# THE EFFECT OF THE MINIMUM WAGE ON EMPLOYMENT LEVELS IN KENYA

BY

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## DECLARATION

This thesis is my original work and has not been submitted for any award in any other university.

Signed: …… Date: ……..……..

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This thesis has been submitted for examination with my approval as University Supervisor.

Signed: ……...… Date: ……

Dr. Martine Odhiambo Oleche

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Most of all, thanks to God Almighty for enabling all this to be fulfilled. Nonetheless, I am solely responsible for any errors or omission in this thesis.

## DEDICATION

This thesis is devoted to my dear parents Eng. Leopold Asawo and Mrs. Susan Akoth Asawo to whom I owe all that I am, and most importantly to Almighty God.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| ADF | Augmented Dickey Fuller Test |
| ARDL | Autoregressive distributed lag model |
| AW | Average Wage |
| AWAB | Agricultural Wages Advisory Board |
| CPI | Consumer Price Index |
| DWT | Durbin Watson Test |
| ECM | Error Correction Model |
| Ec | Employment in Competitive Market |
| FTSA | Fair Labor Standards Act |
| GDP | Gross Domestic Product |
| GWAB | General Wages Advisory Board |
| GWR | Global Wage Report |
| ILO | International Labour Office |
| KNBS | Kenya National Bureau of Standards |
| KES | Kenyan Shillings |
| LR | Long Run |
| Mc | Minimum Wage in Competitive Market |
| MLC | Marginal Labour Cost |
| MPL | Marginal Productivity of Labour |
| MPK | Marginal Productivity of Capital |
| MRPL | Marginal Revenue Product of Labour |
| MRPK | Marginal Revenue Product of Capital |
| MW | Minimum Wage |
| RAW | Real Average Wage |
| RMW | Real Minimum Wage |
| SR | Short Run |
| TLF | Total Labour Force |
| USD | United States Dollars |
| VIF | Variance Inflation Factor |
| WB | World Bank |
| Wc | Equilibrium wage level |

## ABSTRACT

This study employed a time series data spanning 1980 to 2016 to examine the effect of minimum wage on employment levels in Kenya. The main purpose of the study was to investigate the effect of minimum wage on employment levels -while using control variables, and to give policy recommendations from the findings. Diagnostic tests were carried out before regression of the model. Multicollinearity test led to dropping of some variables while the ARDL cointegration approach (Bounds Test) led to employment of a short run empirical model, the ARDL model-the relationship between minimum wage and employment levels being postulated as a short run one.

The findings of the research indicated that minimum wage had a positive significant effect on employment levels in the short run-there is no long run relationship between minimum wage & employment levels in Kenya. This effect in terms of magnitude is not that weighty and therefore explicit use of minimum wage to increase employment levels may not yield much. It is therefore advisable to look at other factors that yield stronger & positive effects on increasing employment levels. The findings also show that GDP has no significant effect on employment levels in Kenya & therefore can't be manipulated in an effort to increase labour employment in Kenya. The same can be said for inflation rates; it has no significant effect on employment levels in Kenya. This is in contrary to the Short run Phillip's curve theory.

# CHAPTER 1: INTRODUCTION

## 1.1. Background of the Study

There is currently increased acknowledgement of the importance of tracking the trend in wages and wage policies as a measure of enhancing sustainable development in different economic setups over years. This has been occasioned by the understanding that favourable wage policies that increase employment levels in low-income earning households and lower wage disparities result into reduced poverty levels and generally enhanced wellbeing of individuals (World Bank, 2016). In this regards, *The Global Wage Report of 2012/2013* advocated for a global approach in wage policy harmonisation in an attempt to enhance inclusive and sustainable growth in wages across different economies (ILO, 2012).

The labour market and wage setting plays a noteworthy role in combating poverty and inequality. The labour theory explains the dynamics of waged employment, that is, waged employment is unique as it does not follow the normal theory of demand and supply. Principles of fairness and human dignity must be applied in labour pricing-unlike commodity pricing. Therefore, the institution of minimum wage is important in ensuring application of these principles- it ensuring fairness and equity in compensation of work of similar value through elimination of discrimination of individuals of different demographic setups (International Labour Organisation (ILO), 2008).

According to Global Wage report (ILO, 2015), 70% to 80% of aggregate household incomes before tax and after transfers for developed nations represent waged income. 80% of incomes in these countries belong to the middle class, but for the lower class, social transfer represent the highest propotion of income. For developing nations, wages represent 50% to 40% and upto 30% of total income. Self-employment represents the largest source of income for these nations. Therefore in order to promote growth of income and reduction in income disparities in these economies, it is important to promote job creation for households that fall under the lower income brackets and strive to attain equitable distribution of wages. This is where minimum wage as a policy comes in.

In 1984, New Zealand saw the introduction of the minimum wage (MW) policy, that feat was replicated by Australia in 1986 and later in the UK in 1909 (Neumark & Wascher, 2008). United States' first state to introduce MW policy was Massachusetts in 1912. Thereafter, the US adopted its first federal MW in 1938 by passing the Fair Labor Standards Act (FTSA). This saw a MW setting of USD 25 cents per hour. This MW has increased 22 times and was

recently increases from USD 6.55 to USD 7.25 per hour in 2009 (US Department of Labor, 2009). Since then, many other counties have adopted MW regulations over the years. Kenya adopted its first MW regulations in 1932. Most recently various developing economies have instituted and strengthened their MW regulations, these include China in 2004, Brazil in 2005,Russia in 2007, Malaysia in 2013 and most recently Cape verde in 2014 (ILO, 2015).

Even with the advent and rush in the adoption of this policy, various scholars have studied the effectiveness of MW in increasing employment levels and improving living standards. Proponents of minimum wage argue that it provides a guaranteed basic minimum that will ensure a worker lives a decent life; it prevents exploitation of low-qualification workers, women and long term unemployed (Bengal, 2012); it helps smoothen imbalances brought about by labor market distortions in both the labor supply and labor demand where there are varying reservation wages for different sexes (Rubery & Grimshaw, 2009); it can result in increased wages which in turn increase workers' productivity, which will lead the employer to increase wages due to increased productivity- productivity may increase due to less shirking on the job, improved health and human development and training undertaken by the employer (Levin-Waldman & M, 1997); it helps reduce poverty among the low class individuals-this is evident in developing countries in Latin America and other parts of the world (Lustig & McLeod, 1977).

Critics of minimum wage argue that minimum wage may lead to job losses especially when it is fixed above the average wage in the labor market- largely disadvantaging the most disadvantaged segments of the labor force in the labor market (informal sector workers, young and older workers, women and the low skilled) (Bengal, 2012); It may also be ineffective in reducing poverty in developing countries due to the perennial problems of low compliance levels of firms and incomplete coverage of the policy due to large employment levels occurring in the uncovered sector (informal sector); It may also aggravate reduced labor demand for the low skilled workers whom the policy was intended for since firms will prefer highly productive individuals to whom they would then pay the higher wages (Brown, 1995).

Empirical evidence has also been gathered from varying nations. Most of these studies have been carried out in established countries, with a few being carried out in developing countries. Card and Krueger (1995) carried out a study on effect of MW on job opportunities in Texas convenience food industry and found significant positive impact. Alatas and

Cameron (2003) found that MW only lowered job opportunities under modest private organisations, this wasn't the case for bigger firms within Indonesia. Lemos (2004) found that MW reduced employment in both informal and formal sectors in Brazil while Gindling and Terrell (2004) found that MW increased wages in both informal and formal sectors of Costa Rica. Studies that have been conducted in Kenya also show conflicting evidence. Vandemoortele and Ngola (1982) found that MW reduced work opportunities in the private setting, but not public setting, while Manda et al. (2007) found that MW reduced job opportunities in civic domain but increased employment in the non-civic domain. However, most studies conducted in Kenya seem to support the disemployment effect of minimum wage (Vandemoortele & Ngola, 1982; Omolo & Omiti, 2004; Bengal 2012).

