Impact of Minimum Wages on Formal Employment in Kenya

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Abstract

This paper uses time series data to analyze the impact of minimum wages on employment in the private and public formal sectors in Kenya. An error correction model is used to analyse the long-run and short-run effect of minimum wage on employment in the two sectors. The results show that minimum wage has a significant negative effect on employment in the formal public sector, both in the short-run and long-run. However, in the private sector, minimum wage has a positive significant effect on employment in the long-run but has no effect on employment in the short-run. Increase in real average wage has a negative effect on employment in the private sector. The results also show that both negative and positive shocks on the economy have an impact on employment. The model shows that short-run disturbances feed into the long-run employment path. The results imply that it is the cumulative effect of minimum wage that has an impact on employment. Thus, limiting the frequency of adjusting minimum wage upwards, such as changing minimum wage after two years instead of changing it every year as currently the practice in Kenya can help minimize the negative impact of minimum wage on employment.

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1. Introduction

Minimum wage regulation prohibits the payment of wages below a specified threshold. In many countries, minimum wage is used to guarantee low-skilled workers' earnings that are high enough to cover their basic needs and to raise their standards of living. Minimum wage can also be a means of protecting vulnerable workers against exploitation by their employers. Apart from benefiting disadvantaged workers, increase in minimum wage can be part of a strategy to reduce poverty. Minimum wage can also benefit employers in several ways. It can increase the productivity of unskilled employees by minimizing shirking (motivating workers), reducing labour turnover by ensuring uniform wages, and can also contribute to social peace by strengthening social cohesion with employers (Saget, 2002).

If increasing minimum wage leads to a reduction in employment, then it can hurt the same workers it is intended to protect. In most developing countries, minimum wage may be ineffective as a policy instrument for poverty reduction due to incomplete coverage, due to the many workers employed outside the wage sector, due to the low level of firm compliance, and the fact that it may lead to decreased demand for low-skilled workers. A binding minimum wage may reduce the demand for those workers whom it intends to benefit (Brown, 1995). Such an outcome is in line with the conventional wisdom based on neoclassical economic theory that if minimum wage is set at a level above the market-clearing wage, labour demand and employment would fall, resulting in increased unemployment.

Indeed, most previous studies on the impact of minimum wage on employment (Abowd, Kramarz and Margolis, 1999; Currie and Fallick, 1993; Chesnes, 2001; Alatas and Cameron, 2003; Brown, Gilroy and Kohen, 1982) find a negative impact of minimum wage on employment. This conventional wisdom has, however, been challenged in a study

by Card and Krueger (1994), which shows that an increase in the minimum wage in some States in the USA did not lead to job loss. Card and Krueger (2000) confirmed their 1994 findings by carrying out a re-analysis based on payroll data on the state of New Jersey. Studies done in Europe show mixed results, with some (e.g. Abowd, Kramarz and Margolis, 1999; Behrman, Sickles and Taubman, 1983; Neumark and Wascher, 1992; Freeman and Freeman, 1991) indicating a negative impact, while others (e.g. Machin and Manning, 1997; Stewart, 2001) showing little or no impact of minimum wage on employment. An OECD (1998) survey of 20 major studies concludes that there were no clear, unambiguous findings on the impact of minimum wages on employment. In Australia, studies show that an increase in statutory minimum wage leads to job loss (Leigh, 2003; 2004). However, Watson (2004) has criticized the findings by Leigh (2003; 2004) on grounds of the type of data used and methodological weakness.[1] In general, when using the "natural experiment" method, it is difficult in practice to determine a proper control group (Saget, 2002).

Overall, most research on the impact of minimum wages on employment has been done in developed countries with only a few studies in developing countries (e.g. Carneiro, 2000; Freeman and Freeman, 1991; Bell, 1997; Gindling and Terell, 2004; Rama, 1999; Islam and Nazara, 2000; Alatas and Cameron, 2003; Jones, 1997). Yet, in most developing countries, minimum wage laws are used in principle to guarantee low-skilled workers a wage high enough to cover their basic

[1] First, Leigh (2003) reluctantly uses ABS macro-data aggregates such as employment to population ratios instead of using micro-data, which other studies using the natural experiments approach have used. Also, macro-data is inappropriate to use when studying impact of small movements in relative wages on a small subset of the population. Secondly, Leigh (2004) does not include adequate controls in a regression that yields a negative impact of minimum wage on employment in Western Australia (Watson, 2004).

