# **Agricultural producer responses to minimum wage changes**

Michael Kilumelume[[1]](#footnote-1),[[2]](#footnote-2), Rulof Burger1, Dieter Von Fintel1,[[3]](#footnote-3),[[4]](#footnote-4), Mariles Piek2 and Seiro Ito[[5]](#footnote-5)

**ABSTRACT**

The South African agricultural sector experienced a significant increase in minimum wages of about 52% in 2013. This study employs a difference-in-differences estimator to assess the channels through which farm owners internalised the additional costs associated with the increase in minimum wages. Our study is significant at two primary levels; Firstly, in addition to the employment channel, which South African minimum wage literature extensively focuses on due to difficulties in accessing micro firm-level data, this paper investigates the other firm-level margins used to internalise the additional costs associated with minimum wage increases. Secondly, we use administrative tax data to study the effects of minimum wage changes, which provides a large sample size and increased accuracy relative to survey data.Our results show that low-wage farms experienced a rise in average wages after the minimum wage increase and responded by significantly reducing their employment levels. Although we find no evidence of capital-labour substitution, we show that the increase in minimum wages did not affect the sales revenues, implying an increase in efficiency.

**Key words:** minimum wage, demand-side, Agriculture, labour cost, employment, revenue, efficiency

**JEL classification:** C21, C23, J23, J38

1. **Introduction**

Since the seminal work of Card & Kruger (2000), the new minimum wage literature has prompted intense debate as to whether minimum wages have substantial effects on low-wage employment. A range of empirical studies with conflicting results have broadened the theoretical consensus about minimum wages and economists are changing their views about the cost of reduced employment associated with minimum wages (Geide-Stevenson & La Parra-Perez, 2022). Pertinently, there has been a paucity of evidence from developing countries, where minimum wages have muted effects on employment because of non-compliance with the legislation (Bhorat *et. al.*, 2017). While non-compliance is one way that firms can respond to minimum wage increases, complying firms either change employment or adjust production methods - such as substituting of labour with capital or reducing profitability. This paper investigates firm-level responses to agricultural minimum wages in South Africa, a topic which has not been explored in developing country contexts.

We identify two main streams of minimum wage literature - the supply and demand-side streams. Supply-side studies employ household survey data to investigate the impact of minimum wage changes on wages and employment, at the individual level. A common finding presented by the supply-side studies is that the minimum wages increase workers' earnings at the bottom of the wage distribution. While many empirical studies show that minimum wages decrease employment (Brown et al., 1982; Paredes and Riveros, 1989; Chacra Orfali, 1990), some studies find that minimum wages have no significant impact, and others present positive effects on employment (Card and Krueger,1993, Martinez et al., 2001; Miranda, 2013).

The demand-side literature presents a broader picture of the effects of minimum wage increases on the economy. These studies use firm-level data, mostly producer surveys, to evaluate the impact of minimum wage changes on firm-level outcomes, including employment, wages, profits and sales revenue. Unlike the case with household survey data, firm-level data allow researchers to study the minimum wage effects on employers, workers (and sometimes consumers). Demand-side studies are relatively scarce due to the difficulties in accessing firm-level data. Moreover, the available demand-side studies have mainly focused on developed economies and the few studies on emerging economies concentrate exclusively on the manufacturing sector.

The present study contributes to the scarce demand-side literature that focus on minimum wage adjustment channels in emerging economies. Our study is significant on two primary levels. Firstly, while the South African minimum wage literature extensively focuses on the employment channel - due to difficulties in accessing micro firm-level data - our study explores other firm-level margins that shift in response to minimum wage changes. Secondly, we use administrative tax data to study minimum wage effects. While administrative tax data are challenging to access and require specific expertise to make them usable for research, they have many attributes that make them desirable compared to survey data. These attributes include increased accuracy of reporting, larger sample sizes, and access to sensitive information that respondents are less likely to provide in a survey. However, it is worth noting that despite these desirable attributes, the major disadvantage of using administrative tax data is that it excludes the informal sector, which consists primarily of micro and small-scale producers. While we acknowledge the pivotal role of informal sector in minimum wage impacts, the impacts and interactions with the informal labor market is outside the scope of this paper. It is often considered that unregulated informal firms mostly fall outside of the net of minimum wage legislation (Bhorat *et. al.*, 2017). Due to lack of enforcement and lack of firm level data, we only note the potential repurcussions of a minimum wage increase on informal sector: Disemployment impacts in the formal sector cans introduce a downward pressure on wages or an upward pressure on unemployment in the informal sector after increased labor supply inflows.

Using the fraction of workers in each firm affected by minimum wages – proportion falling below legislated thresholds – before the policy as our treatment variable, we follow Machin, Manning, and Rahman (2003) and Harasztosi and Lindner (2019) to estimate time-varying impacts on various firm outcomes. We investigate the demand-side effects of a 50% real minimum wage increase in South Africa's farming sector in 2013. Our empirical results show evidence of an increase in average wages and significant employment reductions following the minimum wage increase. We find that despite significant employment cuts, revenue and operating profit of low-wage farms remained unaffected after the minimum wage increase, indicating an increase in labour productivity.