Minimum wage regulations in Kenya were introduced around 1932 and continue to be effected up to date. Figure 1, shows Kenya's real minimum wages (RMW) and real average wages (RAW) trends for the years 1980 to 2016. Since 1980's to late 1990's RMWs have been above RAWs. This trend changed since 2000s to date, where RMWs have tended to be lowered compared to the RAWs. This trend may illustrate the cautious nature of government in ensuring MWs stay lower than RAWs so as not to set wage returns above equilibrium wage price- in the case of competitive labour theory. This trend necessitates accompaniment of MW policy with other policies aimed at reducing poverty & inequality.

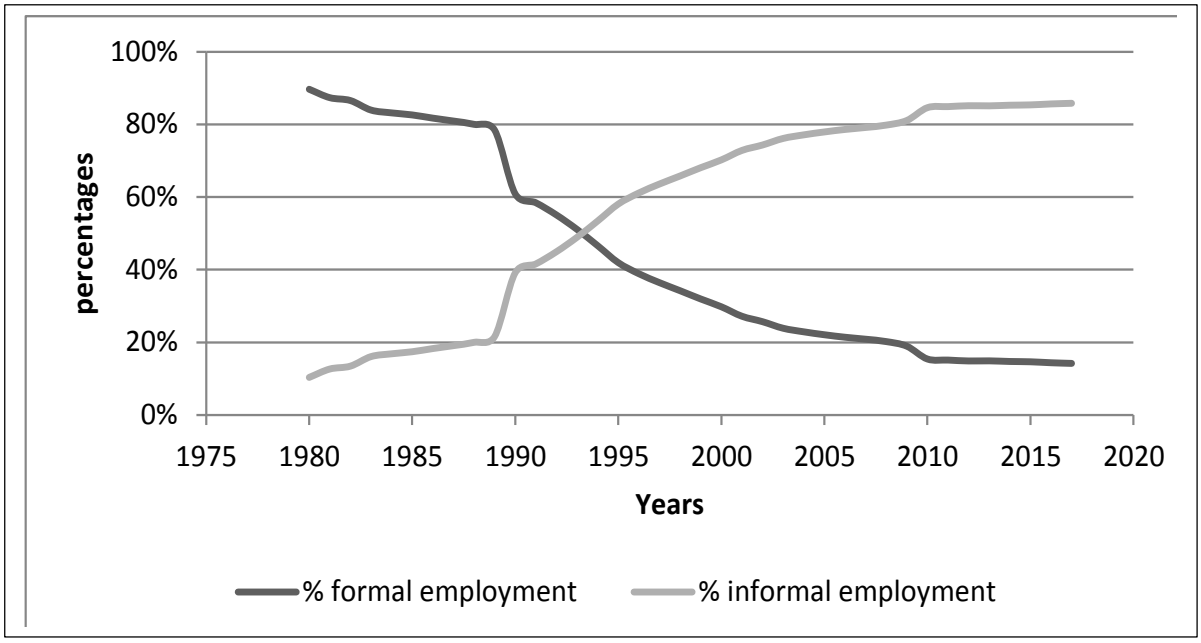
**Figure 1: Real Minimum Wages and Real Average Wage**


**Source: Kenya National Bureau of Statistics, Economic Surveys, (1979-2018)**

As can be seen from figure 2, formal employment was the main source of employment since 1970s to early 1990s. With implementation of Structural adjustment programs (SAPs) in

early 1990s, the trend in employment was reversed-informal employment increased with decrease in formal employment. The shift in sectoral employment since the early 1990s can be attributed to the liberalization policies that were in force during this period, governments effort towards promoting prosperity and development of the informal sector and expansion of the definition of informal sector as well as enhanced data recording of the informal sector statistics in the country's national statistics. This led to the jump in informal sector employment in the year 1990-1992 (Omollo, 2010). Implementation of SAPs can be attributed to trends in figure 1 & 2-they reduced formal employment at expense of informal employment and brought MWs below RAWs reducing incentive of formal employment (covered sector).

**Figure 2: Informal & formal sector as % of aggregate employment in Kenya (1979-2018)**




**Source: Kenya National Bureau of Statistics, Economic Surveys (1979-2018)**

In Kenya, MW orders vary by the location (Nairobi & Mombasa, Municipal & urban councils and other areas), occupation (unskilled and skilled) and sector of activity (agriculture). There are two wage boards that set the standard minimum wage and the terms and conditions of employment for workers in various sectors. These are the Agricultural Wages Advisory Board (AWAB) and the General Wages Advisory Board (GWAB). AWAB sets minimum wages in agricultural sector while GWAB sets minimum wages for other sectors of the economy (Kosimbei, Wanjala, & Manda, 2007; Bengal 2012).

## 1.2. Statement of the Problem

There has been varying theoretical explanations and empirical indications explaining the relationship between least payable enumeration and job opportunities. Competitive labour theorists argued that least payable enumeration lowers employment opportunities, employing the perfect competitive labour model with a market clearing equilibrium wage level where supply curves and demand curves intersect (Kosimbei et al, 2007; Ghellab, 1998). These models include two sector model & the two sector model with queuing. Alternative labour theorists argue that lowest wage payable exhibits positive or insignificant effect on job opportunities; these models include the monopsony labour theory, monopolistic labour theory and efficiency wage theory (Kosimbei et al, 2007; Ghellab, 1998; Bengal, 2012).

Empirical evidences that have supported the competitive wage theory include Brown, Gilroy & Kohem (1982); Brown (1999); Rama (1996); Vandemoortele & Ngola (1982); Omollo & Omiti (2004), Lemos (2004); Bengal (2012), among others. Those that have supported alternative wage theory include Card & Kruger (1995); Atlas & Cameron (2003); Gindling & Terrell (2004), among others.

Studies in Kenya have shown mixed results; Vandemoortele and Ngola (1982) found that minimum wage reduced opportunities in selfowned organisations as opposed to government owned organisations while Manda et al. (2007) found that minimum wage reduced opportunities in the government owned domain but raise opportunities in self-owned organisations the long run. Bengal (2012) found that minimum wage lowered opportunities in the long run for both males and females.

This study will therefore investigate the impact of least payable wage on job oppportunities by using current time series data spanning up to 2016, using additional control variables supported by current studies and improved empirical methods.

## 1.3. Objective of the Study

The main objective of this study is to determine the effect of minimum wage on employment levels in Kenya.

The specific objectives of this study are as follows:

i. To investigate the effect of minimum wage on employment in Kenya.
ii. To suggest policy recommendations from the findings of the study.

## 1.4. Significance of the Study

The study of the impact of least payable age on job opportunities is necessary given minimum wage's wide incorporation as a policy tool aimed at reducing wage inequality among workers- especially within low income households- and consequently reducing poverty levels within economies. With implementation of minimum wage policy, it has been noted by some scholars, that it curtails employment in an economy. In order for a country to sustain an increasing level of Gross Domestic Product (GDP), however, cost of production for firms within the economy need to remain low for them to produce more. Implementation of minimum wage within labour intensive sectors with high proportion of unskilled workers- most of whom receive pay lower than minimum wage- may lead to unemployment of workers and reduction in output of these sectors leading to overall reduction in GDP and economic growth rate- GDP is normally used as a measure for economic growth. However, this may not always occur and therefore it is important to always check the behaviour of minimum wage (as a policy) with changes in economic growth and growth in job opportunities. This study will therefore be significant to policy makers. It will also be significant to scholars as it will enhance their knowledge in minimum wage and its impact on employment, as well as provide grounds for additional studies on the topic.

# CHAPTER 2: LITERATURE REVIEW

## 2.1. Introduction

There are numerous theoretical explanations developed to try to depict the consequence of increased minimum wage on employment levels. This section will discuss some of these theoretical findings. This chapter will discuss both the theoretical and empirical literature after which an overview of the literature will be formulated to summaries the content under the literature review.