needs (Jones, 1997). Also, the level at which the minimum wages are fixed in these countries is often contested and raises concerns of job loss. Due to differences in the labour market conditions between developed and developing countries, the findings based on developed economies cannot be applied to the labour markets in developing countries. There is need for more research in developing countries to inform labour policies on the impact of minimum wage on employment. As in other developing countries, research on the impact of minimum wage on employment in Kenya is limited, yet increases in minimum wage are usually contested both by employers and employees.[2] This study aims to fill this knowledge gap by looking at the impact of minimum wages on both private sector and public sector employment.[3]

[2] Employers argue that raising minimum wage increases the cost of production, making Kenya uncompetitive compared to major competitor countries like China, India and other newly industrializing countries of South East Asia. On the other hand, employees believe that increase in minimum wage is not high enough to compensate them for the increase in cost of living.

[3] It was not possible to consider formal *vis-à-vis* informal employment because of data limitations. Also, minimum wages in Kenya mainly apply to the formal sector, but not informal sector.

2. Minimum Wages and Employment in Kenya

Minimum wage was introduced in Kenya in 1932, with the introduction of a minimum wage ordinance, which was based on the needs of single males who lived in urban areas without family responsibility (Bigsten, 1984). After independence in 1963, the Kenyan government continued using minimum wage policy as a means of protecting low-skilled workers against exploitation from employers. According to the regulation of wages and conditions of Employment Act (Cap 229) of the Laws of Kenya, the basic wage to be paid to any employee should not be less favourable than that specified in relation to the category of the employee and to the area of employment. The minimum wage policy applies to all sectors but is particularly enforced in the formal sector (Omolo and Omiti, 2004).

Minimum wages in Kenya vary according to geographical regions and skill levels of employees. The minimum wage applicable to cities is relatively higher than the one for municipalities and other regions. The disparities are meant to compensate for the differences in skill acquisition by workers and the regional disparities in the relative costs of living. When fixing minimum wages, the government now considers several factors, including changes in the entire economy and performance of various sectors. In the recent years, the main consideration by the government has been to increase employment opportunities by keeping wage rates in line with productivity of the workers and ability of the employers to pay the wages. Minimum wage reviews in Kenya were traditionally undertaken every Labour Day (1st May of every year), but since 2004 the reviews are undertaken once in every two years.

The institutional framework for minimum wage fixing in Kenya is based on the Industrial Relations Charter. It is founded under the principles of ILO Convention No. 144 on tripartite consultations through the

involvement and participation of workers' and employers' representatives in the formulation and implementation of labour policies. In Kenya, this is specifically provided for in the country's core labour laws, such as the Regulation of Wages and Conditions of Employment Act (Cap 229) Laws of Kenya. It gives powers to the Minister in charge of labour matters to appoint an Advisory Board(s) to regulate wages and other basic conditions of employment in various sectors of the economy (Omolo and Omiti, 2004). In this respect, there are two wage boards: Agricultural Wages Advisory Board and the General Wages Advisory Board. These boards are mandated to fix minimum wages and other basic terms and conditions of employment in the agricultural sector, and other sectors of the economy, respectively.

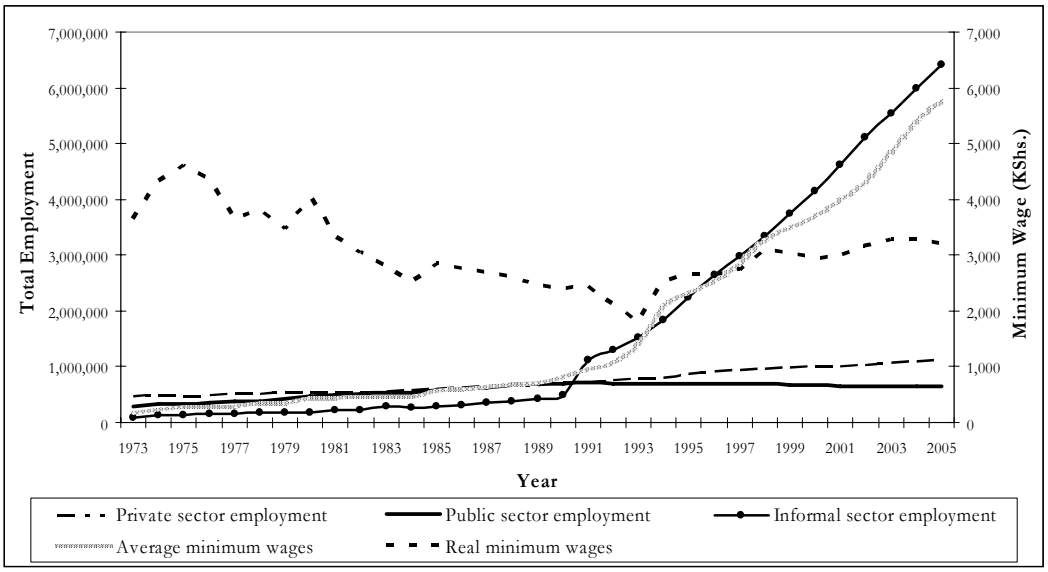
The members of the Kenya Wage Boards include the Ministry of Labour and Human Resource Development, the Central Organization of Trade Unions (COTU), and the Federation of Kenya Employers (FKE). The board chairmanship is identified from independent members while the Ministry serves as the secretariat, both technical and administrative. The Economic Planning Division of the Ministry of Labour and Human Resource Development hosts the technical secretariat. Since the wage boards are advisory in nature, the Minister in charge of labour matters can either approve or amend their proposals without necessarily consulting them.

