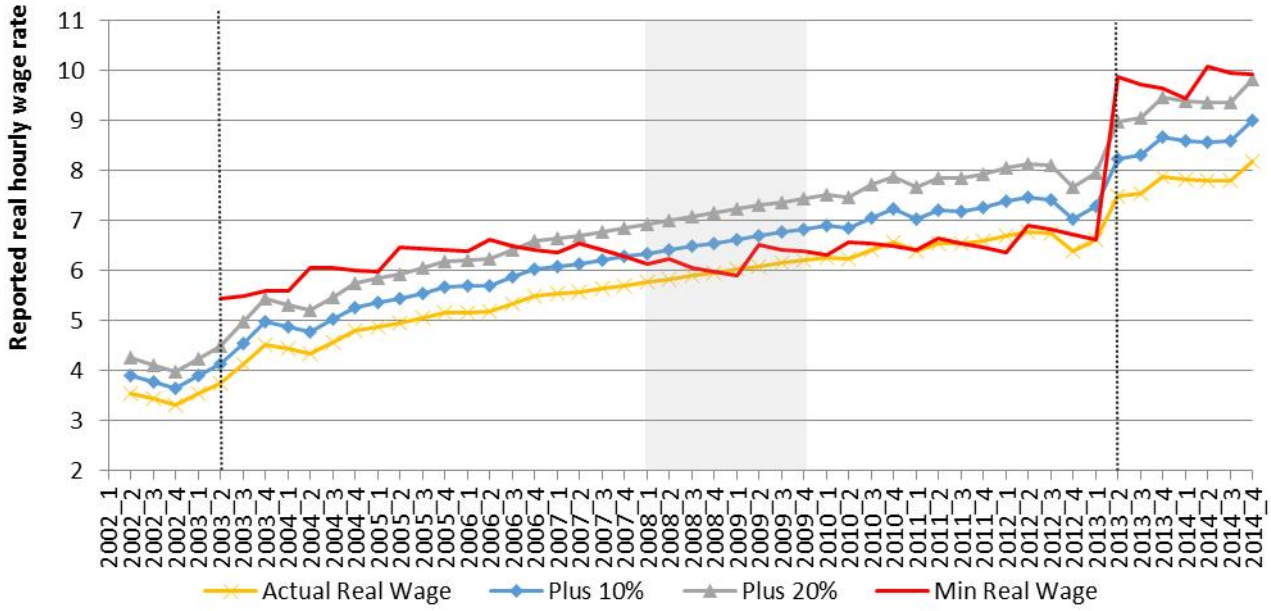


Figure 4: Self-reported real agricultural wages per hour 2001-2014 for entry-level workers

Source: StatsSA LFS (2001-2015) Note: Values for 2008 and 2009 are interpolated due to lack of data

[2] According to Revision 149 (2006) of the "Basic Conditions of Employment Act of 1997"an agricultural employer can deduct a maximum of 10% for food supplied to the worker [8(1)(a)] and a maximum of 10% for accommodation in which the worker normally resides [8(1)(a)], provided that the criteria stipulated in sub-clause 8(2) are met

Shocks and longer term trends

The most interesting aspect of Figure 4 is the upward trend in average self-reported real wages after the initial 'jump'. Self-reported wage rates continued their upward trend and reached the legislated minimum wage by 2009, where after it remained relatively stable. Theoretically some workers could have earned up to 20% more than the minimum wage depending on level of non-wage benefits received and the extent of under-reporting. Note that whilst average self-reported wages exceeded the minimum wage at this point, some non-compliance (the number of people who report a wage below the minimum) still existed. The upward trend in real wages over the longer term was enabled by structural changes that took place in the sector over the medium-term in order to achieve greater productivity levels, possibly through the removal of marginal land from production, increased farm sizes, mechanisation and other measures directed to productivity increases.

The 2013 increase

Self-reported wages showed a similar response to the 51.2% adjustment in 2013, with self-reported wages showing a steep increase shortly before and after implementation thereof. Similarly to 2003, the initial increase in 2013 also stabilised at a level of roughly 20% below the legislated minimum wage. The trend seem to be upward after the sharp initial increase suggesting that the structural adjustments towards greater productivity are in progress. A similar situation to 2009 where a large number of workers receive a above minimum wage is still a number of years off.

Summary

This section underscored the fact that the sector shows both short- and long term responses to increased minimum wages. Over the short term the sector adjusts through a combination of increased real wages, increased non-wage benefit payments and non-compliance. Real wages trend upward over the longer term, however, in response to structural adjustments directed at increased output per worker. This underscores the importance of taking both the short- and long term impacts of wage increases into consideration when considering minimum wage increases.

3 Sector level modelling: the impact of the 2013 increase

This study builds on the analysis of the impact of the 2003 minimum wage by Bhorat, Kanbur and Stanwix (2014) for the 2013 increase through the use of a difference-in-difference analysis. The basic notion is to not only study differences over time, but how the progression of labour market outcomes diverges from a suitable control group after the imposition of new wage legislation. As it is possible that other macro trends that affect all sectors could act contrary to the minimum wage, such effects are removed by differencing away the experiences of comparable sectors. In this case non-unionised elementary and machine workers from the manufacturing sector are used as a control group. In essence, the aim of this approach is to establish whether labour market outcomes in the agricultural sector grew or shrunk at a faster or slower rate than a comparable group *after* the increase in the minimum wage. For this purpose entry level/ unskilled agricultural workers are compared to entry level/ unskilled manufacturing workers, both for the group as a whole but also for permanent and seasonal workers. Figure 5 shows the overall trends for these groups.

3.1 Employment

Unskilled employment increases shortly before the positive minimum wage shock at the end of Quarter 1 of 2013. While the control group has a constant time trend, agricultural jobs are in decline after the increase. This highlights modest disemployment effects in the agricultural sector that are, however, mitigated

somewhat by the end of 2014. Permanent workers are affected one quarter *after* the change in the determination, while temporary workers are affected immediately. Both job types show signs of recovery sometime after the wage increase.

The middle panel in Figure 5 emphasizes that while the control sector saw a decline in *real* wages over the period, real wages rose for agricultural workers. The increase already took place before the new determination was legislated, as employers anticipated the change (which was announced two quarters in advance). Temporary workers experienced a steep increase in wages relative to permanent workers given the higher (above minimum wage) initial income of the latter.

The results also show a reduction in weekly work hours. This was made possible by the fact that the daily minimum wage was for a nine hour day. Furthermore, permanent workers in both sectors experienced a reduction in working hours across the entire period but this was much steeper in the agricultural sector. Temporary workers' hours increased for both groups, though this trend was slower in the agricultural sector. Despite these changes over time, permanent workers still work for approximately one hour longer each week than temporary workers, and two hours more than their counterparts in the control group. A decline in hours worked in conjunction within an increase in wages, will result in an increase in wages per hour equal to the legislated increase. On a monthly basis the increase in total income would be proportionally smaller than the legislated minimum wage increase, if constant non-wage benefits are assumed.

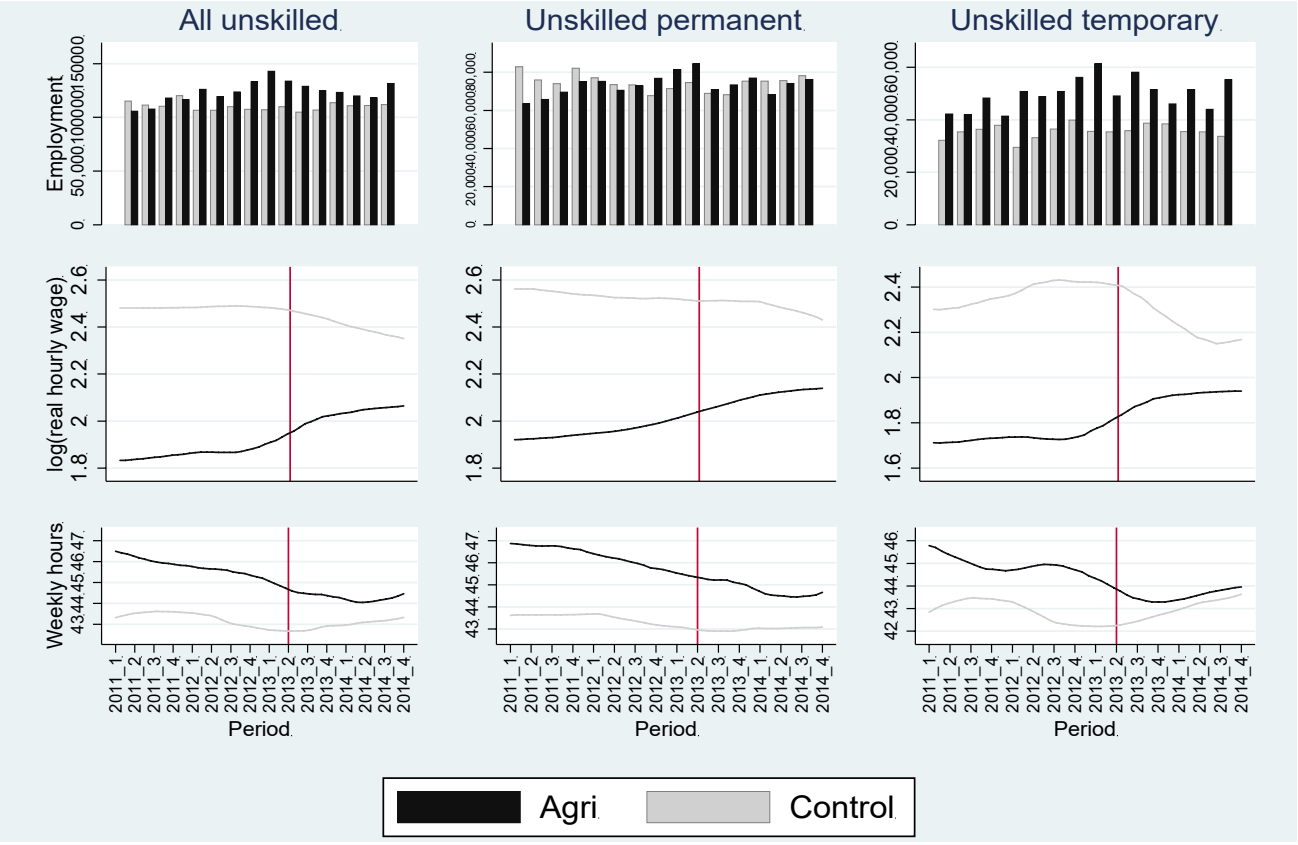


Figure 5: Employment, wage and hours trends for unskilled agricultural and manufacturing workers

NOTES: Own calculations from the Labour Market Dynamic Survey (2011Q1 to 2014Q4). Inflation rates obtained from Statistics South Africa. Period of intervention is from 2013Q2, after the new determination was legislated. Treatment group: elementary workers and machine operators in formal agricultural sector. Control group: elementary workers and machine operators in formal manufacturing sector. Unionised workers and those covered by collective bargaining arrangements are excluded.

Figure 6 highlights that prior to the new determination in 2013, approximately the 25th *reported* wage percentile corresponded with the minimum wage in the Western Cape. Hence, about 75% of workers reported earnings above the legislated threshold. In the Eastern and Northern Cape the median wage corresponded to minimum wages, while in Free State, Limpopo and Mpumalanga (not all provinces are shown here) only the 75th percentile worker earned the minimum wage. After the new determination was implemented in 2013, roughly 25% of workers (in addition to the figures previously quoted) in some provinces reported being paid non-compliant wages. Figure 7 summarises this information differently by showing both the self-reported and benefit-adjusted compliance per province, with full compliance denoted by 1. It suggests that the proportions of workers reporting wages above the minimum declined in most regions. In provinces where this figure was already low prior to the increase in minimum wages, it simply remained low. The situation in previously compliant regions (such as the Western Cape) has also deteriorated but note that it is trending upwards in most provinces after the initial decline, given the structural adjustment that is likely in progress in a similar fashion to the period after the 2003 implementation as discussed in the previous section.

3.2 Difference-in-difference regression

The data summarised in Section 2.2 was analysed econometrically through difference-in-difference regressions[3] in order to quantify the impact of the increase. The results are presented in Table 1. Ordinary least squares (OLS) estimates show the differences in the time trajectories of the agricultural and control sectors, thereby allowing the estimation of the immediate impact of the minimum wage increase on the agricultural sector.

The results indicate that the self-reported wages of temporary workers showed the greatest increase (32.7%) whilst the average wage of entry level workers as a group increased by 29.2%, which is significantly less than the 51.2% legislated increase. This is due to a) some workers received more than the minimum wage (see previous section) before the increase, b) the reduction in working hours, c) increased non-wage benefit payments or d) lower compliance levels.

The disemployment effects as a result of the increase were found to be statistically insignificant (given the econometric model applied) both for the entire sample and seasonal workers, but the increase resulted in a 1.8% reduction in the number of entry level permanent agricultural workers employed. The minimum wage-employment elasticities are negligible for temporary workers and for all contract types overall. The elasticity for permanent workers suggests that a 1% increase in the minimum wage leads to a 0.065% reduction in employment, keeping in mind that some workers received above minimum wages before the increase, working hours can be reduced and non-wage benefits can be increased.

[3] Only the causal impact of interest is presented here, full outputs are available on request.

Table 1: Difference-in-difference estimates of wage, employment and hour effects, 2013

	Unskilled occupations		
Diff-in-diff results	All contracts	Permanent	Temporary
Wages	0.292***	0.276***	0.327***
Employment	0.004	-0.018***	0.005
Hours	-1.220***	-1.416***	-0.989*
Legislated wage increase (adjusted for inflation)	0.493	0.493	0.493
Ratio of measured to legislated wage increase	0.593	0.560	0.664
Proportion of reported wages below minimum (pre)	0.549	0.470	0.667
Proportion of adjusted wages below minimum (pre)	0.320	0.201	0.494
Proportion of reported wages below minimum (post)	0.714	0.657	0.796
Proportion of adjusted wages below minimum (post)	0.472	0.349	0.649
Implied wage-employment elasticity	0.013	-0.065	0.015

NOTES: Own calculations from the Labour Market Dynamic Survey (2011Q1 to 2014Q4). Minimum wages obtained from sectoral determinations. Inflation rates obtained from Statistics South Africa. Period of intervention is from 2013Q2, after the new determination was legislated. Treatment group: elementary workers and machine operators in formal agricultural sector. Control group: elementary workers and machine operators in formal manufacturing sector. Unionised workers and those covered by collective bargaining arrangements are excluded. Methodology follows Bhorat et al (2014). Adjusted wages add 10% for a food allowance for all workers, and an additional 10% for an accommodation allowance for permanent workers.