The structure of the paper is as follows. First, we present the background of the study in Section 2. Section 3 presents the theory and empirical evidence of the effect of minimum wage adjustment channels. In Section 4, we describe the identification strategy employed in this study. In Section 5, we describe the data and present summary statistics. Our results and robustness checks are presented in Sections 6 and 7. And Section 8 concludes the paper.

1. **Background**

Before the introduction of a National Minimum Wage in 2019, minimum wages were sector-specific. Sectorial Determinations 8 and 13, regulated employment conditions and minimum wages in the agriculture sector. Agricultural minimum wages were introduced in 2003 and increased in line with inflation each year. As a result of farmworker strikes in the Western Cape province at the end of 2012, the agricultural sector experienced an increase in minimum wages from ZAR 70 to ZAR 105 per day, as of 1 March 2013[[6]](#footnote-6). This significant increase provided a good testing ground for the effects of minimum wages. In this study, we analyse the impact of the 2013 minimum wage hike on the evolution of multiple firm-level outcomes.

Supply-side studies have explored the employment effects of the 2013 minimum wage hike. They present evidence of disemployment effects (Bhorat *et al.,* 2014; Garbers *et al*., 2015; van der Zee, 2017; Piek & von Fintel, 2019, Piek *et al*., 2020). Due to the lack of firm-level data in South Africa, demand-side studies on minimum wage effects are scarce. To the best of our knowledge, only one study has explored the demand-side effects of the agricultural minimum wages in South Africa, presenting empirical evidence of a significant increase in labour costs and their spillover effects to firms exposed the 2013 minimum wage increase via supply chains (Tan, 2021). Our paper is the first to investigate other adjustment channels that farmer used in response the minimum wage hike.

1. **Theory and evidence on minimum wage adjustment channels**

Theoretical models present varying assumptions about the labour market and predictions of the effect of minimum wages on firms’ decisions. The main models used to assess the impact of minimum wages include the neoclassical competitive, monopsony, institutional and search-theoretic models (Bhaskar and To, 1999; Herr et al., 2009; Schmitt, 2013; Gorry, 2013) . These models help us to understand that there are several margins which firms can shift when responding to a binding minimum wage. They will guide us which outcome variables one should examine and covariates to control for after the rise in minimum wages.

In addition to employment adjustments, firms can internalise the minimum wage costs by cutting non-labour expenses, improving overall efficiency, or passing a portion of the costs to consumers by increasing the prices of goods produced. Failure to employ any adjustment channels can decrease profits due to increased costs induced by the minimum wage increase. Each of these responses assumes that minimum wages are adequately enforced. However, the effects are often muted because firms do not fully comply with legislation where monitoring is weak or when firms fail to pass the increased cost to consumers (Bhorat *et. al.,* 2017; Goraus-Tanska and Lewandowski, 2019; Weil, 2005).

The neoclassical competitive model presents a frictionless labour market, and as such, wage floors result in the reduction of employment in the absence of other channels (Lester 1960, Hirsch et al. 2015, Wilson 2012, Kaufman 2010, Lee and Saez 2012, Schmitt 2013). However, employment adjustment is not limited to reducing employee head count. A firm can also react by cutting the number of working hours. The firms in the neoclassical model can also respond to wage floors by cutting non-wage benefits and reducing the training costs of low-skilled workers. Where the minimum wage is binding, firms can also mitigate the minimum wage effect by reducing fringe benefits such as employer-provided health insurance (Clemens, Khan, and Meer; 2018). When firms reduce these nonwage costs under competition, it will be considered as a reduction in effective remuneration to the workers, or effective noncompliance of minimum wage laws, and may fail to fully retain or recruit workers. This indicates that one needs to see both the wage and nonwage costs to understand the firm’s compliance. Furthermore, since firms operate at maximum efficiency, there is no room for efficiency improvements in the neoclassical model.

Minimum wage impcats on output prices depend on the extent of product market competition. In a perfectly competitive product market of an open economy, there is no scope for product price adjustments after a minimum wage increase. In an imperfectly competitive market, firms face a downward sloping demand curve and the increase in product price depends on the price elasticity of the demand. These considerations indicate that non-tradable sectors, characterized by a smaller degree of competition than traderable sectors on average, may result in a higher increase in product prices in response to an increase in minimum wages as shown in the previous work (Harasztsosi and Lindner, 2019).

Search and monopsony models account for market imperfections due to search frictions and imperfect substitutability of employers for workers arising from differences in nonmonetary aspects of jobs (Cahuc 2014, Flinn 2006; Rogerson et al. 2005; Ashenfelter et al., 2010; see Manning, 2020, Langella and Manning, 2021 for a recent review). These models aim to address some key issues which the competitive model does not easily address. Here, wage floors can positively affect employment (Robinson, 1933, Manning, 2003; Ashenfelter et al., 2010). Search models allow for the coexistence of unemployed individuals and unfilled job vacancies. Therefore, an increase in minimum wages can boost job search, and lead to a rise in employment and improved efficiency. Similarly, in the monopsony models, individual firms face an upward-sloping labour supply curve, where employment is an increasing function of wages. Monopsony models predict that minimum wage increases can lead to increased employment if the increase is not too large.