## 2.2. Theoretical Literature

### 2.2.1. Competitive Labour Theory

This is the traditional labour theory that forecasts a decrease in employment levels resulting from surge in minimum wage. It rides on assumptions that there is perfect competition in the market; employers, whose aim is to maximise profits have no influence on wage setting; the workers are homogenous and there is complete coverage of the minimum wage enforcement. Labour demand is plummeting, while the supply of labour surges upwards, consequently leading to a market clearing equilibrium where the two curves intersect (Bengal, 2012; Kosimbei et al, 2007).

At the market clearing equilibrium point, an equilibrium wage level (Wc) and equilibrium employment level (Ec) is set. At equilibrium, wages are equal to marginal product of labour (MPL). It follows that any improvement in least payable wage above Wc would lead to a decline in opportunities. This is because the low-skilled workers previously paid Wc would not be sustained at the new higher minimum wage since their productivity is below that wage. This would lead to their layoff and consequently increased unemployment. The two negative effects of the minimum wage regulations include the substitution effect– substituting capital for labour or skilled workers for unskilled workers- and the scale effect- reduction in production due to reduction in factors of productions like labour. The overall effect of the minimum wage would be a deadweight loss in labour allocation (Kosimbei et al, 2007; Ghellab, 1998).

This model however has some downfalls especially in the assumptions. The assumption of complete coverage is unrealistic due to the existence of the uncovered sector; workers are heterogeneous and not homogenous; labour market is complex and not faced by a perfectly competitive market as purported and finally, large firms are able to influence wage setting. In

light of these deficiencies, the model has been revised to try and make it more palatable (Kosimbei et al, 2007; Ghellab, 1998).

The two sector model and the two sector model with queuing for covered sector jobs are the result of this revision. The two sector model was developed by Welch in 1974.It states that an increase in MW above Wc would directly lead to a decrease in employment in the covered sector and a shift/ increased in employment in the uncovered sector to absorb those laid off from the covered sector. However, this would be influenced by the reservation wage, elasticity of labour demand and supply and size of the covered sector. The two sectors model with queuing developed by Mincer in 1976 predicts increased queuing in the covered sector due to increased minimum wage which acts as an incentive for those out of the labour force to join the labour force (Ghellab, 1998).

### 2.2.2. Alternative Models

These models postulate that minimum wages do not always negatively affect employment. They develop the idea that minimum wage may have positive or little impact on employment levels. One such model is the monopsony labour theory. It assumes that employers are able to influence wage setting and that there's a single employer in the market. To attract and retain workers, the firm has to increase its wages. Minimum wage here acts as a guide to increasing wages in this market (Wessel, 1997). Here, the firm pays its workers an amount less than their MPL therefore there is room for salary increases. However Minimum wage cannot be set above the point where MLC is equal to MPL. Otherwise, this would lead to unemployment. Generally the model predicts that increased wages - set below profit maximising wage- increases labour turnout which in turn increasing employment, production and firm profits. This theory was revised later on to a monopolistic labour theory that assumed several employers and imperfect information leading to poor labour turnout. The basis of this model was to incorporate the ability of minimum wage in reducing monopoly among employers (Kosimbei et al, 2007; Ghellab, 1998; Bengal, 2012).

The efficiency wage theory argues that MW creates efficiency in the labour market. If the market was laissez faire and the demand and supply theory was left to apply, an economy with an increasing labour force and unemployment levels would see a reduction in wages and poor living conditions for its workers leading to reduced productivity and reduced profits. This would adversely affect the economy. Minimum wage, unemployment and growth theory postulates that MW regulation leads to economic growth. MW will lead to lower demand for

less proficient workers and an increase in demand for proficient workers consequently reallocating human capital towards more qualified sectors. It will also lead to increased human capital formation as low skilled workers will be forced to acquire more skills to stay in employment. This will in turn lead to increased economic growth (Ghellab, 1998).

### 2.3. Empirical Literature

Card and Krueger (1995) carried out a natural experiments evaluation approach in determining the effect of minimum wage on employment in the fast food industry. They conducted surveys in New Jersey- where the wage rise had occurred -and Pennsylvania - where the wage remained constant – applying the difference in difference method of analysis. They concluded that minimum wage did not necessarily increase unemployment and that employment increased in the high waged restaurants more than low waged restaurants consequently supporting the monopolistic theory (Card, 1995). Katz and Krueger (1992) carried out the same study as Card and Krueger (1995) in Texas and found a significant positive impression of minimum wage on employment in the fast food sector in Texas (Katz & Krueger, 1992.).

Card and Krueger (1995) and Katz and Krueger (1992) have both faced criticism from Neumark and Wascher (1992) who argued that they did not control for lagged effects of MW and that Katz et al (1992) didn't control for endogeinity of school enrolment in affecting youth employment. Neumark and Wascher (1992) used panel data approach to investigate the effect of MW on both teenage and young adult employment levels. They employed control variables that included unemployment rate, population proportion in the relevant age group and the rate of school enrolment. They found a negative impact of MW on teenage and young adult employment with employment elasticities of -0.1 to -0.2 for teenagers and -0.15 to -0.2 for young adults. .

Brown, Gilroy and Kohen (1982) undertook a time series analysis of the impact of MW on youth unemployment. They found a negative relationship between MW and teenage unemployment, that is, a 10% increase in MW would decrease employment by 1-3% a cross sectional study also revealed the same trend. Brown et al, found a 1% decrease in youth employment with a 10% increase in MW. He was criticized by Solon who argued that his model was not correctly formulated leading to high residual values and a conclusion of no MW effect. Wellington used time series analysis and found an insignificant effect of MW on

employment with a 1% reduction in employment from a 10% increase in MW (as cited in Brown et al., 1982; p. 487-528).

Cousineau, Tessier and Vaillancourt (1992) found a negative impact of MW on women and youth employment in Ontario. Bazen and Martin discovered that MW increased average real earnings of youths. They concluded that MW didn't significantly reduce unemployment with a 1-2% decrease in youth unemployment from a 10% increase in MW. Skourias found a negative insignificant effect of MW on youth employment. A 10% increase in MW would lead to a 2-2.2% decrease in employment (as cited in Cousineau et al., 1992).

Vans Soest (1993) used time series data to investigate the micro and macro proof of the relationship between MW and employment. He used the standard approach in explaining macro analysis. On the contrary, he discovered a lower long-term MW effect on youth than adult employment. He concluded that MW decrease employment. He was however criticized by Gregg and Bazen who argued that he didn't estimate MW independently from average wage (Van Soest, 1993).

Brown (1999) used time series approach to investigate the effect of MW on employment. He included lagged variables to measure the long run effects of MW and deduced that the effect of MW had a moderate negative impact on employment. Abowd, Kramark and Margolis (1997) used logit models to determine the effect of MW on employment in France and England. They found a noteworthy negative relationship between MW and employment. Abowd et al (1999) later used longitudinal data to investigate further this relationship. They again found a negative relationship (Abowd et al., 1999).

Rama (1996) using regression analysis finds a negative relationship between urban youth employment and MW in Indonesia. However, the elasticity is insignificant. He asks for caution in interpreting the results given the high noncompliance rate in the region. Buchtikova investigated the effect of MW on industrial sector employment in Czech Republic. She concluded that MW reduced low skilled employment levels. The study is however limited by lack of inclusion of a trend, unsatisfactory number of observations and inability to generalize the findings for the whole economy (as cited in Rama, 1996).

Alatas and Cameron (2003) used the difference in difference method to determine the effect of MW on employment in Indonesia. They conclude that MW increases do not necessarily reduce employment in large firms but on the contrary, it reduces employment in small

domestic firms. He however finds no significant effect of MW on entry and exit of companies in the economy. Lemos (2004) used time series analysis to investigate the effect of MW on the informal and formal sectors of Brazil. He concluded that increase in MW decreased employment both in the formal and informal sectors and largely in the informal sector. Unemployment effect of MW was found to be positive. This contradicted with the standard two sector model (Lemos, 2004).

