FARM SECTORAL DETERMINATION: AN ANALYSIS OF AGRICULTURAL WAGES IN SOUTH AFRICA

A report by BFAP

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The Bureau for Food and Agricultural Policy (BFAP)

The Bureau for Food and Agricultural Policy (BFAP) (www.bfap.co.za) is a network linking individuals with multi-disciplinary backgrounds to a coordinated research system that informs decision making within the Food System. The core analytical team consists of independent analysts and researchers who are affiliated with the Department of Agricultural Economics, Extension and Rural Development at the University of Pretoria and the Department of Agricultural Economics at the University of Stellenbosch. BFAP is the first of its kind in South Africa and has become a valuable resource to government, agribusiness and farmers by providing analyses of future policy and market scenarios and measuring their impact on farm and firm profitability. BFAP acknowledges and appreciates the tremendous insight of numerous industry specialists over the past decade.

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South Africa's agricultural sector has long been dependent on cheap and unskilled labour. However, it is becoming clear that this system will not survive into the future, which will be characterised by fewer, more skilled and better paid workers. The transition between these production systems is already in motion, and has many policy implications. One thing that has become evident with the current spate of labour unrest is that public policy is not geared to ease this transition for either the workers or the farmers: in fact there is hardly any evidence that the problem itself is recognised among the different role players.

The results of this analysis are sombre. While the situation of permanent farm workers is not cause for immediate concern, especially on the intensive fruit farms that were analysed, the reality is different when it comes to seasonal workers. Permanent workers generally seem to earn more than the current minimum wage on these farms, and on potato and the mixed wheat/sheep farm that was analysed. The position of seasonal workers seems to be different, however, and even on the fruit farms they earn at most around R84 per day compared to the minimum wage of just less than R70 per day.

So there is some scope to increase the minimum wage. From the analysis, however, it is evident that if average wages increase by more than R20/day (i.e. to around R104.00 per day), many of the typical farms will be unable to cover their operating expenses, and hence not be able to pay back borrowings or to afford entrepreneurs remuneration. The real problem is that even at what seems to be an unaffordable minimum wage of R150.00 per day, most households cannot provide the nutrition that is needed to make them food secure. The potential conflict that this creates can be highly disruptive and will have to be managed with circumspection.

It is also evident from the analysis that the fact that a negative net farm income (NFI) is generated under scenarios where wages rise by more than R20 per day from the base case scenario does not imply that there will be no farming in South Africa in years to come. What it does mean is that structural adjustments will be made to accommodate the higher wage rates. These structural adjustments include mechanization and consolidation of farming units to become more efficient. This does not imply that the larger farms are always more cost efficient, but the larger farming units have the ability to mechanize and as wages rise,

mechanization becomes more attractive. This is a general phenomenon in agriculture and the trend of larger farming units that are more mechanized with more skilled labour that is compensated at a significantly higher rate will continue. This phenomenon re-emphasizes the importance of the 2030 strategy that was published by the National Planning Commission in 2011. For this strategy, BFAP clearly identified the winning industries and the potential to expand and intensify South African agriculture from a natural resource potential as well as a marketing potential and thereby create close to 1 million jobs. Knowing that South Africa has un-cultivated arable soils suitable for expansion and intensification as well as additional sources of water under efficient water management systems, mechanisation should not necessarily be seen as a threat against manual labour; it should rather be thought of as the opportunity to increase the output delivered per worker and stimulate the agro-economic sector under a favourable economic and political environment. Increases in production could result in building human capital, where agriculture will employ more skilled, well paid and young workers.

Structural adjustments will not occur overnight. The BFAP sector model shows that over the medium term total levels of production will decline compared to the base case scenario and commodity prices will rise. In other words, higher wages will not go without higher food prices due to higher costs of production in the medium term. As structural adjustments take place over the long run, the impact on production and price will be negligible.

It is difficult to estimate how much labour will be shed throughout the industry if minimum wages are increased, since there are a number of factors that have to be taken into consideration that could not be covered in this study due to time and budget constraints. One important factor to consider will be a mechanization threshold for each industry that many of the role players have already calculated and considered as an option. The study highlighted some cases of the costs of mechanization. Yet, not all industries can mechanize and therefore one can anticipate that for highly labour intensive industries that cannot mechanize, the structural adjustments will be greater and the loss in job opportunities will be significantly higher.

FARM SECTORAL DETERMINATION: AN ANALYSIS OF AGRICULTURAL WAGES IN SOUTH AFRICA

1. Purpose

On the 22nd of November 2012, violent protests erupted in the De Doorns area of the Hex River Valley of the Western Cape Province. This is an idiosyncratic locality that straddles the main road between Cape Town and Johannesburg: the entrance to the valley from the Cape Town side is by a narrow pass, while the exit on the way to Johannesburg is by way of a steep mountain pass. The narrow gauge (the "Cape gauge") of virtually all railway lines in Africa can be directly ascribed to the difficulty encountered in laying the railway line through this pass with its steep gradient and sharp corners[1]. The valley is no more than 30 - 40km in length and only a few kilometres wide at its widest point, and is home to the production of high quality table grapes that are destined for urban markets in South Africa and overseas. The protests were ostensibly about the low wages paid to seasonal farm workers, and came just as preparations were under way to begin the 2012 harvest. While the debate on the origins of the violence, which also spread to other parts of the Western Cape, is on-going, it is clear that the occurrence marks a watershed in farm labour policy and practice, and is a milestone on the road away from the cheap labour policy that characterised South African agriculture in the past.

The most prominent immediate demand of the striking workers was for an increase in the minimum wage to R150.00 per day. In reaction, the Department of Labour decided to revisit the Sector Determination for Agriculture, the most recent being concluded in March 2012. To this end, BFAP undertook this study to provide the salient factual background that will enable the responsible parties to make well-informed decisions about these weighty matters. The second and third sections of the report introduce some of the more important concepts and trends in agriculture generally, and in those aspects that affect farm workers specifically. This is followed by an in depth analysis of the farm level impact of incremental increases in the minimum wage for selected industries in Section 4. Section 5 presents the economy wide impacts of the wage scenarios and shadow prices of labour are reported in Section 6 (section 6 was authored by Dr D. Louw). Section 7 takes an aggregate approach in calculating the total impact of higher wages on the labour bill in agriculture and weighs this up to the dilemma of the workers in terms of rising food prices and the required level of income to make a living. Conclusions are presented in Section 8.

[1] South African Construction World, July 1990, pp. 60-61

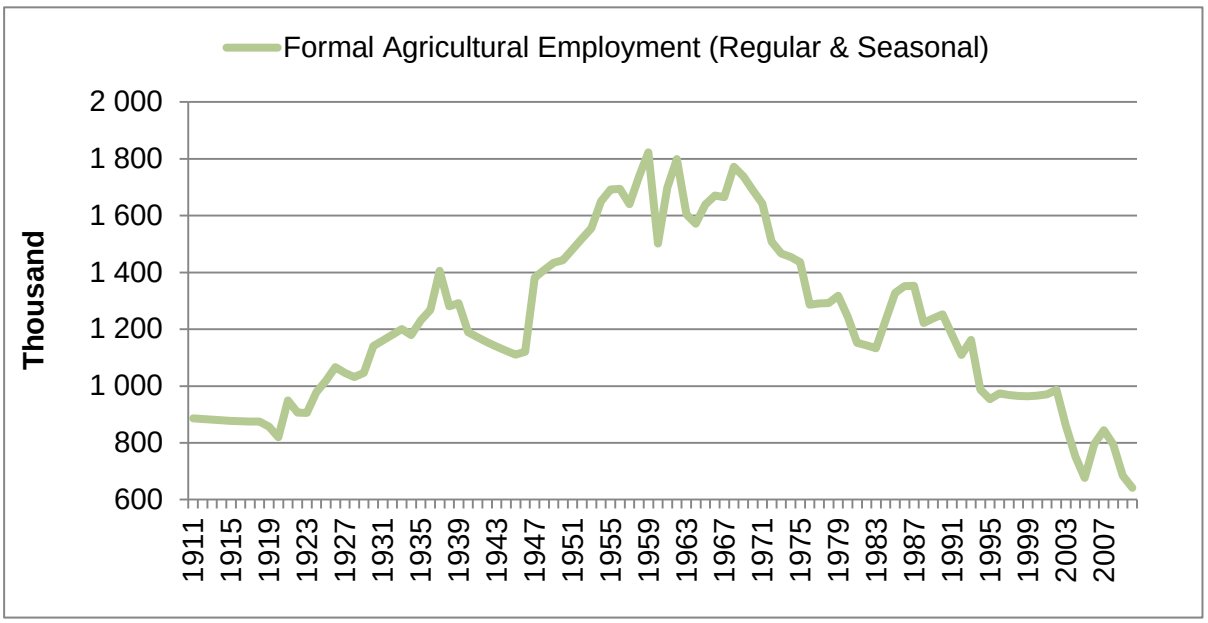
2. Introduction and overview

Generally speaking, extensive livestock production uses less labour than dryland crop production, which in turn uses less labour than the production of fruit and vegetables, which is mostly done under irrigation. With crop production, more labour is generally used in harvesting than in production itself (ploughing, weeding, etc.) because it is easier to replace workers with machines in production than in harvesting. In the modern era virtually all harvesting of dryland crops has become mechanised, while a substantial proportion of harvesting activities of fruit and vegetables is still dependent on manual labour. The rate at which labour is displaced by machines in these activities differs between commodities and countries. It is a function of available technology as well as the relative cost of capital and labour. South Africa ranks among the countries where primary agriculture is still relatively labour intensive, but where the process of substituting out of labour for machines is already far advanced, especially in the last few years where spikes in commodity prices have boosted the profitability of crop production.

In the years after the Second World War employment on commercial farms in South Africa exploded as the area ploughed for dryland production increased with the introduction of tractors on a large scale – more workers were needed to harvest the crops on the larger area planted. This continued until the 1970s, by which time combine harvesters had taken over most of the harvesting process for dryland production of maize, wheat, sugarcane, etc. Because dryland production dominated employment during that time, total employment in agriculture started to decline, from a level of between 1.6 and 1.8 million worker equivalents in the 1960s to below a million by the early 1990s[2]. In the period after 1994, when South Africa's commercial farmers were able once more to compete in international markets and the exports of labour-intensive fruit and wines started to increase rapidly, employment stabilised for a while (until 2002) but has continued its downward trend since (Figure 1).

[2] Accurate data on farm worker numbers are notoriously hard to come by in South Africa. This is partly because of the many types of workers (permanent, seasonal, temporary, etc.), the grey boundaries between industries (e.g. farm work and processing, tourism or domestic work), and the geographically dispersed nature of production which increases the cost of enumeration in many ways. In South Africa there is a particular difficulty in separating seasonal from permanent workers.

Figure 1: Employment in commercial agriculture in South Africa, 1910-2010



Source: Liebenberg, 2011

There is evidence from these intensive farming areas that commercial farmers have shifted from permanent workers to using more seasonal workers, and that many people who used to live and work on farms no longer do so, principally as a result of the uncertain investment climate created by speculation around property rights. Here the Extension of Security of Tenure Act (No 62 of 1997) and other related legislation has supposedly played the major role. At the same time the application of labour legislation to agriculture has provided the motivation for farmers to increasingly use the services of labour brokers in an attempt to avoid the hassle factor that comes with employing large numbers of workers for short periods of time. Both of these processes are open to exploitation by unscrupulous employers, whether the farmers directly or the labour brokers.

Against this background, the following are the most important employment trends in South African agriculture over the past two decades:

- South Africa's total agricultural production, agricultural exports and agricultural imports have all increased in real terms since 1994. South Africa, which is the third largest agricultural producer on the African continent (after Nigeria and Egypt) has by far the most productive labour force (which includes owners, managers and workers at all levels), with a value-added per worker almost four times the global average, higher than that of any other Africa country, and second only to Brazil amongst the BRICS countries. However, the growth in agricultural production in South Africa is considerably slower than the average for Africa, and is slower than the other BRICS countries with the exception of Russia.
- Agriculture's share of GDP in South Africa has declined from over 3% in 1994 to below 2% today, agricultural exports have declined from around a third in the 1970s to less than 10% since the 1990s and agricultural imports have remained relatively stable at around 3 to 6% of total imports over the past six decades. At the same time

agriculture's share of formal sector employment has declined from above 15% in 2000 to around 5% today. These are all the normal signs of a modernising economy where a more urbanised population becomes more involved in tertiary economic activities. As agriculture becomes more mechanised, the unskilled labour force is replaced by a significantly smaller skilled labour force. Note also that the share of the manufacturing sector in South Africa's GDP is also declining.

- The agricultural sector is still one of the most labour intensive sectors of the South African economy, and is one of the more labour intensive agricultural sectors globally. For example, Japan uses 4500 tractors for every 100 km^2 of arable land, compared to 270 in the USA and only 43 in South Africa.
- The unit cost of labour (the labour cost of producing an additional Rand of farm output) has declined by some 70% since 1993. At the same time the share of labour remuneration in the agricultural value added has remained at around a third. This is largely because the unit cost of intermediate inputs (fertilizer, seed, agrochemicals, etc.) has increased, and their share of agricultural value added has increased. As a result farmers' profits have declined as a share of the gross value of agricultural production.
- At the time of the first Sector Determination for agriculture in 2002 it was pointed out that the mean and median real wages in agriculture were considerably lower than in other sectors of the economy. In 1997 mean farm worker wages were 13% lower than the wages of domestic workers, 63% lower than the wages of construction workers, 72% lower than the wages of manufacturing sector workers and a full 80% lower than wages in the services sectors. Nevertheless, the average wage of agricultural workers increased by 1.65% per year in real terms between 1970 and 1998. This was the second highest rate of increase in the economy, surpassed only by the increase in wages in the mining sector. Since 2000, the average remuneration of farm workers has grown even faster in real terms, increasing almost twofold between 2003 and 2011. Note that the data on remuneration include salaries, wages and cash bonuses, i.e. they include remuneration to managers and skilled professionals as well. Since the introduction of the minimum wage at the beginning of 2003, the minimum wage of farm workers has increased in real terms by just more than 10% for workers in the farming areas contiguous to urban areas and by a more substantial 50% for workers in the more remote rural areas. Thus, the wages of skilled and managerial workers have increased faster than those of unskilled workers.
- A recent study[3] has shown that the introduction of the minimum wage in agriculture did result in increased wages, especially among workers who had been earning the lowest wages, and in an increase in the proportion of workers who were covered by

[3] Bhorat, H, R Kanbur and B Stanwix, 2012. Estimating the impact of minimum wages on employment, wages and non-wage benefits: the case of agriculture in South Africa. University of Cape Town, DPRU Working Paper 12/149 JULY 2012

formal employment contracts. However, it also resulted in a decline in employment opportunities. However, because the minimum wage has been in implementation for less than a decade, the authors caution that more time must pass before the real impacts can be measured.

Finally, a farm owner has to produce a return that is sufficient to pay for i) the farming requisites that are used in production (fertilizer, herbicides and insecticides), ii) the labour that is used, iii) the capital that is used (working capital such as tractors; and fixed capital such as land and the orchards on the land), and iv) have something left over as remuneration for the entrepreneur. If the cost of one of these four factors increases irrevocably, the owner generally has one of four choices:

- Decrease the remuneration to one of the other factors of production (e.g. use less borrowed capital and reduce the return to own equity);
- Change the ratio of factors (e.g. use less labour and more capital in the form of machinery);
- Increase productivity (measured as the physical output produced divided by the inputs used); or
- Exit from farming, at least in those specific commodities.

Obviously these decisions are not independent: they can be taken together or in tandem. What is true is that each of these choices can have large structural impacts on the specific industry, on the farming sector as a whole and on the wider economy. So, for example, if farmers were to react to a higher wage structure by trying to lower their unit costs of production, farms would get bigger so that overheads could spread over the higher cost, and the employment intensity of the industry (employment per hectare) would decline. Yet an increase in wages will not automatically result in increased mechanisation, because the technology is not always available. This is especially evident in intensive agriculture, where harvesting technologies, even where they do exist, are not suited to high quality fruits and vegetables destined for the export market.

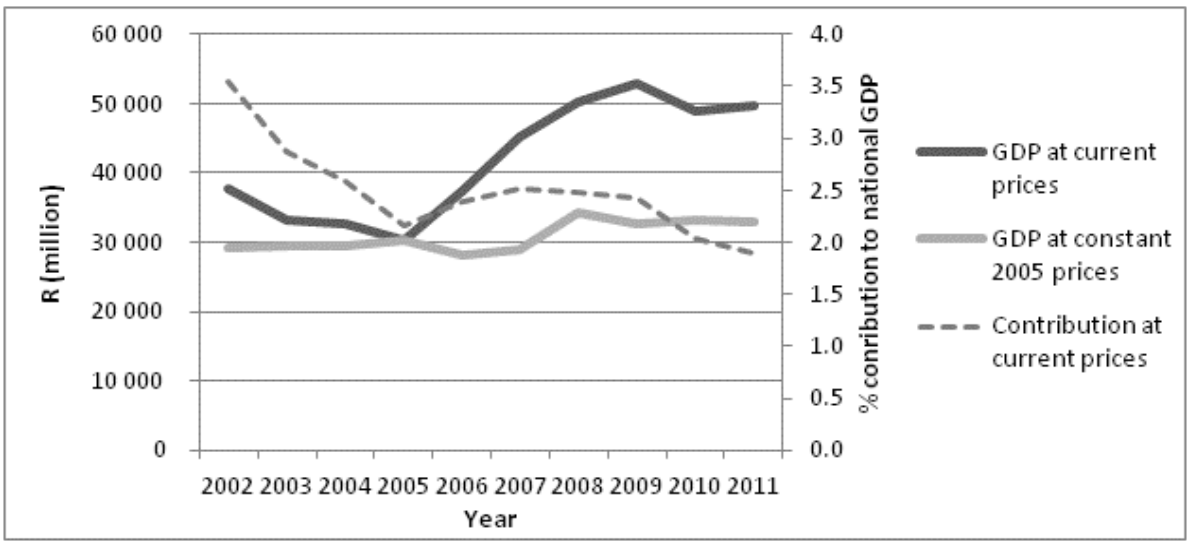
All of these choices are subject to influence by public policy. If the analysis contained in this report were to teach any lesson, it would be that the South African authorities responsible for agricultural policy need to anticipate such big changes in the strategic environment that confronts agriculture, and to put remedial measures in place.

3. Labour and total compensation in the agricultural sector

In 2011 the gross domestic product (GDP) at basic prices (before production taxes and subsidies) for agriculture was R49.8 billion. This represents 77% of the GDP of the larger category of agriculture, forestry and fishing, in which agriculture is often reported. The contribution of agriculture in this larger category has therefore declined from 83% in 2008 to 77% in 2011, whereas the contribution of forestry has increased from 13.4% to 18.8% during the same period. From 2008 to 2011 the contribution of agriculture to national GDP declined from 2.5% to 1.9%, i.e. to below 2% for the first time in 2011.

Figure 2 indicates agriculture's GDP in both nominal and real (2005) terms, measured on the left axis. The decline in the real contribution after 2002 reflects the slowing down of agriculture's gross income after the exchange value of the Rand strengthened. The contribution of agriculture to national GDP at basic prices is represented by the dotted line and is measured on the right axis.