In the institutional model (Kaufman 2010, Hirsch et al. 2015, Lester 1960, Hall and Cooper 2012, Schmitt 2013, Wilson 2012), unlike in the neoclassical model, firms have room to improve economic efficiency. This model predicts that a firm’s immediate response to high minimum wage costs is to improve efficiency by adjusting the flexibility of work schedules, effort requirements, and investing in employee training opportunities (Clemens, 2021). In this paradigm, firms can also increase the prices of their products to complement the increase in economic efficiency.

The employment adjustment channel of minimum wage adjustment is the most widely studied and contentious topic among empirical economists. While a recent study by Geide-Stevenson and Perez (2022) reports a decrease in the consensus among economists that minimum wages reduce youth and low-skill employment over time, recent empirical evidence supports that there are adverse effects of minimum wages on employment of low-skilled workers (Neumark et al., 2014; Neumark & Shirley, 2022).

The evidence of price pass-through is presented by Wadsworth (2010) who observed a relatively faster and more significant increase in prices of goods produced in minimum wage intensive sectors. Harasztsosi and Lindner (2019) also investigated price effects of minimum wages and reported a substantial pass-through of around 75%. Furthermore, the pass-through was lower in tradeable than non-tradeable sectors, which suggests that the tradeables sector is more in line with the competitive model predictions. Several other studies support the positive effect of minimum wages on inflation (Card and Krueger, 1995; Macdonald and Aaronson,2000; Hirsch et al., 2015; Huang et al., 2014).

While older studies find that minimum wage increases do not significantly affect productivity (e.g., Acemoglu and Pischke 2003; Grossberg and Sicilian 1999; Neumark and Wascher 2001), more recent studies present positive minimum wage effects on training and productivity. For instance, Hirsch et al. (2015) find that minimum wages enhance productivity through the introduction of tighter working schedules and increased investment in employee training. Similarly, Riley and Bondebene (2015) report that the UK minimum wage increased labour productivity through an increase in the total factor productivity - a finding consistent with the institutional model of the labour market.

If firms fail to use any channel of adjustment in response to minimum wage increase, increased labour costs lead to reduced profits. However, empirical evidence on the effect of minimum wages on profits is scarce. Draca, Machin and van Reenen (2011) found that firms largely absorbed the newly introduced National Minimum Wage in the United Kingdom (UK) through reduced profits. The profit effects on minimum wage legislation have implications for firm survival and exit. A negative impact of minimum wages on profit eventually increases the risk of firm exit (Luca and Luca, 2019). Firm exit was particularly pronounced for small scale firms when Germany introduced the national minimum wage (Dustmann et al. 2022)

1. **Empirical strategy**

To estimate the impact of the minimum wage hike on farms, we compare the evolution of key variables between our treatment and control firms. We closely follow Machin, Manning, and Rahman (2003) and Harasztosi and Lindner (2019) to estimate time-varying impacts on various firm outcomes in the event-study design form in percentage changes:

(1)

where is the outcome variable of interest for firm at time , is the fraction of affected workers before the minimum wage increase (year 2011?, specify) and is contant for each firm for the entire period. And, represents the firm-level controls (i.e. firm-size dummy variables , foreign ownership status, pre-policycapital-labour ratio) and is the error term. We also control for three-digit industry fixed effects. The dependent variable in Equation 1 is the percentage change in the outcome variable between 2013 (i.e. the last tax year before the minimum increase) and year . The parameter measures the impact of the minimum wage hike on the dependent variable. In this setup, time effects and firm characteristics vary flexibly over time (Harasztsosi and Lindner, 2019).

The identification assumption for to be consistently estimated is firms with different values of follow a common trend. While we cannot test this assumption directly, we will show that firms with different values follow a common trend in the pre-policy periods in various outcome measures.

1. **Data and variables**

We use South African anonymized tax data to study the firm-level effects of the minimum wage hike. This study uses the Corporate Income Tax (CIT) and payroll tax certificate (IRP5) datasets.

The fraction of affected workers, our treatment variable, comes from the IRP5 data containing rich income information on employment spells and annual employment incomes of individuals. We aggregate the IRP5 data to the firm level after calculating the number of workers on each farm (i.e., employment) and fraction of workers in 2012 earning below the 2013 minimum-wage. The IRP5 data contains unique firm identifiers which are used to merge the employment data into the CIT data.

Other outcome variables come from the CIT data, which contains detailed balance sheet information about the farm. We use the two-digit SIC7 industry codes to limit our sample to the farming sector.[[7]](#footnote-7) Not all farms in the CIT have corresponding IRP5 certificates. The CIT dataset contains about 30,553 farms, but we only matched 15,037 (i.e., approximately 49 % ) to the IRP5 data. Our final analysis sample restricts the analysis to CIT farms that have corresponding IRP5 certificates. As shown in Table 1, the matched sample consists of relatively larger farms. We therefore reweight our results by farm size to account for the oversampling of larger farms.