***statistically significant at 1% level **statistically significant at 5% level *statistically significant at 10% level

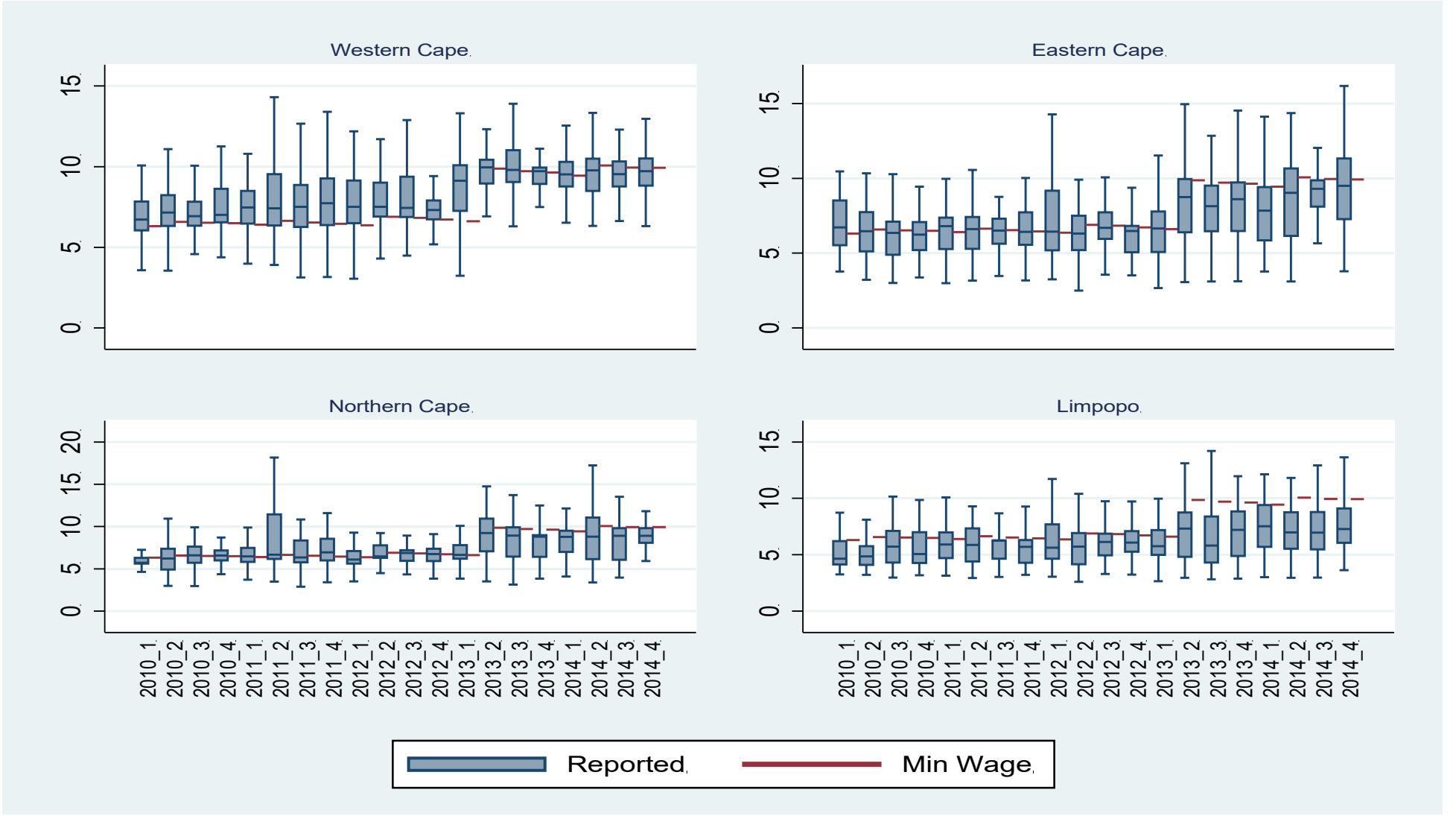


Figure 6: Self-reported real wages of agricultural workers relative to the real minimum wage (2010 prices)

NOTES: Own calculations from the Labour Market Dynamic Survey (2010Q1 to 2014Q4). Minimum wages obtained from sectoral determinations. Inflation rates obtained from Statistics South Africa.

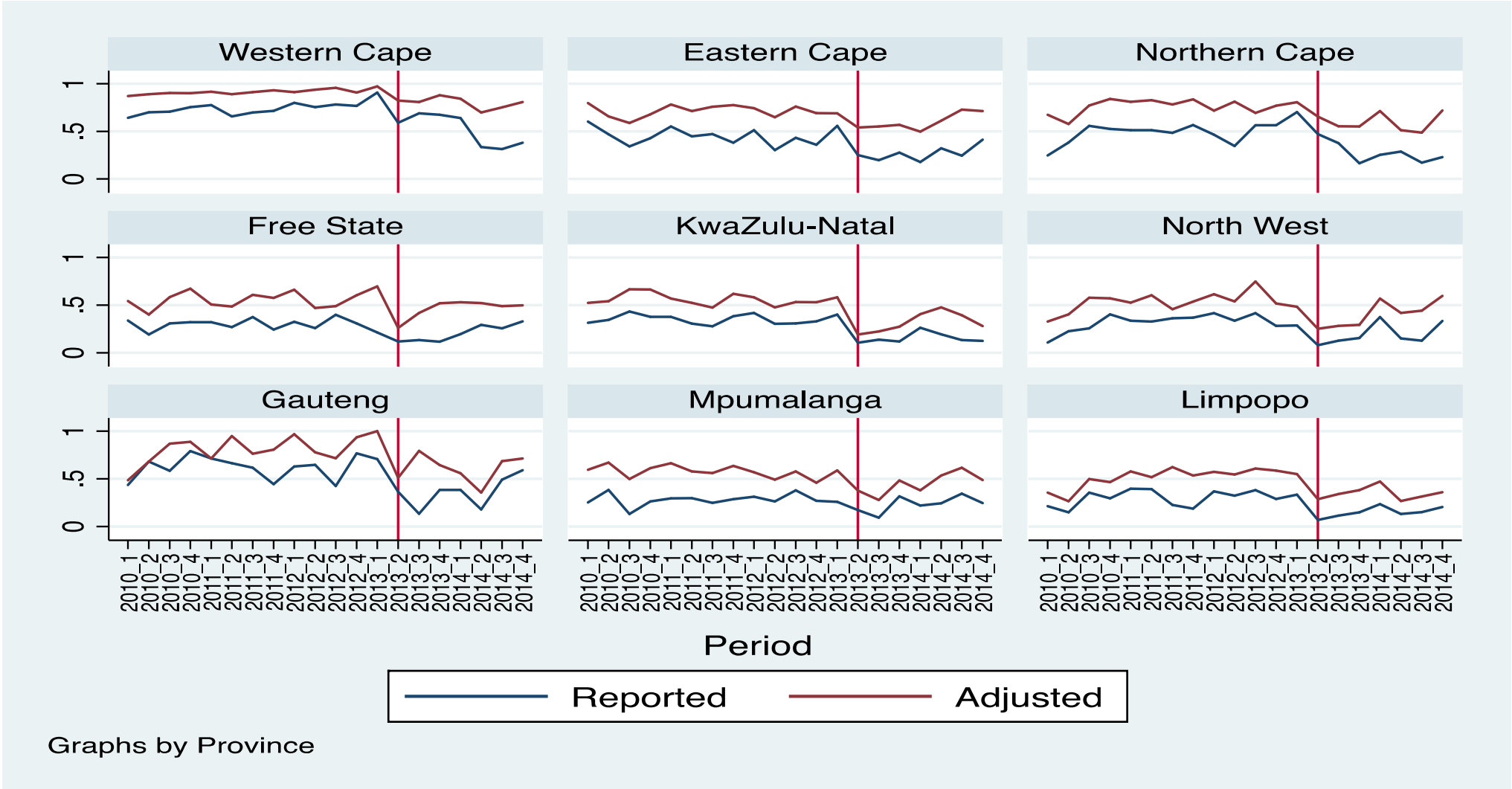


Figure 7: Self-reported wage compliance rates with minimum wages, by province

NOTES: Own calculations from the Labour Market Dynamic Survey (2010Q1 to 2014Q4). Minimum wages obtained from sectoral determinations. Inflation rates obtained from Statistics South Africa. "Reported" wages are as contained in the survey data. Adjusted wages add 10% for a food allowance for all workers, and an additional 10% for an accommodation allowance for permanent worker

4 Farm level analysis

4.1 The current reality

The food and agricultural environment is often volatile and typically characterised by high levels of uncertainty given unstable weather patterns, volatile markets and the ability to maintain a sustainable business under an increasing production cost environment. The decision-making environment of producers is therefore complex and is influenced by a large variety of factors which in most cases are beyond the control of the producer. In recent seasons, instability in the macro-economic environment, localised droughts, fluctuation in international and domestic prices and the rise in inputs costs have impacted farming activities directly. Before the implication of increasing labour costs will be illustrated, it is important to consider other risks that producers are exposed to in the broader agricultural environment.

Figure 8 and Figure 9 illustrate world price trends for key commodities simultaneously with input cost indexes in nominal and real terms. Commodity prices have declined substantially from their highs in 2013 following the US drought. Going forward, commodity markets are expected to remain high relative to historic levels since the changed fundamentals post 2006/07 will continue to drive demand growth. The outlook for demand growth is subdued however, given the controlled slowdown of economic growth in China and limited growth in biofuel markets as a result of the lower oil prices. Input costs (Figure 8) have also shown some decline but are still high by historic standards and are expected to increase going forward, which will put margins under pressure.

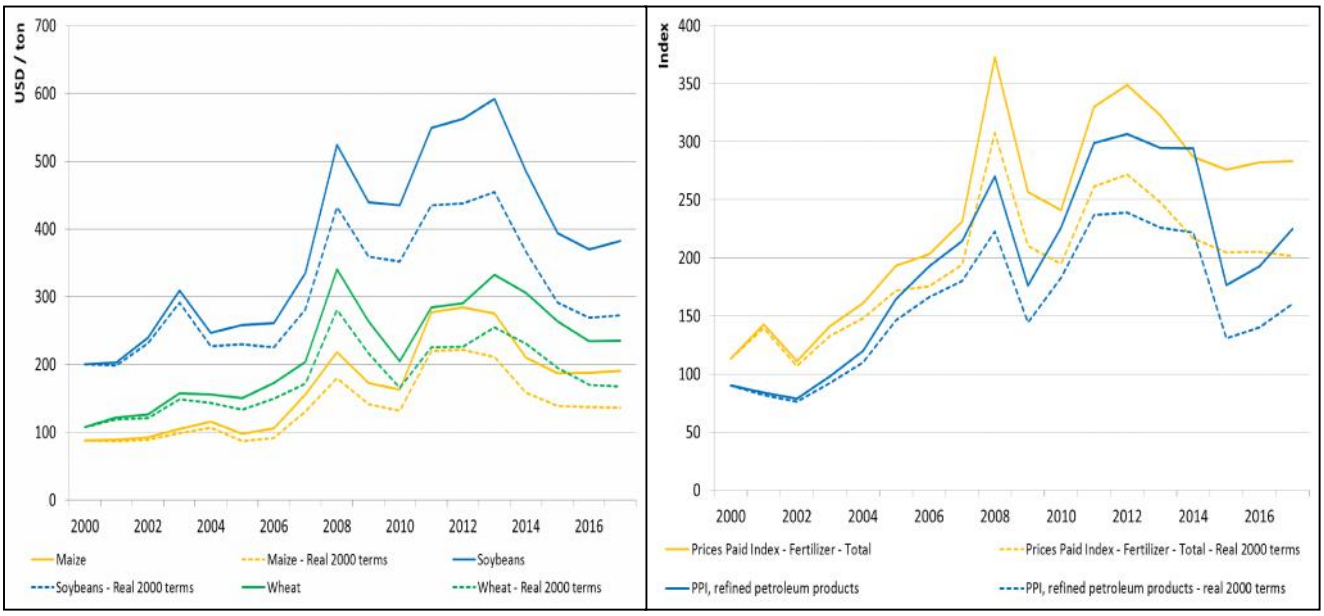


Figure 8: World prices and input cost indexes - nominal and real terms

Source: BFAP, 2015

Domestic producers face a similar situation, as shown in Figure 9. Here the indexed (2000) real gross returns of maize, wheat and soybeans are shown. All of these crops achieved a positive growth in net returns over the period that ended in 2014. During this period the cost of fuel, fertilizer and other farming requisites, which represent the bulk of total direct input costs, continued an increase that started in 2006 (Figure 10). These costs are expected to show somewhat of a pullback in 2015 given the lower oil price, but are then expected increase over the near term given the expectation of higher oil prices and a weakening exchange rate. The typical cost-price squeeze, where costs increase at a faster rate than returns, is therefore expected

to persist and will continue to drive the need for productivity increases. The short term (2015-17) outlook for profit margins is therefore negative whilst the outlook for inputs costs is neutral.