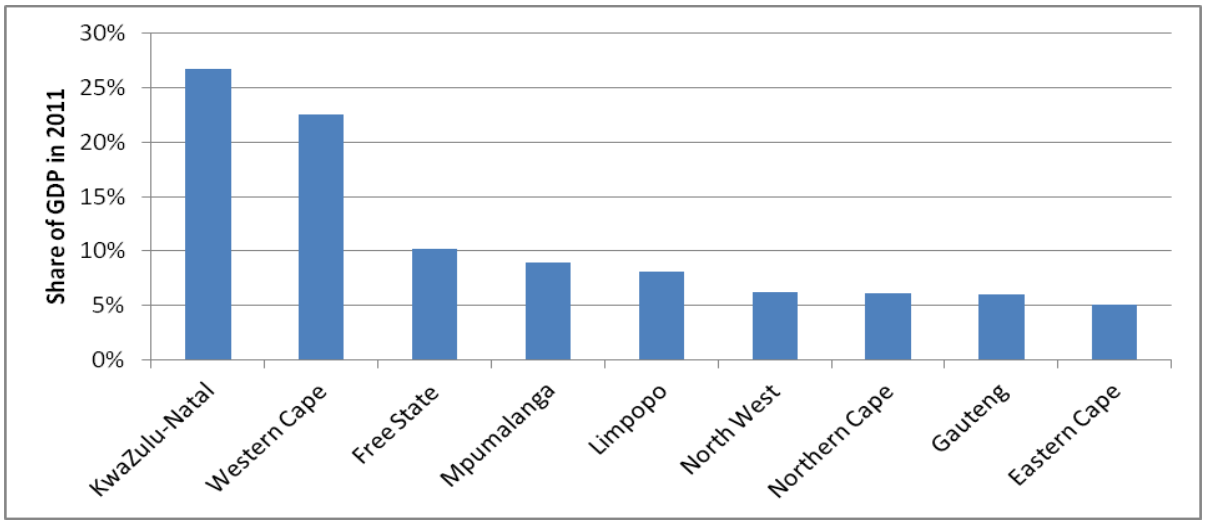
Figure 2: Annual GDP of the agricultural sector



Source: StatsSA (2011)

There are notable differences in the role of agriculture at provincial level. Figure 3 shows the provincial share in agricultural GDP at basic prices in 2011. The ranking does not change much over time. KwaZulu-Natal contributed 26.8% (R17.3 billion) in 2011, followed by the Western Cape with 22.6% (R14.6 billion). Reported figures are aggregates for agriculture, forestry and fishing.

Figure 3: Provincial share of annual GDP for agriculture, forestry and fishing

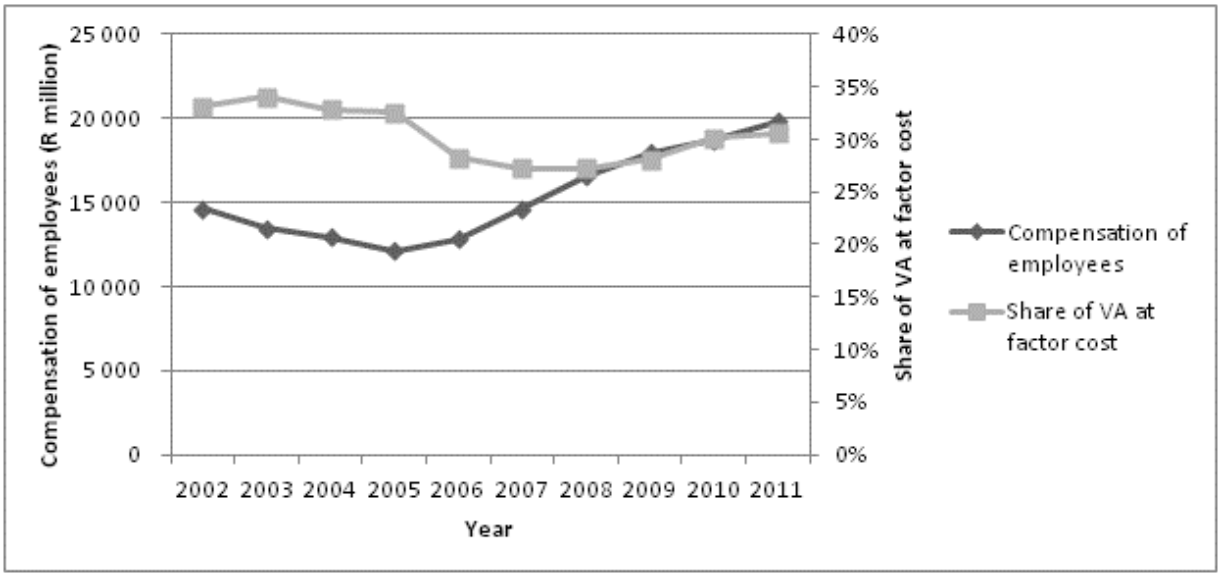


Source: StatsSA (2011)

Compensation of employees in the agriculture, forestry and fishing sector has steadily increased from R12.1 billion in 2005 to R19.8 billion in 2011. Compensation of employees

expressed as a share of total value added at factor cost amounted to 31% in 2011, where total value added refers to total remuneration of labour, land, capital and entrepreneurship. The share has decreased from 34% in 2003 to 27% in 2007 and 2008 and it is has gradually increased since 2008.

Figure 4: Compensation of employees for agriculture, forestry and fishing



Source: StatsSA (2011)

Table 1 presents the distribution of employment in the agricultural, forestry and fishing sector as an average for 2008 to 2012, and for the third quarter of 2012. Seasonal workers are captured as part of the elementary workers. There were 482 258 elementary workers in the third quarter of 2012.

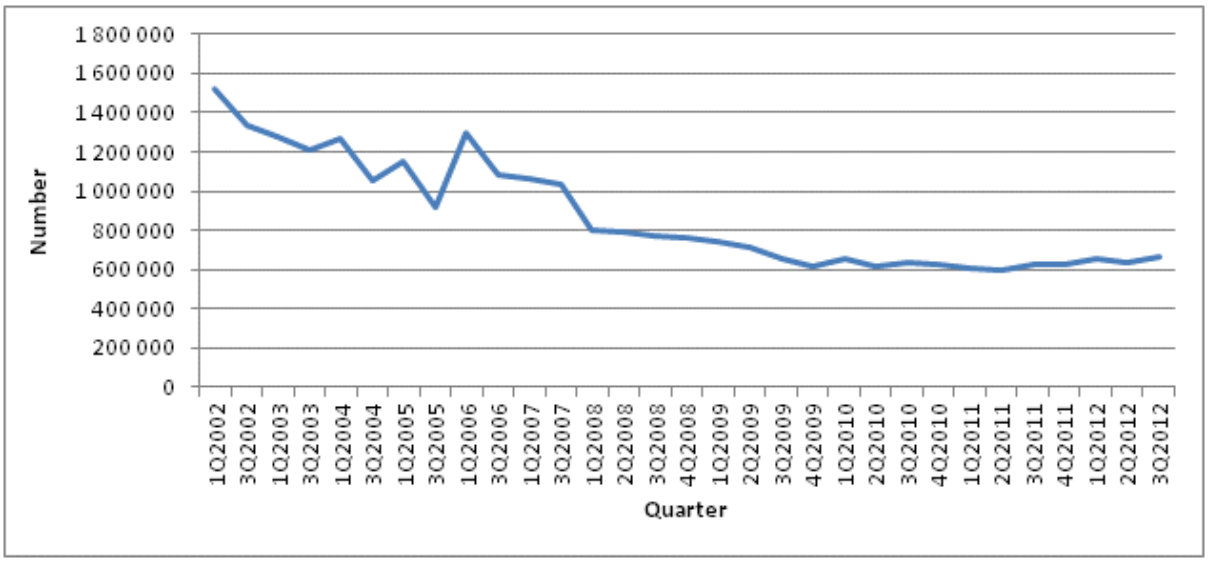
Table 1: Distribution of labour categories in agriculture, forestry and fishing

	Average 2008-2012	Q3 2012	Q3 2012 (Number)
Elementary Occupations	72.5%	73.0%	482 258
Skilled Agricultural and Fishery Workers	9.5%	8.7%	57 760
Plant And Machine Operators and Assemblers	7.6%	7.5%	49 247
Legislators, Senior Officers and Managers	3.7%	3.4%	22 725
Craft And Related Trades Workers	2.5%	2.1%	14 175
Technicians and Associate Professionals	1.1%	1.8%	12 205
Service Workers and Shop and Market Sales Workers	1.1%	1.8%	11 724
Clerks	1.4%	1.4%	9 492
Professionals	0.5%	0.2%	1 438
Total	100	100	661 024

Source: StatsSA QLFS

Figure 5 shows that the number of employees in the agricultural, forestry and fishing sector has declined from 1.52 million in 2002 to 661 025 in the third quarter of 2012. These numbers include all the categories of labour included in the table above.

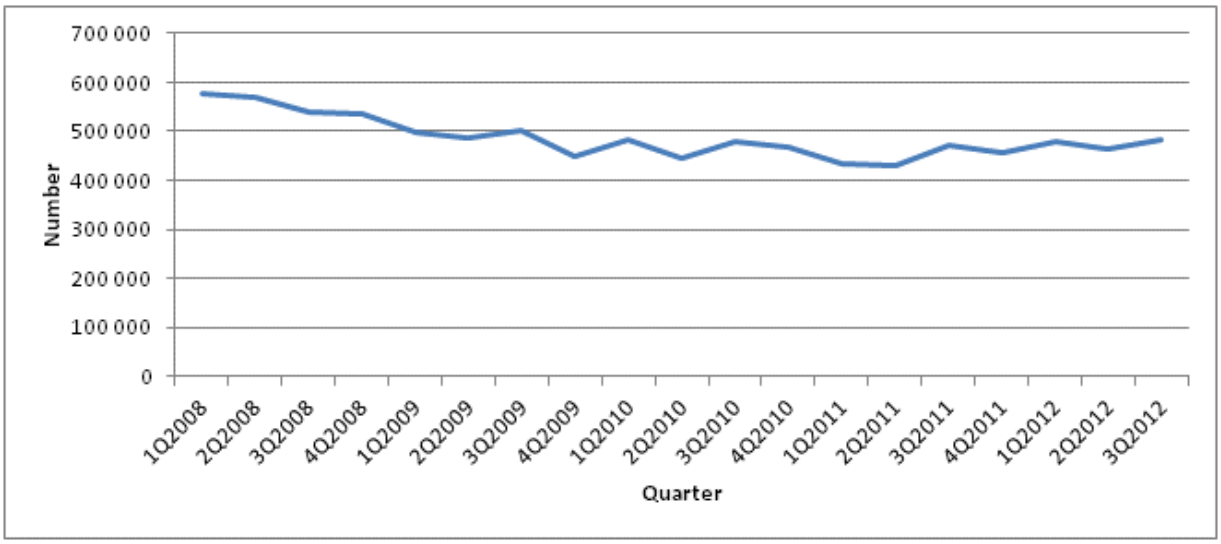
Figure 5: Number of employees in agriculture, forestry and fishing



Source: StatsSA LFS and QLFS

The number of workers in elementary occupations in the agricultural, forestry and fishing sector since 2008 is shown in Figure 6. The number of workers declined from 577 560 in 2008 to 428 750 in the second quarter of 2011. It then increased again to 482 250 in the third quarter of 2012.

Figure 6: Number of workers in elementary occupations in agriculture, forestry and fishing



Source: StatsSA QLFS

When BFAP compiled the employment report for the National Planning Commission in 2011, (BFAP, 2011) a labour multiplier model was developed. For this study, this labour multiplier model was further refined to provide more detail on labour multipliers per industry in order to estimate the total impacts of higher wages on the agriculture industry at large.

Table 2 provides an overview of the top ten industries in agriculture with respect to the number of people employed in the industry.

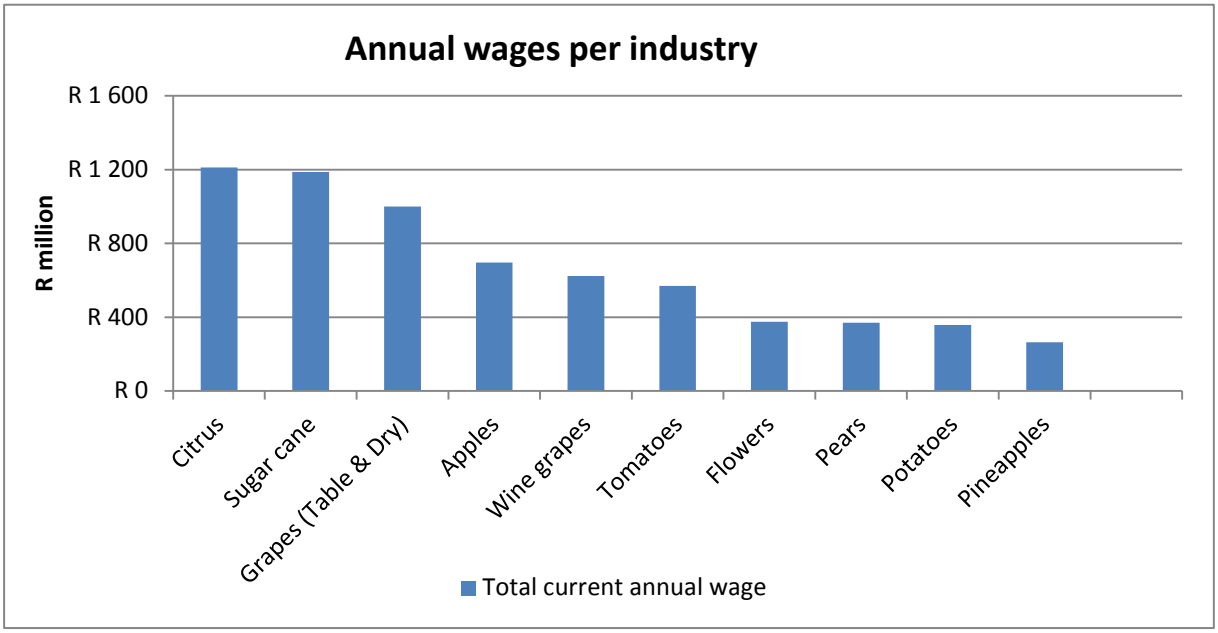
Table 2: Top ten industries in agriculture: number of employees

		Permanent	Seasonal	Total
1	Citrus	10 200	75 000	85 200
2	Sugar cane	7 560	70 875	78 435
3	Grapes (Table & Dry)	20 478	18 903	39 381
4	Tomatoes	17 091	16 528	33 284
5	Potatoes	5 972	24 885	30 857
6	Wine grapes	24 136	6 034	30 170
7	Apples	14 248	13 152	27 400
8	Pineapples	15 858		15 858
9	Bananas	15 600		15 600
10	Pears	7 575	6 992	14 567

Source: BFAP labour model

As mentioned, the total compensation for the agriculture, forestry and fishing sector amounts to R19.8 billion. If forestry and fisheries are excluded, the total compensation bill in agriculture amounts to R12.7 billion. Figure 7 depicts the total annual wages that are paid out to workers for the top ten industries.

Figure 7: Annual wages paid in top ten industries



Source: BFAP labour model

In the following section, an in depth analysis is provided of the plausible impact of higher minimum wages for selected industries.

4. In depth impact analysis of selected industries

4.1 Introduction

This section focuses on the impact of various wage rate scenarios on typical apple, pear, potato, grain and oilseed farms. The scenarios represent increases of R10, R20, and R30 over the current (2012) wage rate. The minimum and maximum scenarios encompass the current minimum wage of R70 and the demand of R150 per day respectively.

The BFAP **farm level** models can be used to assist in farm level management decision making. The effect of uncertainty created by like macro, sector and farm level variables in the decision making environment of a farming production system can be analysed and projected. However, the impact can be measured at farm level only: for the wider impact on the sector the BFAP **sector level** model is used to provide an overview of the supply and demand response of the whole industry to exogenous shocks such as higher minimum wages, and can illustrate the impact on market prices.

This section provides an in depth analysis using these models for selected industries. In order to provide a broader overview of the impact on the agricultural industry at large, the newly developed BFAP labour model is then applied to generate total industry impacts.

The farm level (FinSim) model analyses for the apple and pear (pome) industries in the Western Cape are discussed first, followed by potatoes, grains and oilseeds. In the case of the pome and potato industries, the farm level results are supplemented by illustrating the supply response for the total industry through the simulations of the BFAP sector model. The scenarios are discussed in the next section.

4.2 The apple and pear industries

4.2.1 Labour remuneration scenarios

For purposes of this analysis the data on labour remuneration as supplied by Hortgro Services was used. The remuneration structure of labour is based on the Patterson scale and the absolute values of the different classes of labour in the pome and stone fruit industry is based on survey data (Hortgro Services, 2012a). Refer to Table 3 for the remuneration structure and weighted average cost of labour for the base situation and to Table 4 for the various scenarios evaluated.

Table 3: Current average weighted labour cost for the pome and stone fruit industries

Remuneration structure and scales	Weight (%)	Average cost/day (R)	Weighted cost/day (R)
Permanent labour:	**100**		**109.67**
General labour (A2/A3)	50.2	97.84	49.12
Tractor driver (B1)	11.2	116.02	12.99
Lorry driver (B2)	3.3	154.73	5.11
Supervisor (B2)	5.7	132.19	7.53
Manager (B2)	4.8	206.97	9.93
Other (A3)	24.8	100.76	24.99
Casual labour - permanent equivalents (A1/A2)	**100**	**84.90**	**84.90**

Source: Hortgro Services, 2012a

In these Tables the base wage refers to the current wages without any wage increases. When the analysis extends over time, the base wage for permanent and seasonal workers will increase by 6% per annum (the assumed rate of inflation in the economy) over the baseline period. The wage increases modelled in the scenarios below are **in addition** to these inflation increases over the baseline period.

Table 4: Labour wage assumptions for the base and scenarios

Type of labour	Base (R/day)	Scenario: R70/day (% decrease from Base)	Scenario: Base+R10 (% increase from Base)	Scenario: Base+R20 (% increase from Base)	Scenario: Base+R30 (% increase from Base)	Scenario: R150/day (% increase from Base)
Permanent	109.67	-36.2	9.1	18.2	27.4	36.8
Casual	84.90	-17.6	11.8	23.6	35.3	76.7

Under each scenario, both permanent and seasonal labour costs will increase. While most farmers already remunerate permanent workers above the minimum wage rate, an increase in the minimum wage generally tends to result in an upward shift in all wage rates, albeit not at the same rate as for seasonal workers. Thus, regardless of the current wage rate of permanent workers, a general increase in the labour cost is anticipated.

4.2.2 Description of the typical apple and pear farm

A FinSim typical pome fruit farm for the Western Cape was analysed based on the 2010/11 production and market information. Projections for the same typical farm were simulated for the period 2012 to 2020. The description and characteristics of this typical farm were based on data from Hortgro Services (2012b) and adjusted by a panel of pome fruit farmers at a group discussion. The size of the simulated farm is 55 ha (44 ha apples and 11 ha pears), consisting of three blocks of different ages for each of the various apple (Granny Smith, Golden Delicious, Gala, Pink Lady / Cripps Pink, Topred / Starking, Fuji and Braeburn) and

pear (Packham's Triumph, Forelle / Vermont Beauty, Bon Chretien and Abate Fetel) cultivars. The replacement cycles for apples and pears are 25 and 30 years respectively.