Gindling and Terrell (2004) use individual-level pooled cross-section/time-series data and micro data together with Kernel density functions to determine the effect of MW on informal and formal sectors of Costa Rica. They find that MW not only increases wages of those in the formal but also informal sector. The raise in salaries is higher in the informal than the formal sector. It is therefore effective in reducing wage disparities within the sectors. MW does not reduce wages of self-employed worker (Gindling, 2004). Maloney and Nunez (2004) use both numerical measures and Kernel density plots to determine the impact of MW on wage distribution in Latin America. They then employ Colombian panel data to quantify the effects. Their findings imply that MW effects are greater than they have been purported to be.

Vandemoortele and Ngola (1982) conducted a study to determine the effect of MW on employment in both private and public domains in Kenya. They found that MW reduced employment in the private sector but did not have any significant effect on the public sector. This study was however criticized for failing to consider long run effects of MW (Vandemoortele & Ngola, 1982). Omolo and Omiti (2004) employed descriptive statistics to measure the impact of MW on employment in Kenya. They concluded that MW limited employment. They however did not quantify the impact of MW on employment (Omolo & Omiti, 2004).

Manda et al. (2007) used time series data to examine the effect of MW on formal employment in Kenya. They used the error correction model to determine both the long run (LR) and short run (SR) effects of MW. They found that MW increases reduced employment in the public domain in the LR and SR but increased employment in the private sector in the LR with no effect in the SR. That increased RMW significantly reduced employment levels in the private sector. Bengal (2012) used time series data to measure the impact of MW on female and male employment in Kenya. She analysed both LR and SR effects of MW. In the SR MW increases had a substantially positive effect on women employment and negative

effect on male employment. However, in the LR it had a negative effect on both males and female employment.

## 2.4. Overview of the Literature

Indeed, there have been a number of studies conducted that infer differently on the impact of minimum wage on job turnover. Earlier scholars from developed countries found insignificant influences of minimum wage on employment levels while most researches in the developing countries found negative impact of minimum wage on employment. Even so, research on this controversial subject is still going on and researchers continue to find varying results even for similar countries. This is also the case with the study in Kenya. For this matter, research on this topic continues to be an issue of importance.

# CHAPTER 3: METHODOLOGY

## 3.1. Introduction

This section delves into the methodology used in achieving our research objectives. It explains the model specification that explains the expected relationship between employment rates and minimum wage. It also elaborates the empirical procedure for the study as well as the data types and sources.

## 3.2. Theoretical Framework

This study adopted the Cobb-Douglas production function that was adopted by Manda et al. (2007) in their study of the effect of minimum wage on formal employment in Kenya. The Cobb-Douglas production function was developed by Cobb and Douglas (1928). The production function is of the form:

$Q(L,K) = AL^{\beta}K^{\alpha}$ ……..1

Where Q is quantity produced, K is capital used, L is labour used, A is technology used and α and β are constants. From equation 1 we can get:

MPL= $\frac{\mathrm{d}Q}{\mathrm{d}L} = \beta AK^{\alpha}L^{\beta-1} > 0$…….2

MPK= $\frac{\mathrm{d}Q}{\mathrm{d}K} = \alpha AL^{\beta}K^{\alpha-1} > 0$…….3

The marginal products are then multiplied by unit price P, to obtain the marginal revenue products:

MRPL= $P\left(\beta AK^{\alpha}L^{\beta-1}\right) = w$…….4

MRPK= $P\left(\alpha AL^{\beta}K^{\alpha-1}\right) = r$ ……...5

Where, w and r are the wage rate and interest rate respectively, that is, the rewards for the factors of production. Equation 4 represents the short run demand for labour.

However the firm's objective is to maximise output and minimise cost of production. In maximising output, the firm is constrained by the cost of production (derived from cost of input). Therefore the profit maximising point (optimum point) of a firm is derived by solving the equations below:

I. $q = f(x_1, x_2)$……6

II. $c^0 = r_1x_1 + r_2x_2 + b$……7

Where $x_1, x_2$ is labour and capital respectively, $r_1, r_2$ their prices and b fixed inputs.

The objective is to maximise equation 6 subject to equation 7 as follows:

$\theta = f(x_1, x_2) + \lambda(c^0 - r_1x_1 - r_2x_2 - b)$……8

$\frac{\partial \theta}{\partial x_1} = f_1 - \lambda r_1 = 0$ ……9

$\frac{\partial \theta}{\partial x_2} = f_2 - \lambda r_2 = 0$……..10

$\frac{\partial \theta}{\partial \lambda} = c^0 - r_1 x_1 - r_2 x_2 - b = 0$……11

Dividing 9 by 10:

$\frac{f_1}{f_2} = \frac{r_1}{r_2}$……12

Therefore, the ratio of MPL and MPK should be equal to the ratio of their respective prices at the optimum point. Putting λ as subject in 9 and 10:

$\lambda = \frac{f_1}{r_1} = \frac{f_2}{r_2}$……13

Therefore, MPL divided by price of labour should be equal to the MPK divided by price of capital at optimum point.

Equations 12 and 13 illustrate the long run optimum conditions for both labour and capital.

From these equations, labour is determined as a function of wage rate, output, among other variables, that is L=f (w, r, Q).For this study we divided wage into minimum wage and average wage (Manda et al., 2007).

### 3.3. Model specification

The study employed multiple linear regression analysis in an attempt to illustrate the perceived relationship between minimum wage and employment by use of time series data. A descriptive statistic would be undertaken on the variables to determine their properties. This study adopted the Standard Neoclassical Model advanced by Lemos (2004). The model for this study was developed as follows:

$Emp_t = \beta_0 + \beta_1 TLF_t + \beta_2 MW_t + \beta_3 RAW_t + \beta_4 GDP_t + \beta_5 I_t + \beta_6 R_t + \varepsilon_t$……..14

Introducing natural logarithms, we got equation 15- however; the natural logarithm of R was not taken since R had some negative values.

$LN\ Emp_t = \beta_0 + \beta_1 LN\ TLF_t + \beta_2 LN\ MW_t + \beta_3 LN\ RAW_t + \beta_4 LN\ GDP_t + \beta_5 LN\ I_t + \beta_6\ R_t + \varepsilon_t$……15

Where:

$LN\ Emp_t$ is the natural logarithm of the employment levels measured by the total population employed in Kenya;

$LN\ TLF_t$ is the natural logarithm of total labour force that comprises of working age population of between 15 and 64 years;

$LN\ MW_t$ is the natural logarithm of minimum wages;

$LN\ RAW_t$ is the natural logarithm of real average wages;

$LN\ GDP_t$is the natural logarithm of gross domestic product measured in current US dollars;

$LN\ I_t$is the natural logarithm of inflation rates given by the CPI index;

$R_t$ is the real interest rates;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 and\ \beta_6$ are the parameters that measure the magnitude and direction of the relationship between employment and the respective independent variables; $\beta_0$ is the intercept explaining the link between minimum wage and employment; and $\varepsilon$ is the idiosyncratic error term.

According to Benoit (2011), we use natural logarithms because they are convenient when transforming a highly skewed variable into one that is more approximately normal (It is the most appropriate means of measuring variables with different units of measurements). According to Manda, Kosimbei and Wanjala (2007), natural logarithms are used due to the perceived inverse relationship between minimum wage and employment.

### 3.4. Definition of Variables

The variables employed in the study are explained in this section. The independent variable under study is minimum wage and the dependent variable is employment level. The control variables employed are total labour force, real average wage, gross domestic product, inflation rate and interest rate. All the variables employed are continuous in nature. Table 1 shows the variables employed, their symbols and expected signs.