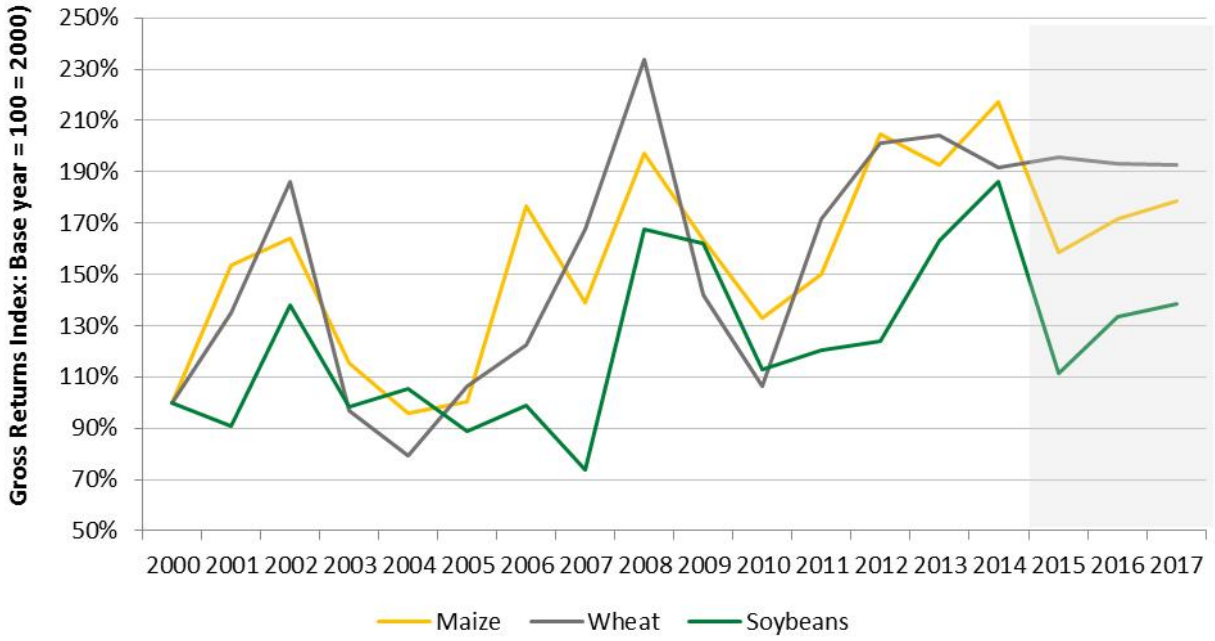


Figure 9: Real gross returns in South Africa

Source: BFAP, 2015

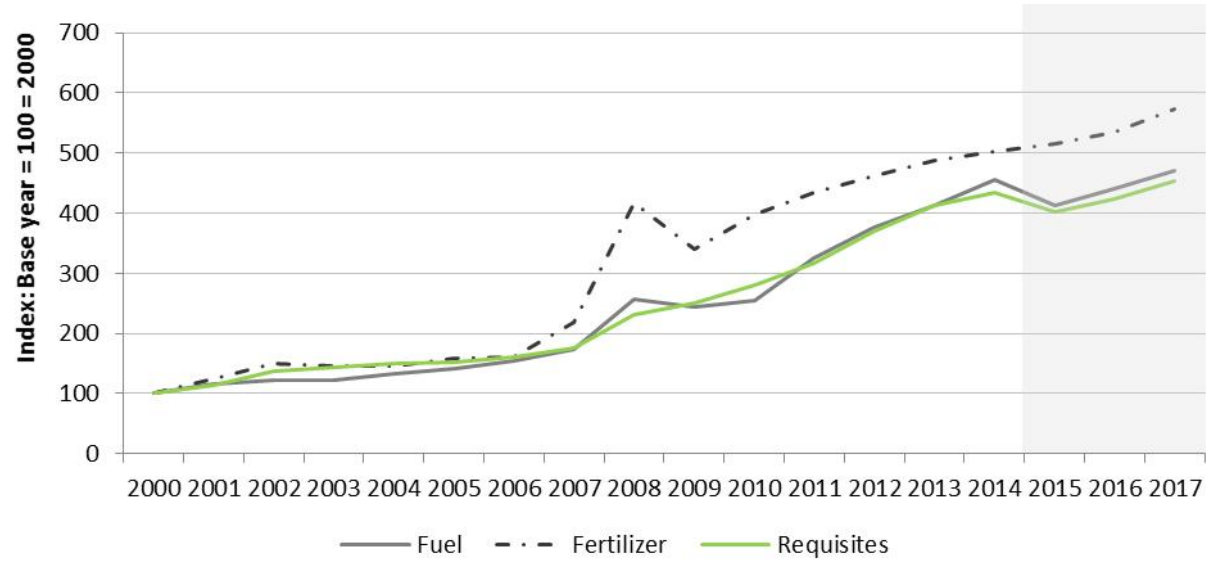
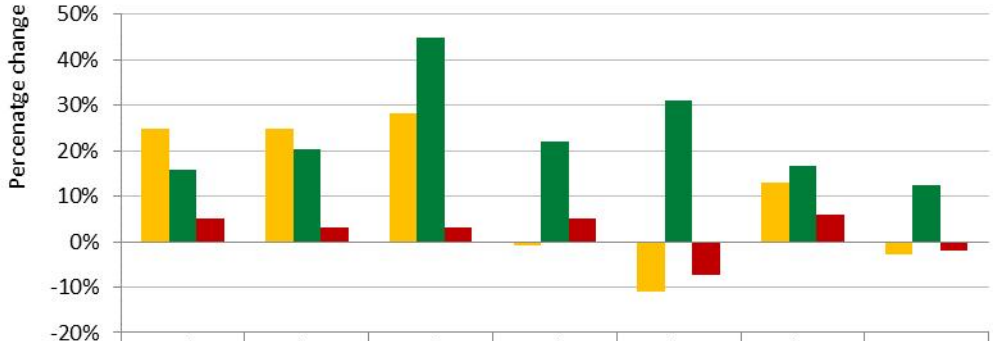


Figure 10: Fuel, fertilizer & farming requisites cost trends (2000-2017)

Source: BFAP, 2015

Figure 11 shows a longer term outlook of the percentage growth in real returns from 2000 to 2020 as six year averages for four periods: 2000-2005 (period 1), 2005-2010 (period 2), 2010-2015 (period 3) and a projected average for 2015-2020 (period 4). Maize, wheat and barley achieved growth rates in excess of 20% in period 1 to 2, whilst the results for the other crops were more diverse. Going forward it is clear that the

growth expectation for period 3 (as the red bars) is significantly lower for all crops with some even posting declines.



	Maize	Wheat	Barley	Sorghum	Sunflower	Soybeans	Sugarcane
Average: 2000-2005 to 2005-2010	25%	25%	28%	-1%	-11%	13%	-3%
Average: 2005-2010 to 2010-2015	16%	20%	45%	22%	31%	17%	12%
Average: 2010-2015 to 2015-2020	5%	3%	3%	5%	-7%	6%	-2%

Average: 2000-2005 to 2005-2010 Average: 2005-2010 to 2010-2015 Average: 2010-2015 to 2015-2020

Figure 11: Change in real gross returns

Source: BFAP, 2015

Extending the input analysis, Figure 12 and Figure 13 contextualise South African input costs within the global environment. Input costs and particularly the cost of fertilizer on prototype[4] farms in South Africa and the US are compared and illustrated in these Figures.

Figure 12 compares the cost of nitrogen per kilogram on typical US and South African farms. South African farmers, on average, pay 45% more for nitrogen when compared to the US. Prototype farms in North Dakota, Indiana, Kansas and Iowa pay between US$1.05 to US$1.39 per kilogram of nitrogen where farms in the North West, Northern Free State, Western Free State and the Northern Cape pay between US$1.73 to US$2.26 per kilogram. The difference is largely caused by the exchange rate and supply chain related costs shifting fertilizers from the port to inland destinations.

Figure 13 elaborates on the differences by illustrating the cost and application per hectare. Despite the fact that South African farmers apply less fertilizer on a per hectare basis (red diamonds), the cost per hectare is similar in both regions (blue vs. orange lines), confirming the negative impact of the costs related to imported inputs on South African producer due to exchange rate and transport costs.

[4] *Prototype farms across South Africa's key producing regions are constructed according to a standard operating procedure and linked strategically into the BFAP system of integrated models, allowing quantification of the impact of different policy options, macroeconomic variables, and volatile commodity market conditions on the financial position of farm businesses in key production regions in South Africa. Figures, data and production statistics illustrated in this chapter do not reflect provincial averages, but rather average values for the specific regions where the prototype farms are situated. Production statistics within these regions are as representative as possible given the information and resources available.*

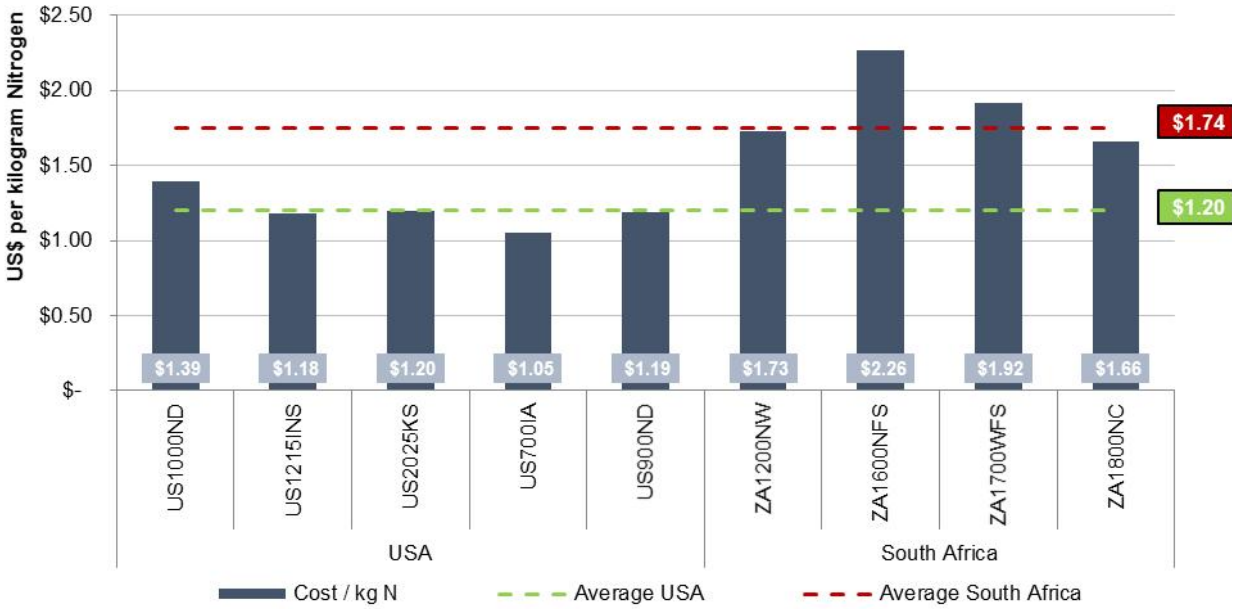


Figure 12: Comparison of the cost of nitrogen between the USA & South Africa (2011 – 2013)

Source: Agri-benchmark (2015)

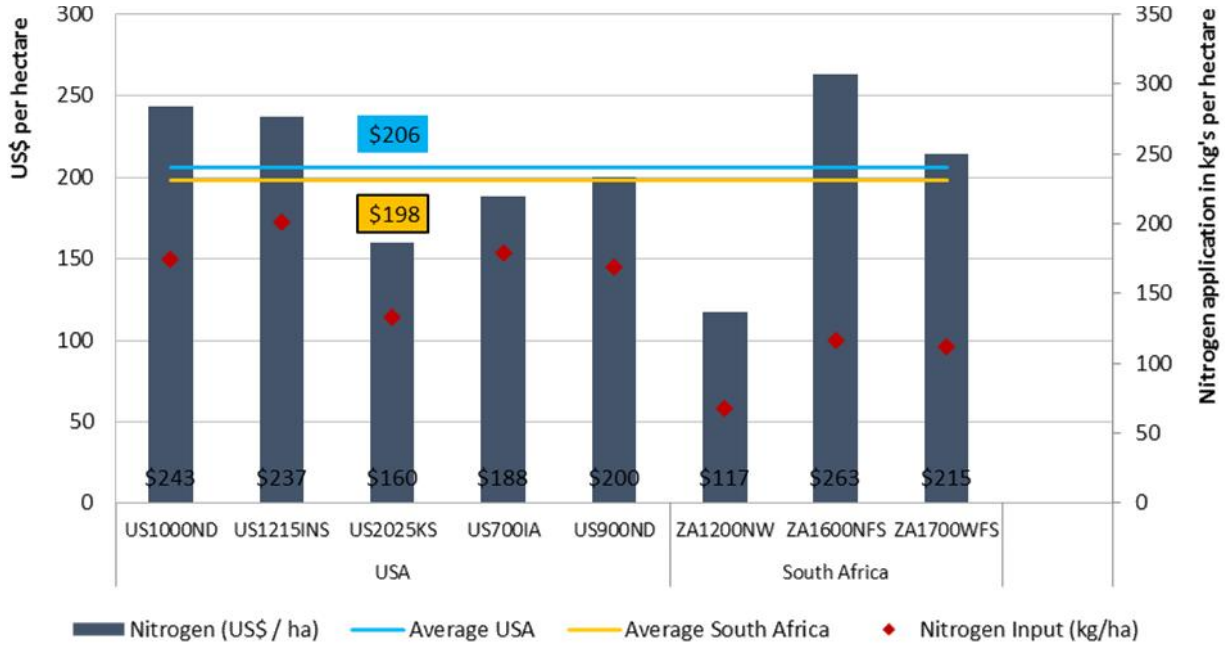


Figure 13: Nitrogen cost & application per hectare (2011-2013)

Source: Agri benchmark (2015)

This section has highlighted the fact that the agricultural sector is currently operating in an environment where real returns are moving sideways or could even decline given increasing costs and declining commodity prices. Domestic producers are exposed to international price and exchange rate movements, but also to domestic inefficiencies in transport and distribution. An increase in labour costs will therefore increase production costs in addition to these and other factors such as electricity prices.

4.2 Wage scenarios investigated

Four wage scenarios where created to evaluate the possible impact of an increase in minimum wages. Scenario 1, as the baseline or "business as usual" scenario, represents the continuation of the current annual increase schedule of CPI inflation plus 1.5%. Scenario 4 on the other side of the spectrum represents the proposed national minimum wage of R4 500[5] per month or R207.7[6] per day, a 72.6% increase above the current level of R120.3 per day. Scenarios 2 and 3 are the interpolated mid-points between Scenarios 1 and 4. It is assumed that annual wage increases resume the "business as usual" increase schedule after any increase in 2016-17. Note that these scenarios do not represent recommended wage levels but rather serve as hypothetical values through which the impact of the changes are tested. The respective scenarios are presented in Table 2 and summarised in Figure 14.