The prominent view by workers and their organizations about minimum wages is that it is too low to accord an average worker a bare minimum standard of living as implied in the policy. Also, enforcement of the statutory minimum is a problem due to lack of capacity on the part of government, lack of cooperation from employers and the general lack of awareness on the part of workers. Due to this, enforcement is mainly in the formal sector as compared to the informal sector. On the other hand, employers are of the view that minimum

wage is high relative to workers' productivity and, therefore, increases the cost of production, making Kenya less competitive.

Trends in minimum wages and employment in Kenya are as shown in Figure 1. The informal sector is 'uncovered' in terms of compliance with policies and regulations and, therefore, hardly adheres to the minimum wage regulations. Public sector employment has been the lowest throughout the period under consideration. On average, both private and public sector employment account for only about 22 percent of total employment in Kenya in 2004.[4] Real minimum wage declined from the mid 1970s to the early 1990s when it started increasing again.

Figure 1: Minimum wages and employment



Source: Government of Kenya, Economic Survey (various).

[4] Given that compliance with minimum wage regulations is only guaranteed in the formal sector, which only accounts for about 22 percent of total employment, then the effectiveness of using minimum wage to ensure that workers are not underpaid and, therefore, reduce poverty is undermined.

On the other hand, nominal minimum wages were fairly constant between the 1970s and early 1990s, but rose significantly from mid 1990s. A close look at the trends in real minimum wages and nominal minimum wage indicate that the increase in nominal minimum wages is partly due to inflation creep. The trends also show that real minimum wages have not recovered to attain their 1970s level.

3. Theory and Emprical Outcomes of Minimum Wages

3.1 Theoretical Aspects

From theory, the government's intervention in the labour market could lead to market distortions, thereby affecting the equilibrium wage and employment level. In this case, workers whose marginal product is less than the minimum wage would lose jobs, thereby undermining the capacity of using minimum wages to reduce poverty. There are several theoretical models that explain the impact of minimum wages on employment. This section briefly outlines these models.

Standard neoclassical model

This is the most widely used model. The model assumes homogenous labour, a competitive labour market, and complete coverage of minimum wage legislation. An individual's wage should equal the marginal product of his/her labour. If minimum wages are set above the market clearing wage, the firms' demand for labour declines, leading to a reduction in total employment. *Ceteris paribus*, after the introduction of a statutory minimum wage, the wage of workers previously paid below that minimum will exceed their marginal product. To avoid losses, the firm may dismiss any worker whose marginal product is below the statutory minimum wage. The model assumption of complete coverage of minimum wage legislation is, however, strong and unrealistic not only for developing countries but also for developed countries. In Kenya, for instance, coverage is incomplete and enforcement of minimum wage law in the informal sector is difficult. Also, in the real world, labour is heterogeneous and not homogeneous as assumed in the model. There are a number of theoretical model extensions of the standard neoclassical model that explore the impact of minimum wages in the presence of a non-

negligible uncovered sector (Welch, 1976; Mincer, 1976; Harrison and Leamer, 1997) and taking into account workers with different skills.

Under conditions of incomplete coverage and assuming that there is perfect mobility of labour across sectors, the standard competitive model predicts that all workers are paid the same wage. Since there is no wage differential across sectors, workers are indifferent between formal and informal sectors; level of employment in the two sectors is the same because there is an equal demand for labour in both sectors. In this case, imposing a minimum wage above the equilibrium wage rate will ration jobs in the formal sector. The introduction of a minimum wage under such conditions would lead to wage differential and a reduction of formal sector employment.