**Table 1: Definition of variables**

| **Variable** | **Symbol** | **Expected Sign** |
|---|---|---|
| Employment level | Emp | |
| Total Labour Force | TLF | Positive |
| Minimum Wage | MW | Negative |
| Real Average Wage | RAW | Negative |
| Gross Domestic Product | GDP | Positive |
| Inflation Rate | I | Positive |
| Interest Rate | R | Negative |

**Source: Author (2018)**

Employment levels measures the total population of a country that is currently employed. A proxy of the total population employed in Kenya within the period 1980 to 2016 was used for this variable with data collected from KNBS surveys.

Total labour force measures the total population that is employed and total population that is unemployed (but actively looking for work). The total labour force data for working age 15-64 was used as a proxy for this variable; this was collected from World Bank Indicators.

Minimum wage is the least payable wage level allowable by law that is set by government as a policy in regulating labour sector. Minimum wage data was collected from various KNBS surveys for the period 1980-2016.

Real average wage measures the mean wage level that is adjusted for inflation, within an economy over a particular period, say a year. Real average wage data was collected from various KNBS surveys spanning 1980-2016.

Gross Domestic Product measures the economic wellbeing of a nation. GDP at current USD dollars was used as a proxy for economic wellbeing of the country; this was collected from World Bank Indicators.

Inflation rate measures the general increase in price levels. Consumer price index (CPI) was used as a proxy for inflation rate as it accounts for change in purchasing power parity of consumers brought about by price increases. Data was sourced from World Bank Indicators.

Interest rates are determined by long-term government interest rates for bonds with ten years maturity. Data on interest rates were sourced from World Bank indicators.

### 3.5. Diagnostic Tests

The following diagnostic tests were carried out on the data before transformation of data for regression analysis.

#### 3.5.1. Normality Test:

Normality measures the extent to which a variable follows the standard normal distribution. Skewness and Kurtosis are measures of normalcy. Kurtosis measures the peakness or flatness of a distribution while skewness measures the degree of asymmetry of a series. A normal distribution has a Kurtosis of 3 and a zero skewness value The Shapiro-wilk test developed in 1965 was used to determine the normality of variables under consideration.

### 3.5.2. Heteroscedasticity Test:

Heteroscedasticity occurs when the variance changes across all observations leading to biasness of estimated standard errors even though estimated coefficients are unbiasedness. This is a problem as it affects the hypothesis testing and makes the OLS approach ineffective. To test for heteroscedasticity, we employed the Breusch-Pagan test developed by Trevor Breusch and Adrian Pagan in 1979.

### 3.5.3. Autocorrelation Test:

Autocorrelation occurs when error terms are correlated overtime and is, therefore, also known as serial correlation of disturbance terms across periods. Here, autocorrelation leads to biased standard errors and unbiased estimated coefficients consequently leading to false inferences (Thomas, 1997). Autocorrelation was tested through the Durbin-Watson (DW) Test.

### 3.5.4. Multicollinearity Test

Hair et.al (1998) argued that Multicollinearity leads to problems in clearly discovering the effect of variables as it leads to the biased estimates of the coefficients since the independent variables used to predict dependent variable are related. This study employed the Variance Inflation Factor (VIF). According to Rinle et al. (2015), 5 is the maximum acceptable level of VIF, variables with VIFs greater than 5 should be dropped.

### 3.5.5. Cointegration Test

Cointegration test is performed to establish the existence of a long run correlation among the variables under consideration. It is defined by stationarity and the order of integration of the series. In estimating cointegration of the series of different orders, it is best to use the ARDL Cointegration approach (bounds test), proposed by Pesaran, Shin and Smith (2001); it is also ideal for small samples & it derives unbiased estimators of the long run model (Harris & Sollis, 2003). The bounds test proposed by Pesaran, Shin and Smith (2001) was used to determine cointegration between variables of study. The null hypothesis postulates that there is no cointegration while the alternative hypothesis postulates of existence of cointegration.

### 3.5.6. Stationarity Test

Stationarity occurs when the statistical properties of the series- mean, variance, etc- are independent of time. Non stationarity means that a series is dependent on time; this is a timeseries problem. Stationarity is a problem because it leads to invalid inference due to the spurious regression (where unrelated series can seem to be related since they share a common

time trend) and inconsistent regression problems (regressing a stationary series on a non-stationary series would lead to a non-constant regression coefficient), (Green, 2003). It is therefore important to ensure regression of variables of the same order of integration, in this case, variables are to be differenced until they are made stationary after which they are suitable for regression (Thomas 1997). Augmented Dickey Fuller test (Engle and Granger, 1987) was used to test for stationarity.

### 3.5.7. Data types and sources

The study employed time series data that spanned a period of 37 years from 1980 to 2016. The data was sourced from various economic surveys within the Kenya National Bureau of Standards (KNBS) platform as well as from the World Bank indicators sourced from World Bank data base. Data was analysed using stata software.

# CHAPTER 4: DATA ANALYSIS, RESULTS AND DISCUSSIONS

## 4.1. Introduction

This chapter details the analysis, results and discussion of the data collected from Kenya National Bureau of Standards (KNBS) platform and the World Bank indicators sourced from World Bank data base. It begins with descriptive statistics, followed by pretests then the regression model. The results of the analysis are then discussed.

## 4.2. Descriptive statistics

Descriptive statistics was carried out on both the raw data and transformed data to determine the properties of the data. The findings of these inquiry are briefed in table 2 and 3:

**Table 2: Summary of descriptive statistics for raw data**

| **Variable** | **Emp (in millions)** | **TLF (in millions)** | **MW** | **RAW** | **GDP (in millions)** | **I** | **R** |
|---|---|---|---|---|---|---|---|
| **Mean** | 6.168 | 16.0 | 4,991.75 | 144,090.5 | 2.09e+4 | 12.28 | 7.45 |
| **Median** | 5.097 | 15.3 | 3,840.67 | 116,844.7 | 1.29e+4 | 10.28 | 6.82 |
| **Standard deviation** | 4.575 | 5.886 | 4,711.14 | 168,542.3 | 1.89e+4 | 8.69 | 6.60 |
| **Minimum** | 1.191 | 7.646 | 380 | 303.39 | 5.75e+03 | 1.55 | -8.00 |
| **Maximum** | 16.0 | 27.4 | 15,591 | 402,383.6 | 7.05e+4 | 45.98 | 21.10 |
| **Variance** | 2.09e+07 | 3.46e+07 | 22.2 | 2.84e+10 | 3.58e+16 | 75.51 | 43.59 |
| | | | | | | | |
| **Variable** | **Emp** | **TLF** | **MW** | **RAW** | **GDP** | **I** | **R** |
| **Skewness** | 0.63 | 0.30 | 0.91 | 0.67 | 1.31 | 1.91 | 0.06 |
| **Kurtosis** | 2.17 | 1.91 | 2.74 | 1.81 | 3.42 | 7.57 | 2.83 |
| **Observations** | 37 | 37 | 37 | 37 | 37 | 37 | 37 |

**Source: Author (2018)**

The parameters measured for each variable included the variance, standard deviation, average, kurtosis and skewness. The mean and median are measures of central tendency, the

standard deviation, variance and range- difference between the maximum and minimum values- are measures of dispersion, and skewness and kurtosis are measures of normalcy. The mean measures the average values for each variable -gotten by summing up all values of a variable divided by the number of observations. The median is the middle number after sorting values of a variable in ascending/descending order. Maximum & minimum are the highest & lowest values of each variable. Kurtosis measures the peakness or flatness of a distribution with regards to a particular series- a normal distribution has a Kurtosis of 3. Skewness measures the degree of asymmetry of a series- a normal skewness is one with a zero skewness value (-1, +1) (meaning the series is symmetric around the mean).