Table 2: Agricultural Minimum Wage Scenarios

		Model Year	0	1	2	3	4	5	6	7
		Financial year	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
		CPI forecast		5.6%	5.5%	5.3%	5.3%	5.3%	5.4%	5.4%
		Wage increase		7.1%	7.0%	6.8%	6.8%	6.8%	6.9%	6.9%
Scenarios		Year 1 change	per day	per day	per day	per day	per day	per day	per day	per day
Scenario 1	Business as usual CPI + 1.5%	7.1%	120.3	128.8	137.9	147.2	157.3	167.9	179.5	191.9
Scenario 2	Interpolation 1 (1 & 4)	28.9%	120.3	155.1	166.0	177.3	189.3	202.2	216.2	231.1
Scenario 3	Interpolation 2 (1 & 4)	50.8%	120.3	181.4	194.1	207.3	221.4	236.5	252.8	270.2
Scenario 4	National Minimum wage	72.6%	120.3	207.7	222.2	237.4	253.5	270.7	289.4	309.4

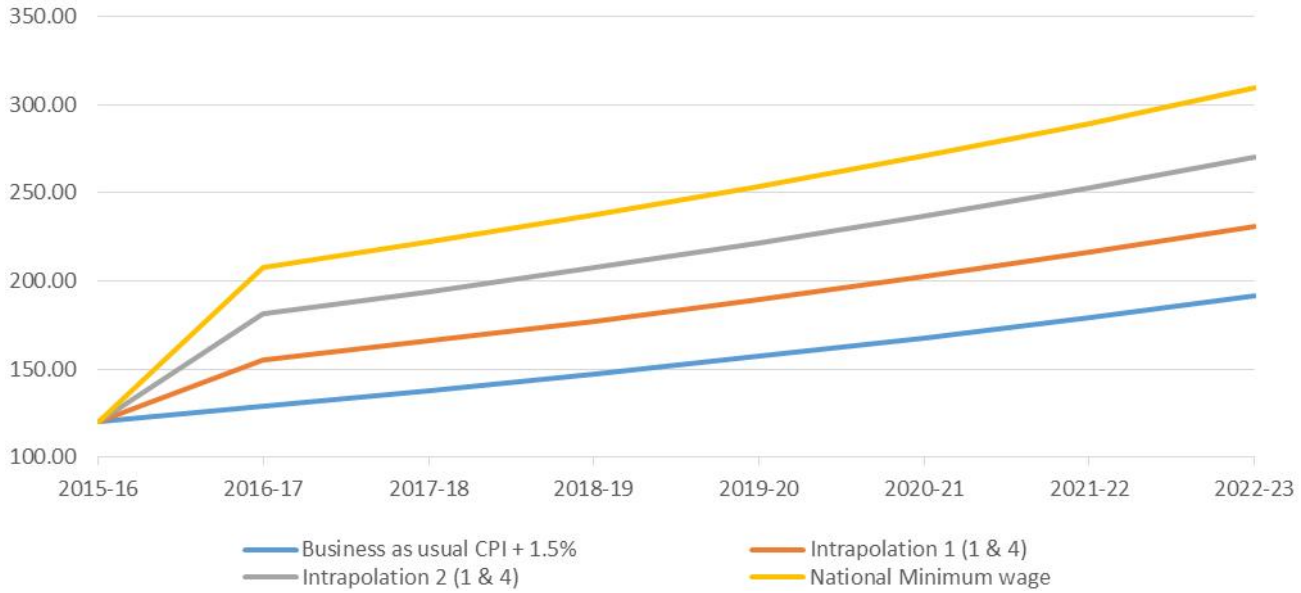


Figure 14: Wage scenarios, gross nominal wage per day

[5] As proposed in the public discourse.
[6] Assuming 4.33 weeks per month and 21.67 work days per month

4.3 Farm level scenario impacts

This section focuses on the impact of the different wage scenarios on typical apple and pear, potato, grain and oilseed farms[7] under the four scenarios outlined above. The annual percentage increases from 2017-18 to 2022-23 are indicated in Table 3. Scenarios 2 and 3 represent two stepwise increments between the agricultural minimum wage and the national minimum wage in 2016-17 respectively, with the same annual percentage increases from 2017-18 to 2022-23.

Table 3: Assumptions for the wage scenarios

Modelling year	Base	1	2	3	4	5	6	7
Financial year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
CPI projections* (%)		5.6	5.5	5.3	5.3	5.3	5.4	5.4
Wage increase (%)		7.1	7.0	6.8	6.8	6.8	6.9	6.9

The BFAP farm level FinSim models can be used to assist in farm level management decision-making. The effect of uncertainty created by macro, sector- and farm level variables in the decision-making environment of a farming system can be analysed and projected by these farm level models. This is accomplished by linking the output of the macro and sector-level BFAP models to the farm level FinSim models. In this study the BFAP sector-level model was used to provide an overview of the supply, demand and price response of the respective industries to exogenous shocks such as the higher minimum wage.

4.3.1 The apple and pear industries

Labour remuneration scenarios

For purposes of the analyses in the apple and pear industries, the minimum agricultural wage of R120.32 per working day and the data in Table 3 was assumed for evaluating **seasonal** workers in Scenario 1. Hortgro Services, the industry representative body, estimates that the actual daily wage for **permanent** workers was R155.43 (the minimum agricultural wage adjusted by a factor of 1.2918). This remuneration structure was based on the Patterson scale and the absolute values of the different classes of labour in the pome fruit industry were based on survey data (Hortgro Services, 2012).

For each of the other scenarios, both permanent and seasonal labour costs were increased. Thus, the respective percentage increases in the minimum agricultural wage for seasonal workers for Scenario 2, 3 and 4 was 28.9%, 50,8% and 72.6% from 2015-16 to 2016-17. The annual percentage increases from 2017-18 till 2022-23 are as indicated in Table 3. Most farmers in the pome industry already remunerate permanent workers above the minimum wage, and an increase in the minimum wage generally tends to result in an upward shift in all wages, albeit not necessarily at the same rate for permanent as for seasonal workers. Thus the respective increases for permanent workers from year 2015-16 to 2016-17 was assumed at 22.4%, 39.3% and 56.2% respectively for Scenario 2, 3 and 4. The annual percentage increases from 2017-18 till 2022-23 were assumed as indicated in Table 1.

Description of the prototype (typical) apple and pear farm

The three main apple and pear production areas in South Africa are the Koue Bokkeveld (Ceres), EGVV (Elgin, Grabouw, Vyeboom and Villiersdorp) and the Langkloof. Pome fruit production systems are export

[7] This typical farm should not be confused with the concept of a representative or "average" farm. The construction of typical farm models follows norms that are well established in the Agricultural Economics literature.

orientated and profitability is thus influenced by exchange rates and the competitiveness of the South African industries. The pome fruit industry is labour-intensive and thus sensitive to changes in labour cost.

Climatic conditions and farm sizes differ between and within the production regions. For purposes of this study a FinSim typical pome fruit farm was used to analyse the effect of the various wage scenarios on farm profitability. The latest available FinSim prototype farm model was based on the 2012-13 production year and concomitant market conditions. The adjusted structure of this prototype farm was then simulated for the period 2015-16 to 2022-23. The description and characteristics of the prototype farm were based on data from Hortgro Services (2014) and adjusted by a panel of pome fruit farmers at a group discussion in 2014. The size of the simulated prototype farm is 100 ha (67 ha apples and 33 ha pears), consisting of three blocks of different ages for each of the various apple cultivars (Granny Smith, Golden Delicious, Royal Gala, Pink Lady/Cripps Pink, Topred/Starking, Fuji, Sundowner and Braeburn) and pear cultivars (Packham's Triumph, Forelle, Bon Chretien, Beurre Bosc, Rosemarie/Cheeky and Abate Fetel). The assumed replacement cycles for apples and pears were 25 and 30 years respectively.

Remuneration of seasonal workers for apples and pears amounted to R48 992 and R45 625 per ha of full bearing fruit respectively, which represents 51% of the directly allocable variable cost per ha. The total annual remuneration of permanent workers amounted to R2 247 182 for this prototype farm. More details on the assumptions regarding the yields, market segments (export, local, processing), classes and farm gate prices per cultivar of fruit, can be found in BFAP (2014: 128–129).

The FinSim farm level model was linked to the apple and pear sector model and the BFAP macro model via indices to respectively accommodate simulated projected cultivar prices and changes in the expected exchange rate and inflation rate for input prices, interest rates and other macroeconomic variables. Separate sector model results were simulated for each wage scenario and as such incorporated into each corresponding farm level scenario for apples and pears.

Results at farm level

For the purposes of this study a baseline situation (Scenario 1) was assumed and the effect of the three different wage scenarios (Scenario 2 to 4) modelled as deviations from the baseline. The assumptions discussed in the previous section formed the baseline situation for the modelling process and the wages of permanent and seasonal labour were increased according to the assumptions for Scenario 2 to 4 respectively. The FinSim farm level apple and pear model was simulated for 1 000 iterations for each scenario and the simulated mean net farm income (NFI)[8] and simulated mean rate of return on capital for each year of the period 2015-16 to 2022-23 were used as performance measures. The simulated decline in mean ROI over time for each successive scenario is shown in Figure 15. At the proposed national minimum wage the simulated mean annual reward to the capital invested in the farm business would be more than 40 percent lower than the baseline or "business as usual" (Scenario 1) earnings on capital.

[8] The NFI is a general performance measure applied in interfarm comparisons and represents the reward to own and external entrepreneurial skills/input, land and other capital. A NFI of R0 implies that there is not enough net income generated by the business to reward the entrepreneurial input, land and capital.

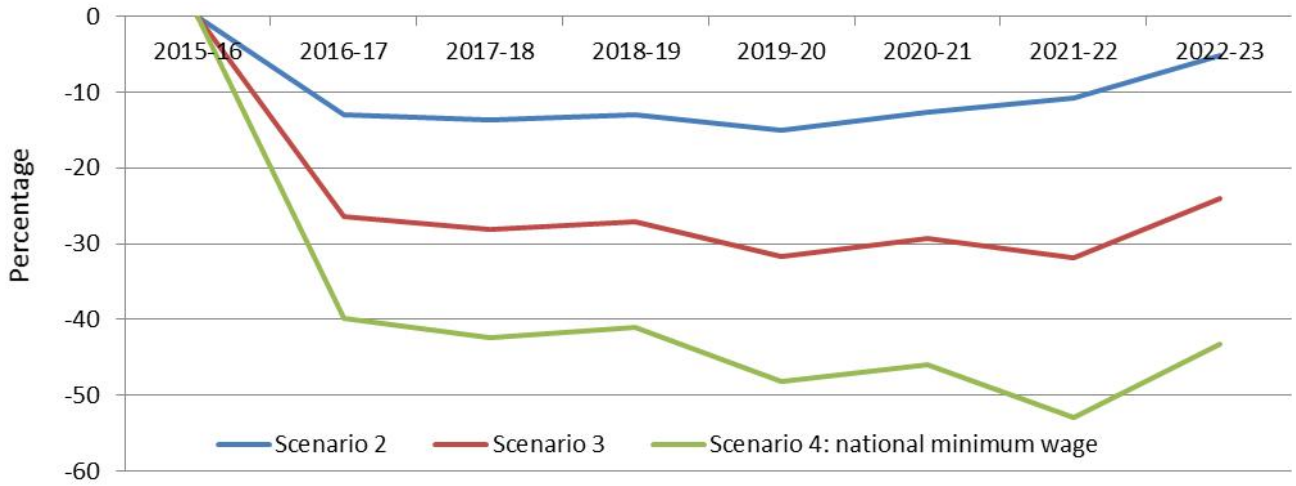


Figure 15: Decline in the mean rate of return on capital from the baseline scenario (%)

4.3.2 The potato industry

Since 1993, the total number of commercial potato producers in South Africa has declined by more than 60% with fewer than 600 commercial producers remaining in the industry. The reason for this decline was the risk associated with potato production together with the required capital investment. Domestically, production peaked at 2.2 million tons in 2014, produced on roughly 51 000 hectares. The high associated input cost in the production of potatoes entails a significantly higher financial risk, especially in the Eastern Free State where dryland cultivation is occurring. The sector is also facing increased costs of fuel and fertiliser. In the irrigation regions the proposed hike in electricity tariffs by Eskom adds to the cost price squeeze. Prices have also declined in real terms since 2000 (Figure 16) and this trend is expected to continue.

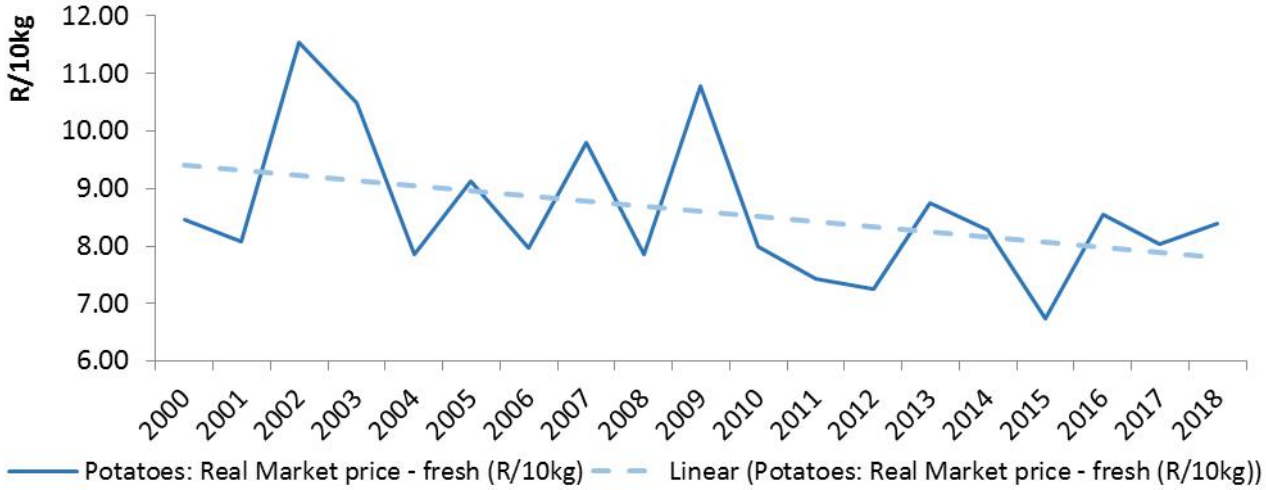


Figure 16: Real market price trend for fresh potatoes (2000-2018)

Potato farmers in the Eastern Free State typically grow about 168 hectares for which they employ 36 seasonal workers during planting, 48 seasonal workers at harvesting and an additional 80-90 seasonal workers in the pack house. This amounts to roughly 174 seasonal workers for a period of 139 days. The total cost amounts to R2.1 million when seasonal and permanent workers are combined, which represents 14% of

the total cost of production. A small increase in labour costs can therefore have a significant cost implication for a farm.

The impact of the respective scenarios on the financial position of growers can also be tested on a typical potato farm in the Eastern Free State. For the generation of the scenarios it was assumed that normal weather conditions would prevail and that projected price, input cost and yield trends would continue. Table 7 indicates the immediate cost implication under the various wage scenarios or their absolute difference from the baseline projection and can be summarised as follow:

- Under business as usual, profitability is 38 percent below 2013 levels driven by a lower price and increases in other input costs such as fuel and fertilizer.
- Under scenario 2 or an increase of 28.9 percent in labour cost, the immediate loss in income amounts to R424 915 in the 2016/17 production season.
- A 50.8 percent increase entails a loss of more than R900 000 with a decrease in NFI of 79 percent from 2013 levels.
- Scenario 4 indicates that NFI will decrease by more than R1.3 million or 100 percent less than 2013 levels.

Table 4: Income implication from introducing labour scenarios: Difference from Baseline NFI

	2016/17	2017/18	% change: 2013 to 2016
Scenario 1 - Baseline	-	-	-38%
Scenario 2 - 28.9%	R-424 915	R -440 280	-58%
Scenario 3 - 50.8%	R -900 322	R -949 107	-79%
Scenario 4 - 72.6%	R -1 373 559	R -1 455 610	-100%

Figure 17 highlights the cost implication on the typical potato farm in the Eastern Free State. When scenario 4 is anticipated, total labour cost will increase from R2.08 million in 2016 to R3.60 million in 2017. Similarly, under scenarios 2 and 3, the cost will increase to R2.69 and R3.14 million respectively.