**Table 1: Mean comparison between matched and unmatched samples**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tax year** | **Labour cost (ZAR)** | | **Capital Expenditure (ZAR)** | | **Sales Revenue (ZARZ0** | |
| **Matched** | **Unmatched** | **Matched** | **Unmatched** | **Matched** | **Unmatched** |
| 2010/2011 | 3,833,521 | 1,859,318 | 11,396,921 | 7,638,598 | 40,090,864 | 10,092,924 |
| 2011/2012 | 4,172,529 | 1,807,241 | 14,041,518 | 7,972,111 | 43,295,332 | 10,518,447 |
| 2012/2013 | 4,077,651 | 2,454,689 | 15,389,129 | 10,590,323 | 42,449,404 | 14,309,355 |
| 2013/2014 | 4,936,624 | 2,497,485 | 18,700,073 | 10,723,606 | 51,079,534 | 16,974,225 |
| 2014/2015 | 5,689,800 | 2,429,357 | 22,056,752 | 11,287,229 | 57,516,251 | 17,171,298 |
| 2015/2016 | 6,282,174 | 3,786,944 | 25,890,801 | 12,779,931 | 66,298,197 | 27,159,031 |
| 2016/2017 | 6,973,257 | 2,775,420 | 29,383,460 | 12,627,818 | 72,352,202 | 20,442,980 |
| Notes: Table 1 shows the means values in ZAR of the key CIT variables for matched and unmatched farms. We only use the matching farm in the final sample.  Source :Authors computations from own datasets (CIT) based on National Treasury and UNU-WIDER (2021) | | | | | | |

**Table 2: Time series values of labour cost, employment, capital and revenue**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tax year** | **Labour cost (ZAR)** | **Farm Employment (ZAR)** | **Capital Expenditire (ZAR)** | **Sales Revenue (ZAR)** |
| 2010/2011 | 1,003,962,564,608 | 210,841 | 2,981,089,247,232 | 10,507,942,625,280 |
| 2011/2012 | 1,093,059,870,720 | 243,54 | 3,674,502,332,416 | 11,340,643,041,280 |
| 2012/2013 | 1,185,175,175,168 | 241,826 | 4,466,417,860,608 | 12,357,276,270,592 |
| 2013/2014 | 1,252,043,915,264 | 239,65 | 4,737,278,148,608 | 12,947,473,563,648 |
| 2014/2015 | 1,312,030,982,144 | 258,086 | 5,079,629,824,000 | 13,254,987,350,016 |
| 2015/2016 | 1,296,707,223,552 | 253,486 | 5,328,326,885,376 | 13,666,644,656,128 |
| 2016/2017 | 1,262,382,219,264 | 265,705 | 5,314,899,869,696 | 13,093,870,501,888 |
| Notes: Table 2 shows the time series values, from our final matched sample, of the critical variables across the tax years covered in the sample. The values are reported in the South African Rand (ZAR)  Source :Authors computations from own datasets (CIT and IRP5) based on National Treasury and UNU-WIDER (2021) | | | | |

The fraction affected variable shows the proportion of minimum wage workers on a farm in the pre-policy period. We use the pre-policy (2011-2013) mean of the fraction of workers earning below the new minimum wage to compute the fraction of affected workers variable. This value is time-invariant for each farm and ranges from 0 to 1, with the least affected farms at the bottom of the distribution and the most affected farms at the top. As shown in Figure 1, more than 15% of farms were already paying all their workers above the new minimum wage before it was implemented, and were therefore not directly affected by the minimum wage hike. On the other hand, around 5% of farms almost exclusively employed workers that earned below the new minimum wage. About 65% of workers on the median farm fell below the new threshold.

**Table 3: Percentiles of Fraction of affected workers**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1% | 5% | 10% | 25% | 50% | 75% | 90% | 95% | 99% |
| **Fraction affected** | 0 | 0 | 0 | .27 | .65 | .83 | .94 | .99 | 1 |
| Notes : Table 3 shows the distribution of our treatment variable, a fraction of affected workers.  Source :Authors computations from own datasets (IRP5) based on National Treasury and UNU-WIDER (2021) | | | | | | | | | |

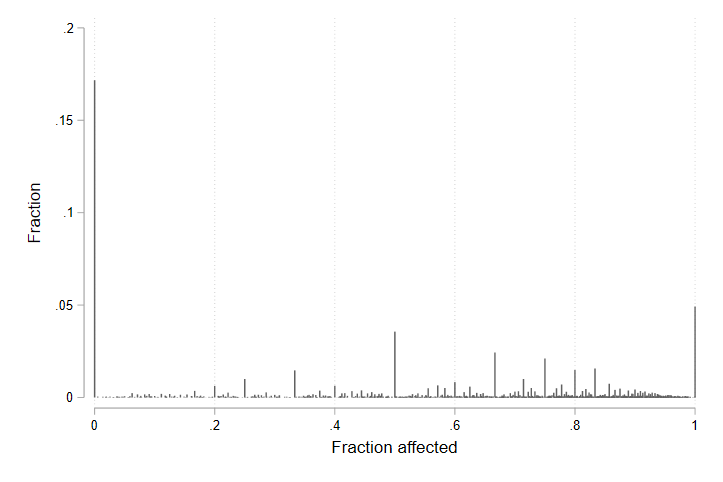
****

Figure 1 : Spike plot showing the distribution of the treatment variable (fraction of affected workers)