Table 2 summarises all the statistical properties of the variables. Employment has an average of 6.168million with a median of 5.097million. The maximum and minimum employment levels are 16 million and 1.2 million respectively. The skewness and kurtosis are 0.63 and 2.17 therefore employment faces a normal distribution. Total labour force (TLF) has an average of 16million with a median of 15.3 million. The maximum and minimum total labour force is 27.4 million and 7.6 million respectively. The skewness and kurtosis are 0.30 and 1.91 therefore total labour force faces a normal distribution. Minimum Wage (MW) has an average of about KES 4,992 with a median of KES 3,840. The maximum and minimum minimum wages are KES 15,591 and KES 380 respectively. The skewness and kurtosis are 0.91 and 2.74 therefore minimum wage faces a normal distribution. Real average wage (RAW) has an average of KES 144,090 with a median of KES 116,844. The maximum and minimum real average wages are KES 402,383 and 303.39 respectively. The skewness and kurtosis are 0.67 and 1.81 therefore real average wage faces a normal distribution. Gross Domestic Product (GDP) has an average of USD 20.9 billion with a median of USD 12.9 billion. The maximum and minimum gross domestic products are USD 70.5 billion and USD 5.75 billion respectively. The skewness and kurtosis are 1.31 and 3.42 respectively; therefore gross domestic product is not normally distributed. Inflation has an average of 12.28% with a median of 10.28%. The maximum and minimum inflation rates are 45.98% and 1.55% respectively. The skewness and kurtosis are 1.91 and 7.57 respectively, therefore inflation is non-normal. Real interest rates have an average of 7.45% with a median of 6.82%. The maximum and minimum interest rates are 21.1% and -8% respectively. The skewness and kurtosis are 0.06 & 2.83 respectively; therefore real interest rates are normally distributed. A descriptive statistic was also carried out on transformed model and results are illustrated in table 3.

**Table 3: Summary of descriptive statistics for transformed data**

| Variable | LNEmp | LNTLF | LNMW | LNRAW | LNGDP | LNI | R |
|---|---|---|---|---|---|---|---|
| **Mean** | 15.3144 | 16.5176 | 7.9041 | 9.4272 | 23.42348 | 2.28702 | 7.4528 |
| **Median** | 15.4441 | 16.5458 | 8.2534 | 11.6686 | 23.28018 | 2.3306 | 6.8152 |
| **Standard deviation** | 0.8587 | 0.3832 | 1.2697 | 3.1609 | 0.79928 | 0.705104 | 6.6021 |
| **Minimum** | 13.9901 | 15.84971 | 5.94017 | 5.71505 | 22.47278 | 0.44104 | -8.01 |
| **Maximum** | 16.5879 | 17.12505 | 9.65445 | 13.0216 | 24.9793 | 3.82818 | 21.096 |
| **Variance** | 0.7373 | 0.14681 | 1.61204 | 9.9912 | 0.63885 | 0.497172 | 43.5883 |
| **Skewness** | -0.1533 | -0.14116 | -0.33104 | -0.04697 | 0.6252787 | -0.511767 | 0.0638 |
| **Kurtosis** | 1.6205 | 1.8169 | 1.73022 | 1.0936 | 1.99797 | 3.76151 | 2.8348 |
| **Observations** | 37 | 37 | 37 | 37 | 37 | 37 | 37 |

**Source: Author (2018)**

From table 3, natural logarithm of employment (LNEmp) has an average of 15.31 with a median of 15.44. The maximum and minimum values for the natural logarithm of employment are 16.58 and 13.99 respectively. The skewness and kurtosis are -0.15 and 1.62 respectively, therefore the natural logarithm of employment faces a normal distribution. The natural logarithm of total labour force (LNTLF) has an average of 16.51 with a median of 16.54. The maximum and minimum values of the natural logarithm of total labour force are 17.12 and 15.84 respectively. The skewness and kurtosis are -0.14 & 1.81 respectively, therefore natural logarithm of total labour force faces a normal distribution. The natural logarithm of minimum wage (LNMW) has an average of 7.9 with a median of 8.25. The maximum and minimum values of the natural logarithm of minimum wage are 9.65 & 5.94 respectively. The skewness and kurtosis are -0.33 & 1.73 respectively, therefore the natural logarithm of minimum wage faces a normal distribution. The natural logarithm of real average wage (LNRAW) has an average value of 9.42 with a median of 11.66. The maximum and minimum values of the natural logarithm of minimum wage are 13.02 & 5.71 respectively. The skewness and kurtosis are -0.04 & 1.09 respectively, therefore the natural

logarithm of minimum wage faces a normal distribution. The natural logarithm of gross domestic product (LNGDP) has an average of 23.42 with a median of 23.28. The maximum and minimum values of the natural logarithm of gross domestic product are 24.97 & 22.47 respectively. The skewness and kurtosis are 0.62 & 1.99 respectively; therefore, natural logarithm of gross domestic product is normally distributed. The natural logarithm of inflation rates (LNI) has an average value of 2.28 with a median of 2.33. The maximum and minimum values of natural logarithm of inflation rates are 3.82 & o.44 respectively. The skewness and kurtosis are -0.51 & 3.76 respectively. Real interest rate (R) has an average of 7.45% with a median of 6.81%. The maximum and minimum real interest rates are 21.1% and -8% respectively. The skewness and kurtosis are 0.06 & 2.83 respectively; therefore real interest rates are normally distributed. The logarithm of real interest rates was not taken in the transformed model since real interest had some negative values hence if the natural logs were to be taken there would be missing values in the transformed model.

### 4.3. Normality test

**Table 4: Shapiro-Wilk Normality Test**

| Shapiro-Wilk W test for normal data | | | | | |
|---|---|---|---|---|---|
| Variable | Observations | W | V | Z | Prob>z |
| Employment levels | 37 | 0.89589 | 3.877 | 2.838 | 0.00227 |
| Total Labour Force | 37 | 0.94739 | 1.959 | 1.408 | 0.07955 |
| Minimum Wage | 37 | 0.88088 | 4.435 | 3.120 | 0.00090 |
| Real Average Wage | 37 | 0.76433 | 8.775 | 4.549 | 0.00000 |
| Gross Domestic Product | 37 | 0.76259 | 8.840 | 4.565 | 0.00000 |
| Inflation Rate | 37 | 0.82289 | 6.595 | 3.951 | 0.00004 |
| Real Interest Rate | 37 | 0.96278 | 1.386 | 0.683 | 0.24721 |

**Source: Author (2018)**

Table 4 shows the findings from Shapiro-wilk normality test. The null hypothesis postulates normalcy & alternative postulates non normalcy. In order to reject null we have to have significant p values (5%,10%, 1%). The p values of less than 5% (0.05) indicate non-normalcy while values greater than 5% indicate normalcy (Shapiro & Wilk, 1965). The results indicate that only Total Labour Force and Real interest rates are normally distributed- Employment level, Minimum Wage, Real Average Wage, Gross Domestic Product and Inflation are not normally distributed.

### 4.4. Heteroscedasticity Test:

The Breusch-Pagan test (1975) was carried out to determine whether there were cases of heteroscedasticity- implying a non-constant variance across observations. The null hypothesis postulates absence of heteroscedasticity (implying homoscedasticity), while the alternative hypothesis postulates presence of heteroscedasticity. The Breusch-Pagan test is a chi-square distribution with degrees of freedom equal to number of variables in z (Breusch & Pagan, 1975). The Breusch-Pagan test was undertaken on the untransformed model and the following results were generated; chi2 (6) = 6.18 with Prob > chi2 = 0.4030. The chi2 results at 6 degrees of freedom indicated that the series was homoscedastic at 5%, 10% & 1% significance level since 0.4030>0.10>0.05, therefore the null hypothesis was not rejected.

### 4.5. Autocorrelation Test:

The Durbin Watson test was carried out to determine whether the error terms were correlated overtime. The null hypothesis postulates absence of serial correlation while the alternative hypothesis postulates presence of serial correlation. After regression of the untransformed time series model, Durbin Watson test was undertaken and the results were generated as; Durbin-Watson d-statistic (7, 37) =1.660121. The DW significant table was used to generate a decision to reject/not reject the null. From the table; K=6, n=37 therefore at their intersection the lower cut off=0.950 & upper cut off=1.662; 0.950 >1.660121>1.662 therefore decision on autocorrelation isn't certain (Green, 2003; pg. 270).