When there is no labour mobility, introduction of a minimum wage raises the wage in the formal sector and creates an excess supply of labour to the formal sector. Since labour supply is inelastic (because of trade union power, efficiency wages, rent sharing), no workers shift into informal sector employment, and unemployment emerges among formal sector workers. In the informal sector, wages are assumed to be very elastic. The supply of informal sector workers remains the same both before and after the introduction of the minimum wage. Consequently, minimum wage legislation has little impact on workers in the informal sector. Unlike the case of perfect mobility, the entire brunt of the legislation falls on the shoulders of workers in the formal sector who experience a rise in unemployment. Despite the fact that the theories differ in terms of the assumptions concerning mobility between covered and uncovered sectors, most of them predict the conventional negative employment impact of minimum wage on employment in the covered sectors.

Heterogeneous labourforce models take into account the fact that employees have different qualifications and the effect of the minimum

wage on employment varies across different labour groups (Brown, 1999). Incorporating workers with different skill levels in the basic competitive model yields the prediction that a minimum wage will lower employment among low-wage workers but may not lower total employment (Currie and Fallick, 1996; Neumark and Wascher, 1995). A rise in the minimum wage mostly affects low-qualified labour, whose productivity and labour cost is low. An increase in minimum wage increases the cost of low-qualified labour and it leads to substitution of their labour for alternative production factors. Low qualified labour can be substituted by composite non-labour input (mainly capital). This would lead to an overall reduction in employment. Low qualified labour can also be substituted by marginally more qualified labour.

Monopsony

Market structures other than perfect competition can result in different predictions of the impact of minimum wage on employment. In a monopsonistic labour market, an increase in minimum wage over a certain range may lead to increased employment. A monopsonist faces an upward sloping labour supply curve while a perfect competitive firm in the labour market faces a horizontal labour supply curve and can hire an unlimited number of workers at the market clearing wage. In a monopsony model, the employer (firm) has enough market power to influence the wage. The monopsonistic firm must raise the wage it offers in order to hire additional workers (Wessels, 1997). When minimum wage is imposed at a level between the profit-maximizing wage for a monopsony and the competitive wage level, the monopsony hires workers at the amount equal to the supply of workers at that price, because the wage is still lower than the marginal revenue of the workers. In this case, setting the minimum wage above the monopsonistic wage would increase employment. Fixing minimum

wage beyond the level of competitive wage would, however, reduce employment relative to the level of a competitive labour market, but would still be more than the free market monopsony level of employment.

Monopsonistic competition

A model with a single monopsonistic employer is rarely applicable in reality. It is more likely that a monopsonistically competitive market structure would apply in the labour market, where multiple employers compete with one another for workers (Burdett and Mortensen, 1998; Bhaskar, Manning and To, 2002). Monopsonistic competition in the labour market is similar to the monopsony case, since the labour supply curve facing an individual firm is not perfectly elastic. The difference between the two is that in a monopsonistic competition, an increase in minimum wage reduces the labour of an individual to a firm. Whether minimum wage would lead to a reduction or an increase in employment would depend on the relative magnitude of supply shift. When the labour supply shift is relatively small, the employment effect of minimum wage is positive. The positive effect on employment is, however, small in magnitude compared to that in the case of a monopsony.

3.2 Empirical Literature

An overview of empirical studies shows that a majority of the studies on the effects of minimum wages on employment focus on specific groups of labour, which are directly affected by minimum wage, such as teenagers, youth, low-wage or unskilled employees and employees in low wage sectors. The results of the studies tend to differ even for studies that use similar methodology. Most of the studies show the conventional result that an increase in minimum wages would lead to

a reduction in employment (Brown, Gilroy and Kohen, 1982). However, some studies (Card and Krueger, 1994; 2000; Leigh, 2003) find results that differ from the conventional expectations. They show that the effect of minimum wage on employment is either positive or insignificant. The general consensus in more recent overviews (OECD, 1998; Brown, 1999; Safety Net Reviews, 2002; 2003) is that if minimum wages affect a substantial part of the workforce, then their increase has a negative impact on employment.