The capital investment of this typical farm amounted to R18 million (R326 255/ha), the establishment cost of apple and pear orchards R180 000 and R174 600 per ha respectively and the directly allocable variable cost for apples and pears R39 565 and R32 799 per ha respectively (excluding packaging cost). Remuneration of casual labour for apples and pears amounted to R13 600 and R11 274 per ha full bearing respectively. This represents 34% of the directly allocable variable cost per ha[4]. The annual remuneration of permanent workers amounted to R1 122 000 for this typical farm (representing a fixed cost of R20 400 per ha). More details on the assumptions regarding this "optimistic" typical farm, amongst others the yields, market segments (export, local, processing), classes and farm gate prices per cultivar of fruit, can be found in BFAP (2012: 84-90). The modelled typical farm used in the labour analyses for this report is based on the above average typical farm ("optimistic"), where 15% and 10% higher yields for apples and pears respectively, were assumed.

The FinSim farm level model is 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.

4.2.3 Results at farm level

For purposes of this analysis a baseline situation was assumed and the effect of different scenarios evaluated as deviations from the baseline. The assumptions discussed in the previous section form the baseline situation for the modelling process. The model was simulated for 500 iterations and the simulated mean net farm income (NFI)[5] for each year of the projection period (2012 to 2020) was used as a performance measure. The probability that the NFI would be negative in a specific year was also calculated from these simulated results. The FinSim typical apple and pear farm model was repeatedly applied to simulate results for the base situation and the various scenarios based on the data in Table 3 and Table 4.

The differences in the simulated mean NFI generated by the simulation model for the various scenarios, is evident from Table 5 and Figure 8.

[4] This s higher than the 13% to 26% reported below because the latter is the share of total cash expenses.

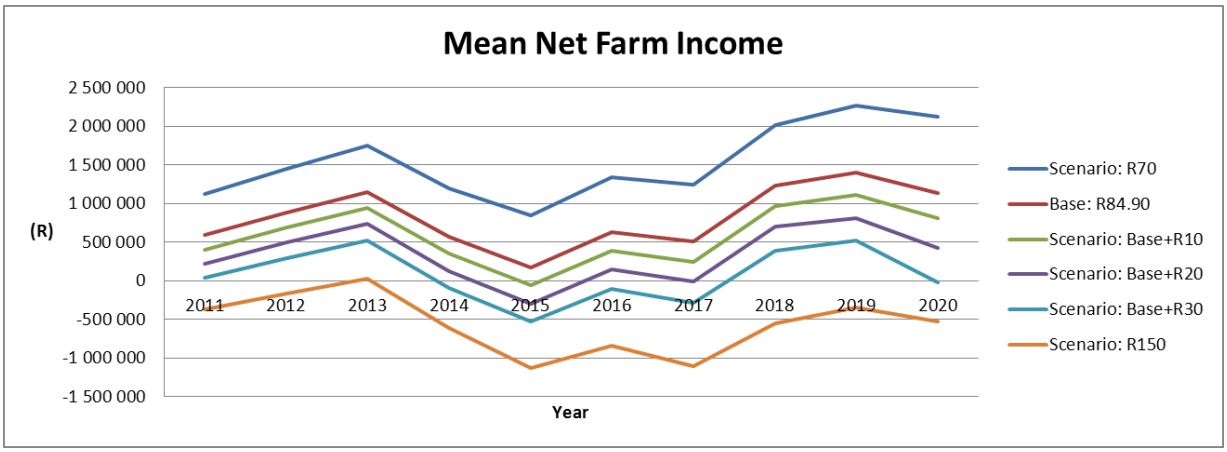
[5] The NFI is a general performance measure applied in interfarm comparisons and represents the reward to own and external entrepreneurial skills/input, land and other capital. A NFI of R0 implies that there is not enough net income generated by the business to reward the entrepreneurial input, land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

Table 5: Changes to the net farm income for a typical apple and pear farm (R per year)

Scenario:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
R70	1 121 812	1 446 252	1 745 512	1 196 728	842 362	1 336 536	1 244 010	2 009 790	2 270 267	2 121 820
R84.90 (base)	591 470	886 033	1 151 044	563 098	173 924	633 263	508 266	1 236 648	1 398 786	1 133 178
Base+R10	405 245	687 554	939 592	345 384	-61 355	385 706	244 306	964 258	1 112 490	806 576
Base+R20	219 020	492 393	730 716	123 317	-293 719	140 782	-10 659	700 457	811 992	423 836
Base+R30	33 518	295 508	518 506	-99 733	-524 806	-110 222	-282 924	386 892	517 613	-26 363
R150	-377 762	-165 293	31 578	-618 088	-1 131 655	-841 202	-1 112 748	-552 580	-346 812	-529 743

In terms of this typical farm, a reward to capital (land included) of 8% interest per year (R1 440 000) and an annual entrepreneurial salary of R400 000 would require a NFI of R1 840 000 (for 2011). This simulated net income is not realised in the base or the scenarios. In the case of the R150/day-scenario the simulated mean NFI becomes negative.

Figure 8: Mean net farm income for a typical apple and pear farm



The relationship between the remuneration of casual and permanent workers and total cash farm expenses (excluding interest paid and depreciation) for the typical apple and pear farm for the base situation and the various scenarios are indicated in Table 6 to Table 11 and Figure 9 to Figure 14. It is clear that as the wage per day increases from R70 to R150, the share of casual labour is increasing faster than for permanent labour. Total cash farm expenses obviously increase and the NFI decreases.

The increasing share of the remuneration for casual labour as a percentage of total cash farm expenses (interest excluded) is also clear from Table 6 to Table 11. The expected simulated share increased from 13% to 26%.

Table 6: Performance measures for a typical pome fruit farm: Scenario R70

Scenario: R70	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NFI (R)	1 121 812	1 446 252	1 745 512	1 196 728	842 362	1 336 536	1 244 010	2 009 790	2 270 267	2 121 820
Total cash farm expenses (R)	3 285 536	3 776 830	4 048 780	4 492 700	4 779 582	4 586 277	4 839 739	4 678 498	4 883 379	5 316 944
Casual labour remuneration (R)	554 706	582 050	614 923	625 702	633 342	685 587	711 122	768 201	814 921	852 063
Permanent labour remuneration (R)	718 080	762 601	808 357	856 050	903 989	951 900	999 495	1 047 471	1 162 473	1 285 207
Probability of negative NFI (1 = 100%)	0	0	0	0	0	0	0	0	0	0
Casual labour as % of Total cash farm expenses (%)	17	15	15	14	13	15	15	16	17	16

Figure 9: Simulated NFI, casual and permanent labour remuneration and total cash farm expenses for Scenario R70/day

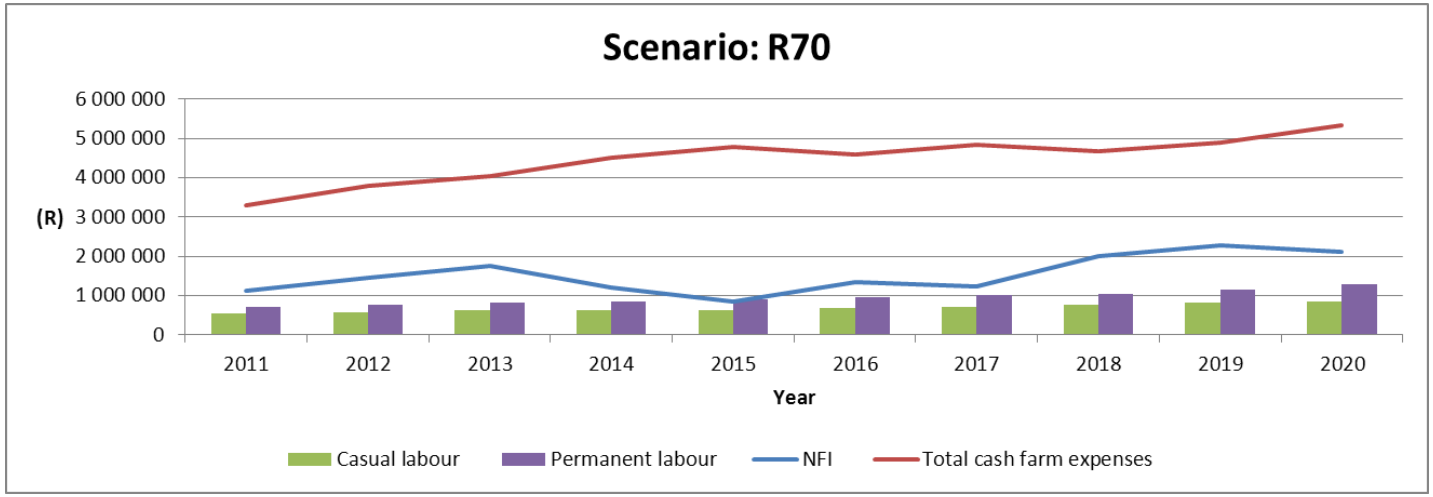


Table 7: Performance measures for a typical pome fruit farm: Base R84.90

Base: R84.90	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NFI (R)	591 470	886 033	1 151 044	563 098	173 924	633 263	508 266	1 236 648	1 398 786	1 133 178
Total cash farm expenses (R)	3 815 878	4 340 053	4 645 796	5 124 940	5 447 228	5 289 309	5 577 922	5 452 113	5 741 929	6 266 141
Casual labour remuneration (R)	681 128	716 311	757 238	776 414	792 494	853 175	887 088	952 614	1 019 580	1 078 331
Permanent labour remuneration (R)	1 122 000	1 191 564	1 263 058	1 337 578	1 412 483	1 487 344	1 561 711	1 636 674	1 816 364	2 008 136
Probability of negative NFI (1 = 100%)	0.00	0.00	0.00	0.05	0.33	0.03	0.10	0.00	0.00	0.03
Casual labour as % of Total cash farm expenses (%)	18	17	16	15	15	16	16	17	18	17

Figure 10: Simulated NFI, casual and permanent labour remuneration and total cash farm expenses for the Base situation (R84.90/day)

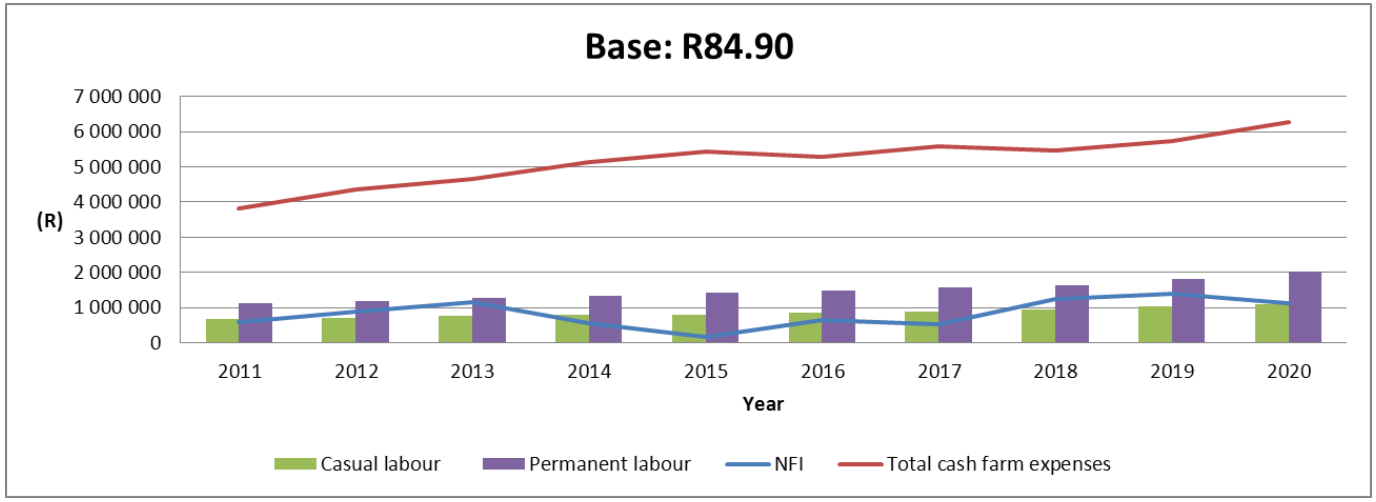


Table 8: Performance measures for a typical pome fruit farm: Scenario Base+R10

Scenario: Base+R10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NFI (R)	405 245	687 554	939 592	345 384	-61 355	385 706	244 306	964 258	1 112 490	806 576
Total cash farm expenses (R)	4 002 103	4 537 824	4 855 433	5 346 946	5 681 666	5 536 172	5 837 128	5 723 762	6 043 402	6 599 442
Casual labour remuneration (R)	766 373	806 841	853 200	878 038	899 808	966 177	1 005 741	1 076 961	1 157 580	1 230 901
Permanent labour remuneration (R)	1 222 980	1 298 805	1 376 733	1 457 960	1 539 606	1 621 205	1 702 265	1 783 974	1 979 837	2 188 868
Probability of negative NFI (1 = 100%)	0.00	0.00	0.00	0.18	0.60	0.14	0.29	0.00	0.00	0.13
Casual labour as % of Total cash farm expenses (%)	19	18	18	16	16	17	17	19	19	19

Figure 11: Simulated NFI, casual and permanent labour remuneration and total cash farm expenses for Scenario Base+R10

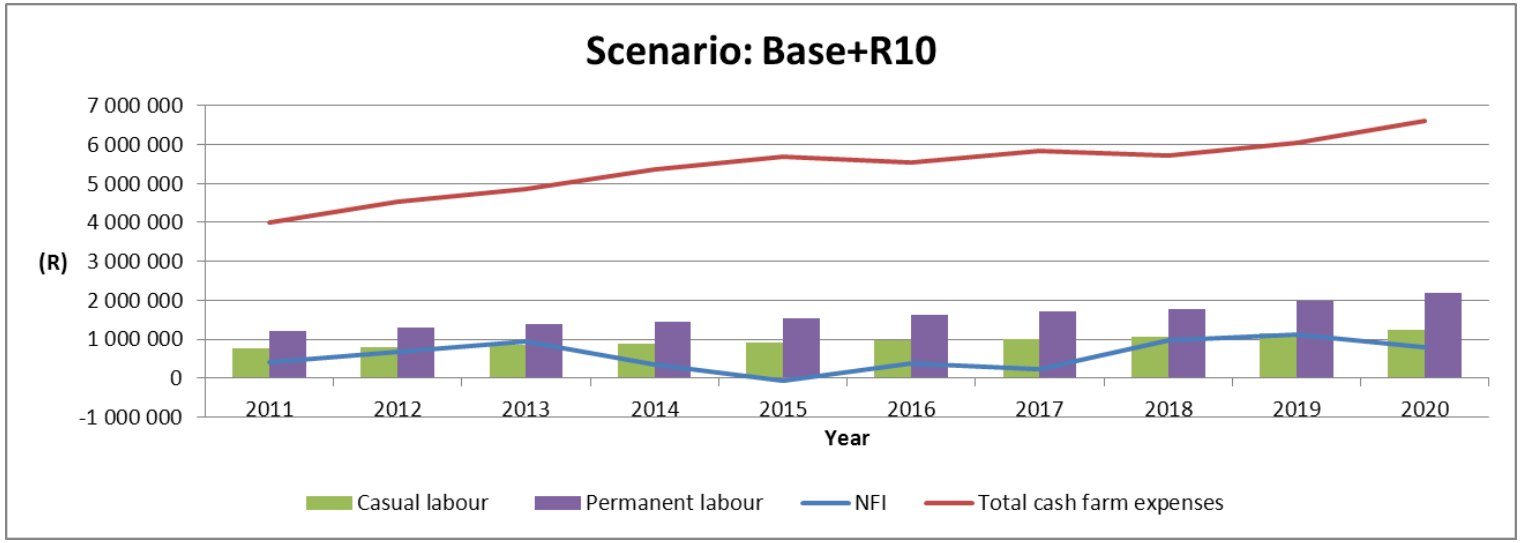


Table 9: Performance measures for a typical pome fruit farm: Scenario Base+R20

Scenario: Base+R20	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NFI (R)	219 020	492 393	730 716	123 317	-293 719	140 782	-10 659	700 457	811 992	423 836
Total cash farm expenses (R)	4 188 328	4 735 594	5 065 070	5 568 952	5 916 104	5 783 035	6 096 334	5 995 410	6 344 874	6 932 744
Casual labour remuneration (R)	851 618	897 371	949 162	979 662	1 007 123	1 079 179	1 124 393	1 201 309	1 295 580	1 383 471
Permanent labour remuneration (R)	1 323 960	1 406 046	1 490 408	1 578 342	1 666 730	1 755 066	1 842 819	1 931 275	2 143 309	2 369 600
Probability of negative NFI (1 = 100%)	0.00	0.06	0.00	0.41	0.77	0.39	0.54	0.03	0.05	0.27
Casual labour as % of Total cash farm expenses (%)	20	19	19	18	17	19	18	20	20	20

Figure 12: Simulated NFI, casual and permanent labour remuneration and total cash farm expenses for Scenario Base+R20

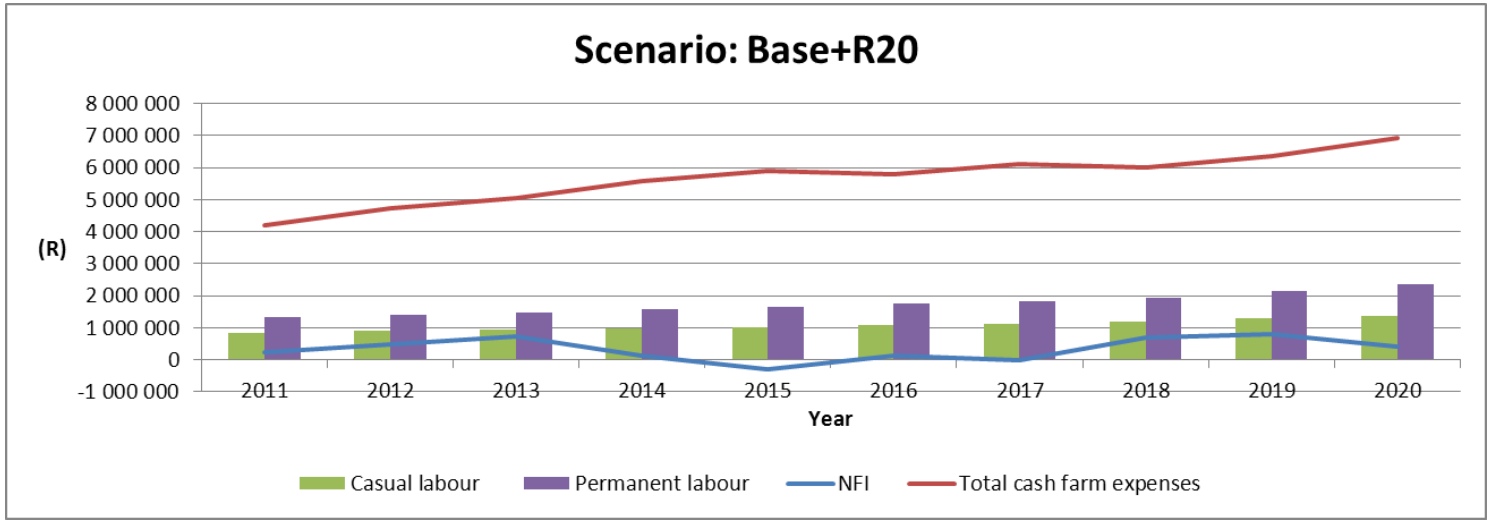


Table 10: Performance measures for a typical pome fruit farm: Scenario Base+R30

Scenario: Base+R30	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NFI (R)	33 518	295 508	518 506	-99 733	-524 806	-110 222	-282 924	386 892	517 613	-26 363
Total cash farm expenses (R)	4 373 831	4 932 598	5 273 894	5 790 096	6 149 632	6 028 941	6 354 535	6 266 004	6 645 177	7 264 753
Casual labour remuneration (R)	936 140	987 133	1 044 311	1 080 424	1 113 528	1 191 224	1 242 040	1 324 603	1 432 410	1 534 747
Permanent labour remuneration (R)	1 424 940	1 513 286	1 604 083	1 698 724	1 793 853	1 888 927	1 983 374	2 078 575	2 306 782	2 550 332
Probability of negative NFI (1 = 100%)	0.00	0.20	0.06	0.61	0.91	0.63	0.78	0.18	0.15	0.51
Casual labour as % of Total cash farm expenses (%)	21	20	20	19	18	20	20	21	22	21