### 4.6. Multicollinearity test:

Variance Inflation Factor (VIF) method was used to determine multicollinearity within the transformed regression model. According to Rinle et al. (2015), 5 is the maximum acceptable level of VIF, variables with VIFs greater than 5 should be dropped. The following VIFs results were derived from the test. Table 5 shows the final variables that met this condition for computation of the regression analysis. Natural logarithm of real average wage (LNRAW), natural logarithm of Total Labour Force (LNTLF) and Real interest rate (R) were dropped to deal with the problem of multicollinearity.

**Table 5: Variance Inflation Factor test**

| **Variable** | **VIF** | **1/VIF** |
|---|---|---|
| Natural log of Gross Domestic Product | 4.89 | 0.204663 |
| Natural Log of Minimum Wage | 4.85 | 0.206049 |
| Natural Log of Inflation Rate | 1.07 | 0.936802 |
| Mean VIF | **3.60** | |

**Source: Author (2018)**

### 4.7. Stationarity test:

The Augmented Dickey Fuller test was chosen to test for stationarity. The null hypothesis postulates non-stationarity while the alternative hypothesis postulates stationarity. The null hypothesis is rejected when ADF test statistics is greater than Mckinnon's critical values and when the absolute value of the ADF test statistics is greater than critical values at different significance levels-1%, 5% & 10% (Gujarati, 2004). The results on table 6 indicate that natural logarithm of Total Labour Force (LNTLF), natural logarithm of Inflation (LNI) and Real interest rate (R) were stationary without differencing, ie I(0), while natural logarithm of Employment level (LNEmp), natural logarithm of Minimum Wage (LNMW), natural logarithm of Real Average Wage (LNRAW), natural logarithm of Gross Dometic Product (LNGDP) were stationary after first differencing, ie I(1).

**Table 6: ADF Test**

| Variable | 1st difference | | 2st difference | | Comment |
|---|---|---|---|---|---|
| | ADF | McKinnon | ADF | McKinnon | |
| LNEmp | -0.639 | -2.449 | -3.360*** | -2.453 | I(1) |
| LNTLF | -1.771** | -1.694 | | | I(0) |
| LNMW | -0.928 | -2.449 | -4.275*** | -2.453 | I(1) |
| LNRAW | -0.823 | -2.449 | -4.140*** | -2.453 | I(1) |
| LNGDP | 0.552 | -2.449 | -3.219*** | -2.453 | I(1) |
| LNI | -3.763*** | -2.449 | | | I(0) |
| R | -3.057** | -2.449 | | | I(1) |
| | | | | | |

**Asterisk (**) = Significance at 5% & 10%; (***) = Significance at 1%, 5% & 10%**

**Source: Author (2018)**

Therefore, in estimating the cointegration of the series of different orders, it is best to use the bounds test proposed by Pesaran, Shin and Smith in 2001 and not the Johansen and Juselius (1990) approach (Harris & Sollis, 2003; Emeka & Aham, 2016).

### 4.8. Cointegration Test

The bounds test proposed by Pesaran, Shin and Smith (2001) - applying Kripfganz and Schneider (2018) critical values and approximate p-values- was used to determine cointegration between variables of study. The null hypothesis postulates that there is no cointegration while the substitute hypothesis postulates of existence of cointegration. Decision rule is not to reject the null if both F statistic and t statistics are closer to zero than critical value of lower bound I(0)- there's no long run relationship and we estimate Autoregressive distributed lag (ARDL) model. If both F statistics and t statistics are more extreme than critical value for upper bound I(1) we reject null- in this case there is a long run association and the Error Correction Model (ECM) is estimated (Kripfganz & Schneider, 2018; Pesaran, Shin & Smith, 2001; Emeka & Aham, 2016). The results shown in the table below were gotten from the computation of this test with LNEmp and LNMW used as endogenous variables in two separate models.

**Table 7: Bounds test for cointegration**

| Statistic | Kripfganz and Schneider (2018) Critical values | | | | | | P Values | |
|---|---|---|---|---|---|---|---|---|
| | 10% | | 5% | | 1% | | | |
| | I(0) | I(1) | I(0) | I(1) | I(0) | I(1) | I(0) | I(1) |
| Natural Log of Employment levels as the endogenous variable (F=3.321, t=-3.078) | | | | | | | | |
| **F** | 2.943 | 4.128 | 3.608 | 4.955 | 5.201 | 6.920 | 0.067 | 0.195 |
| **T** | -2.562 | -3.454 | -2.916 | -3.858 | -3.641 | -4.676 | 0.036 | 0.177 |
| Natural log of Minimum Wage as endogenous variable; (F=2.515, t=-2.812) | | | | | | | | |
| **F** | 2.953 | 4.111 | 3.614 | 4.925 | 5.190 | 6.849 | 0.158 | 0.366 |
| **T** | -2.573 | -3.463 | -2.923 | -3.861 | -3.640 | -4.667 | 0.063 | 0.256 |
| F stat=1.442; t stat=-0.749 | | | | | | | | |

**Source: Author (2018)**

From the computed results on table 7 where natural log of employment levels is the endogenous variable, F stat (3.321) is closer to zero than I(0)s; 3.608 & 5.201; t stat (-3.078) is also closer to zero than I(0); (-3.641). Both statistics are clearly less extreme than the critical value for upper bound I(1).At 1% significance level, we cannot reject the null hypothesis that there is no relationship between the variables.

In the case where natural log of minimum wage is taken as the endogenous variable, F stat (2.515) is closer to zero than I(0)s 2.953, 3.614 & 5.190; t stat (-2.812) is closer to zero than I(0)s at 5% & 1% significance level (-2.923 & -3.640). Both statistics are clearly less extreme than the critical value for upper bound I(1). At 1% significance level, we cannot reject the null hypothesis that there is no long run relationship between the variables.

The two separate models postulate a short run relationship between the variables. We therefore employ the ARDL model for regression of the short run relationship between the variables.

### 4.9. Model specification using ARDL:

Having concluded that there is no long run relationship between employment and minimum wage, a short run model was adopted for the regression, that is, the Autoregressive distributed lag model (ARDL).

The generalised model is specified as follows:

$Y_t = \alpha_{0i} + \sum_{i=1}^{p} \mu_i y_{t-1} + \sum_{i=0}^{q} \beta_i x_{t-1} + e_{it}$ ……..…..16

Where $y_t'$ is a vector of dependent variable, $x_t'$ are independent variables allowed to be I(0) or I(1); β & μ are coefficients, α is a constant, i= 1, … ,k; p and q are optimal lag orders; eit is a vector of error terms (Emeka & Aham, 2016).

Equation 16 simply states that forecasted employment is a function of its lagged values and the current and lagged values of the explanatory variables.

In this case, our model is specified as follows:

$\Delta LNEmp_t = \alpha_{01} + \sum_{i=1}^{p} \mu_{1i} \Delta LNEmp_{t-1} + \sum_{i=0}^{q} \beta_{1i} \Delta LNMW_{t-1} + \sum_{i=0}^{q} \beta_{2i} \Delta LNGDP_{t-1} + \sum_{i=0}^{q} \beta_{3i} \Delta LNI_{t-1} + e_{it}$ ……..……17

Equation 15 is now transformed to equation 17 after running diagnostic tests on the variables and determining the best model to adopt-exogenous ARDL model informed from cointegration. Some variables under equation 15 were dropped in equation 17 to correct multicollinearity problem

The variables adopted are explained as follows;

$\Delta LNEmp_t$ is the change in the natural logarithm of the current overall employment levels

$\Delta LNEmp_{t-1}$is the change in the natural logarithm of the previous year's overall employment levels

$\Delta LNMW_{t-1}$ is the change in the natural logarithm of the previous year's minimum wages

$\Delta LNGDP_{t-1}$ is the change in the natural logarithm of the previous year's gross domestic product

$\Delta LNI_{t-1}$ is the change in the natural logarithm of the previous year's inflation rate

β & μ are coefficients, α is a constant, i= 1, … ,k; p and q are optimal lag orders; eit is a vector of error terms.