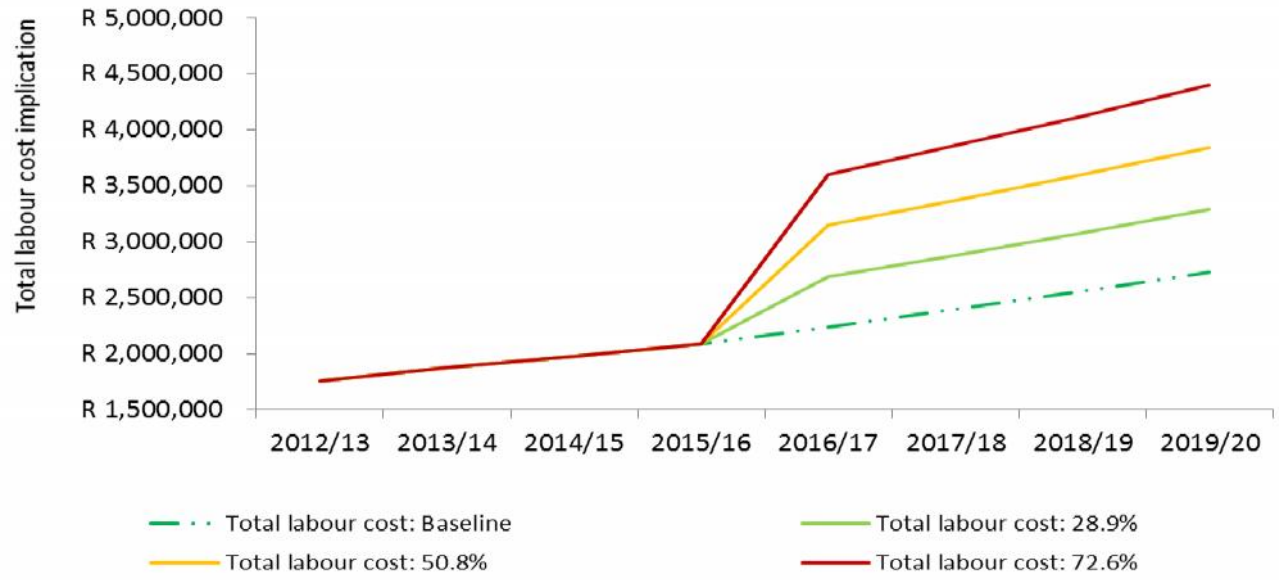


Figure 17: Total labour cost in the Eastern Free State under the various wage scenarios (2013-20)

Figure 18 illustrates the input contribution between the baseline and scenario 4. Under the baseline, fertilizer is the single most expensive input and contributes 24 percent to total direct cost, with labour amounting to 14 percent. When scenario 4 is assumed, labour will increase to 22 percent which will equal fertilizer's contribution.

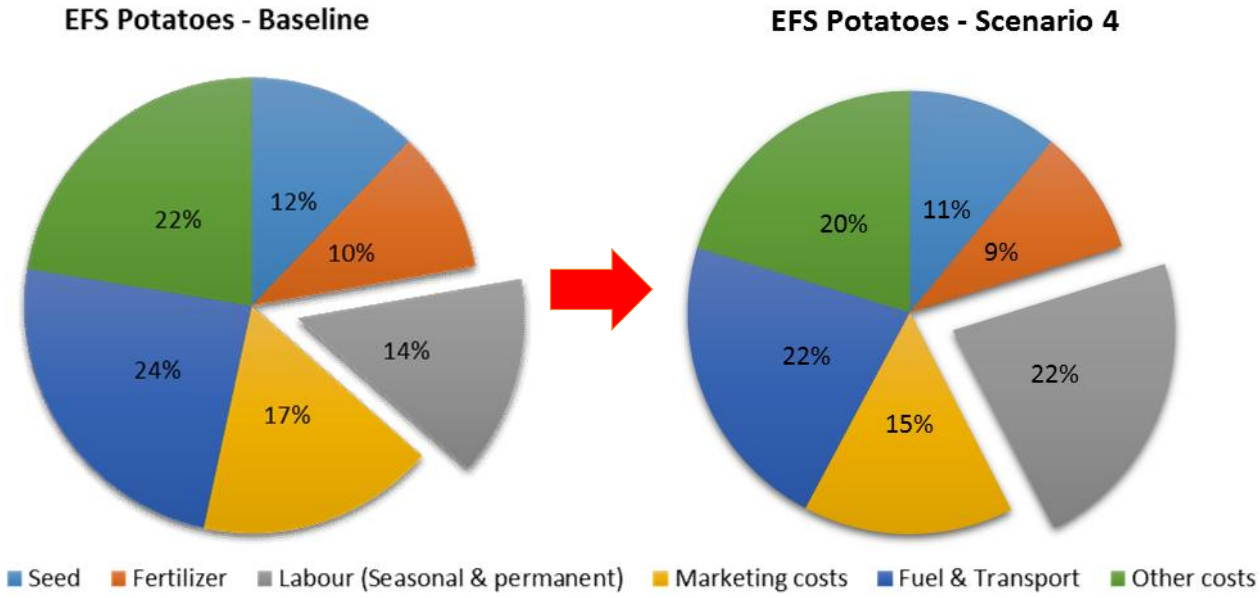


Figure 18: Eastern Free State input contribution: Baseline vs. Scenario 4 in 2017

It is clear that potato farming is highly sensitive to wage rates, and that any increase above the "business as usual" scenario will result in financial losses, and hence in a contraction in potato production under dryland conditions. Figure 19 brings this point home by showing the impact of increased labour costs on the financial situation of such farms by considering the return on investment (ROI) of the farm business.

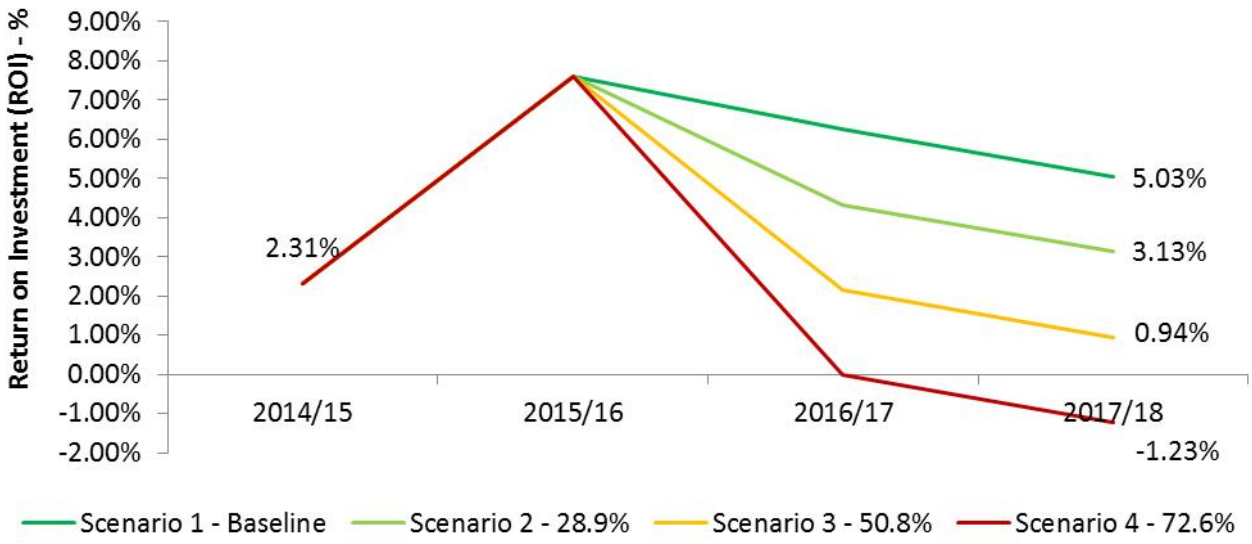


Figure 19: Return on investment for an Eastern Free State potato producer (2015-2018)

The graph shows that farms are projected to realise an average ROI of 5.2% over the period from 2016 – 2020 – already too low to be considered a sound investment considering, the risk involved in cultivating potatoes, and the fact that one can realise a "risk free" return of 8.4% on government bonds. The ROI for the other scenarios is even worse with Scenario 4 realising a nominal ROI of – 1.2%. If prices do not recover producers will have to reduce employment through mechanisation or shift to alternative crops with a greater return and most probably a smaller labour requirement.

A previous study by BFAP and Potato South Africa investigated the impact of wages on producers of different sizes (50, 150 and 350 hectares) and evaluated their possibilities with mechanisation. The analysis showed that small scale producers (50 hectares) could not afford to mechanise and therefore had to absorb the higher wages or cease production. Producers of a 150 hectares could make some adjustments towards greater mechanisation whilst producers of 350 hectares and more could mechanise completely (BFAP, 2014).

4.3.3 Grains and oilseeds

In recent years, summer grain and oilseed producers have faced some extreme weather conditions, a volatile market and the typical cost price squeeze where the cost for inputs increases at a faster rate than returns. Producers in the North West province in particular, which accounts for 24.5% of the area planted to maize and 16 percent of the production experienced severe drought recently, with yields dipping below 1.5 tons per hectare in 2015. The impact of these droughts is illustrated in Figure 20 – in 2013 and 2015 farm businesses made a substantial loss, giving a return on investment of -7% and -17% respectively.

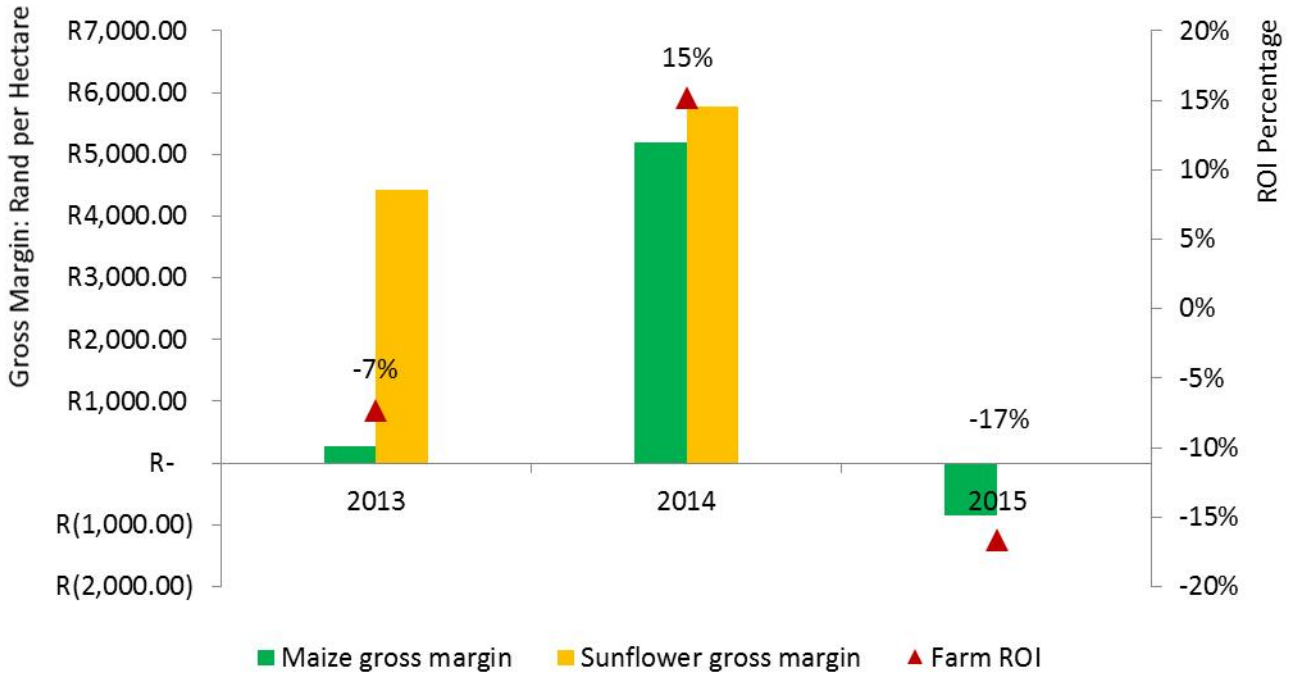


Figure 20: Profitability performance on a North West prototype farm (2013-2015)

Similar conditions are experienced in key Northern and Western Free State production regions, with estimated average yield levels of 3.20 tons per hectare in 2015. The Free State province is responsible for 46 percent of the total maize area and 40 percent of total maize production of the country. In light of the

above, a challenging environment was experienced by maize producers in key growing regions in South Africa.

Figure 20 and Figure 21 illustrate the impact of various wage increase scenarios on a typical North West farm producing maize and sunflower which employs between 14 and 19 permanent workers and 30 seasonal workers on an annual basis.

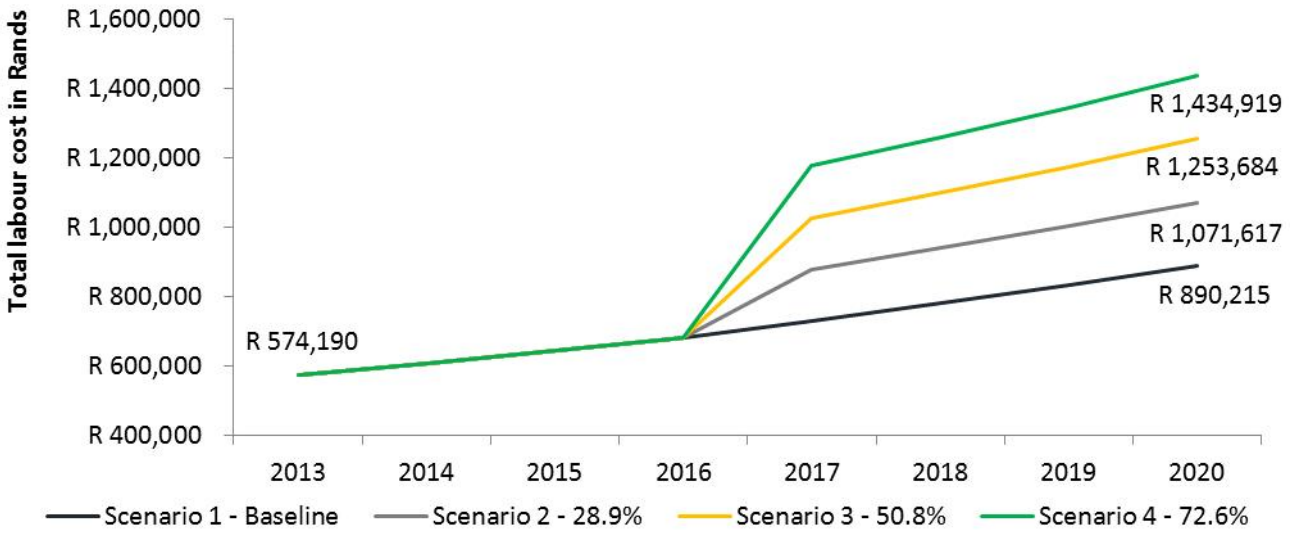


Figure 21: Cost of labour under various wage scenarios on a North West prototype farm

Figure 21 can be summarized as follow:

- The total cost of permanent and seasonal labour in 2013 and 2014 was R574 190 and R610 364 respectively and under a business as usual scenario (baseline) it is projected that this cost will increase to R890 000 in 2020.
- Under scenario 2 and 3, the total cost of labour will increase to R878 038 and R1 027 216 in 2017. Towards 2020, the cost of labour in these scenarios will exceed R1 050 000.
- Scenario 4 or a hike in labour cost of 72.6 percent entails that the labour cost will increase from R681 178 in 2016 to R1 175 712 in 2017.