Figure 13: Simulated NFI, casual and permanent labour remuneration and total cash farm expenses for Scenario Base+R30

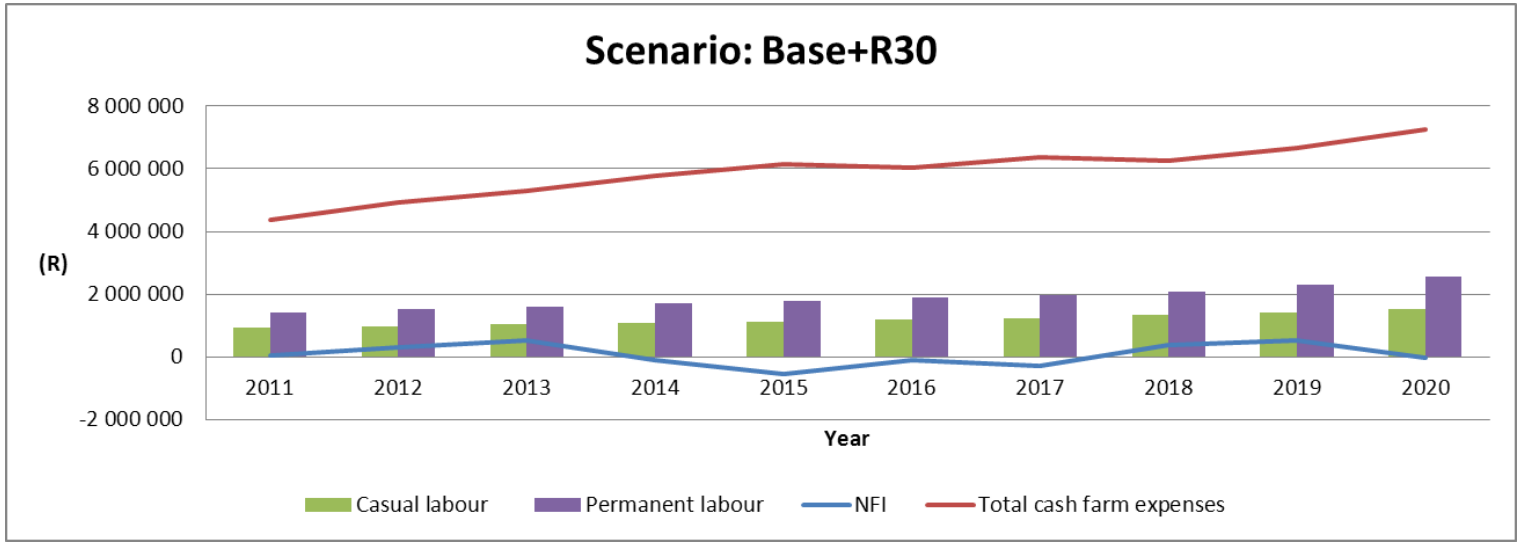
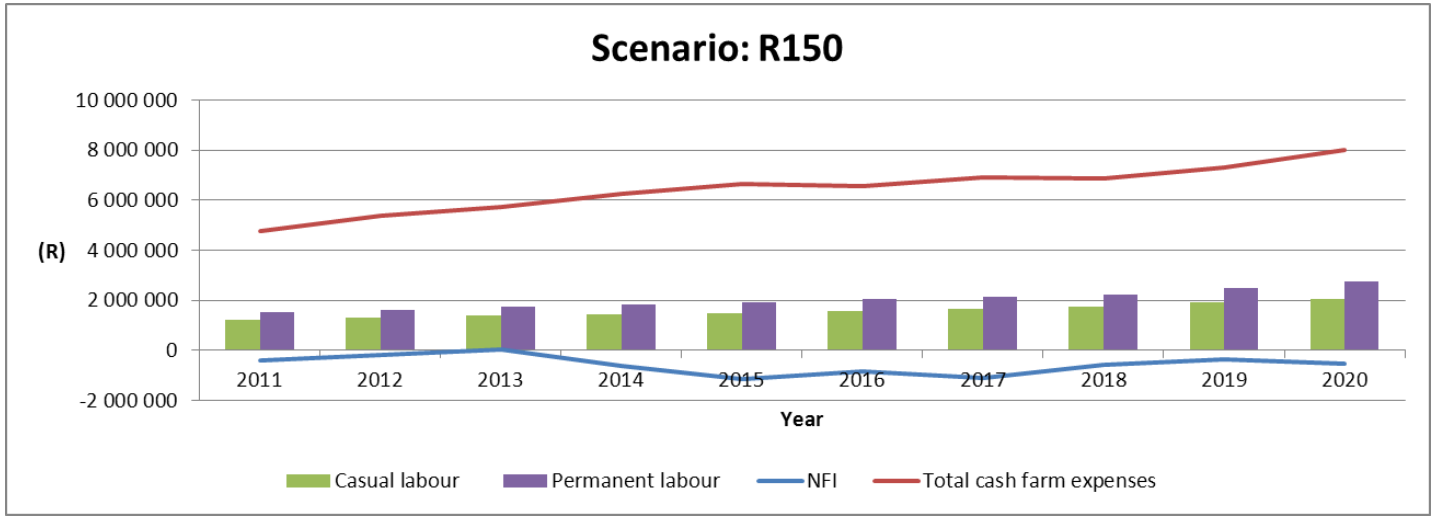


Table 11: Performance measures for a typical pome fruit farm: Scenario R150

Scenario: R150	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NFI (R)	-377 762	-165 293	31 578	-618 088	-1 131 655	-841 202	-1 112 748	-552 580	-346 812	-529 743
Total cash farm expenses (R)	4 785 110	5 369 377	5 736 879	6 280 398	6 667 391	6 574 140	6 926 995	6 865 942	7 310 982	8 000 854
Casual labour remuneration (R)	1 235 220	1 304 756	1 380 990	1 436 968	1 490 038	1 587 689	1 658 328	1 760 873	1 916 579	2 070 034
Permanent labour remuneration (R)	1 537 140	1 632 443	1 730 389	1 832 482	1 935 101	2 037 662	2 139 545	2 242 243	2 488 419	2 751 146
Probability of negative NFI (1 = 100%)	1.00	0.69	0.49	0.94	1.00	0.99	1.00	0.90	0.75	0.74
Casual labour as % of Total cash farm expenses (%)	26	24	24	23	22	24	24	26	26	26

Figure 14: Simulated NFI, casual and permanent labour remuneration and total cash farm expenses for Scenario R150/day



The probability that a negative NFI will be realised in any specific year of the projection period for the base situation and each scenario is also evident from Table 6 to Table 11. This probability was zero for each year of the Scenario R70 and increases for the other scenarios till it reaches high probabilties for the Scenario R150.

The stoplight charts in Figure 15 and Figure 16 indicate the probabilities that the simulated NFI for the typical pome farm, for two of the evaluated cases, would fall within the specific ranges:

- Green coloured area: probability of the NFI higher than R300 000;
- Yellow coloured area: probability of the NFI between R0 and R300 000;
- Red coloured area: probability of a negative NFI.

Figure 15: Forecasted NFI for a typical pome fruit farm for the Base situation (R84.90/day)

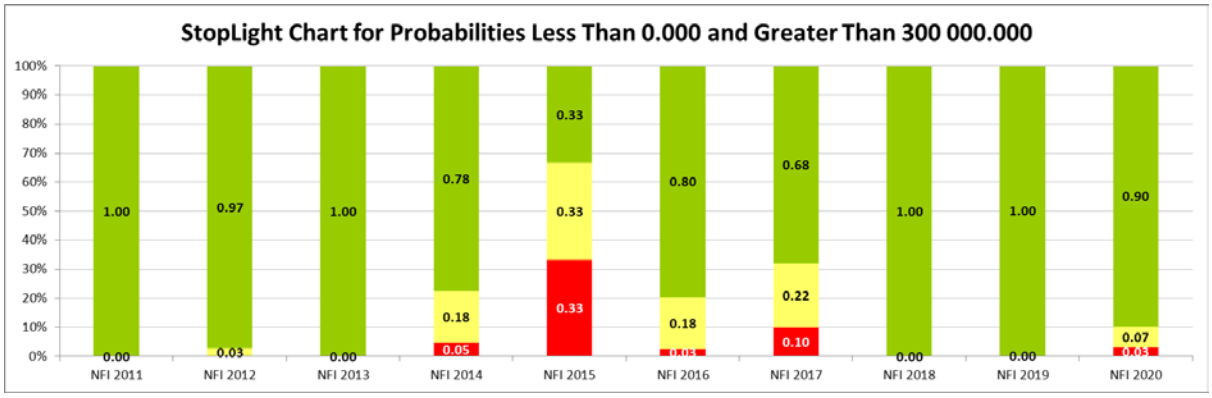
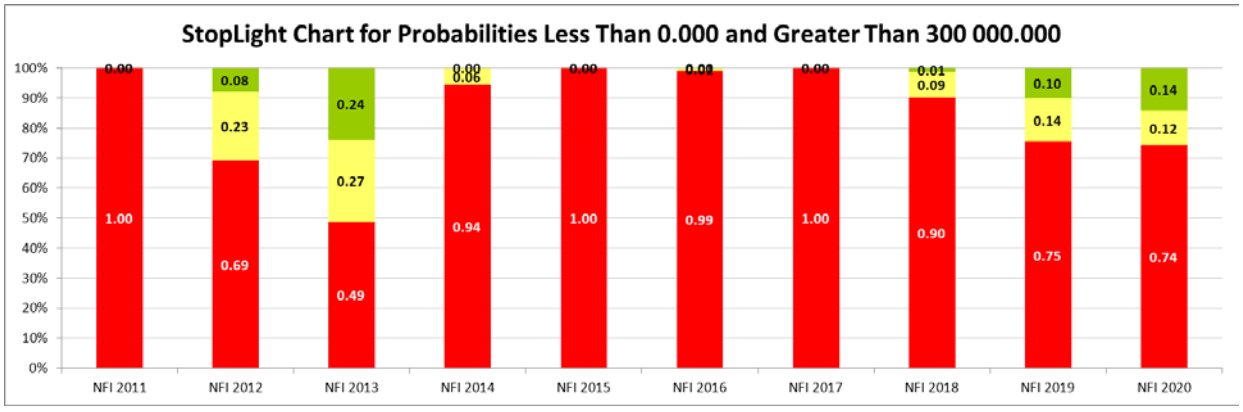


Figure 16: Forecasted NFI for a typical pome fruit farm for the Scenario R150/day



4.2.4 Results at sector level

Having illustrated the impact of higher minimum wages at farm level, the question then arises what could happen to the industry at large to accommodate higher wage rates or, stated diffently, how will the industry adjust. First and foremost, it is important to state that the farm level results were simulated under the assumption of constant business structures where there is no relative shift out of labour to mechanization. Second, the farm-level model

does not automatically simulate higher farm prices due to a possible drop in production over the medium term. However, the market effects are simulated by the BFAP sector model and the exercise below highlights some of the salient market features over the medium term.

This section provides an indication of the impact of the different scenarios on the pome fruit industry, considering the effect on area planted and consequently production, prices and value of the industry. The BFAP sector model for pome fruit was used to analyse the various scenarios. The sector model is a partial equilibrium econometric model simulating the industry by solving equilibrium prices ensuring demand equals supply.

The lower return per hectare resulting from the increase in labour remuneration results in a smaller area planted to apple and pear trees. This is a combination of (1) uprooting of marginal hectares no longer profitable due to the higher cost and (2) lower plantings due to cash flow problems. Table 12 summarises the impact of the different scenarios on the area planted to apples and pears.

Note that there is a lag of four to five years for apples and five to six years for pears before the change in labour costs impacts on the area planted and consequently on production because only bearing hectares are included in the model and it takes about four to five years for apple trees and five to six years for pear trees to come into production.

Table 12: Change in area for different scenarios

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Base: R84.90												
Apples: Bearing hectares	19 712	19 977	19 965	19 566	19 067	18 895	18 961	19 015	19 069	19 218	19 444	19 727
Pears: Bearing hectares	10 761	10 971	11 131	11 213	10 990	10 582	10 311	10 203	10 146	10 087	10 082	10 118
Scenario: Base+R10												
Apples: Change in hectares	-	-	-	-	-38	-196	-416	-590	-728	-846	-943	-1 025
% change	0.0%	0.0%	0.0%	0.0%	-0.2%	-1.0%	-2.2%	-3.1%	-3.8%	-4.4%	-4.9%	-5.2%
Pears: Change in hectares	-	-	-	-	-	-18	-50	-75	-93	-106	-115	-122
% change	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.5%	-0.7%	-0.9%	-1.0%	-1.1%	-1.2%
Scenario: Base+R20												
Apples: Change in hectares	-	-	-	-	-73	-297	-573	-792	-965	-1 111	-1 233	-1 336
% change	0.0%	0.0%	0.0%	0.0%	-0.4%	-1.6%	-3.0%	-4.2%	-5.1%	-5.8%	-6.3%	-6.8%
Pears: Change in hectares	-	-	-	-	-	-35	-95	-144	-180	-203	-221	-235
% change	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	-0.9%	-1.3%	-1.7%	-1.9%	-2.1%	-2.2%
Scenario: Base+R30												
Apples: Change in hectares	-	-	-	-	-106	-390	-718	-978	-1 183	-1 356	-1 501	-1 624
% change	0.0%	0.0%	0.0%	0.0%	-0.6%	-2.1%	-3.8%	-5.1%	-6.2%	-7.1%	-7.7%	-8.2%
Pears: Change in hectares	-	-	-	-	-	-35	-95	-144	-180	-203	-221	-235
% change	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	-0.9%	-1.3%	-1.7%	-1.9%	-2.1%	-2.2%
Scenario: R150												
Apples: Change in hectares	-	-	-	-	-171	-576	-1 007	-1 348	-1 617	-1 844	-2 035	-2 200
% change	0.0%	0.0%	0.0%	0.0%	-0.9%	-3.0%	-5.3%	-7.1%	-8.5%	-9.6%	-10.5%	-11.2%
Pears: Change in hectares	-	-	-	-	-	-79	-218	-329	-410	-463	-505	-538
% change	0.0%	0.0%	0.0%	0.0%	0.0%	-0.7%	-2.0%	-3.1%	-3.8%	-4.3%	-4.7%	-5.0%

Table 12 shows that the initial impact is small, but that it gains momentum over time. Overall losses are, however, small: for the Base+R20 scenario the model simulates a loss of 1 336 ha (6.8%) of apples and 235 ha (2.2%) of pears by 2022, compared to the Base. For a minimum wage of R150 per day the loss in apple and pear hectares is projected at 2 200 (11.2%) and 538 (5%) hectares respectively by 2022. The impact on the apple industry is

notably larger compared to the pear industry because the labour cost per hectare for apples is greater.

Note, however, that the model simulates only the change in bearing acreage, resulting in a lag of at least 4 years before any effect is seen. Furthermore, orchards that become unprofitable will be uprooted in due course, but it is difficult to predict which orchards, and when they become unprofitable because profitability is a function not only of costs and prices (as modelled here), but also of quality of soil, management, choice of cultivar and rootstock, age of trees, etc. These latter factors are either not quantifiable or very difficult to incorporate in a model at industry level. Thus the lag effect and the inability of the model to fully account for the profitability of orchards at the industry level results in an **underestimate** of the impact over the short term (next five years). This is especially true when the age distribution of apple and pear trees is considered. Thirty three per cent of apple trees are 25 years and older, with 13% of all plantings exceeding 40 years. About 29% of pear trees are 25 years and older, with 9% exceeding 40 years. Orchards aged 40+ years are expected to experience problems with yield and quality, considering that the replacement cycle for apples is roughly 25 years and for pears 30 years. One could argue that most of these orchards are only marginally profitable and a permanent significant upward shift in costs may result in the uprooting of these orchards – representing 12% or 3 880 hectares of total plantings. Some of these orchards will be replaced over time, but some might be lost to other agricultural activities.

Table 13 provides an indication of the impact on the value of the industry. The greatest loss will be suffered in the export market where South Africa is largely a price taker. The lower supply from South Africa has little impact in returns in the export market, hence the relatively large losses in the value of exports. The results show, for example, that for the Base+R20 scenario the apple industry is projected to lose R1.4 billion over the next ten years, equivalent to 2.3% of industry income. The corresponding figure for the pear industry is R46 million or 0.2%. The impact on the value of the pear industry is smaller than the impact on the value of the pear export market. The upward shift in the local price of apples also supports the local price of pears. This leads to a positive impact on the value of the local market for pears, softening the negative impact of the export and processing markets.

Table 13: Change in values of the pome fruit industry for different scenarios (R million)

	2015	2016	2017	2018	2019	2020	2021	2022	Total	%
Scenario: Base+R10										
Apples: Loss in value of export industry	-5	-27	-64	-101	-136	-171	-206	-240	-950	-1.5%
Apples: Loss in value of total industry	-5	-29	-71	-112	-153	-194	-235	-277	-1 077	-1.8%
Pears: Loss in value of export industry	-	-2	-5	-8	-10	-12	-14	-16	-67	-0.3%
Pears: Loss in value of total industry	1	1	1	1	0	1	1	2	7	0.0%
Scenario: Base+R20										
Apples: Loss in value of export industry	-9	-41	-89	-136	-181	-226	-270	-315	-1 266	-2.1%
Apples: Loss in value of total industry	-9	-45	-98	-152	-204	-257	-310	-363	-1 438	-2.3%
Pears: Loss in value of export industry	-	-3	-9	-15	-20	-24	-28	-31	-131	-0.5%
Pears: Loss in value of total industry	1	1	-2	-5	-8	-10	-11	-12	-46	-0.2%
Scenario: Base+R30										
Apples: Loss in value of export industry	-13	-54	-112	-168	-222	-276	-330	-384	-1 560	-2.5%
Apples: Loss in value of total industry	-14	-59	-123	-188	-252	-316	-380	-444	-1 776	-2.9%
Pears: Loss in value of export industry	-	-4	-13	-22	-29	-35	-40	-46	-189	-0.8%
Pears: Loss in value of total industry	2	1	-5	-11	-16	-19	-22	-25	-96	-0.4%
Scenario: R150										
Apples: Loss in value of export industry	-21	-81	-158	-234	-306	-378	-450	-523	-2 150	-3.5%
Apples: Loss in value of total industry	-22	-88	-175	-262	-348	-435	-521	-610	-2 460	-4.0%
Pears: Loss in value of export industry	-	-7	-21	-35	-46	-56	-65	-73	-302	-1.2%
Pears: Loss in value of total industry	3	1	-10	-21	-31	-37	-44	-49	-189	-0.8%

Lower supply in the local market exerts upward pressure in the price of fruit. Figure 17 shows that an increase of R20 in the wage rate will result in an increase of 0.3% in the price of apples in 2015 and a 3.9% increase by 2022. Note that these price increases are compared to the Base scenario; they are not year-on-year price increases. Increasing the minimum wage to R150 per day will result in an average apple price that is 0.7% higher in 2015 and 6.4% higher in 2022, compared to the Base scenario. The local price of pears will also shift upwards, with price increases from the Base for 2022 ranging from 2.3% for the Base+R10 scenario to 5.2% for the R150 scenario. It should be mentioned that these price changes are the result of a change in supply and do not take into consideration the net effect on change in demand resulting from increased wages and/or job losses.