As illustrated in Figure 2, our there is a positive but weak relationship between the fraction affected and the number of workers employed on the farm. This relationship implies that big employers are not necessarily low-wage farms

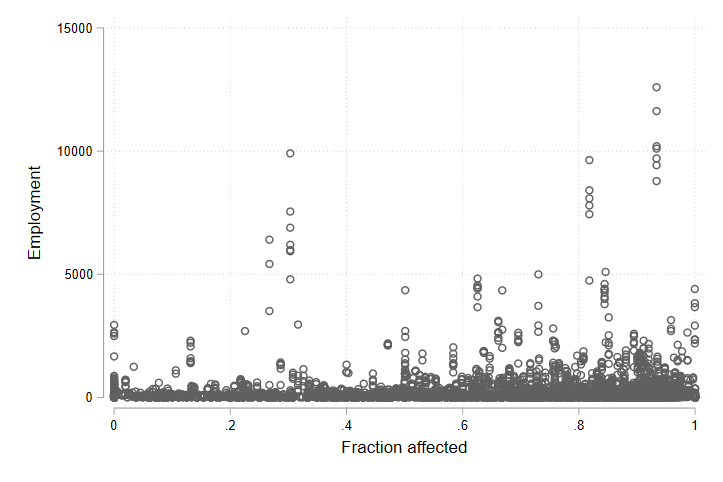
****

Figure 2 : Scatter plot showing the relationship between employment and fraction of affected worker

Source: Authors computations from own datasets (CIT and IRP5) based on National Treasury and UNU-WIDER (2021)

1. **Results and Discussion**

This section presents the regression results obtained from estimating Equation 1. The regression tables associated with the coefficient plots presented in this section can be found in Appendix A. Figure 3 shows the effect of the minimum wage legislation on the total labour cost and labour cost per employee of low-wage farms. While the results show no policy effect in the total labour cost outcome variable, we find that low-wage farms experienced a significant increase in the labour cost per employee. While farmers did not change their total bill, reductions in average wages are driven by a reduction in employment. We discusse this finding in greater detail below.

|  |  |
| --- | --- |
| Figure 3: Effect of minimum wage hike on Labour cost per worker | |
|  | Chart, box and whisker chart  Description automatically generated |
| **Notes**: Figure 3 shows the results of the evolution of total labour cost after the minimum wage increase. A firm's total labour cost consists of wage and non-wage components. The non-wage component may include group life insurance, Unemployment Insurance Fund (UIF) contribution, employee training expenditure etc. **Source**: Authors computations from own datasets (CIT and IRP5) based on National Treasury and UNU-WIDER (2021). | |

|  |  |
| --- | --- |
| Figure 4: Effect of minimum wage hike on employment and capital | |
| Chart, box and whisker chart  Description automatically generated | Chart, box and whisker chart  Description automatically generated |
| **Notes:** Figure 4 shows the evolution of employment and capital after the minimum wage hike. The results are weighted by farm size. See the regression table in Appendix A to compare the results from the weighted and unweighted models.  **Source**: Authors computations from own datasets based on National Treasury and UNU-WIDER (2021) | |

The left-hand side panel in Figure 4 shows the employment effects. Affected farms reacted to the minimum wage increase by gradually reducing employment. Employment decreases became larger over time. The decrease in employment drives the observed increase in labour cost per worker. There is, therefore, no conclusive evidence in our results that the minimum-wage increase resulted in increased *total* labour costs among affected farms. Our findings, however, imply that farms with a high proportion of minimum-wage workers reduced their employment in response to the minimum wage hike and divided their remuneration budget between fewer workers. The right-hand panel in Figure 3 shows that farms did not increase capital in response to the minimum wage hike. We therefore rule out significant capital-labour substitution.

Given the results in Figure 4, one would expect lower production levels on low-wage farms and with subsequenty reductions in revenue and profits. However, contrary to our expectations, Figure 5 shows that the minimum-wage hike did not significantly impact revenues. With fewer workers and no change in fixed capital expenditure, low-wage farms maintained their pre-policy levels of revenue. The increase in revenue per worker suggests that labour productivity increased among these low-wage farms. One possible way in which farms could achieve increased efficiency was by laying off less productive workers and retaining more productive workers.

|  |  |
| --- | --- |
| Figure 5: Effect of minimum wage hike on revenue and revenue per worker | |
|  |  |
| **Notes:** Figure 5 shows the evolution of sales revenue and revenue per-workers after the minimum wage hike. The results are weighted by farm size. See the regression table in Appendix A to compare the results from the weighted and unweighted models.  **Source:** Authors computations from own datasets based on National Treasury and UNU-WIDER (2021) | |

1. **Robustness** **Analysis**

Our results show significant employment cuts among low-wage farms following an extensive and persistent minimum wage increase. While Figure 4 shows that the common trend assumption holds, the common practice is to conduct a placebo test to check the robustness of the results. Many studies check the robustness of their findings by conducting a horizontal placebo test where they introduce the treatment before the event date and check out for policy effects in their outcome variables. A policy effect in the outcome variable during a placebo test casts doubts on the validity of the results; it indicates that the results are driven by a variable other than the treatment variable.