Figure 22 highlights the effect from 2016 to 2017 under the various scenarios on the income position of the farm. Under business as usual, labour cost will increase by nearly R50 000 from 2016 to 2017. Under the assumption that scenario 2 and 3 prevails, the loss in income will amount to R196 860 and R346 038 over the stipulated period. Scenario 4 indicates that a farmer will spend nearly R500 000 more on labour in 2017 when compared to 2016.

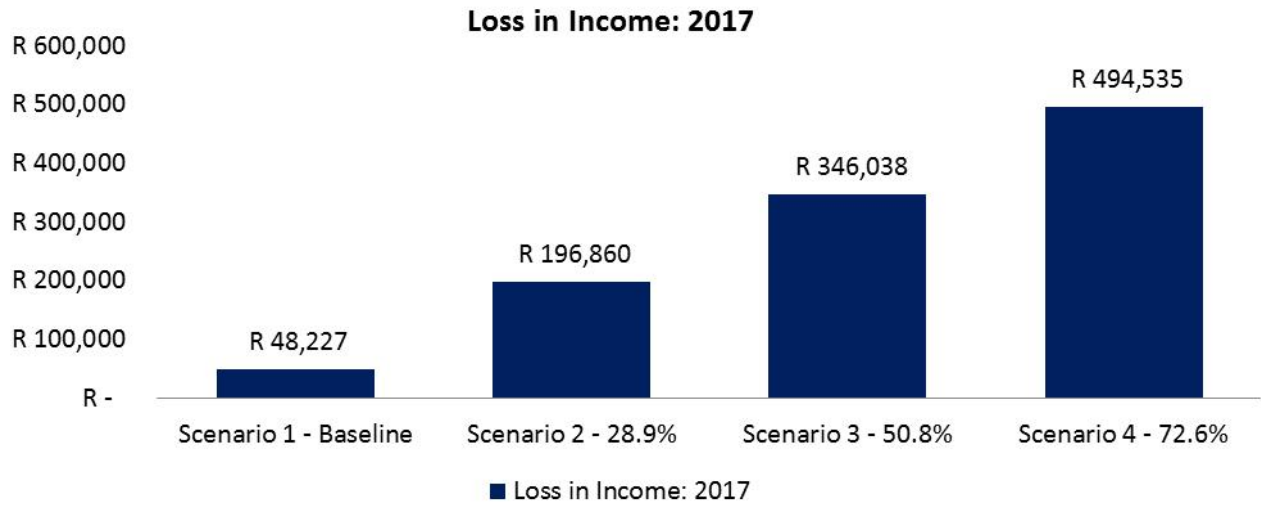


Figure 22: Cost implication due to various wage rate hikes on a North West prototype farm

4.3.4 Sugarcane

The South Africa sugarcane industry acts as one of the key agricultural employers due to the current nature of the production system. Production takes place in the coastal and Midland regions of KwaZulu-Natal and Mpumalanga but have shown a substantial decline since 1994 (Figure 23). This is the result of both a decline in average yields and total area under production. Lower yields is the result of longer replacement schedules in response to current profitability levels and uncertainty relating to land reform. Increased pressure from Eldana, a parasitic insect or generally known as the African sugarcane borer, is also putting yields under pressure since it forces producers to cut immature sugarcane. Area planted is also under pressure due to the urbanisation of coastal regions and fluctuating weather conditions.

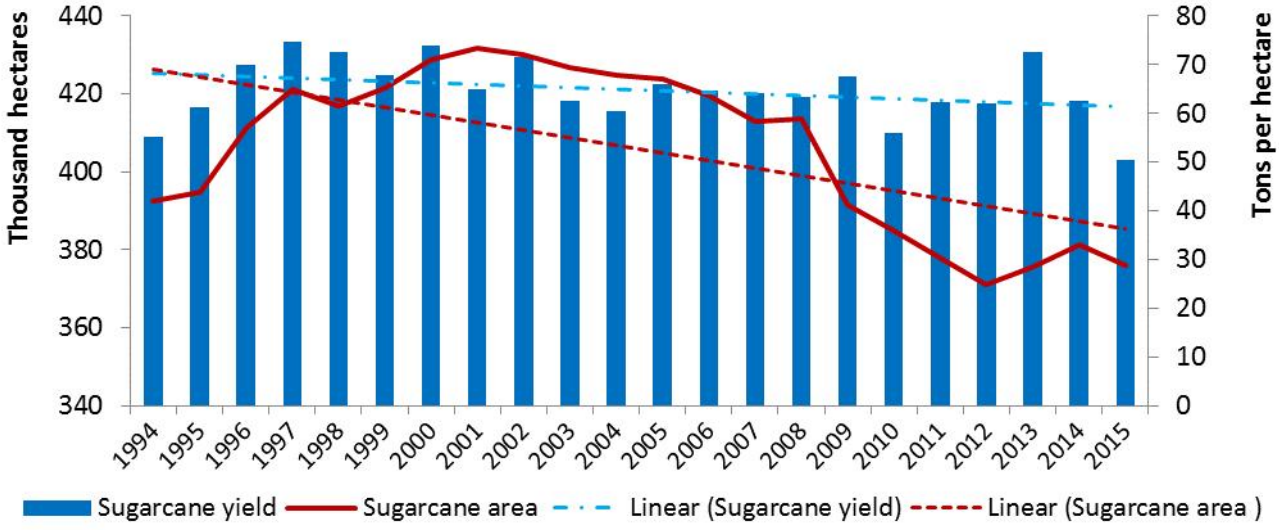


Figure 23: Sugarcane area and yield (1994 - 2015)

Source: BFAP, 2015

The coastal regions are particularly labour-intensive since they are mainly cultivated by hand due to the sloping terrain and steep hills which limits the efficiency of machinery. These regions typically employ seven general workers and two field managers per hectare per annum. Roughly about 21 cutters and stackers are

employed during the harvest. The dependence on hired labour is illustrated in Figure 24 that compares international cane producers through the *Agri benchmark* methodology. It shows that South African producers (ZA) spend three times more on this labour category if compared to farms in Brazil (BR), Thailand (TH) and Vietnam (VN). Figure 25 also shows that South African sugarcane establishment cost in the North Coast rain-fed region have a high input cost per tonne produced if compared with producers in Brazil, Thailand and Vietnam. This result is driven by high fertiliser costs (especially nitrogen & potassium) and low yield levels. Production in these coastal region is therefore subject to relatively high input costs, have a high exposure to hired labour costs and is threatened by urbanisation in coastal areas.

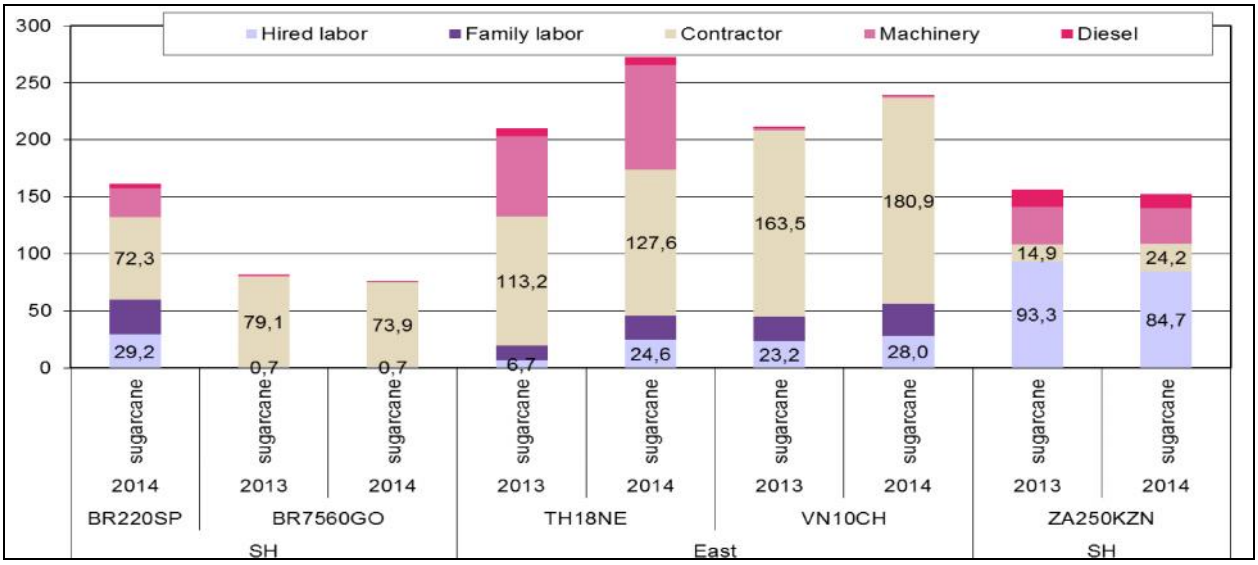


Figure 24: Sugarcane operational cost (US$ per ton sugar produced)

Source: Agri benchmark, 2015

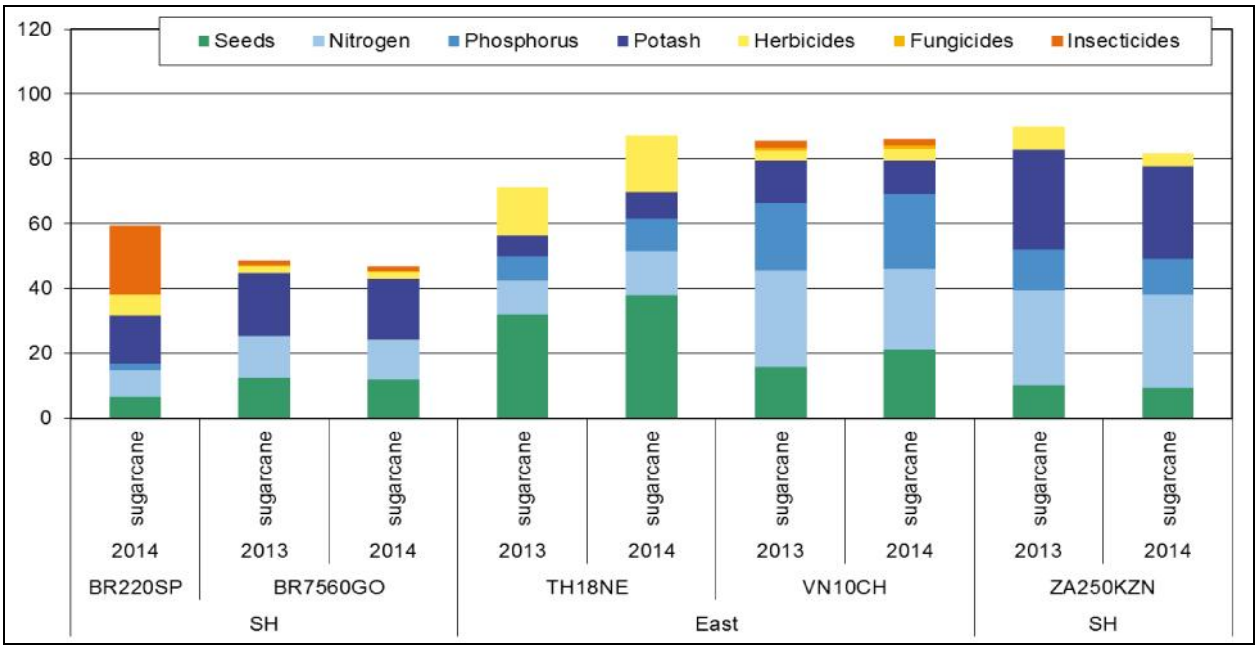


Figure 25: Sugarcane establishment cost (US$ per ton sugar produced)

Source: Agri benchmark, 2015

Figure 26 shows the historic and projected total labour cost of a coastal rain-fed proto-type farm in KwaZulu-Natal. Its shows a total labour cost of just over R 1.17 million during the 2014/15 season, which is projected to increase to R1.24 million in the 2015/16 season. Labour costs is expected to increase by 22.4% towards 2018/19 following the continuation of the current sectoral agreement as Scenario 1. Under scenario 4 total labour cost is expected to increase by 97% between 2015/16 and 2018/19. This could make cane production in these areas financially unsustainable given current yield levels, production costs, dependence on hired labour and inability to mechanise.

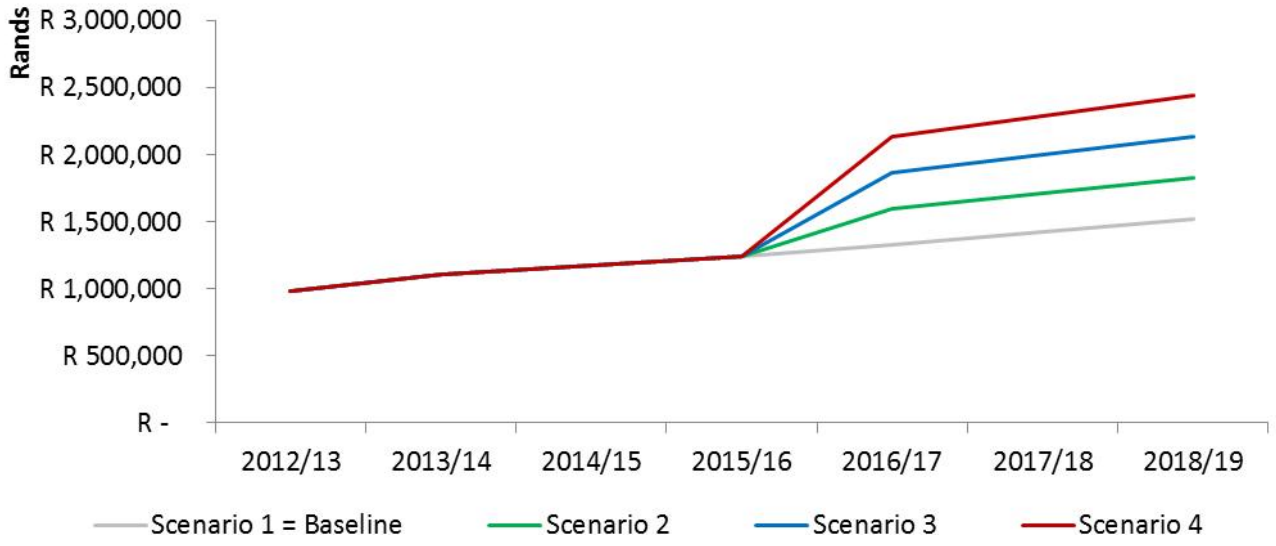


Figure 26: Labour cost implication under wage scenarios

4.3.5 Wine grape production

A perspective on the possible impact of different wage scenarios on the wine industry is crucial given the sector's relatively high labour intensity and importance as a foreign exchange earner. Hence a simple input cost impact analysis constructed from the input cost data published by Vinpro (2011-2014) and projected forward with BFAP cost factors for 2015/16 and 2016/17 was conducted for grape growers. The Paarl region is used given its relatively high labour cost as a percentage of total cost. The result, as presented in Figure 27, shows that labour costs represented 33.8% of total costs in 2014/15 and theoretically would increase to 47.8 % in 2016/17 following the implementation of the proposed national minimum wage. However, this is unlikely to materialise since wine grape producers would make the necessary structural adjustments, including the removal of marginal land from production, shifts to alternative crops or job losses through mechanisation.