Figure 17: Impact on local price of apples

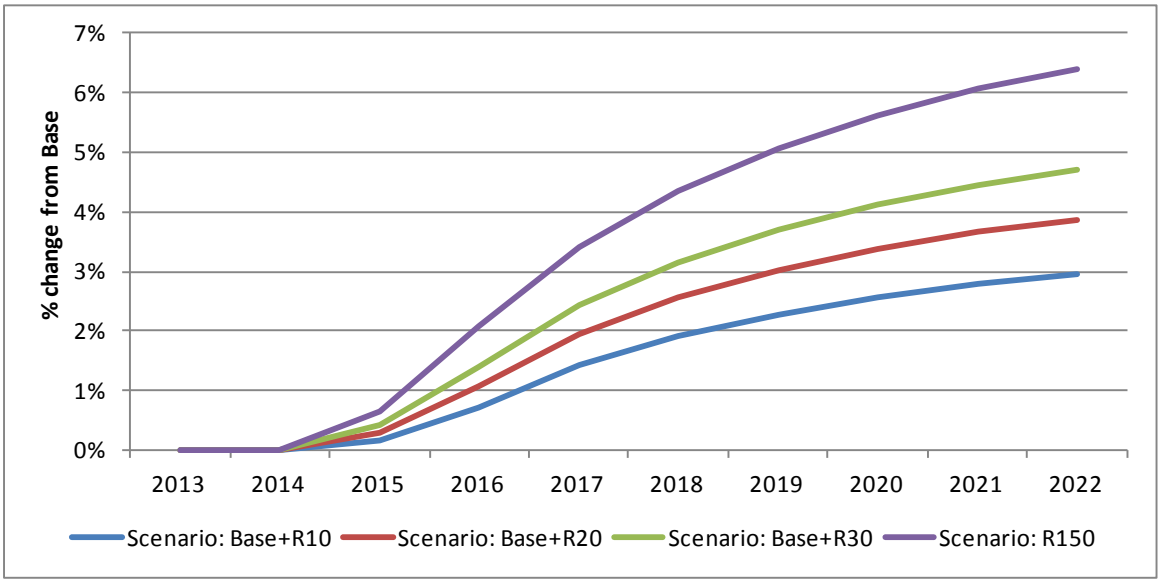
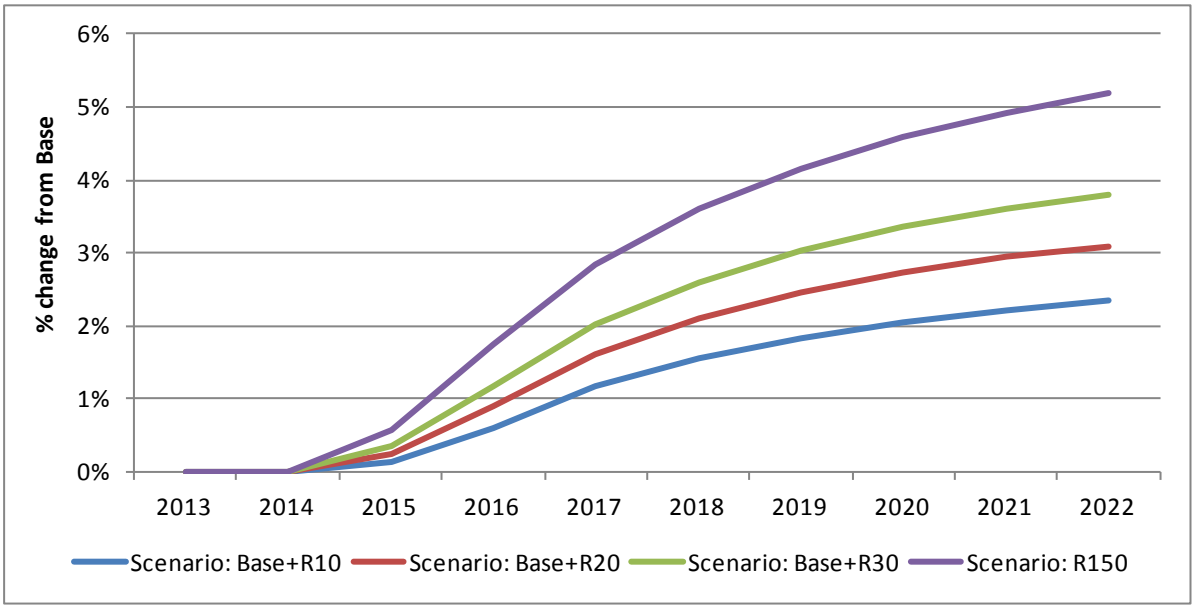


Figure 18: Impact on local price of pears



4.2.5 Conclusions

The simulated mean NFI for the 55 hectare unit is influenced negatively by the higher remuneration rates for labour and it is evident that the capital, land and entrepreneurial input on such a typical farm will not receive market related returns as the labour remuneration increases unless productivity can be increased. Considering that 20% of grower units (farms) in the pome industry are between 40 and 100 hectares and 67% are smaller than 40 hectares, the increases in labour remuneration could, therefore, have a far reaching impact on the size structure of farms.

For the typical 55 hectare farm, remuneration paid to permanent labour accounts for 45% of overhead costs and 26% of total costs. Farms need to consolidate in order to bring down overhead costs per hectare and to benefit from economies of size. Data shows that from 2005 to 2011 the number of grower units between 100 and 250 hectares increased by 19%. Increasing costs, especially overhead costs, is expected to hasten this process of consolidation.

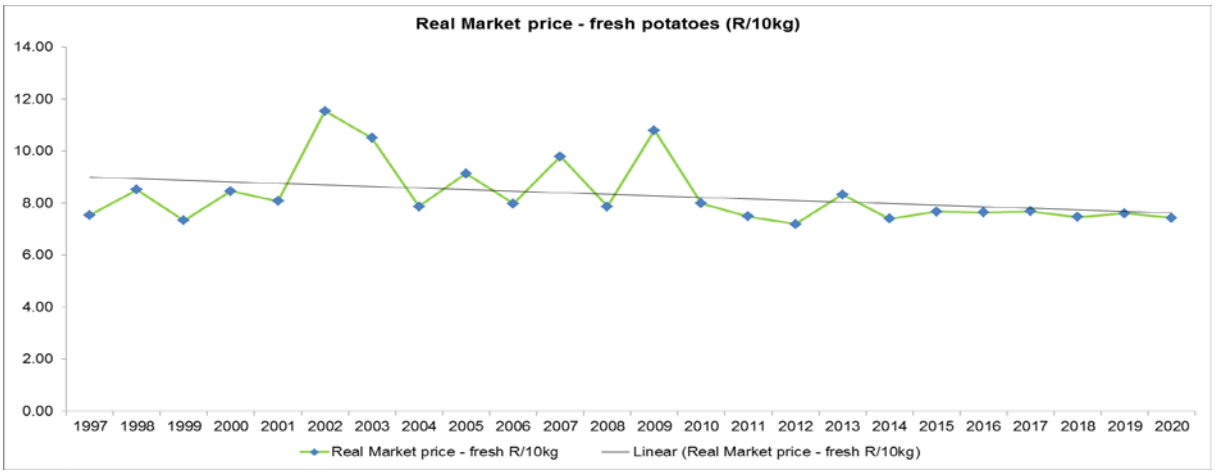
4.3 Potatoes

4.3.1 Potatoes at sector level

The total number of potato producers in South Africa has declined by more than 60% since 1993, with fewer than 700 commercial producers remaining in the industry. This decline can mainly be attributed to the large production, market and financial risk involved in the production of potatoes. For many farmers, the large high cost of production and the uncertainty associated with erratic rainfall patterns in the main producing regions were

simply not sufficient motivation to continue production. Figure 19[6] illustrates the real market price trend of fresh/table potatoes. It is evident from the figure (linear trendline) that the real potato price has been declining, which in principal suggests that market returns for potato producers may be decreasing – and are decreasing for those farmers unable to increase their productivity.

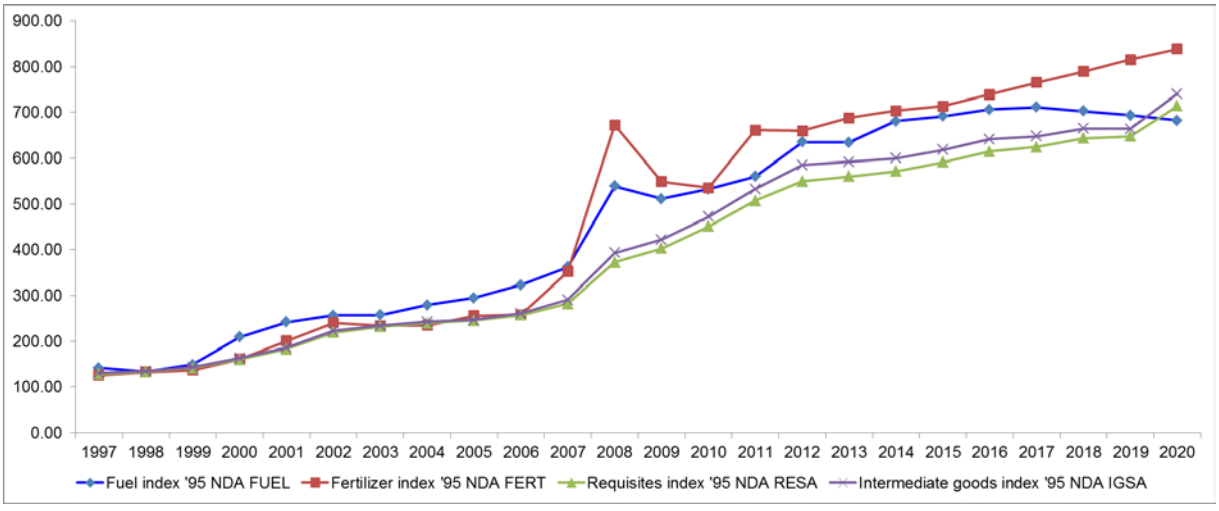
Figure 19: Real market price trend of fresh potatoes



Source: BFAP potato sector model

In support of the previous figure, the input cost evolution is illustrated in Figure 20 below. The blue, red, green and purple lines represent the fuel, fertiliser, requisites and intermediate goods indices respectively. The cost of all inputs has increased significantly over the illustrated period, especially from 2007 towards the end of 2012. Furthermore, the cost of inputs is expected to remain high in the future.

Figure 20: Input price index (1995 = 100)



Source: BFAP potato sector model

[6] The values up to 2011 are actual values, whereas the values from 2012 till 2020 are estimated using the BFAP sector model.

In general, therefore, potato farm profitability and sustainability will remain under pressure in future, mainly due to volatility in the expected market returns given the historic and projected input inflation trends.

4.3.2 Potatoes at farm level

The employment norm in the potato industry is roughly 0.11 permanent and 1.1 seasonal workers per hectare planted to potatoes. Thus, a typical potato farm in the Western Cape will employ about 19 permanent workers on a full-time basis and 40 seasonal workers per annum compared to up to 150 seasonal workers and 24 permanent workers on a typical potato farm in the eastern Free Sate. The BFAP labour model shows that the potato industry employs 5 972 permanent workers and 24 885 seasonal workers in total. Currently in the Western Cape permanent workers make up 2.85% of total farm expenditure and seasonal workers, 1.52%. The total labour bill for a typical farm in the Western Cape is more than R630 000 per annum. In this specific case study, a permanent worker's wage amounts to R28 284 per annum or R2 357 per month.

Table 14: The cost structure of a typical potato farm in the Western Cape

Item	**R/ha**
Production costs	R85 342
Labour costs	R4 572
Overhead costs	R13 758
Total costs	**R103 672**
Labour share of total costs	4.41%

Table 15 illustrates that a large operational investment (R85 342/ha) is necessary in order to generate a potato crop the next season. Because most farmers cannot afford to fully fund the required operational expenditure they borrow, thereby increasing their risk.

4.3.3 Results

The results obtained in Table 15 below illustrate the effect of the same scenarios used for the analysis of the apple and pome fruit industries. The results were derived using the FinSim model and show that the cost of production on a typical potato farm in the Western Cape will increase by between R25 000 and R290 000 depending on the magnitude of the increase in the minimum wage.

Table 15: Potential loss in income for a typical farm

Scenarios	Increase in costs
Baseline: R84.90/day (current anticipated wage rate)	-
Scenario 1: Baseline + R10	R 25,783
Scenario 2: Baseline + R20	R 90,550
Scenario 3: Baseline + R30	R 155,317
Scenario 4: R150/day	R 291,247
Scenario 5: R70/day	-R 231,124

Figure 21: Net farm income under various scenarios (2011-2018)

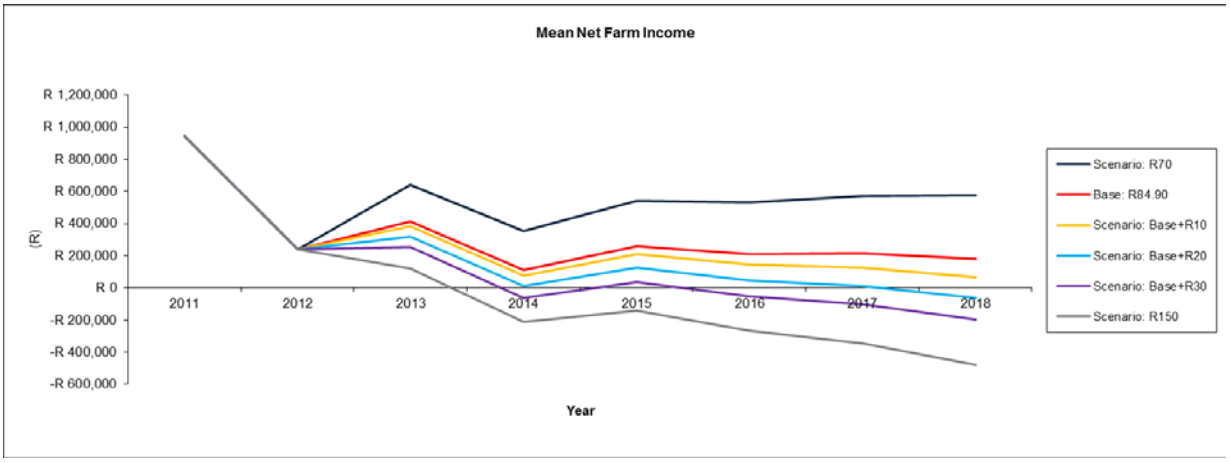
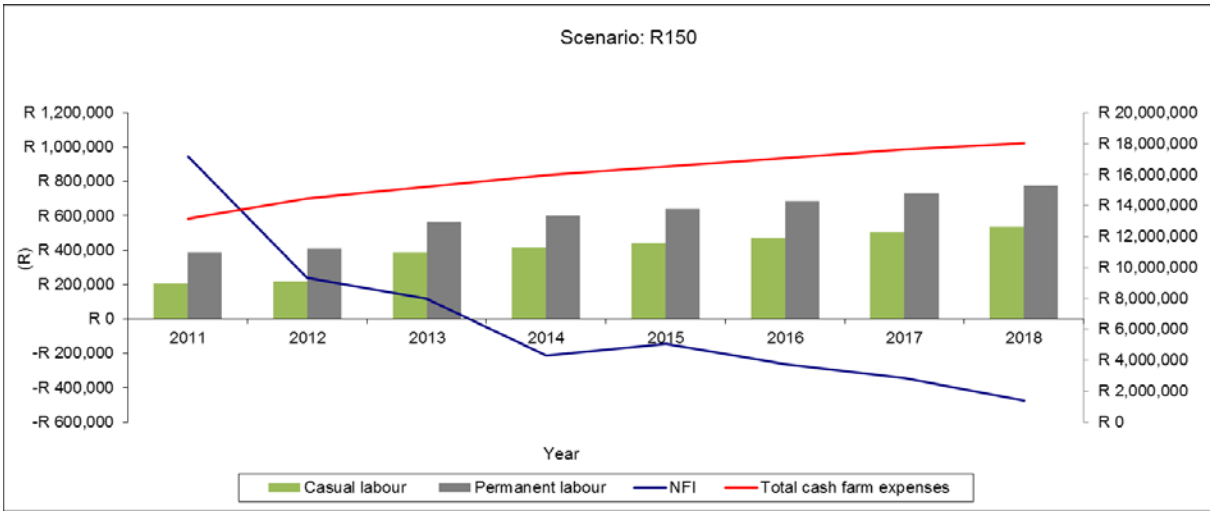


Figure 21 illustrates the impact on farm profitability under the different scenarios. In the absence of a wage increase (red line) the income of potato farmers in the Western Cape region is already under pressure, especially as NFI only refers to cash income and expenditure which includes interest on borrowed funds and depreciation. However, income and land taxes, principal payments and family living costs are not included in the calculation.

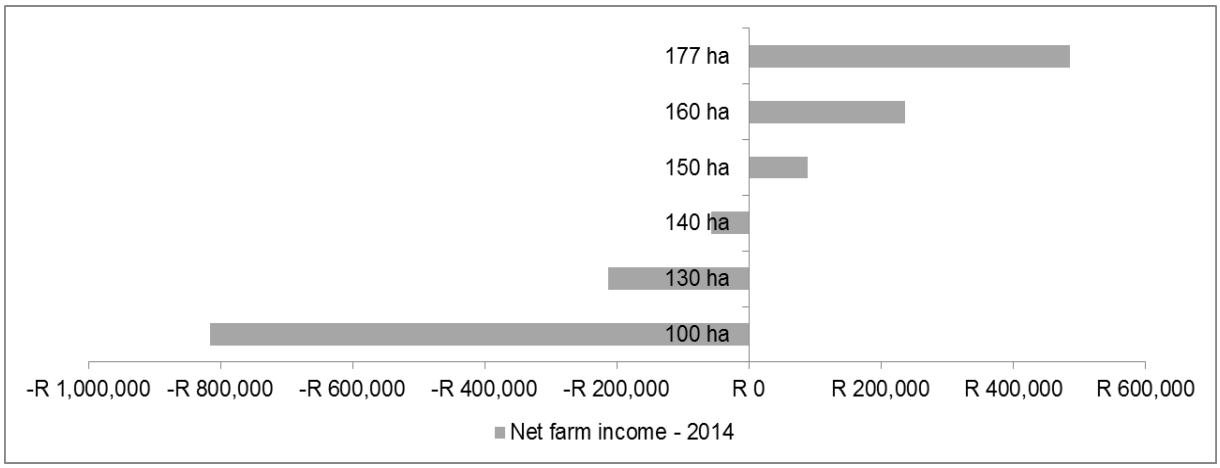
Figure 22: Net farm income under the R150/day wage scenario



The net farm income, casual and permanent labour component and total farm expenditure for the R150 per day scenario is illustrated in Figure 22. The cost of both permanent and seasonal wages increases substantially from 2012 to 2013. From 2014 onwards the farm will experience a negative income.