Our sample only has two years in the pre-policy period; therefore, conducting a horizontal placebo test will be impossible. We, however, can conduct a vertical placebo test by running our model on a sample of high-wage farms (i.e., least affected farms). To create our placebo sample we restricted our sample to farms above the 75th percentile of labour cost in the pre-policy period. Our placebo sample has 1,884 farms, and there is still some variation in treatment variables (i.e., a fraction of affected workers).

|  |
| --- |
| Figure 6: Placebo test: Effect of minimum wage hike on high -wage farms |
|  |
| **Notes:** Figure 6 shows the evolution of employment for farms above the 75th percentile of the pre-policy labour cost distribution. Appendix B presents a regression table showing estimate results foe employment and other outcome variables.  **Source:** Authors computations from own datasets based on National Treasury and UNU-WIDER (2021) |

Figure 6 shows the employment outcome results when we estimate our model on a sample of high-wage firms, and we do not observe a policy effect on employment (See appendix B for a regression table with the results obtained from the placebo sample). This outcome of our placebo test gives us confidence that the change in the minimum wage legislation drives our reported results.

More research is required to understand how firm survival and exit contributes to the trends we observe. It is possible that farms that exited our sample were on a downward revenue trajectory, so that reductions in profitability could nevertheless have presented as an adjustment mechanism.

1. **Conclusion**

Our study used unique administrative tax data to investigate the firm-level effects of a significant minimum wage increase on South Africa's farming sector. Our difference-in-differences results do not show evidence of increased total labour costs among affected farms. However, we observe a gradual increase in labour cost per employee, driven by an observed decrease in employment levels. This outcome suggests that affected farmers responded to the minimum wage legislation by cutting employment to avoid incurring significant labour costs induced by the newly introduced minimum wage. We further show that affected farmers maintained their policy revenue levels with fewer workers and pre-policy levels of fixed capital expenditure. Given that farming is a "tradeable" sector, one would expect revenues to either decrease or remain unchanged post the minimum wage hike. However, given that the main adjustment channel was employment, our findings suggest that the minimum-wage legislation had an efficiency-enhancing effect on South Africa's farming sector, possibly attained by terminating jobs of unproductive workers and holding on to more productive workers to maintain pre-policy revenue levels.

**References**

Arulampalam, W., Booth, A. and Bryan, L. (2004). ‘Training and the NewMinimum Wage’. Economic Journal 114(494): C87–C94.

Bhorat, H., Kanbur, R. and Stanwix, B. (2017), ‘Minimum Wages in Sub-Saharan Africa: A Primer’. *The World Bank Research Observer* 32(1): 21–74, <https://doi.org/10.1093/wbro/lkw007>

Boal, W. M., & Ransom, M. R. (1997). Monopsony in the labor market. *Journal of economic literature*, *35*(1), 86-112.

Bodnár, K., Fadejeva, L., Iordache, S., Malk, L., Paskaleva, D., Pesliakaitė, J., ... & Wyszyński, R. (2018). How do firms adjust to rises in the minimum wage? Survey evidence from Central and Eastern Europe. *IZA Journal of Labor Policy*, *7*(1), 1-30.

Bodnár, K., Fadejeva, L., Iordache, S., Malk, L., Paskaleva, D., Pesliakaitė, J., ... & Wyszyński, R. (2018). How do firms adjust to rises in the minimum wage? Survey evidence from Central and Eastern Europe. *IZA Journal of Labor Policy*, *7*(1), 1-30

Brown, C., Gilroy, C., & Kohen, A. (1982). *The effect of the minimum wage on employment and unemployment: a survey* (No. w0846). National Bureau of Economic Research.

Bhaskar, V., & To, T. (1999). Minimum wages for Ronald McDonald monopsonies: A theory of monopsonistic competition. *The Economic Journal*, *109*(455), 190-203.

Card, D., & Krueger, A. B. (1993). Minimum wages and employment: A case study of the fast food industry in New Jersey and Pennsylvania.

Card, David, and Alan B. Krueger. “Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply.” The American Economic Review 90, no. 5 (2000): 1397–1420. http://www.jstor.org/stable/2677856.

Draca, M., Machin, S., and Van Reenen, J. (2005). The Impact of the National Minimum Wage on Profits and Prices, Research Report for the Low Pay Commission.

Draca, M., Machin, S., and Van Reenen, J. (2011). ‘Minimum Wages and Firm Profitability’. American Economic Journal: Applied Economics, 3, 129-151.

Dustmann, Christian , Attila Lindner, Uta Schönberg, Matthias Umkehrer, Philipp vom Berge: “Reallocation effects of the minimum wage,”’ *Quarterly Journal of Economics*, Volume 137, Issue 1, February 2022: 267–328, <https://doi.org/10.1093/qje/qjab028>

Galindo-Rueda, F. and Pereira, S. (2004). The Impact of the National Minimum Wage on British Firms, Research Report for the Low Pay Commission

Garita, J. (2020). Minimum Wages and Firm Dynamics: Evidence From Costa Rica’s Occupation-Based System. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3727791>

Georgiadis, A. (2013). ‘Efficiency Wages and the Economic Effects of the

Geide-Stevenson, D., & La Parra-Perez, A. (2021). Consensus Among Economists 2020: A Sharpening of the Picture.