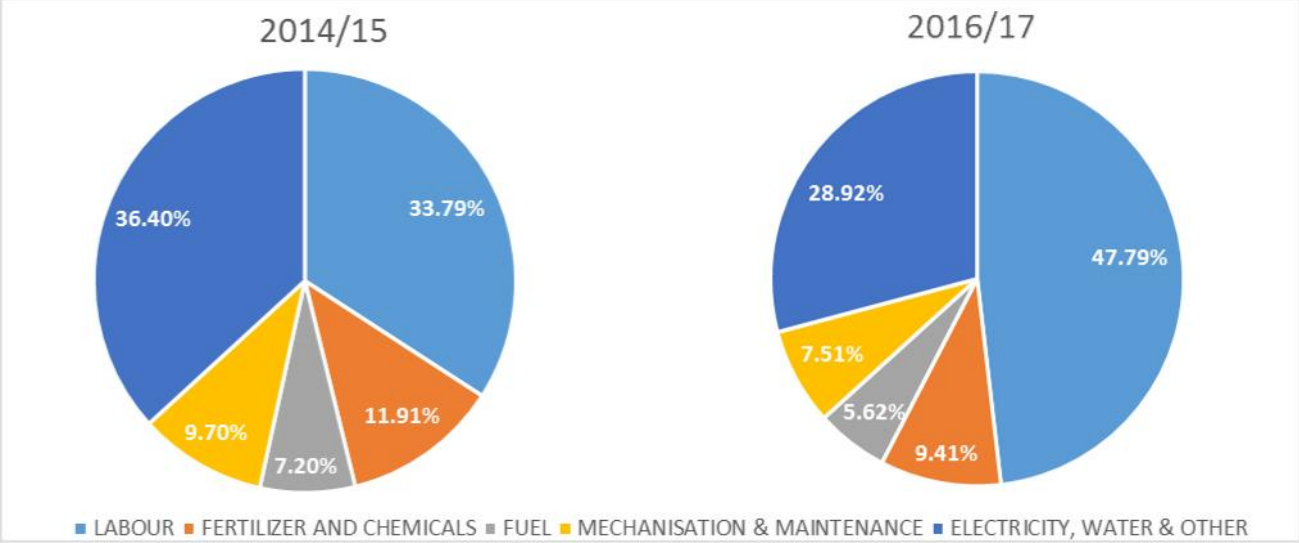


Figure 27: Relative input cost share per hectare in Paarl: Before and after national minimum wage

Source: Vinpro (2010-2015)

4.4 Sub-sector impact summary

The primary objective of this section was to illustrate the effect of the respective scenarios on profitability. Labour cost impacts, however, cannot be evaluated in isolation since farmers always face a host of biophysical and economic uncertainties. This includes low yields due to weather variability, unfavourable domestic and international product price movements, exchange rate volatility and rising costs of inputs such as fertiliser, fuel and electricity. The impacts of increased wages are also not uniform across industries given the variation in the share of labour in total cost. In summary, the respective subsectors face the following challenges:

Apples and pears: Labour costs represent a major cost component within these enterprises and thus the respective scenarios will have a significant impact on costs as illustrated through the projected decline in net farm income. Wage increases will have a negative impact on the global competitiveness of the sector as the sector acts as an important foreign exchange earner and regional employer, especially of lower skilled workers. The continued competitiveness of the sector is important from a South African food system perspective since the foreign exchange earned enables the procurement of primary food items such as rice and wheat on the global market.

Potatoes and sugar cane represent some of the most labour-intensive field crops given the current production systems. Production of these products can be extensively mechanised, however, and this would also result in a structural consolidation of the number of farms, thereby decreasing employment even further. Potato production in the Free State, as the least mechanised production system for potatoes in the country, is currently unsustainable, giving a return on investment of just over 5% (below inflation and the yield on government bonds). This would decline to a negative return if farmers had to pay the national minimum wage. The sector will therefore not be able to afford any wage increases and will have to reorganise production costs in order to increase profitability, or to exit production.

While *grain and oilseeds* have a smaller exposure to labour cost changes, the national minimum wage scenario would increase labour costs by almost R500 000 on a prototype farm in the North West. This sub-sector has a high exposure to climate variability - producers in the North West are currently facing their

second drought in three years – and generally low returns due to the high degree of uncertainty faced by producers. Increases in costs worsen the vulnerability of the sector and accelerate the structural change towards bigger farms with lower total labour use per hectare, and hence a decline in total employment.

The wine grape industry is also vulnerable to increases in wage costs. The brief analysis here shows that the national minimum wage would increase labour costs from 33.8% to 47.8% of total input costs. Such a substantial increase would necessitate structural adjustments such as switching to alternative crops, removing land from production or increased use of labour saving technologies.

5 Towards a food affordability perspective

5.1 Objective

The objective of this section is to determine the minimum cost of a healthy (nutritionally balanced) monthly food basket for a household earning agricultural wages. This analysis addresses the "*cost of living"* and "*poverty alleviation"* considerations of the Employment Conditions Commission as stipulated in sub-section 3(d) and (e) of Article 54 of the "Basic Conditions of Employment Act" (No 75 of 1997).

5.2 Background calculations and assumptions.

5.2.1 The recommended food intake for individuals within a household

The *Guidelines for Healthy Eating* of the *Department of Health (DoH)* were applied to compile a healthy monthly food basket, where the DoH guidelines allow for individual food preferences of consumers to be taken into consideration[9]. The eating plans contain all the food groups and provide for the nutritional and energy needs of children and adults of various ages, and of average height and moderate activity levels (see Table 5).

As the objective of this section is to determine the minimum cost of a healthy (nutritionally balanced) monthly food basket for a household earning agricultural wages, it was decided to only work with the more economical (thus more starch dependent) serving plan as recommended by DoH (see Table 6).

In this regard, serving units are based on information in the '*Guidelines for Healthy Eating*' of the Department of Health. According to these guidelines

- "A portion is the amount of food that a person eats of one food at one time. Members of the same family may have different portion sizes of some foods, e.g. active men will have a bigger portion of starchy food than women. A single portion of food may have one or more units (food guide units) that are eaten at one time."
- A food guide unit within a particular food group "is calculated based on the nutritional value of the food, and this amount is then stated. Thus a single unit of each food in a food group provides a similar amount of nutrients as other units in that same group. The unit sizes of different foods are described in different ways, for example 1 slice of bread (starchy food), 1 apple (vegetables and fruit) or 1 cup of milk (milk group)."

[9] www.nutritionweek.co.za

Table 5: Energy needs of various age and gender groups within the DoH Guidelines

Age category	**Male**	**Female**
5 - 9 years old	6 500 Kilojoules/day	6 500 Kilojoules/day
10 - 13 years old	8 500 Kilojoules/day	8 500 Kilojoules/day
14 - 18 years old	10 500 Kilojoules/day	8 500 - 10 500 Kilojoules/day
Adults	10 500 Kilojoules/day	8 500 Kilojoules/day
Sedentary, older adults	8 500 Kilojoules/day	6 500 Kilojoules/day

Table 6: Food guide units per food group per day within the DoH Guidelines

	Number of portions (*more starchy food options, less animal food options)*		
	6 500 kJ	**8 500 kJ**	**10 500 kJ**
Starchy foods	8	11	15
Vegetables	3	3	3
Fruit	1	1	1
Dry beans, split peas, lentils, soya	1	1	1
Fish, chicken, lean meat, eggs	1	1	1
Milk, maas, yoghurt	1	1	1
Fat, oil	4	6	8
Sugar	2	6	6

5.2.2 Typical composition of a household

Figure 28 illustrates the average composition of agricultural farmworker households according to the Quarterly Labour Force Survey of StatSA (4th quarter of 2014). The average household size was 4.2 people. The data presented in Figure 28 suggests that the 'average' farmworker household consists of about 2 adults and 2 children.

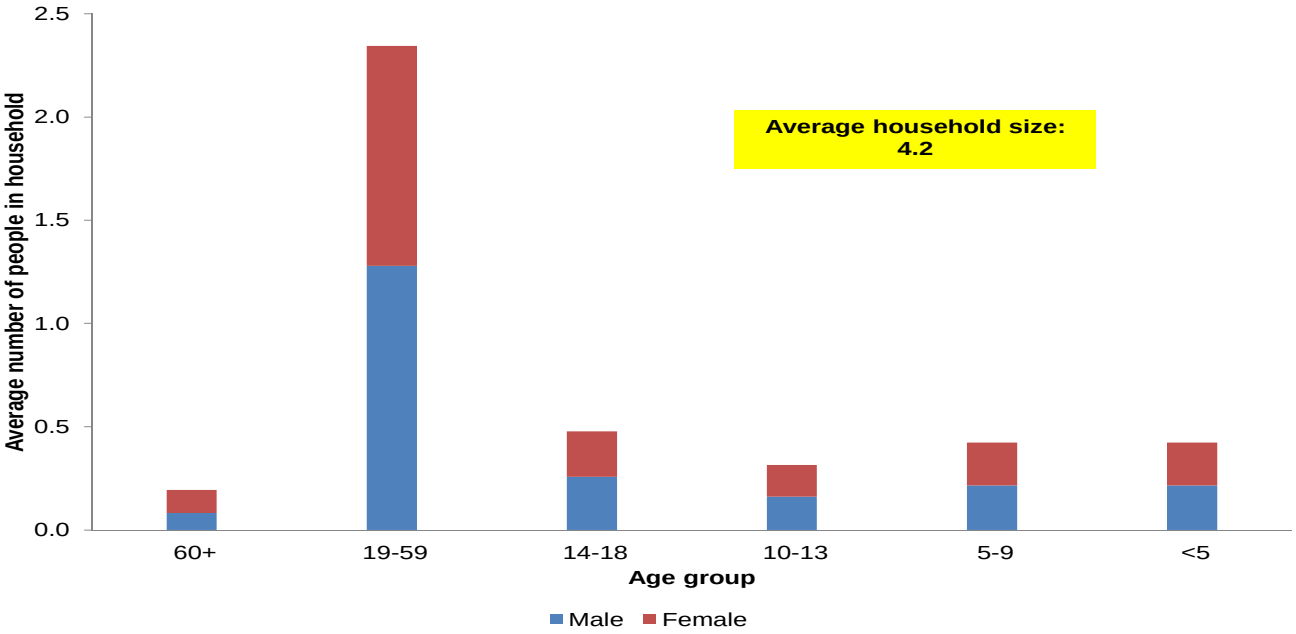


Figure 28: Average agricultural farmworker household composition, QLFS (4th quarter of 2014)

The household composition data from the Quarterly Labour Force Survey of Statistics South Africa (4th quarter of 2014) was subsequently subjected to a clustering exercise, to develop frequencies for the various household compositions within the survey group. These results are presented in Table 7.

Table 7: Dominant household composition for farmworkers from the QLFS (4th quarter of 2014)

Prevalence order	Household composition:	Share: (n = 632)
1	Single adult male	20.4%
2	Two in household: One adult male, One adult female	8.5%
3	Single adult female	2.7%
4	Two adult males	2.1%
5	Four in household: One adult male, One adult female, Two children <10	1.4%
6	Three in household: One adult male, One adult female, One child <10	1.3%
7	Four in household: One adult male, One adult female, One child <10, One child 10-14	1.3%
8	Three in household: Two adult male, One adult female	1.1%
9	Three in household: One adult male, One adult female, One child 10-13	1.1%
10	Five in household: One adult male, One adult female, One child 10-13, Two children <10	1.1%
11	Five in household: One adult male, One adult female, Three children <10	0.9%
12	Five in household: Two adult male, One adult female, Two children <10	0.9%
13	Five in household: Two adult male, Two adult female, One child <10	0.9%
14	Two in household: One adult female, One elderly male	0.8%
15	Three in household: One adult female, Two children <10	0.8%
-	Other combinations associated with less than 5 observations	54.6%

The composition of entry-level farm worker households shows a high degree of variability - more than 45% of the possible combinations are not captured in these results. The large number of single male households is questionable but from the results it is clear that a small percentage of households consists of more than

four persons. Given these results it was decided to test three household combinations in order to allow for a wide spectrum of possible realities. They are as follows:

- One-person household with an adult male;
- Four-person household with an adult male, adult female and two children.
- Six person household with an adult male and adult female as full time farm workers, an elderly person who receives a state pension and three children.

5.2.3 Taking typical food behaviour into consideration

A healthy food basket should take average food purchasing patterns into consideration to ensure that the basket also reflects the actual behaviour of the particular group of consumers. In this case the StatSA Income and Expenditure Survey (StatsSA IES) data was applied with the most recent survey conducted during 2010/2011, measuring annual household expenditure on a wide variety of detailed food items across the socio-economic spectrum.

The current minimum agricultural wage is R120.32 per day. If a household has two wage earning adults and 21.7 working days per month per adult such a household could earn R5 213.56 per month, implying that they could be found within the range of Expenditure Decile[10] 5 to 7. Subsequently the servings recommended by DoH as described above were 'populated' with food options according to the food expenditure behaviour of these Expenditure Deciles. The food items reported within the StatsSA IES were sorted according to the food categories as listed in Table 6, for expenditure deciles 5 to 7. Within each food group the expenditure share contributions of the various food items to total expenditure on the food group was calculated in order to identify the dominant food items to work with (contributing 80% to 90% to total category expenditure).

The process of 'populating' the number of portions according to the StatsSA IES data is explained below by means of an example:

According to the Guidelines for Heatlhy Eating of the DoH an individual requiring 6500 kJ per day within the more staple dependent plan, needs 8 staple portions per day, or about 240 staple portions per month. An analysis of the household-level expenditure data of StatsSA IES 2010/11 for Expenditure Deciles 5 and 6 (i.e. the income range of wage earning households) revealed that the top 5 starchy staple foods for these households are maize meal, brown bread, rice, white bread and potatoes (Table 8). We then expressing these households' average expenditure on these items in 2010/11 as share of total expenditure on these 5 items as illustrated in the table below. These shares were then applied to the total number of staple portions needed (i.e. 240 as mentioned above) in order to 'populate' the staple component of the monthly basket for this particular category of individuals. These number of portions were then worked back to food quantities by taking the standard portion sizes information into account. The process was then repeated for all food groups and for all energy need categories.