Based on the methodology used, the empirical studies can be classified into four groups. These are time series studies, pooled cross-sectional macro-data studies, longitudinal micro-data studies, and Kernel density plots and descriptive statistics. Time series studies regress employment against a measure of minimum wage and other control variables. The basic equation estimated in time series studies is the following (Brown, 1999).

$$E_t = \alpha + \beta MW_t + \delta X_t + \varepsilon_t$$

Where E_t is employment, MW_t is the level of minimum wage and X_t represents other control variables. The variables are in logarithmic form so that the coefficients are elasticities. According to Brown (1999), most time series studies focus solely on contemporaneous effects and exclude lagged variables due to the fact that there is high turnover in low-wage sector and the fact that minimum wage increases are usually known in advance. However, the short-run and long-run responses to the minimum wage are different (Hinosaar and Room, 2003). Studies that have used time series regression approach include Lemos (1994a; 1994b); Chesnes (2001); Jones (1997); Brown, Gilroy and Kohen (1982); Bell (1994); Hinosaar and Room (2003), among others. Empirical findings from time series studies are sensitive to the exact estimation method used and the inclusion of different variables can alter the results (Safety Net Review, 2002; Saget, 2002). Also, the extent of non-

compliance practices in developing countries is expected to mask the effects of minimum wages. Due to this, we analyse the effect of minimum wage on employment on the formal (covered) sector.

For most studies using pooled cross-sectional macro-data, the impact of changes in minimum wage is analysed across countries or states. In the case of pooled cross-country data, it is possible to compare changes in employment in countries where minimum wage has increased to others countries where it has remained unchanged; that is an analysis in a setting that resembles the natural experiment (Hinosaar and Room, 2003). Panel data estimation techniques are normally used and lagged variables are normally included in a fixed effect regression model.

In longitudinal micro-data studies, datasets of individual workers are normally used and this makes it possible to compare similarities in impact of minimum wage on employment of different individual workers; for instance, workers in covered and uncovered sectors. Longitudinal studies apply the difference-in-difference methodology, where two different sets of groups are defined: one group whom minimum wage increase should directly affect, and the second group being a control group. When applying the difference-in-difference methodology, one has to control for the general economic trend in order to get a pure response to minimum wages (Brown, 1999), otherwise the estimation can pick up spurious correlation. The difference-in-difference method has been used in the US to study the impact of minimum wage in one state compared to the other where minimum wage was not raised (Card and Krueger, 1994; Neumark and Wascher, 2000; and Card and Krueger, 2000). Other studies that have used this methodology include Leigh (2003) and Alatas and Cameron (2003).

Some studies (Baanete, 2005; Maloney and Nunez, 2004) use non-parametric methods, for example Kernel density plots, to analyse the

impact of minimum wages on employment. The main finding from these studies is that minimum wage has a negative impact on earnings. The major disadvantage of non-parametric methods is that it is inefficient to use in the case where assumptions of the parametric methods can be met. Also, for large samples, data manipulations tend to become laborious, and also the available software does not generate the critical values for test statistics under the non-parametric methods.

Previous studies on the impact of minimum wages on employment in Kenya are few (e.g., Vandemoortele and Ngola, 1982; Omolo and Omiti, 2004). Vandemoortele and Ngola (1982) analysed the effect of minimum wage adjustment of May 1980 on employment and found a negative relationship between minimum wage and employment in the private sector but no significant relationship in the public sector. This study only considered short-run effects of minimum wages on employment. Omolo and Omiti (2004) used descriptive statistics to analyze the effect of minimum wages on employment and found that minimum wages rationed employment, but did not consider the magnitude of the impact. This study is an update of Vandemoortele and Ngola (1982), and an improvement over the three studies, mainly by modeling the impact of minimum wages both in the short and long run, and also comparing the effect between the public and private sector.

4. Model Specification

In this section, we develop and specify the model to be estimated and outline the data source.

4.1 The Model

To analyze the impact of minimum wage on employment, we estimate a labour employment equation. A labour employment equation can be derived from a Cobb-Douglas production function given in equation 1.

(1)

where Q = real output; K = capital stock; L = units of labour employed; A = efficiency parameter; α, β are factor share coefficients. To derive a labour demand function, we assume that the firms' aim at maximizing profits. Profits are maximized when a firm, for instance, employs labour and capital so that the marginal revenue product of labour (MRP_L) equals the wage rate (w) and the marginal revenue product of capital (MRP_K) equals the user cost (r). The marginal products of labour and capital are derived by differentiating the Cobb-Douglas equation with respect to labour and capital. The marginal products are then multiplied by the respective unit price (p) to obtain MRP_L and MRP_K as below.