Gorry, A. (2013). Minimum wages and youth unemployment. *European Economic Review*, *64*, 57-75.

Hall D, Cooper D (2012) How raising the federal minimum wage would help working families and give the economy a boost, issue brief no. 341. Economic Policy Institute, Washington, DC.

Harasztosi, P., & Lindner, A. (2019). Who Pays for the Minimum Wage? *American Economic Review*, *109*(8), 2693–2727. <https://doi.org/10.1257/aer.20171445>

Herr, H., Kazandziska, M., & Mahnkopf-Praprotnik, S. (2009). *The theoretical debate about minimum wages* (No. 6). Global Labour University Working Paper

Hirsch, B. T., Kaufman, B. E., & Zelenska, T. (2015). Minimum wage channels of adjustment. *Industrial Relations: A Journal of Economy and Society*, *54*(2), 199-239.

Hirsch, B., Kaufman, B. and Zelenska, T. (2015). Minimum Wage Channels of Adjustment, IZA Discussion paper n. 6132.

Huang, Y., Loungani, M. P., & Wang, G. (2014). *Minimum wages and firm employment: Evidence from China*. International Monetary Fund

Huang, Y., P. Loungani, G. Wang (2014), Minimum wages and firm employment: evidence from China. IMF Working Papers, 2014/184, October 2014

Kaufman, B. E. (2010). Institutional economics and the minimum wage: broadening the theoretical and policy debate. *ILR Review*, *63*(3), 427-453.

Langella, Monica, Alan Manning, “Marshall Lecture 2020: The Measure of Monopsony”, *Journal of the European Economic Association*, Volume 19, Issue 6, December 2021, Pages 2929–2957, <https://doi.org/10.1093/jeea/jvab039>

Lester, R. A. (1960). Employment effects of minimum wages. *ILR Review*, *13*(2), 254-264.

Liebenberg, F. (2013). *South African agricultural production, productivity and research performance in the 20th century* (Doctoral dissertation, University of Pretoria).

Manning, Alan (2020) "Monopsony in labor markets: a review." *Industrial and Labor Relations Review*. ISSN 0019-7939, https://doi.org/10.1177/0019793920922499

Minimum Wage: Evidence from a Low-Wage Labour Market’. Oxford Bulletin of Economics and Statistics, 75(6): 972-979.

Neumark D, Salas J. M I, Wascher W (2014) Revisiting the minimum wage–employment debate: throwing out the baby with the bathwater? Industr Labor Relat Rev 67(3\_suppl):608–648

Neumark, D., & Wascher, W. (2006). Minimum wages and employment: A review of evidence from the new minimum wage research.

Neumark, D., Salas, J. I., & Wascher, W. (2014). Revisiting the minimum wage—Employment debate: Throwing out the baby with the bathwater? *Ilr Review*, *67*(3\_suppl), 608-648

Neumark, David and Shirley, Peter (2022), “Myth or measurement: What does the new minimum wage research say about minimum wages and job loss in the United States?,” *Industrial Relations: A Journal of Economy and Society*, 61(4), 384-417, https://doi.org/10.1111/irel.12306.Orfalí, V. C. (1990). Efectos Del Salario Mínimo. Aplicación del Método Tobit. *Cuadernos de Economía*, 83-101.

Owens, F. and Kagel, J. (2010). ‘Minimum Wage Restrictions and Employee

Piek, M., von Fintel, D., & Kirsten, J. (2020). Separating employment effects into job destruction and job creation.

Riveros, L. A., & Paredes, R. (1988). *Measuring the impact of minimum wage policies on the economy* (No. 101). Country Economics Department, World Bank.

Ranchod, V., & Bassier, I. (2017). *Estimating the wage and employment effects of a large increase in South Africa’s agricultural minimum wage*. REDI3x3 Working Paper.

Riley, R. and Rosazza Bondibene, C. (2015) The Impact of the National Minimum Wage on UK Businesses, Research Report for the Low Pay Commission. Rizov,

Robinson, Joan. (1933) *The economics of imperfect competition*, London: Mcmillan.

Schmitt, J. (2013). *Why does the minimum wage have no discernible effect on employment?* (Vol. 4). Washington, DC: Center for Economic and Policy Research.

Tan, B. (2021). The minimum wage and firm networks: Evidence from South Africa. *Available at SSRN 3848902*.

Van der Zee, K. (2017). *Assessing the effects of two agricultural minimum wage shocks in South Africa* (Master's thesis, University of Cape Town).

Wilson, Mark. "The negative effects of minimum wage laws." *CATO Institute Policy Analysis* 701 (2012).