The overhead structure plays a significant role in the financial structure of a potato farm business. Generally, the cost of operating and maintaining a pack house is an expensive exercise. Thus, economies of scale, which refers to the size of the operation, to large extent determine the sustainability of the farm. Larger farms have a greater capacity to absorb input related shocks, such as an increase in agricultural wages. Figure 23 illustrates the net farm income of potato producers in 2014 under various farm sizes where the wage rate is increased to R150 per day.

Figure 23: Impact of farm size on sustainability of potato producers under R150/day scenario



It is obvious from the figure that a farm that produces 100 to 140 hectares of potatoes will not be able to absorb a R150 per day wage increase which is reflected by the negative farm income. However, a 150 hectare and upwards farm will indicate a positive net farming income, but still at an extremely low return on investment. Principal payments, income taxes and family living cost still need to be deducted from the net farm income, which indicates that, the attractiveness of engaging in farming activities remains low.

Volatility in the potato industry makes scenario development difficult. Furthermore, there is scope for mechanisation in the industry: industry specialists argue that it is possible to replace almost 40% of the labour force in the industry through mechanisation and pack house modification – this could result in the loss of employment for almost 10 000 seasonal workers and 2300 permanent workers.

4.4 Grain and oilseeds

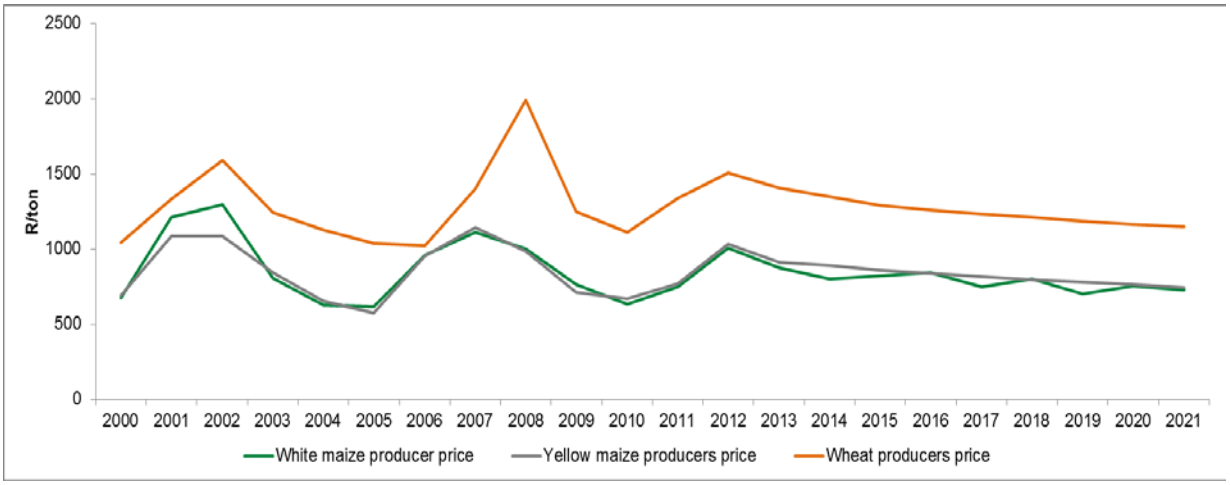
4.4.1 Grain and oilseeds at sector level

The total grain and oilseed industry of South Africa uses more than 4.3 million hectares of land, of which 2.7 million hectares was under maize production in the 2011/2012 season. The labour multiplier on any specific grain and oilseed farm in general is low; however, since such a large area is under production each year these industries still contribute substantially to job creation for both skilled and unskilled workers.

These industries have traditionally been characterised by volatility, a situation that has become worse since the food price crisis of 2007. The diversion of grains to biofuel production in the US and Europe, low stock levels, adverse weather conditions and speculation on commodity markets have all been blamed for this increased volatility – either on their own or in combination. Yet since 2007 there has been a regular upward spike in food prices almost every two years. This volatility makes it difficult for producers to manage their exposure to risk, and hence tends to make them more conservative in order to avoid risks as far as possible.

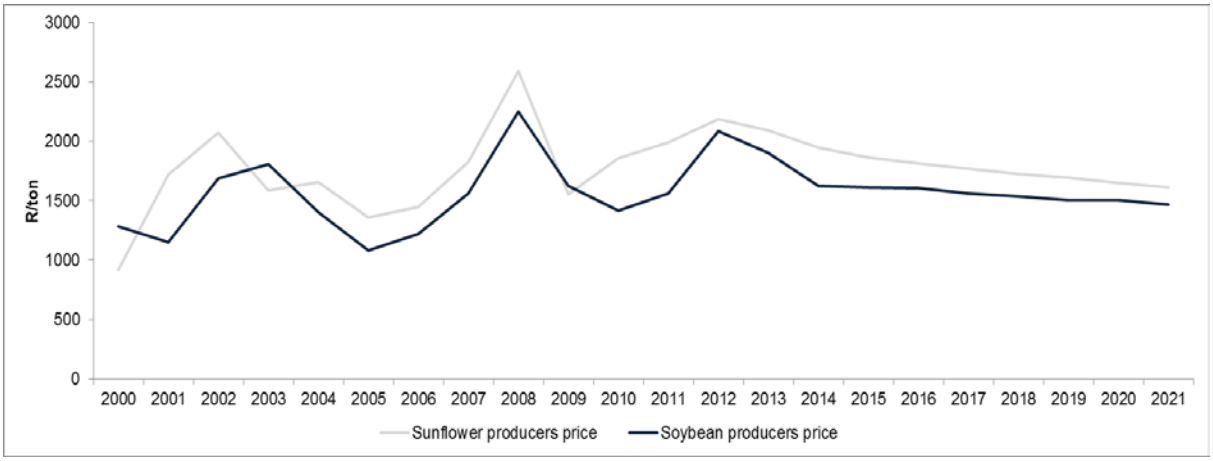
Figures 24 and 25 illustrate the real producer's price for the key grain and oilseed commodities in South Africa. Both maize and wheat prices are predicted to decline in real terms to 2021, while soybean and sunflower prices will likely maintain their value. The values up to 2011 are actual values, whereas the values from 2012 till 2020 are estimated using the BFAP sector model.

Figure 24: The real producer price of maize & wheat, 2000-2021



Source: BFAP sector model

Figure 25: The real producer price of sunflower and soybeans, 2000-2021



Source: BFAP sector model

Rising input costs have already resulted in an increase in the average size of farms in the grain and oilseeds industries as farmers try to spread their overhead costs over larger and larger farming areas.

The following section will focus in more detail on the impact of different wage rate scenarios on the farm income of a typical grain and oilseed farm in the North West province.

4.4.2 Grain and oilseeds at farm level

It is estimated that the current labour multiplier for grain and oilseed farms is 0.011 for permanent workers and 0.014 for seasonal workers. The latter implies that a typical North West maize and sunflower farm will employ between 12 and 18 permanent workers and between 14 and 20 seasonal workers per annum. The total labour expenditure on a typical farm is estimated at R638 150 in 2013, which includes cash and non-cash related benefits. The contribution of labour cost to total operational expenditure is approximately 9.88%.

Tables 16 and 17 provide an overview of the enterprise expenditure for the typical North West farm business.

Table 16: The cost structure of a typical maize farm, North West province, 2012/2013

Item	**R/ha**
Production costs	R4 891
Labour costs	R486
Overhead costs	R968
Total costs	**R6 345**
% Labour of total costs	7.65%

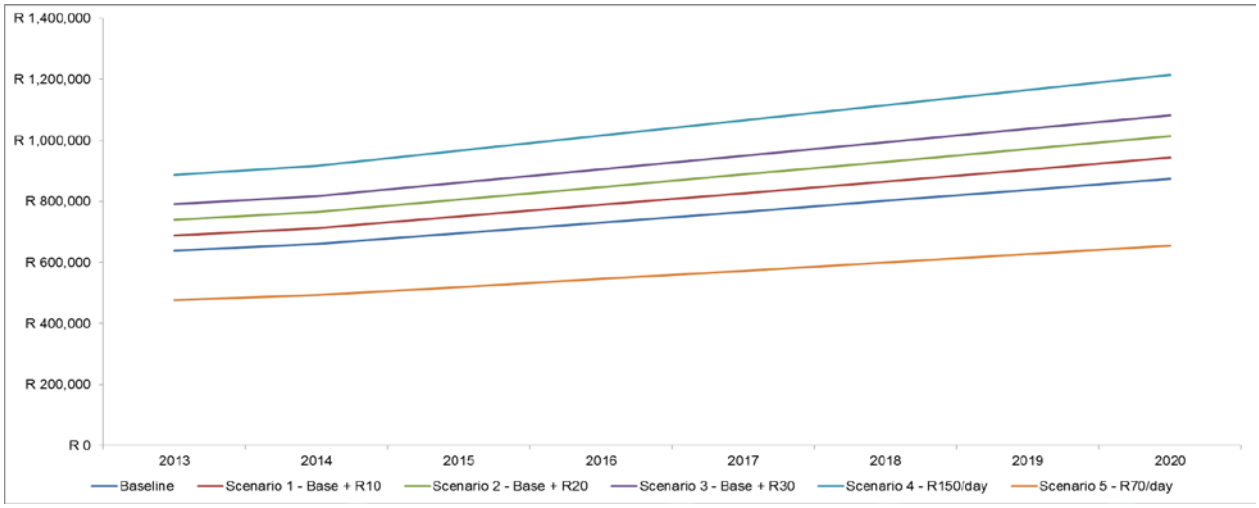
The cost of labour, which includes permanent and seasonal workers, is R486 per hectare, and labour contributes 7.65% of total production cost. In the case of sunflowers labour costs R424 per hectare or 8.71% of total costs.

Table 17: The cost structure of a typical sunflower farm, North West province, 2012/2013

Item	R/ha
Production costs	R3 475
Labour costs	R424
Overhead costs	R968
Total costs	**R4 867**
% Labour of total costs	8.71%

The same scenarios outlined in Table 4 are applied in the North West case study using the FinSim model, thus illustrating the impact of various wage rate levels on the financial structure of a typical farm. Figure 26 summarise the various wage rate scenarios on the total labour bill of the farm business. The baseline refers to the current state and estimated 2012/2013 labour expenditure which increases over the baseline period (2013-2020). The assumption prevails that the various wage rate scenarios will be implemented in 2013 and thereafter increases by the BFAP sector model projections.

Figure 26: Total farm labour expenditure: North West province (2013-2020)



As stated earlier, the baseline total labour expenditure amounts to R638 150 for a typical farm. Scenario 1 (Base + R10) and scenario 2 (Base + R20) illustrates that total labour expenditure will increase to R689 028 and R739 906 respectively: total farm expenditure increases by R50 878 and R101 756 respectively.

Under Scenario 3 (Base + R30) the labour bill on a typical farm will increase to R790 640, approximately R152 490 more than the baseline. Given the current projections, the total labour expenditure can exceed R1.08 million in 2020, while the R150 per day wage rate

scenario will increase the labour cost by R248 671 per farm. Total labour expenditure will amount to R886 821.

The additional farm expenditure due to the various wage rate scenarios is summarised in Table 18. The values refer to the change from the baseline rate of R638 150 in 2013 and 2020. The reason why the 2020 values are included is to illustrate the various impacts and contribution of labour to the farm financial structure.

Table 18: Additional labour expenditure for a typical farm (2013 & 2020)

Scenarios	Change from baseline / additional annual labour expenditure		Additional farm expenditure over a 5 year period	Additional farm expenditure over a 8 year period
	2013	2020	2013 – 2018	2013 - 2020
Scenario 1: Baseline + R10	R50 878	R305 544	R341 651	R477 623
Scenario 2: Baseline + R20	R101 756	R374 939	R683 302	R955 247
Scenario 3: Baseline + R30	R152 490	R444 135	R1 023 977	R1 431 503
Scenario 4: R150/day	R248 671	R576 353	R1 672 967	R2 339 526
Scenario 5: R70/day	-R161 872	R16 446	-R1 083 703	-R1 514 221

Scenarios 1, 2 and 3 imply that labour/farm expenditure will increase by R50 000, R100 000 and R150 000 respectively in 2013. Towards 2020, the total increase in labour cost can range from R300 000 to R440 000 per annum for scenario 1, 2 and 3. On the other hand, Scenario 4 will increase the labour/farm bill by almost R250 000 in 2013 and R576 353 in 2020.

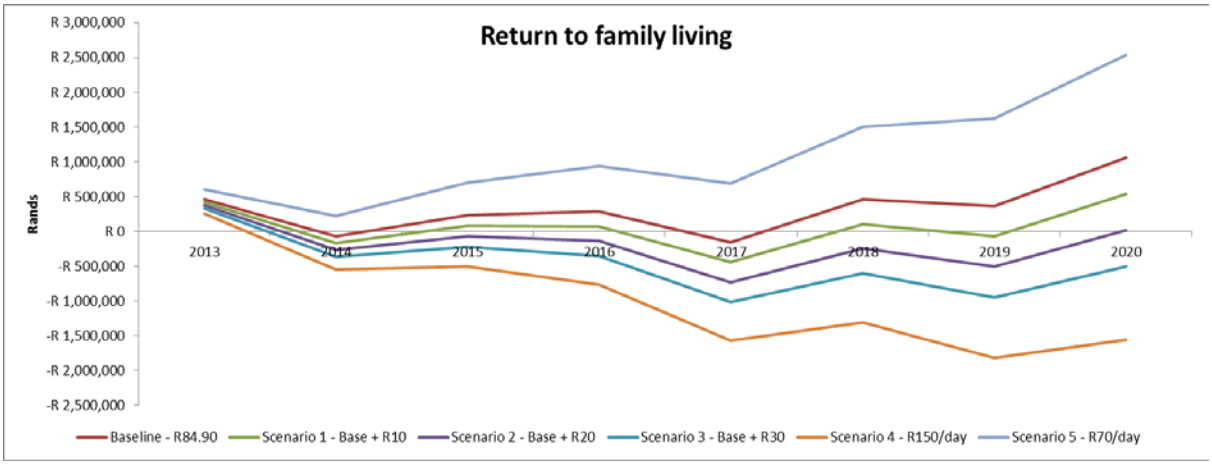
The right-hand columns illustrate the effect of increased labour expenditure over a 5 and 8 year period. Scenario 4, which entails a wage rate of R150 per day, indicates that over a 5 year period the loss in income will amount to R1.67 million, and R2.33 million over an 8 year period. The increased annual and total cost of each individual farmer under the various scenarios should be compared to the replacement or acquisition cost of machinery and implements to determine the rate of mechanisation that can occur in the intermediate or long term. For example, the increased labour expenditure under the R150 per day scenario over an 8 year period is similar to each of the following machinery or implements:

- 1.5 x combined harvester with a three row snapper head (90-150kW). New technology in combine harvesters reduces the amount of grain spills during harvest which means that almost no seasonal workers are required during harvesting.
- 1.2 x 212 kW tractors, which reduce the amount of tractor drivers required for land preparation.
- 2 x 100 kW tractors with 2 x 8 row planters which reduce the number of tractor drivers and seasonal workers required during the planting period.

In practical terms, increased labour expenditure does not necessarily mean that farm businesses will mechanise, since the financial position might not allow for the transformation process. The latter specifically refers to the cost of capital. The reality is that some farmers will simply not be able to absorb these increases in labour expenditure and will have to quit production.

Figure 27 illustrates the return to family living under each wage rate scenario. The baseline (red line) represents the current state. The return to family living is the difference between farm receipts and all cash expenses, interest, depreciation, taxes and principal payments. The cost of living or farm owner remuneration and re-investment cost into the farm business is **not** included in the return to family living.

Figure 27: The impact of various wage rate scenarios on the return to family living



The baseline illustrates that in 2014 and 2017 the return to family living will run into a deficit that exceeds R75 000 and R155 000 respectively. The remainder of the baseline period illustrates that very little cash is available for re-investment in the farm business.

Scenarios 2 to 4 show a negative return to family living from 2014 towards the end of the baseline period, meaning that there is no incentive to continue agricultural production.

5. Economy wide results

This section reports results from a computable general equilibrium model. The model is a comparative static model, which compares results from the base situation to a situation where all the adjustments in the economy have taken place following the wage rate increases. The model includes the entire economy, i.e. it takes general effects, as opposed to partial (industry) effects, into account. The scenarios are similar to those indicated in Table 4, i.e. a R10, R20, and R30 increase in the current wage rates, and minimum and maximum wage rates of R70 and R150 per day respectively. The model distinguishes between unskilled and skilled agricultural workers. Unskilled agricultural workers represent predominantly seasonal labour. It is assumed that skilled labour is fully employed and unskilled labour is not fully employed; hence by fixing the wage rates of unskilled labour there will be adjustment in demand for unskilled labour.

The following general results are observed (results are for the R20 increase):

- Demand for unskilled agricultural labour decreases notably (decline of between 7.8% and 10.5% depending on the province), whereas demands for capital, land and skilled labour remain constant because of the assumption of full employment. Demand for unskilled non-agricultural labour decreases slightly because of the general dampening of the economy (decline of between 0% and 0.05%).
- Because of the minimum wage rate increase, the incomes of all unskilled agricultural labour increase (by 18.9%), whereas incomes of skilled agricultural labour generally decrease (changes between 1.0% and -3.2% depending on the province). The wage rates of non-agricultural skilled labour also decrease negligibly because of the general dampening of the economy (between 0.05% and 0.08%).
- There is a general contraction of the agricultural industries. This is reflected in the decrease of production of all agricultural products (between 0.1% and 1.4% depending on the product) and the general decrease in output of agricultural industries (changes between 0.4% and -3.3% depending on the industry).
- There is a decrease in exports of all agricultural and food products (between 0.8% and 2.8% depending on the product) and an increase in imports of all agricultural and food products (between 0.2% and 1.5%). There is therefore a negative impact on the trade balance.
- Net government income decreases by 0.3% because of the loss in income tax revenue.
- There is upward pressure on producer and purchasers' prices of all agricultural and food products (increase between 0.02% and 1.25%). Price increases of secondary and tertiary sector products are relatively smaller than those in the primary sector.
- Because of the contraction of the agricultural industries the rates of returns to capital and land and the wage rate of skilled labour all show small decreases (between 0.1% and 1.23% depending on the factor).
- Household incomes of poor households generally increase (between -0.04% and +2.63% depending on the household), whereas household incomes of rich households generally decrease (between -0.44% and +0.1%). Household expenditures follow a similar pattern.
- Welfare estimates for poor agricultural households increase (between 0 and 0.04), but it decreases for all other households (between 0 and 0.17), including poor non-agricultural households (between 0 and 0.03) because they now face higher food prices without wage increases.