(2)

$$MRP_K = p(\alpha A^{\lambda} K_i^{\alpha-1} L_i^{\beta}) = \kappa \qquad (3)$$

Solving the system of simultaneously in (2) and (3) above for L we obtain the labour demand function, which is determined by, among other things, the wage rate and output.

$$L = f(w, r, Q) \quad (4)$$

In our case, we separate the wage rate into two parts: that is, the minimum wages and average sectoral wages. Minimum wages are fixed by the government and the average wage are expected to be determined by the market forces. If, for instance, the minimum wages for semi-skilled labour are fixed in such a way that they are greater than their MRP_L, then it will have a negative effect on employment. This prediction is in line with the expectations of the neoclassical theory and its variants.

Following Lemos (2004a), this study adopts a simple time series model of employment whereby employment is a function of the minimum wage and other factors, and is grounded on the standard neoclassical theory. The model can be specified as follows.

(5)

Where, the dependent variable is the logarithm of the number of employees in formal private and public sectors. The independent variables include the logarithm of gross domestic product (GDP), the logarithm of the total labourforce (TLF), logarithm of average minimum wages (MW) and logarithm of the average earnings (Ear).

To capture the long-run and short-run effects, we estimate an error correction model using Engel-Granger two-stage estimation technique. Based on Granger representation theorem, if sets of variables are cointegrated, the short-run dynamics of the long-run equilibrium can be described by an Error Correction Model (Engle and Granger, 1987; Maddala, 1992; Gujarati, 2003). This study explores the existence of a cointegration relationship among the variables in equation (6) below, based on the standard cointegration techniques. If there is cointegration, a long-run relationship among the variables exists. Estimation of the long-run relationship is by Ordinary Least Squares (OLS).

The long-run (equilibrium) specification is given by equation (6) specified below.

(6)

The αs' are population parameters to be estimated. The standard competitive model asserts that minimum wage will reduce employment. We therefore expect an inverse relationship between minimum wage and employment. Separate equations are estimated for formal private sector and public sector employment. Our analysis is based on this two sectors because there are deliberate attempts by the government to enforce minimum wage law in the two sectors.

Short-run dynamics of the long-run model are estimated using the following empirical model.

$$E = \alpha_0 + \alpha_1 ECT_{t-1} + \alpha_2 GDP + \alpha_3 TLF + \alpha_4 MW + \alpha_5 Ear + \varepsilon \quad (7)$$

$$\alpha_0, \alpha_1, \alpha_2 > 0; \alpha_3, \alpha_4 < 0$$

$$\Delta E_t = \phi_0 + \sum_{t=0}^{n} \phi_1 \Delta GDP_{t-n} + \sum_{t=0}^{n} \phi_2 \Delta TLF_{t-n}$$

$$+ \sum_{t=0}^{n} \phi_3 \Delta MW_{t-n} + \sum_{t=0}^{n} \phi_4 \Delta Ear_{t-n}$$

Where ECT_{t-1} is the error correction term, and Δ represents the difference operator, D_i represents dummy variables while u is the disturbance term.

4.2 Data

This study utilizes annual time series data for the period 1971 to 2002 to analyse the impact of minimum wages on employment. The data was collected from Kenya Economic Surveys for various years and various Government of Kenya legal notices on minimum wages. This period is chosen because of data consistency and availability of minimum wage data. The variables used in the analysis include private sector employment (number of employees in the private sector), public sector employment (number of employees in the public sector), total labourforce (total number of people in the labourforce; that is, in the age bracket 15 to 64 years), real minimum wages, real average private sector wages, real average public sector wages and real gross domestic product (GDP). In the analysis, we use the natural logarithms of the variables.

5. Results

Before estimating the model, data properties for the variables used in the analysis are investigated. We discuss the outcome of this results starting with a test for stationarity of the variables followed with a discussion on the correlation coefficients.

Table 1 below shows the stationarity tests for the variables used in the regression analysis. The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) Tests were used to test for stationarity of the variables. The results show that all the variables are non-stationary (integrated of order 1) and, therefore, require differencing to make them stationary. As shown in the table, all the variables become stationary after the first difference.