[10] Each expenditure decile (ED) represents 10% of the South African population, with ED 1 containing the poorest 10% of the population and ED 10 the wealthiest 10% of the population.

Table 8: Example calculations – Staple foods for individuals needing 6500 kJ per day

Total staple portions needed per month:		240
Staple food item:	**Expenditure share contribution (2010/11):**	**Estimated number of portions per month:**
Maize meal	0.34	82
Brown bread	0.25	60
Rice	0.18	43
White bread	0.14	34
Potatoes	0.10	24

The following food items were subsequently selected for further analyses:

- Starchy foods: Maize meal, brown bread, rice, white bread, potatoes;
- Meat, chicken, fish, eggs: Chicken, beef, boerewors/beef sausage, lamb/mutton, eggs, polony/viennas, canned fish, frozen fish;
- Dairy: Full cream milk, sour milk/maas, cheddar cheese, yoghurt;
- Fat, Oil: Edible oils (e.g. cooking oils), margarine and peanut butter;
- Fruit: Apples, bananas, oranges, grapes, pears;
- Vegetables: Tomatoes, cabbage, onions, pumpkin/butternut and carrots;
- Sugary foods: White sugar, brown sugar;
- Dry beans, split peas, lentils, soya: Baked beans in tomato sauce, soya mince, dried beans, lentils and peas.

The definition of serving size units was based on the *Guidelines for Healthy Eating* of the *Department of Health (DoH)*[11]

5.2.4 Food price data and purchasing considerations

The estimated cost of food quantities in this basket was calculated by multiplying the total food quantities by official food prices monitored by Statistics South Africa (April 2015 latest available price set). For all products the price was used for the packaging option with the lowest unit cost available. A few products are not included in this price dataset, and prices for these were obtained from Pick 'n Pay Online Shopping (e.g. grapes, pears, soya mince, lentils, frozen fish, maas, brown sugar).

5.2.5 Child grants

A child grant in South Africa currently amounts to R330 per child per month. According to current policy, households with a single income of less than R3 300 per month or a two-person income of less than R6 600 a month qualifies for child grants[12]. As a result most of the households with children constructed for the purposes of this investigation do qualify for the grant and thus it is assumed that most households receive the grant.

[11] www.nutritionweek.co.za
[12] http://www.gov.za/services/child-care-social-benefits/child-support-grant

5.2.6 Non-wage benefit deductions or 'In-kind' payments on farm level

Non-wage benefits are not taken into account since the objective of the evaluation is to calculate total monthly income needed before deductions.

5.2.7 Old age pension:

An old age pension of R1410 per month was applied in certain scenarios[13].

5.2.8 School feeding:

It is estimated that about 9 million children in South Africa benefit from school feeding programs (Department of Basic Education National School Nutrition Program). If a child receives a nutritionally balanced lunch 5 days a week it translates to a 30% reduction in the home-based needs of that child per day, or a 20% reduction per week given the fact that schools do not provide meals over weekends.

5.3 Results

The results of the analysis are presented in Table 9 while Figure 29 and Figure 30 provide an extract of the main findings. Figure 29 shows the daily income needed per worker if 40% of disposable income is used to buy food. It shows that an individual who earns the current minimum wage of R120.3 will be able to afford a balanced diet, whilst spending less than 40% of his or her income on food. The situation is less positive for the four and six person households given the fact that they will have to spend more than 40% of their combined income (wages, pensions and grants) in order to afford a balanced diet, even in the months when they are working.

Figure 29: Summary results, daily income needed

Figure 30 extends the analysis to the respective scenarios with the bars showing the surplus or deficit in income after the required wage is subtracted from the scenario wage. A positive value therefore indicates that an individual or household can spend less than 40% of their income on food in order to maintain a healthy albeit starch rich diet. From the results it is clear that a single person household can maintain a food

[13] http://www.gov.za/services/social-benefits-retirement-and-old-age/old-age-pension

expenditure budget below 40% within all of the scenarios. A four person household comes close to achieving the 40% threshold in scenario 2 but still falls R6 short. It is only under scenarios 3 and 4 that all households can afford to eat a relatively healthy diet while spending no more than 40% of their income on food, but then only in the months that they are employed.

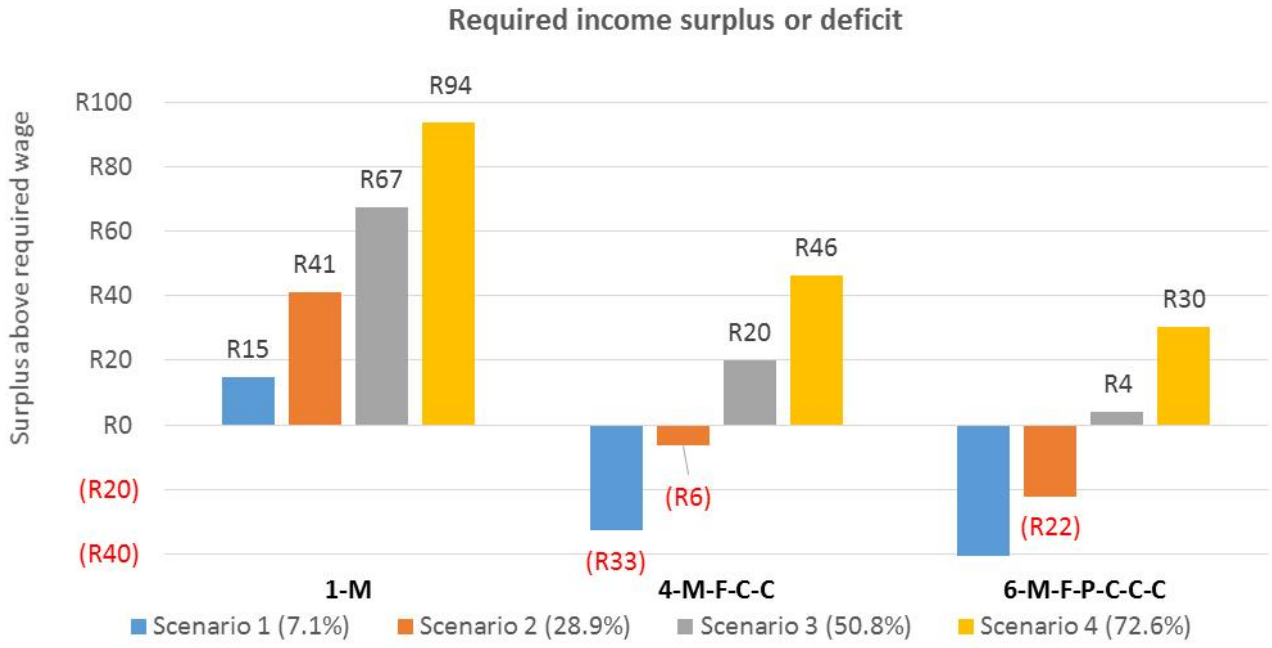


Figure 30: Surplus or deficit income from scenario after required income (2016 values)

Table 9: Results for various scenarios if 40% of income is spent on food

Household composition: *Male (M), Female (F), Pensioner (P) & Child (C)*	Wage earners	School feeding for children?	Child grants received?	Pension:	Total monthly food expense:	Monthly income needed per HH:	Daily income needed per HH*:	Daily income needed per worker per day.
1 M	1	N/A	N/A	No	R 943	R 2 358	R 108	R 108
4 M F C,C	2	No	No	No	R 3 206	R 8 015	R 369	R 184
4 M F C,C	2	No	Yes	No	R 3 206	R 7 355	R 338	R 169
4 M F C,C	2	Yes	No	No	R 2 919	R 7 298	R 336	R 168
4 M F C,C	2	Yes	Yes	No	R 2 919	R 6 638	R 305	R 153
6 M F P C,C,C	2	No	No	Yes	R 4 031	R 8 668	R 399	R 199
6 M F P C,C,C	2	No	Yes	Yes	R 4 031	R 8 008	R 368	R 184
6 M F P C,C,C	2	Yes	No	Yes	R 3 744	R 7 950	R 366	R 183
6 M F P C,C,C	2	Yes	Yes	Yes	R 3 744	R 7 290	R 335	R 168

** Assumption: 4.35 weeks per month, 5 work days per week.*

6 Conclusion and discussion

The South African government is currently pursuing the dual policy goal of ensuring maximum employment and fair or decent wages. For this reason a balance has to be struck between ensuring that workers receive a decent wage whilst ensuring the long term financial sustainability of agribusinesses and maximum employment.

This study has evaluated three objectives in order to contribute to this debate:

The *first objective* was to gain a better understanding of the employment and other impacts of earlier minimum wage increases. The analysis focussed on the period after the inception of agricultural minimum wages in 2003 and the more recent 51.2% increase in 2013.

For the longer term perspective, this study constructed a long term time series of the self-reported wages of entry-level agricultural workers. It shows that self-reported wages increased immediately after the implementation of the minimum wage in 2003 but were still some 20% below the new minimum wage. However, self-reported wages are generally characterised by under-reporting and this error is arguably larger in the agricultural sector for a number of reasons. Mean self-reported wages, adjusted for deductions, therefore probably reached the minimum wage threshold shortly after the increase, thereby achieving compliance. Average non-adjusted self-reported real wages continued to trend upward thereafter and exceeded the minimum wage threshold by 2009 where they remained. The average entry-level worker therefore could have earned up to 20% more than the minimum wage if workers did not report their non-wage benefits. The upward trend in wages is the result of the structural changes that were implemented in order to increase labour productivity. Examples include increased farm sizes that resulted in reduced production costs per hectare and increased labour productivity. Labour-intensive sub-sectors also opted for reduced seasonal employment and increased usage of contractors, with the contractors employing the historically seasonal workers on a permanent basis.

The wages of temporary entry-level workers increased by the greatest margin (32.7%) whilst the average wage of entry-level workers as a group increased by 29.2%. The less-than-legislated increase can be explained as follow: some workers earned more than the minimum wage before the increase, employers increased the use of non-wage benefits, or at least some employers did not comply with the law.

Following the 2013 minimum wage increase, the hours worked declined by 1.2 hours on average with the hours of permanent workers showing the greatest decline. Total agricultural employment declined by 60 000 workers between 2013 and 2014 but little of this can be attributed to the wage increases from a statistical perspective. The analysis shows that the employment effect of the wage increase on entry-level workers is statistically insignificant, with the exception of permanent workers, where employment declined by a modest 1.8%. The decline in permanent workers, and not seasonal workers as in the past, is an important finding as this could be indicative of the fact that a maximum employment/wage threshold has been reached and that it would continue to decline in future in response to implemented and underlying structural changes.

Given the empirical results of this study one could therefore argue that increases in agricultural minimum wages did not have a substantial impact on total employment and simply resulted in an increase in wages, reduction in hours worked and an increase in benefits. The important caveat, however, is that the structural properties of the sector are not similar to those that existed before the 2013 increase. Producers were in a fairly good position to absorb the 2013 increase since a considerable share of workers where earning more than the minimum wage, (up 75% of workers in some provinces), they had the ability to increase non-wage benefits and could reduce working hours. These avenues have been exhausted and the sector is still making

the necessary structural adjustments towards greater productivity levels. A strong argument can therefore be made that the disemployment impact of another major increase in 2016 would be much larger.

The second objective of this study was to evaluate the possible impact of the increases on the long term financial sustainability of farming businesses. The analysis of the labour impact was contextualised within the broader economic environment since producers face a host of biophysical and economic uncertainties. This includes the effect of climate variability, unfavourable domestic and international commodity price movements, exchange rates and rising input costs.

The current agricultural economic environment is characterised by low margins on crops for domestic consumption given a declining commodity price cycle and increasing production costs. Export-orientated high-value crops face a better prospect given current demand levels and a weakening exchange rate. Parts of the country are also facing drought or untimely rainfall patterns. Some field crop producers, for example, are currently facing their second drought in three years. Generalisations on the possible impact of increased labour costs are difficult given structural differences between subsectors and composition of individual farms therein, especially relating to size and labour cost shares. It is evident from the analysis that increased wages will have a negative impact on the profitability of farming businesses. This would necessitate increased productivity levels through structural adjustments such as increased mechanisation, consolidation of farming units or changes in crops produced.

The third objective of this study was to evaluate the wage income needed by a farming household to be able to afford a balanced diet whilst not spending more than 40% of their income on food. For this analysis the cost of a balanced starch rich diet as recommended by the *Guidelines for Healthy Eating* by the *Department of Health (DoH)* was calculated for a number of household composition scenarios.

The results showed that an individual male who earns the current minimum wage of R120.3 per day will be able to afford a balanced diet, whilst spending less than 40% of his income on food. The situation is less positive for the four and six person households, given the fact that they will have to spend more than 40% of their combined income (wages, pensions and grants) on food to afford a balanced diet: they fall R41 and R57 short respectively.

Real farm wages in South Africa have increased rapidly over the period since 1994, and especially since the introduction of the minimum wage in 2003. Producers expect wages to increase, and have grown adept at managing the impact of these wages. Nevertheless, there are limits to their ability to adapt, especially in the short term. The research conducted here tends to show that another substantial short term increase could have a potentially damaging impact on the adaptability of the sector.

In this regard, this study cannot be seen in isolation given the broader debate on the national minimum wage. In a review of the debate, Fourie & Green (2015) try to find common ground amidst the contrasting views. They show that researchers in favour of a national minimum wage stress the need for special provisions for vulnerable sectors such as agriculture and clothing manufacturing due to their exposure to international competition (as stressed in this study). They also argue that the differences in opinion are not insurmountable given the fact that proposals agree with the notion of higher wages but differ in terms the eventual level and implementation time frame.

Seekings & Nattrass (2015) argue for the need to take sectoral characteristics and conditions into account in order to set a relatively low national minimum wage but with higher provisions for sectors where it would have modest disemployment effects. The authors also stress the fact that South African poverty is primarily the result of unemployment and not low wages.

Isaacs & Fine (2015) disagree with the low minimum wage approach of Seekings & Nattrass by arguing for a high minimum wage regime that will necessitate a transformation of the economy away from its

dependence on cheap labour. According to them such a strategy would require well-designed policy that will enhance investment and productivity, especially to improve the international competitiveness of tradeable sectors such as agriculture.

Coleman (2012) highlights the success of the Brazilian case and argues for the implementation of a national minimum wage substantially above current wage levels. Coleman argues against the notion that increased wages would lead to substantial job losses but proposes a differentiated approach for sectors such as agriculture, which could be allowed a phasing in period.

As a result, the new minimum wage should a) signal to producers and farm workers the levels of productivity that will be required to afford the new wage; b) set out the time frame for implementation of a wage that is sufficient to afford workers a decent standard of living; and c) make provision for safety nets for workers that may become unemployed. This, together with investments in infrastructure and well-designed policy will enable the expansion of the international competitiveness of the sector thereby moving the sector towards the high labour productivity economy envisioned by Isaacs & Fine (2015).

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