When the substitutability between different factors such as different labour groups and between labour and capital is increased modestly, the decrease in demand for unskilled agricultural labour could be as high as 28%. It is recognised that not all industry can be mechanised to the same extent or substitute unskilled labour for skilled labour, so the real decrease in demand for unskilled agricultural labour when the minimum wage increases by

R20 could be between 10% and 28%. Agricultural and food price increases are also larger if there is a greater level of mechanisation or switch to skilled labour. The most interesting result in this scenario is that all households (poor and rich, agricultural and non-agriculture) experience a decrease in household income. Returns to land still increases slightly, but incomes for capital and all labour groups decrease. Welfare estimates also confirm that all households are worse off if the minimum wage increases in the presence of greater substitutability between different factors of production.

6. Regional analysis of shadow prices for labour[7]

This section reports shadow prices of labour for four representative agricultural regions in the Western Cape. Four regions were selected which are fairly representative of all the high value crop production regions which are the main contributors to the agricultural GDP of the province. These are:

- Olifants River – Wine Grapes
- Moorreesburg – Wheat and livestock
- Hex River – Table grapes
- Ceres – Mixed fruit farms (Pome fruit and Stone fruit)

Dynamic linear programming models (DLP) were used to calculate the shadow price of labour in the selected regions. The shadow price can be defined as the value of an additional unit of a scarce input (input which is already used to its available limit). For instance if a constraint limits the amount of labour available to you to e.g. 40 hours per week, the shadow price will tell you how much you should be willing to pay for an additional hour of labour. If your shadow price (calculated by the DLP model) is R10 per labour hour for the labour constraint, for instance, you should pay no more than R10 an hour for additional unit of labour. Labour costs of less than R10/hour will increase the objective value (positive financial leverage for **employing more labour**); labour costs of more than R10/hour will decrease the objective value (net profit). Labour costs of exactly R10 will cause the objective function value to remain the same and therefore there will be **no incentive to employ more labour**.

Table 19 shows the results of the modelling of these shadow prices in four regions of the Western Cape. As expected, the more extensive wheat and mixed farming regions are least able to afford an increase in the cost of labour as they are currently paying almost exactly as much as the return to labour in their enterprises. Increasing the minimum wage for these farmers will, therefore, lead to structural changes that will have wider implications for agriculture in the Western Cape.

[7] Our appreciation to Dr. Daan Louw from OABS who compiled the more detailed document: 'Shadow prices of farm labour for selected regions in the Western Cape (2012)' for inclusion in this study.

Table 19: Shadow prices of labour, Western Cape, 2012

Region and commodity	Case study	Shadow price of labour
Olifants River – wine grapes	Two representative farms of 22 ha and 86 ha respectively. Only one shadow price reported: an average for the small and the large farm	R10.34 per hour or R93.14 per 9 hour working day (R23 per day above the minimum wage)
Moorreesburg – wheat and livestock	1010 ha wheat farm (rotation with medics); 1300 sheep	R8.31 per hour or R74.77 per day (about R5 higher than current minimum wage). Little scope for an increase in wages
Hex River region – table grapes	17 representative table grape farms	R11.41 per hour or R102.77 per 9 hour work day.
Ceres region – mixed fruit farming (pome and stone fruit)	14 representative farms which are embedded in a model of the Ceres Koekedouw irrigation region	R11.91 per hour or R107.19 per day which is about R37 per day higher compared to the minimum wage

Source: Louw, 2012

7. The farmers' vs. the workers' dilemma

In this report the focus has been on the farm-level and wider impact of higher wages for workers in selected industries in agriculture. Naturally, higher wages will affect the whole agricultural industry and therefore the first version of the BFAP labour model that was developed for the National Planning Commission has been refined to represent more than 95% of the economic activity in agriculture. This was used to generate the total impact on agriculture if wages were to increase to R150/day: this is referred to as the farmers' dilemma below.

However, the ability of a typical household in the Western Cape to make a living is as important a consideration: this aspect has also been analysed and is presented below as the workers' dilemma.

7.1 The farmers' dilemma

Table 20 presents a summary of the number of permanent and seasonal workers employed in each of the major categories in agriculture as well as the total estimated compensation paid out to farm workers.

Table 20: Employment in agriculture

	Number of workers			Wages (R million)		
	Permanent	**Seasonal**	**Total**	**Permanent**	**Seasonal**	**Total**
Horticulture	180 420	282 178	462 597	4 994	3 679	8 673
Field crops	49 725	29 731	79 456	1 734	55	1 165
Livestock	139 465		139 465	3 781	-	3 781
TOTAL	**369 610**	**311 908**	**681 518**	**10 509**	**3 734**	**13 619**

Source: BFAP labour model

The total compensation to farm workers is estimated at R13.6 billion in the BFAP labour model, compared to the official value of R12.6 billion reported by DAFF. To this point, a recent agricultural census in the Limpopo Province conducted by SIQ provided the following results (**Error! Reference source not found.**).

Table 21: Limpopo agricultural census

	Census by SIQ (2012) (Ha)	Stats SA (2007) (Ha)	% Difference	Potential under-estimated value
Wheat	32 218.71	12 985.00	148.12%	R 77 896 526
Potato	14 197.08	8 526.00	66.52%	R 743 479 112
Tomato	12 243.47	4 711.00	159.89%	R 3 163 637 400
Cabbage	3 034.10	237	1180.21%	R 572 846 080
Avocado	10 811.72	*7568	42.86%	R 2 432 790 000
Mango	10 813.07	*4756	127.36%	R 1 514 267 500
Citrus	36 079.18	19 643.00	83.67%	R 2 350 373 740
				R 10 855 290 358
* 2012 Estimates from Subtrop (No data available from Stats SA for 2007)				

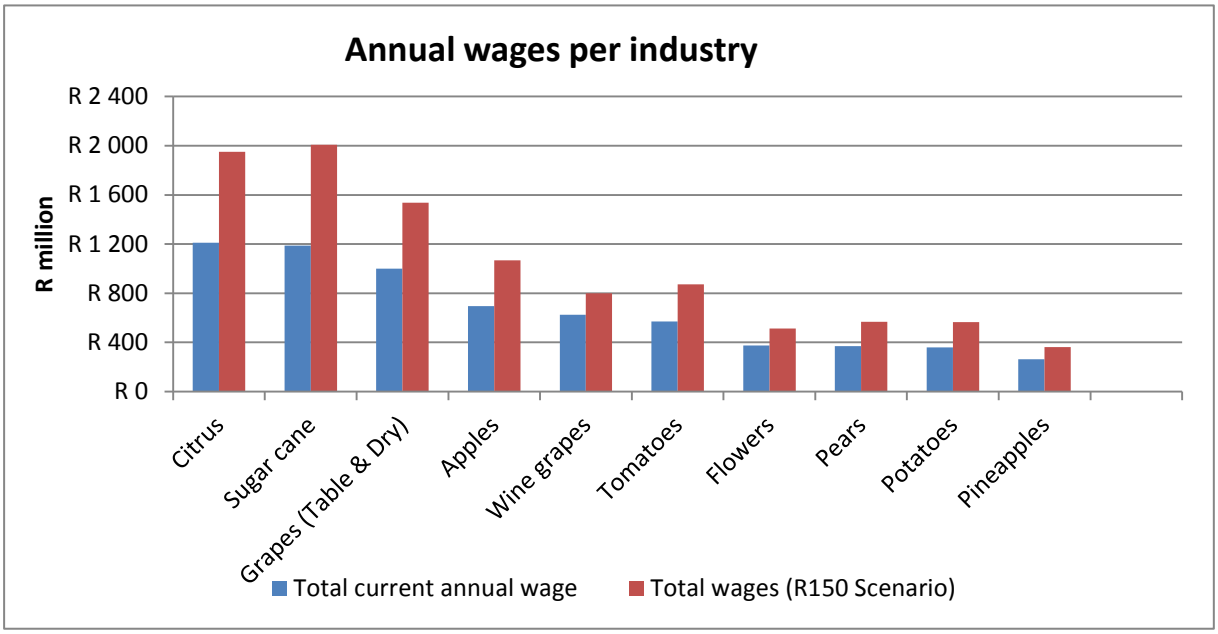
Source: SIQ 2012

According to these results, the gross value of agricultural production in the Limpopo province is underestimated by approximately R10 billion or close to 20%. Labour intensive industries such as the tomato and mango industries are underestimated by more than 100%.

It is thus obvious that agriculture makes a significantly larger contribution to the country's gross domestic product and rural employment than is currently reflected in official statistics.

The BFAP labour model was applied to simulate the impact on the total wage bill of agriculture if the minimum wages were to rise to R150 per day. Exactly the same methodology that was applied in the previous sections was applied in this exercise. Figure 28 summarizes the impact on annual wages per industry. The total impact of an increase in minimum wages to R150 per day amounts to an increase in the cash costs of labour of R3.5 billion for the top ten agricultural industries ranked in terms of total employment.

Figure 28: Annual wages per industry



Source: BFAP labour model

The impact of an increase in the minimum wage to R150/day will increase the total compensation bill of agriculture from R13.6 billion to R20.8 billion. This represents an increase of 53% or R7.2 billion. From the farm level analyses it is evident that the labour intensive farms will not be able to pay a minimum wage of R150/day. Most industries could absorb an increase of approximately R20 per day.

However, in the analyses that follow, the workers' dilemma is highlighted, which is a scenario of just making ends meet. The gap between what farmers can pay and what consumers require to make a basic living is large, and a creative policy framework together with extremely efficient management on farms is required to avoid what currently seems inevitable, namely the shedding of jobs in agriculture. The process of mechanisation in any industry is a given, but the way in which this materialises is key to unlocking the growth potential of the particular industry. With the given time frame in the current wage negotiations, representing industries may not have enough time to respond to the sudden cash flow shock due to a rise in wages, whilst the demand for an increase in compensation is

unlikely to be accommodated by increased returns, efficiency, productivity and profitability in agriculture.

Industries could argue that equity spend on increased wage rates should rather be spend to increase efficiency, whilst increasing human capacity (more skilled labourers), this in turn could result in higher returns. This “concept” is unfortunately the product of mechanisation, but even more so an outcome of producing more from less.

This phenomenon re-emphasizes the importance of the 2030 strategy that was published by the National Planning Commission in 2011. For this strategy, BFAP clearly identified the winning industries and the potential to expand and intensify South African agriculture from a natural resource potential as well as a marketing potential and thereby create close to 1 million jobs. Knowing that South Africa has un-cultivated arable soils suitable for expansion and intensification as well as additional sources of water under efficient water management systems, mechanisation should not necessarily be seen as a threat against manual labour; it should rather be thought of as the opportunity to increase the output delivered per worker and stimulate the agro-economic sector under a favourable economic and political environment. Increases in production could result in building human capital, where agriculture will employ more skilled, well paid and young workers. This is the basic spin-off effect of increased productivity and efficiency due to mechanisation and intensification. Markets and the demand for food in Africa are growing at a rapid rate, these markets and trends should be seen as an opportunity for expansion for the South African produce, especially high value products like apples where the African export market is spiralling.

On-farm mechanisation will in most cases result in the shedding of seasonal labour. It was calculated that approximately R3.7 billion is annually spend on seasonal agricultural labour wages. If 50% of these workers are taken from the system, the economy would lose R1.8 billion annually. But if agriculture were to intensify and expand under a favourable economic and political environment, it could result in increased efficiency and productivity due to mechanisation. The seasonal labourers could be placed in the permanent labour position, increasing the remuneration bill, which will have vast positive spill off effects in rural communities – more entrepreneurs due to more buying power from the local communities, stimulating the entrepreneurial economy. There would be more emphasis on the workers’ value to the farm, rather than just the idea of wages. The reverse of this is also true, what is the value of the farmer to the community or workers, providing housing, transport, clothing and other benefits.

7.2 The workers’ dilemma

The history of food inflation in South Africa is presented in this section based on three food price index measures for the period January 2008 to October 2012: the official Consumer Price Index for Food (CPIF), the ’basic food basket’ index and the ‘BFAP Poor person’s’ index. The methodologies behind these food price indexes are explained in more detail below.

7.2.1 The official CPIF

The official CPIF is based on an extensive list of food products within the following categories (number of indicator products in each category indicated in brackets): Bread and cereals (15), meat (23), fish (7), dairy (16), eggs (1), fats and oils (4), fruit (8), vegetables (30), sugar, jam, honey, chocolate and confectionery (6), other food products (e.g. sauces, condiments, baby food) (15), coffee and tea (3), mineral waters, soft drinks and juices (5). The CPIF gives an indication of food inflation as experienced by the 'average' consumer in South Africa and is calculated based on expenditure weights obtained through the 2005/2006 Statistics South Africa Income and Expenditure Survey. This data series was obtained from the South African Reserve Bank (KBP7145N, seasonally adjusted, with data available up to October 2012).

7.2.2 The 'basic food basket' index

In order to develop an understanding of poorer consumers' inflation experience and impacts the 'basic food basket' index weighted '5 most commonly consumed food items' index were included in this discussion. The historical time frame for the calculation of these index values was selected based on the availability of monthly food price data. The 'basic food basket' index as measure of food inflation is used in the quarterly Food Price Monitor publications of the National Agricultural Marketing Council (NAMC) (refer to www.namc.co.za for more detail), as well as the annual Food Cost Review published by the NAMC.

The 'basic food basket' index reflects the cost of a food basket comprising of basic food items that is largely based on the food items that were selected by the Food Price Monitoring Committee in 2003, based on their opinion of the dominant food items purchased by middle income to poor consumers (NAMC, 2004:43). This index was calculated based on the official food price database used by the NAMC for food price monitoring activities.

Table 22: Food items included within the 'basic food basket' index

Category:	Number of indicator products	Products:
Bread & cereals	5	White bread (700g loaf) Brown bread (700g loaf) Super maize meal (5kg) Special maize meal (5kg) Rice (2kg)
Meat	3	Fresh chicken (1kg whole fresh chicken) Frozen chicken (1kg whole frozen chicken) Stewing beef (1kg beef chuck)
Fish	1	Tinned fish
Dairy	1	Long life full cream milk (1 litre)

Eggs	1	Extra-large eggs (1.5 dozen)
Oils and fats	3	Sunflower oil (750ml) Brick margarine (500g) Peanut butter (400g)
Fruit	3	Apples (1kg) Bananas (1kg) Oranges (1kg)
Vegetables	5	Onions (1kg) Cabbage (1kg) Potatoes (1kg) Tomatoes (1kg) Tinned butter beans (410g)
Coffee & tea	2	Instant coffee regular (750g) Ceylon tea (tagless tea bags 62.5g)

7.2.3 The BFAP Poor person's index

The 'BFAP Poor person's index' was developed based on poor South African consumers' typical portion sizes of the five most widely consumed food items in South Africa: maize porridge, brown bread, sugar, tea and full cream milk (National Food Consumption Survey - Steyn & Labadarios, 2000; Oldewage-Theron et al, 2005; National Food Consumption Survey – Nel & Steyn, 2002). The term 'most widely consumed' means that these food items are consumed by the largest share of South African adults according to the National Food Consumption Survey and other similar studies among poor South African consumers. The BFAP Poor person's index was calculated by weighing the food price data for these food items, based on the typical (cooked) daily portions of very poor consumers (as obtained from the various nutritional studies listed above), in order to calculate the cost of a 'typical daily food plate' for the poor. This index was calculated based on the official food price database used by the NAMC for food price monitoring activities.

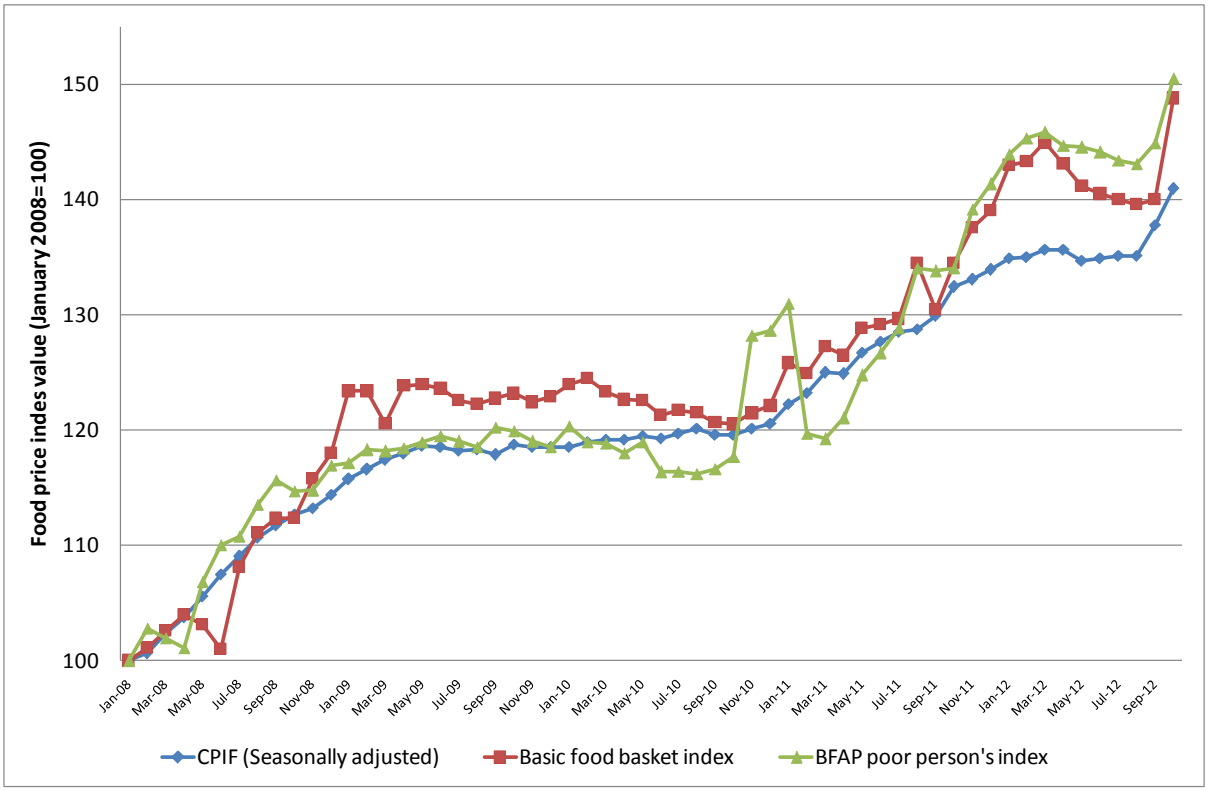
Table 23: Composition of the BFAP Poor person's index

Category	**Products**
Bread & cereals	Maize porridge (532g cooked portion) Brown bread (150g portion)
Dairy	Full cream milk (56g portion)
Sugary foods	White sugar (22g portion)
Hot beverages	Tea (2.5g dry tea portion)

7.2.4 *Comparison of indices*

A comparison of the the official Consumer Price Index for Food (CPIF), the 'basic food basket' index and the 'BFAP Poor person's' index is presented in Figure 29 below based on monthly data for the period January 2008 to October 2012.

Figure 29: Monthly food price inflation in South Africa: January 2008 to October 2012



From January 2008 food inflation in South African was characterised by roughly three phases as based on the CPIF (but closely reflected by the other two food price indices):

a) Significant food inflation from January 2008 to mid-2009

(+19% on CPIF; +24% on 'basic food basket' index; +19% on BFAP Poor person's index)

In actual values the cost of the basic food basket increased from R327 to R405 during this period, while the cost of items within the BFAP Poor person's index increased from R2.83 to R3.37 per person per day.