Correlation results for the variables used in the analysis are shown in Appendix Table 1. The results show that real minimum wages are negatively correlated with employment in both the public and private sector. The relationship between the two variables is significant at the 1% level for the public sector and at the 5% level for private sector. The inverse relationship shows that an increase in minimum wages is likely to be associated with a decline in employment in the two sectors. An increase in total labourforce is associated with an increase in employment in both the public and private sectors. Another important result from the correlation coefficients is that an increase in real average wage in the private sector is associated with an increase in employment in the private sector, while an increase in real average wages in public sector is associated with a decline in employment in the public sector. One of the possible explanations of the outcome of a positive association of real average wage and employment in the private sector is that, for several years, the public sector has been acting as a wage leader in the formal sector so that this outcome would imply that an increase in real

Table 1: Unit root tests

Variable	ADF-Test		PP-Test	
	Level	**1st Difference**	**Level**	**1st Difference**
Logarithm of Private Sector Employment	-1.730254 *(0.0959)*	-7.870981 *(0.0345)*	-1.899612 *(0.0617)*	-7.496823 *(0.0000)*
Logarithm of Public Sector Employment	-1.227971 *(0.3237)*	-5.032381 *(0.0189)*	-0.91469 *(0.3685)*	-4.651807 *(0.0001)*
Logarithm of Total Labourforce	-1.875257 *(0.0709)*	-5.808582 *(0.0000)*	-1.875257 *(0.0709)*	-5.799827 *(0.0000)*
Logarithm of Real Minimum Wage	-1.394528 *(0.1799)*	-6.246181 *(0.0000)*	-1.270098 *(0.1738)*	-9.063232 *(0.0000)*
Logarithm of Real Private Sector Wage	-0.996064 *(0.3281)*	-3.848911 *(0.0016)*	-0.573536 *(0.7618)*	-3.784485 *(0.0006)*
Logarithm of Real Public Sector Wage	-1.185224 *(0.2463)*	-3.985713 *(0.0015)*	-0.945948 *(0.4931)*	-3.949073 *(0.0004)*
Logarithm of Real Domestic Product (GDP)	-1.353565 *(0.1973)*	-5.652267 *(0.0000)*	-1.367305 *(0.1863)*	-5.679504 *(0.0000)*

*p-values are in the parentheses

wage in the private sector improves remuneration in the sector, thereby attracting qualified employees to the sector.

5.1 Long-run Regression Results

Given that all the variables are integrated of order 1 in their level form, it is important to examine whether these variables have a long-run relationship; that is, are cointegrated. Two separate cointegrating equations are estimated, one for private sector employment and the other for public sector employment. The long-run results are shown in Table 2.

The error correction terms for the public and private employment equations are stationary. This shows that there exists cointegrating relationships between these variables. In the long run, real minimum wages have a significant negative impact on public sector employment but a significant positive impact on private sector employment. The negative impact of minimum wages on public sector employment is consistent with neoclassical theory. This means that an increase in public sector wage would lead to a decline in employment in the sector. This outcome is partly due to the fact that minimum wage is more easily enforced in the public sector. In line with the extended standard neoclassical model, the public sector in Kenya is more covered than the private sector in terms of minimum wage legislation.

However, the strong positive effect of minimum wages on employment in the private sector is quite surprising given that it is the private sector that often complains about minimum wages raising the cost of production. Nevertheless, this could be because of the fact that minimum wage laws are not fully enforced in the private sector, such that employment in the sector, especially at the lower cadre may not be paid in line with the minimum wage laws. Private sector employers tend to rely more on casual labourers who are paid on a daily or hourly

rate, which may not be in line with the set minimum monthly wages. Indeed, there has been increased trend in the use of casual labourers in the Kenyan manufacturing sector in the last decade as shown by studies based on Rural Programme for Enterprise Development (RPED) data (Manda and Sen, 2004).

An increase in real wages significantly reduces the level of employment both in the private and public sectors. The results show that the impact of real average wages in reducing employment is larger for the public sector compared to the private sector. The large impact in the public sector could be attributed to the quest to reduce the public wage bill through retrenchment and improving the working conditions, including remuneration, in the sector. GDP has no significant effect on employment in the public sector but has a positive and significant effect on employment in the private sector. A growing economy would imply increased demand for labour in the private sector as one of the factors of production, resulting in an increase in employment. The results show that for the Kenyan case, the economy has experienced growth without employment synergies in the public service, but growth with employment synergies in the private sector. The outcome for the public sector could be true given that there has been some deliberate effort by government to keep the levels of employment in the public sector, especially the civil service, low so as to cut down on the wage bill. However, even in the absence of retrenchment, employment in the public sector in Kenya may have been based on other things such as political patronage, government as employer of last resort, rather than economic performance.