Appendix A : Regression Table

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Labour cost** | **Labour cost** | **Employment** | **Employment** | **Capital** | **Capital** | **Revenue** | **Revenue** | **Profit** | **Profit** |
|  |  |  |  |  |  |  |  |  |  |  |
| fa\*2011 | 0.308 | -0.149 | 0.199 | -0.083 | 0.585 | 0.334 | 0.225 | -0.358 | -0.125 | -0.504 |
|  | (0.353) | (0.558) | (0.382) | (0.507) | (0.473) | (0.527) | (0.393) | (0.638) | (0.414) | (0.621) |
| fa\*2012 | 0.079 | -0.208 | 0.538\*\*\* | 0.085 | 0.475\*\* | 0.220 | 0.201 | -0.220 | -0.012 | -0.314 |
|  | (0.180) | (0.357) | (0.195) | (0.293) | (0.242) | (0.299) | (0.201) | (0.397) | (0.212) | (0.382) |
| fa\*2013 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  |  |  |  |  |  |  |  |  |  |  |
| fa\*2014 | 0.016 | 0.001 | -0.349\*\*\* | -0.202 | -0.122 | -0.190 | -0.006 | -0.040 | -0.046 | -0.038 |
|  | (0.105) | (0.158) | (0.114) | (0.145) | (0.141) | (0.166) | (0.117) | (0.162) | (0.123) | (0.162) |
| fa\*2015 | -0.002 | -0.006 | -0.544\*\*\* | -0.392\*\* | -0.069 | -0.178 | 0.009 | 0.038 | -0.086 | -0.065 |
|  | (0.106) | (0.162) | (0.115) | (0.157) | (0.142) | (0.177) | (0.118) | (0.167) | (0.124) | (0.167) |
| fa\*2016 | -0.017 | 0.030 | -0.630\*\*\* | -0.430\*\*\* | 0.008 | -0.068 | 0.006 | 0.039 | -0.104 | -0.116 |
|  | (0.109) | (0.167) | (0.118) | (0.159) | (0.146) | (0.186) | (0.121) | (0.174) | (0.128) | (0.176) |
| fa\*2017 | 0.024 | 0.152 | -0.756\*\*\* | -0.436\*\*\* | 0.041 | 0.053 | 0.075 | 0.135 | -0.057 | -0.046 |
|  | (0.112) | (0.172) | (0.121) | (0.163) | (0.150) | (0.188) | (0.125) | (0.174) | (0.131) | (0.173) |
| Weight | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 10513 | 10299 | 10513 | 10299 | 10513 | 10299 | 10513 | 10299 | 10509 | 10295 |
| R squared | 0.34 | 0.28 | 0.46 | 0.42 | 0.58 | 0.57 | 0.43 | 0.38 | 0.35 | 0.30 |

Appendix B : Placebo sample regression table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Labour cost** | **Employment** | **Capital** | **Revenue** | **Profit** |
|  |  |  |  |  |  |
| fa\*2011 | -0.601 | -0.588 | -0.311 | -0.288 | -0.418 |
|  | (0.871) | (0.789) | (0.750) | (1.050) | (1.013) |
| fa\*2012 | -0.284 | -0.300 | -0.377 | -0.351 | -0.364 |
|  | (0.541) | (0.460) | (0.468) | (0.610) | (0.571) |
| fa\*2013 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  |  |  |  |  |  |
| fa\*2014 | 0.126 | -0.177 | -0.232 | 0.011 | 0.006 |
|  | (0.279) | (0.268) | (0.290) | (0.304) | (0.295) |
| fa\*2015 | 0.155 | -0.416 | -0.184 | 0.289 | 0.137 |
|  | (0.282) | (0.281) | (0.303) | (0.311) | (0.300) |
| fa\*2016 | 0.303 | -0.338 | -0.079 | 0.472 | 0.229 |
|  | (0.289) | (0.285) | (0.316) | (0.319) | (0.304) |
| fa\*2017 | 0.481 | -0.316 | 0.088 | 0.588\* | 0.248 |
|  | (0.296) | (0.278) | (0.308) | (0.312) | (0.304) |
| Observations | 3415 | 3415 | 3415 | 3415 | 3412 |
| R squared | 0.19 | 0.32 | 0.43 | 0.25 | 0.18 |
| Source :Authors computations from own datasets (CIT and IRP5) based on National Treasury and UNU-WIDER (2021) | | | | | |
|  |  |  |  |  |  |

1. Department of Economics, Stellenbosch University, Stellenbosch, South Africa [25732498@sun.ac.za] [↑](#footnote-ref-1)
2. UNU-WIDER, Helsinki, Finland. [↑](#footnote-ref-2)
3. Institute of Labor Economics (IZA), Bonn, Germany [↑](#footnote-ref-3)
4. Pan-African Scientific Research Council [↑](#footnote-ref-4)
5. Institute of Developing Economies, Japan [↑](#footnote-ref-5)
6. It is worth noting that in the post-policy period, the farming sector's minimum wage increased by 1.5 percentage points above inflation each year. [↑](#footnote-ref-6)
7. The specific agricultural sub-sectors of interest include : (i) Growing of non-perennial crops, (ii) Growing of perennial crops, (iii) Plant propagation, (iv) Animal production, and (v) Mixed farming [↑](#footnote-ref-7)