During this period the major contributors to food inflation within the basic food basket (with above 10% price increase) were rice, instant coffee, cabbage, margarine, butter beans, peanut butter, tinned fish, bread, eggs, Ceylon tea, onions, tomatoes, super maize meal and beef chuck. During this period the food items with significant price inflation mostly involved food types that typically add dietary diversity to consumers' food intake and thus could have had a significant negative impact on dietary diversity of especially poorer consumers. Among the staple foods bread did experience significant inflation and super maize meal relatively high inflation which can explain the observation that the weighted '5 most commonly

consumed food items' index generally had higher index values relative to the other two food price indexes as maize porridge and bread dominate the poor consumers' 'food plate'. During this period high food price inflation was observed for 5 of the 10 most commonly consumed food items by South African adults (Nel & Steyn, 2002:49[8]), namely coffee, margarine, bread, tea and maize meal.

b) Relatively stable food prices from mid-2009 to October 2010

c) Significant food inflation from October 2010 to October 2012

(+18% on CPIF and +23% on basic food basket; +28% on BFAP Poor person's index)

In actual values the cost of the basic food basket increased from R394 to R486 during this period, while the weighted food plate of '5 most commonly consumed food items' increased from R3.33 to R4.26 per person per day.

During this period the major contributors to food inflation within the basic food basket (with above 10% price increase) were super maize meal, oranges, cabbage, peanut butter, bananas, margarine, special maize meal, sunflower oil, beef chuck, instant coffee, bread, butter beans, fresh whole chicken, tinned fish. During this period high food price inflation was observed for 5 of the 10 most commonly consumed food items by South African adults (Nel & Steyn, 2002:49), namely maize meal, margarine, coffee, bread and chicken. During this period the inflation experienced by poorer consumers (as measured by the basic food basket index and the weighted '5 most commonly consumed food items' index were more severe than the trend of the CPIF, mainly attributed to the significant inflation on staple foods (maize meal and bread). The spike in the weighted '5 most commonly consumed food items' index around late 2010 / early 2011 can be attributed to particularly high bread prices during these months.

7.3 Food affordability for low income consumers in the Western Cape

In order to analyse food affordability from the point of view of low income consumers in the Western Cape it was necessary to construct a number of potential household income scenarios (see Table 24 for detail). The scenarios were based on different potential income sources (e.g. child grants, old age pension and wages) and different potential daily wage levels (see Table 4).

According to Statistics South Africa's official Consumer Price Index (CPI) 2008 weights for the total country (StatsSA, 2008) the poorest 20% of consumers in South Africa (called the 'very low expenditure group' with annual expenditure of up to R14 564 or R1 214 per month in 2005/2006) spent around 41.61% of their total expenditure on food and non-alcoholic

[8] Nel JH & Steyn NP (2002) Report on South African food consumption studies undertaken amongst different population groups (1983-2000): Average intakes of foods most commonly consumed. The Department of Health. Pretoria.

beverages. Thus, is this section the assumption was made that the target consumer group spends 41.61% of their total income on food and non-alcoholic beverages.

As a low income household in the Western Cape was the basis for calculations in this section, it was necessary to construct a 'typical' rural household. The composition of a typical rural household in the Western Cape was based on an analysis of data obtained from Statistics South Africa's General Household Survey 2011 (data obtained from the StatsSA Interactive Superweb facility). Based on these analyses a typical Western Cape rural household was assumed to consist of 2 adults and 2 children, since the calculations indicated that:

- 44% of rural Western Cape households have 4 or 5 members (average household size of 4.7);
- 61% of rural Western Cape households have 2 adults (average number of adults 1.7);
- 67% of rural Western Cape households have 2 or 3 children younger than 18 (average number of children 2.3).

Further analyses based on the General Household Survey 2011 (data obtained from the StatsSA Interactive Superweb facility), indicated that the weighted average monthly household income of the poorest 50% of rural Western Cape households was around R2 015 per household per month. The following potential monthly household income scenarios were placed around this average income level: 1 wage worker @ R84.9/day (R1 783/household/month); 1 wage worker @ R94.9/day (R1 993/household/month); 2 child grants and 1 wage worker @ R70/day (R2 030/household/month); 1 wage worker @ R104.9/day (R2 203/household/month); and 2 child grants and 1 wage worker @ R84.9/day (R2 343/household/month). These most likely income options are highlighted in yellow within Table 25.

7.3.1 Approach 1: The BFAP poor person's index approach to analyse food affordability for low income consumers in the Western Cape

As explained above, the 'BFAP Poor persons' index' is based on a particular daily food plate, representing poor South African consumers' typical daily portion sizes of the five most widely consumed food items in South Africa: maize porridge (532g cooked portion), brown bread (150g portion), sugar (22g portion), tea (2.5g portion) and full cream milk (56g portion) (the typical portion sizes were obtained from reputable scientific sources as explained above). The cost of a 'typical daily food plate' for the poor is calculated by combining official StatsSA food price data with the actual portion size weights obtained from literature.

In October 2012 the cost of the daily food plate of the BFAP Poor persons' Index amounted to:

- R4.26 per person per day; or
- R127.80 per person per month; or

- R460.08 per household of 2 adults and 2 children per month.

As evident from the results presented in Table 24, most of the income scenarios can afford a food expenditure level of R460 per month. However, the problem is that this food plate only provides around 2500kJ of energy (thus only around 40% of recommended energy intake) and furthermore it is extremely inadequate in terms of nutrient diversity.

A household with a monthly income level of R2 015 (i.e. the average monthly household income of the poorest 50% of rural Western Cape households according to the General Household Survey 2011) could have only R378 per month available for further food expenditure after purchasing this food plate, in order to increase their energy intake and / or improve the dietary diversity of the people in the household.

Table 24: An analysis of food affordability for low income consumers in the Western Cape – summary of results

Sources of monthly household income:	Monthly income amount:	Food expenditure per month (41.61%):	APPROACH 1: 5 food items in BFAP Poorpersons' index (R4.26 ppp day):		APPROACH 2: 'Basic food basket' approach:	APPROACH 3.1: Balanced daily food plate 'option 1' (10323 kJ) (R65.50 ppp day):		APPROACH 3.2: Balanced daily food plate 'option 4' (6318 kJ) (R21.37 ppp day):	
			Cost of 5 food items per hh/month:	Difference (i.e. balance available for further food expenditure):	How many basic food baskets can h/h afford per month? (R455/food basket)	Balanced daily food plate 'option 1' cost p h/h p month:	Difference (i.e. balance available for further food expenditure):	Balanced daily food plate 'option 4' cost p h/h p month:	Difference (i.e. balance available for further food expenditure):
2 child grants only (R280 x 2)	R 560	R 233	R 460.08	R -227.06	0.5	R7074.00	R -6,840.98	R2307.96	R -2,074.94
1 old age pension only	R 1,200	R 499	R 460.08	R 39.24	1.0	R7074.00	R -6,574.68	R2307.96	R -1,808.64
1 wage worker @ R70/day	R 1,470	R 612	R 460.08	R 151.59	1.3	R7074.00	R -6,462.33	R2307.96	R -1,696.29
2 child grants & 1 pension	R 1,760	R 732	R 460.08	R 272.26	1.5	R7074.00	R -6,341.66	R2307.96	R -1,575.62
1 wage worker @ R84.9/day	R 1,783	R 742	R 460.08	R 281.78	1.5	R7074.00	R -6,332.14		R -1,566.10
1 wage worker @ R94.9/day	R 1,993	R 829	R 460.08	R 369.17	1.7	R7074.00	R -6,244.75		R -1,478.71
2 child grants & 1 wage worker @ R70/day	R 2,030	R 845	R 460.08	R 384.60	1.7	R7074.00	R -6,229.32		R -1,463.28
1 wage worker @ R104.9/day	R 2,203	R 917	R 460.08	R 456.55	1.9	R7074.00	R -6,157.37		R -1,391.33
2 child grants & 1 wage worker @ R84.9/day	R 2,343	R 975	R 460.08	R 514.80	2.0	R7074.00	R -6,099.12	R2307.96	R -1,333.08
1 wage worker @ R114.9/day	R 2,413	R 1,004	R 460.08	R 543.93	2.1	R7074.00	R -6,069.99	R2307.96	R -1,303.95
2 child grants & 1 wage worker @ R94.9/day	R 2,553	R 1,062	R 460.08	R 602.18	2.2	R7074.00	R -6,011.74	R2307.96	R -1,245.70
2 child grants & 1 wage worker @ R104.9/day	R 2,763	R 1,150	R 460.08	R 689.56	2.4	R7074.00	R -5,924.36	R2307.96	R -1,158.32
2 child grants & 1 wage worker @ R114.9/day	R 2,973	R 1,237	R 460.08	R 776.94	2.5	R7074.00	R -5,836.98	R2307.96	R -1,070.94
1 wage worker @ R150/day	R 3,150	R 1,311	R 460.08	R 850.64	2.7	R7074.00	R -5,763.29	R2307.96	R -997.25
2 child grants & 2 wage workers @ R70/day	R 3,500	R 1,456	R 460.08	R 996.27	3.0	R7074.00	R -5,617.65	R2307.96	R -851.61
2 wage workers @ R84.9/day	R 3,566	R 1,484	R 460.08	R 1,023.65	3.1	R7074.00	R -5,590.27	R2307.96	R -824.23
2 child grants & 1 wage worker @ R150/day	R 3,710	R 1,544	R 460.08	R 1,083.65	3.2	R7074.00	R -5,530.27	R2307.96	R -764.23
2 wage workers @ R94.9/day	R 3,986	R 1,658	R 460.08	R 1,198.41	3.4	R7074.00	R -5,415.51	R2307.96	R -649.47
2 child grants & 2 wage workers @ R84.9/day	R 4,126	R 1,717	R 460.08	R 1,256.67	3.5	R7074.00	R -5,357.25	R2307.96	R -591.21
2 wage workers @ R104.9/day	R 4,406	R 1,833	R 460.08	R 1,373.17	3.8	R7074.00	R -5,240.75	R2307.96	R -474.71
2 child grants & 2 wage workers @ R94.9/day	R 4,546	R 1,892	R 460.08	R 1,431.43	3.9	R7074.00	R -5,182.49	R2307.96	R -416.45
2 wage workers @ R114.9/day	R 4,826	R 2,008	R 460.08	R 1,547.94	4.1	R7074.00	R -5,065.98	R2307.96	R -299.94
2 child grants & 2 wage workers @ R104.9/day	R 4,966	R 2,066	R 460.08	R 1,606.19	4.3	R7074.00	R -5,007.73	R2307.96	R -241.69
2 child grants & 2 wage workers @ R114.9/day	R 5,386	R 2,241	R 460.08	R 1,780.95	4.6	R7074.00	R -4,832.97	R2307.96	R -66.93
2 wage workers @ R150/day	R 6,300	R 2,621	R 460.08	R 2,161.35	5.4	R7074.00	R -4,452.57	R2307.96	R 313.47
2 child grants & 2 wage workers @ R150/day	R 6,860	R 2,854	R 460.08	R 2,394.37	5.9	R7074.00	R -4,219.55	R2307.96	R 546.49

7.3.2 Approach 2: A 'basic food basket' approach to analyse food affordability for low income consumers in the Western Cape

The concept of the 'basic food basket' (used in the quarterly NAMC Food Price Monitor) was explained above, as a selection of food items representing the dominant food items purchased by middle income to poor consumers which includes items within all the major food groups. It should be noted that this 'basket' of food groceries was not compiled based on nutritional quantity and quality considerations, but rather to serve as an index value to monitor food prices of a variety of food items over time. In October 2012 the cost of the 'basic food basket' amounted to R485.90.

According to the results presented in Table 24, most of the income scenarios can afford at least one 'basic food basket', with the following range of results:

- A poor household with an income level of R1 200 per month (i.e. food expenditure of R499) can afford roughly one 'basic food basket';
- On the upper end of the spectrum a household with an income level of R6 860 per month (i.e. food expenditure of R2 854) can afford roughly six 'basic food baskets' per month;
- A household with a monthly income level of R2 015 (i.e. the average monthly household income of the poorest 50% of rural Western Cape households according to the General Household Survey 2011) can afford 1.7 'basic food baskets' per month.

7.3.3 Approach 3: A 'balanced daily food plate' approach to analyse food affordability for low income consumers in the Western Cape

A team of qualified nutritionists (led by Prof HC Schönfeldt at the University of Pretoria) recently compiled a series of 'balanced daily food plates', to serve as a basis for the calculation of the cost of an individual's ideal daily food intake. The composition of food choices was based on the National Food Consumption Survey (Steyn & Labadarios, 2000; Nel & Steyn, 2002) and portion sizes were estimated according to Food Based Dietary Guidelines (Department of Health, 2012). Nutrient calculations were done using package information, the South African Food Composition Tables (Wolmarans et al., 2010) and the Medical Research Council (MRC) Food Quantities Manual (Langenhoven et al., 1991). In terms of recommended energy intake, the recommended daily energy intake of adults range between 10000 and 12000 kilojoules, with a value of around 8000 kilojoules for children.

The team of nutritionists compiled 4 possible 'balanced daily food plate' options to account for consumers with different potential food expenditure levels. These options are summarized in Table 25 below. As is evident from the nutritional information in the Table, the total energy values of options 2 to 4 is below the recommended levels for adults, but it represents affordable options for consumers at various income levels. The current cost of the four 'balanced daily food plate' options were calculated based on the official October

2012 prices released by StatsSA, supplemented with current retail prices for those product not included in the StatsSA list of monitored food prices.

Table 25: Examples of 'balanced daily food plate' options

Food plate option:	Visual representation:	Energy content:	Protein content:	Iron content:
1 (Best option)		10323kJ	115g	20mg
2		8507kJ	92g	23mg
3		6699kJ	76g	16mg
4		6318kj	71g	16mg

As shown in Table 25, the 'balanced daily food plate' option 1 is the ideal option among those presented, as it was compiled to provide adequate energy and dietary diversity for an adult through affordable food choice options. The present cost of such a 'balanced daily food plate' amount to R65.50 per person per day, or R1 965 per person per month, or R7 074 per household per month (consisting of 2 adults and 2 children). The results presented in Table 24 clearly illustrates that NONE of the income scenarios can afford this particular 'balanced daily food plate' for their households given their monthly income levels.

Now, considering the 'balanced daily food plate' option 4 in Table 25, the present cost of such a 'balanced daily food plate' amount to: R21.37 per person per day, or R641.10 per person per month, or R2 307.96 per household per month (consisting of 2 adults and 2 children). Thus, assuming food expenditure levels of around 41% only households with a monthly income level of around R5 630 will be able to afford this 'balanced daily food plate' option. Within the income scenarios presented in Table 4, only two of the income scenarios meet these criteria:

- A household with two full time wage workers earning R150/day each (i.e. earning R6 300 per month); and
- A household with two full time wage workers earning R150/day each supplemented with two child grants (i.e. earning R6 360 per month)

However, even though this daily food plate is nutritionally diverse to a certain degree, it only contains about 61% of the energy content of the 'balanced daily food plate' option 1 and it lacks dietary diversity when compared to 'balanced daily food plate' option 1. At the very least consumers with this type of daily food plate will most probably be forced to supplement their energy intake with additional staple food portions. However, according to the results in Table 24, the two income scenarios who could afford this 'balanced daily food plate' will only have between R300 and R600 left for further food expenditure to improve the energy content and dietary diversity within their daily meals.

7.4 Conclusion

The analyses presented in this section clearly illustrate the expense of a balanced daily food intake, given current food prices in South Africa. None of the hypothetical typical rural Western Cape wage earning households presented in this section can actually afford an energy adequate and nutritionally balanced daily food intake (as seen in 'balanced daily food plate' option 1 above) – not even a household with two adults earning a wage of R150 per worker per day. Furthermore, very few of the hypothetical typical rural Western Cape wage earning households can even afford a relatively diverse daily food intake (as seen in 'balanced daily food plate' option 4 above), which only provides about 61% of ideal energy content. Only households with at least two adults earning R150 per worker per day could afford such a food composition. The general trend is characterized by a decrease in nutrient density and an increase in energy provided by starch (staple) foods and food expenditure levels decrease.

8. Synthesis

South Africa's agricultural sector has long been dependent on cheap and unskilled labour. This is a two-edged sword, but is part of the reality faced by the sector. However, it is becoming clear that this system will not survive into the future, which will be characterised by fewer, more skilled and better paid workers. The transition between these production systems is already in motion, and has many policy implications. One thing that has become evident with the current spate of labour unrest in the Western Cape rural areas is that public policy is not geared to ease this transition for either the workers or the farmers: in fact there is hardly any evidence that the problem itself is recognised among the different role players.

The main purpose of the analysis conducted in this study is to provide information that is useful to those role players in deciding on what to do next. In this regard, the results are sombre. While the situation of permanent farm workers is not cause for immediate concern, especially on the intensive fruit farms that were analysed, the reality is different when it comes to seasonal workers. Permanent workers seem to earn more than the current minimum wage on these farms, and on potato and the mixed wheat/sheep farm that was analysed. The position of seasonal workers seems to be different, however, and even on the fruit farms they earn at most around R84 per day compared to the minimum wage of just less than R70 per day. Recall, however, that these are wages as paid on a 'typical' farm, and are not recorded wages. Nevertheless, where recorded wages are available the results seem to support this contention.

So there is some scope to increase the minimum wage. From the analysis, however, it is evident that if average wages increase by more than R20/day (i.e. to around R104.00 per day), many of the typical farms will be unable to cover their operating expenses, and hence not be able to pay back borrowings or to afford entrepreneurs remuneration. The real problem is that even at what seems to be an unaffordable minimum wage of R150.00 per day most households cannot provide the nutrition that is needed to make them food secure. The potential conflict between what we have termed the dilemma of the farmer and the dilemma of the worker can be highly disruptive as has been witnessed in these past weeks, and will have to be managed with circumspection.

It is also evident from the analysis that the fact that a negative net farm income (NFI) is generated under scenarios where wages rise by more than R20 per day from the base case scenario does not imply that there will be no farming in South Africa in years to come. What it does mean is that structural adjustments will be made to accommodate the higher wage rates. These structural adjustments include mechanization and consolidation of farming units to become more efficient. For example, in the case of potatoes, the BFAP FINSIM model clearly shows that a potato farm needs to be at least 150ha in size to achieve a positive NFI under a R150/day wage scenario and then principal payments, income taxes and family living cost still need to be deducted from the net farm income. Thus a typical potato farm that is smaller than 150ha will not be financially sustainable.

This does not imply that the larger farms are always more cost efficient, but the larger farming units have the ability to mechanize and as wages rise, mechanization becomes more

attractive. This is a general phenomenon in global agriculture and the trend of larger farming units that are more mechanized with more skilled labour that is compensated at a significantly higher rate will continue.

Structural adjustments will not occur overnight. The BFAP sector model shows that total levels of production will decline compared to the base case scenario and commodity prices will rise. In other words, higher wages will not go without higher food prices due to higher costs of production in the medium term. As structural adjustments take place over the long run, the impact on production and price will be negligible. These long term trends are not captured in the sector model.

It is difficult to estimate how much labour will be shed throughout the industry if minimum wages are increased, since there are a number of factors that have to be taken into consideration that could not be covered in this study due to time and budget constraints. One important factor to consider will be a mechanization threshold for each industry that many of the role players have already calculated and considered as an option. The study highlighted some cases of the costs of mechanization. Yet, not all industries can mechanize and therefore one can anticipate that for highly labour intensive industries that cannot mechanize, the structural adjustments will be greater and the loss in job opportunities will be significantly higher.

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