### 4.10. Discussion of results

Table 9 shows a summary of the results that were obtained from the regression.

**Table 8: Short run regression results**

| Variable | Coefficient | Standard Error | t-stat | Probability |
|---|---|---|---|---|
| Natural log of Previous period Employment Levels ($LNEmp_{(t-1)}$) | 0.8625 | 0.0778461 | 11.08 | 0.000 |
| Natural log of Minimum Wage (LNMW) | 0.0915 | 0.0434474 | 2.10 | 0.044 |
| Natural log of Gross Domestic Product (LNGDP) | 0.0013 | 0.0270156 | 0.05 | 0.960 |
| Natural log of Inflation (LNI) | 0.0053 | 0.0104031 | 0.53 | 0.603 |
| R-squared | 0.9978 | Breusch-Godfrey LM test | 0.306 Prob>chi2=0.5799 | |
| Adjusted R-squared | 0.9975 | White's test | 10.19 Prob> chi2 =0.7482 | |
| Root MSE | 0.04233 | | | |
| F statistic | 3444.70 | | | |
| Prob>F | 0.0000 | | | |
| Durbin Watson statistic | 2.169305 | | | |

**Source: Author (2018)**

The high value of the F statistic for the regression (3444.70) indicates that the regression is statistical significant. A p-value of 0.0000<0.01 indicates that the regression is statistically significant at 1% significance level. The Adjusted R-squared indicates that 99.75% of the relationship between the variables is explained by the regression model.

The Durbin Watson statistic (5, 36) = 2.169 is more than the upper bound at the intersection of k=4, n=36 of 1.513. This indicates that there is no autocorrelation in the data. This is further supported by a Breusch-Godfrey LM test of 0.306 with Prob>chi2=0.5799 –since 0.56799>0.1, we are 99% confident of absence of autocorrelation in the data. White's test for heteroschedasticity, chi2(14)=10.19 with Prob>chi2=0.7482 indicates absence of heteroschedasticity since 0.742>0.1.Therefore the model is homoscedastic.

From table 8, in the short run, the previous period employment levels have the greatest effect on employment levels with a coefficient of 0.862- a unit increase in the previous period

employment levels will lead to a 0.862 unit increase in current employment levels. The t statistics of 11.08 is greater than the t critical at 5% significance level (1.96=>2); we reject the null of no significant relationship-the first lag of employment levels is therefore significant in explaining variations in employment rate at 5% significance level, using a two tailed test. The value of 0.000<0.05<0.01, therefore, from p value, we are 99% confident that previous period employment is significant in explaining variations in current employment levels. Previous period employment increases current period employment significantly, this is in line with the findings of Bengal (2012).

Minimum wage has a coefficient of 0.0913 meaning that a unit increase in MW would lead to a 0.09 unit increase in employment levels-this isn't a substantial impact on employment levels. A greater t statistics value of 2.10 compared to a critical value of 2 (at 5% significance level) suggests that we reject the null of no significant relationship and accept alternative hypothesis that there is a significant effect of minimum wage on employment levels. A p value of 0.044<0.05 means that there is a significant relationship between minimum wage and employment at 5% significance level. Minimum wage has a positive significant relationship with employment levels. This is consistent with the findings of Bassanini and Duval, (2006) and Card and Kruger, (1995).

Gross Domestic Product has an insignificant effect on employment rate given its t statistics of 0.05 which is less than t critical of 2. Its p value of 0.960 is also greater than 0.10>0.05, therefore not significant even at 10% significance level. In this case we cannot interpret the coefficient but conclude that there's an insignificant relationship between Gross Domestic Product and employment levels. This, however, is contrary to the findings of Bengal (2012) that found significance of previous period GDP in affecting male & female employment levels in the short run.

Inflation rate also has an insignificant effect on employment rate given its t statistics of 0.53 which is less than t critical of 2. Its p value of 0.603 is also greater than 0.10>0.05, therefore not significant even at 10% significance level. In this case we cannot interpret the coefficient but conclude that there's an insignificant relationship between Inflation and employment levels. This, however, is in contrary to the findings of Kierzkowski, H. (1980).

# CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1. Introduction

This chapter is a summary; it also provides a conclusion and recommendations based on the findings of the study.

## 5.2. Summary of findings

This study sought to determine the effect of minimum wage on employment while employing control variables from previous literature (Bengal, 2012; Manda et al., 2007). The findings of the study suggest that there is no long run relationship between minimum wage and employment levels-that instead the relationship is a short run one. This is in opposition to previous studies in Kenya by Bengal, (2012) and Manda et al., (2007) that estimated long run models in postulating the relationship between minimum wage and employment; they employed the Johansen cointegration test as opposed to the ARDL cointegration test on series of different orders of integration, that is, I(0) & I(1). The findings also illustrate a positive significant relationship between minimum wage and employment levels unlike conclusion of previous studies that largely concluded on negative relationship between MW and employment (Vandemoortele & Ngola, 1982; Omollo & Omiti, 2004; Manda et al., 2007; Bengal 2012).

Gross Domestic Product and Inflation rate were also found to be insignificant in affecting employment levels with P values of 0.960 and 0.603 and t values of 0.05 and 0.53 respectively. Other variables that were previously incorporated in the model were dropped to correct the problem of multicollinearity- Real Average Wage (RAW) and Total Labour Force (TLF). In previous studies, however, these unknowns were regressed together and found to be portraying significant relationship with employment levels (Manda et al., 2007; Bengal 2012). These studies however, did not employ multicollinearity test nor correlation tests to determine these relationships. The ARDL model in design doesn't allow for regression of variables suffering from multicollinearity and therefore is an improved model of analysis.

In conclusion, the regression was found to be significant with a P value of 0.0000 and an adjusted R-squared of 0.9975. Therefore, we can be 99% confident that the regression explains 99.7% of the relationship between the variables in the model.

## 5.3. Conclusion

Studies postulating the relationship between minimum wage and employment levels have forecasted varying relationships between minimum wage and employment levels. The competitive labour theory forecasts a decrease in employment levels brought about by an increase in minimum wage while alternative models forecast positive or little impact of minimum wage on employment levels-alternative models include the monopsony, monopolistic, efficiency wage theory and minimum wage, unemployment and growth theory. From our findings, we can conclude that the relationship between minimum wage and employment is best explained by the alternative theoretical model. The results show that minimum wage has a positive effect on employment levels; a 1% increase in minimum wage leads to a 9% increase in employment levels.

We can also conclude that Gross Domestic Product and inflation rates- measured by consumer price index (CPI) - do not have significant effects on employment levels. Therefore, these variables on their own, cannot be employ in an effort to increase employment levels in Kenya.

## 5.4. Recommendations and areas of further research

Minimum wage positively effects employment levels. This means that it is significant in improving employment levels in Kenya, therefore, it can be manipulated periodically in an effort to increase employment levels. However, it doesn't make a big enough impact to be satisfactory on its own and can effectively be employed alongside other policies whose aim is to improve employment levels, reduce inequality in workplace and reduce poverty levels while promoting shared prosperity in Kenya. It is also important to research on other factors that affect employment levels in Kenya in an attempt to better employment levels in Kenya. This will better advice on factors to consider and employ during policy formulations in an attempt to increase employment levels in Kenya. For further research, the relationship between minimum wage and wage inequality as well as minimum wage and poverty levels in Kenya can be employment in an attempt to better understand the contribution of minimum wage policy on the economic wellbeing of the country.

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