Several dummy variables were also included to capture the impact of various shocks on employment in the public and private sectors. The only dummy variable included in the public sector employment equation is that for 1984 and has a positive effect on employment. The

Table 2: Long-run regression results (Dependent variable is the natural logarithm of the number of employees in the public and private sector)

Variable	Public	Private
Constant	26.487*	-2.19591***
	(14.59)	*(0.70)*
Logarithm of Real Minimum Wage	-0.588658**	0.119307***
	(0.28)	*(0.02)*
Logarithm of Total Labourforce	-0.266037	0.901523***
	(0.65)	*(0.03)*
Logarithm of Public Sector Wage	-0.314099*	
	(0.18)	
Logarithm of Private Sector Wage		-0.0850934***
		(0.01)
Logarithm of Real Domestic Product	-0.0226238	0.126076***
	(0.30)	*(0.02)*
Dummy variable for 1982		-0.022394***
		(0.01)
Dummy variable for 1984	-0.266265**	
	(0.13)	
Dummy variable for 1979		0.0768871***
		(0.01)
Dummy variable for 1998		-0.0182103***
		(0.01)
Dummy variable for 2002		-0.0157002***
		(0.01)
Test Summary		
Sigma	0.0102736	0.00558995
RSS	0.00168874741	0.000406217573
R-squared	0.998891	0.999788
F-test	1201**	4080**
log-likelihood	100.241	120.902
DW	2.26	2.02
No. of observations	29	29
AR 1-2 test	F(2,14) = 2.9431 (0.0857)	F(2,11) = 4.1218 (0.1461)
ARCH 1-1 test:	F(1,14) =0.0080201 (0.9299)	F(1,11) = 0.18203 (0.6779)
Normality test:	Chi^2(2) = 0.36424 (0.8335)	Chi^2(2) = 0.41916 (0.8109)
RESET test:	F(1,15) = 0.77523 (0.3925)	F(1,12) = 0.73608 (0.4077)

-Levels of significance: *** 1%; ** 5%; * 10%.
-Standard errors are in the parentheses for estimated coefficients while for test summary P-values are in the parentheses.

dummy variable for 1979 has a positive effect on employment in the private sector while the other three dummy variable for 1982, 1998 and 2002 have a negative effect. This probably shows that the 1982 coup attempt, the liberalization of the economy and the labour reforms in the 1990s and the 2002 multiparty general elections had a negative effect on employment in the private sector.

5.2 Short-run Regression Results

In this section, we analyse the short-run dynamic equation. The results of the short-run equation are shown in Table 3. All estimated parameters for the public sector employment equation are significant at the 1 percent level. For the private sector equation, all estimated parameters except for real minimum wage and GDP are significant at the 1 percent level. Like in the long run, an increase in minimum wages significantly reduces public sector employment. An increase by 1% in real minimum wages leads to a 0.17 percent decline in public sector employment. The effect of an increase in minimum wages on private sector employment is negative and insignificant. The results also show that employment is highly responsive to increases in total labourforce, with the private sector elasticity being higher than the public sector.

In the short run, a growing economy increases demand for labour, thereby increasing employment especially in the public sector. An increase by 1 percent in GDP growth leads to a 0.61 percent increase in public sector employment as compared to a 0.13 percent increase in the private sector. Public sector wages have a positive impact on public sector employment in the short-run but negative in the long-run, while private sector wages on the other hand have a negative impact on private sector employment both in the short-run and long-run. The error correction terms for the two equations have the expected negative sign. The coefficient shows the speed of adjustment. The speed of

Table 3: Short-run regression results

Variable	Public	Private
Constant	-0.0311***	0.3347***
	(0.0050)	*(0.1148)*
Log of real minimum wage in first difference	-0.1738***	-0.0572
	(0.0207)	*(0.0904)*
Log of total labour force in first difference	1.0555***	1.5231***
	(0.1124)	*(0.3743)*
Log real public sector wage in first difference	0.0606***	
	(0.0141)	
Log of real private sector wage in first difference		-0.2888***
		(0.0986)
Log of real GDP in first difference	0.6088***	0.1333
	(0.0232)	*(0.1022)*
Lagged error correction term for the public sector	-0.1297***	
	(0.0049)	
Lagged error correction term for private sector		-0.2768***
		(0.0890)
Dummy variable for 1977	0.0517***	0.1610***
	(0.0054)	*(0.0459)*
Dummy variable for 1983		0.0720***
		(0.0226)
Dummy variable for1984	-0.0388***	
	(0.0041)	
Dummy variable for 1986	-0.0374***	
	(0.0045)	
Dummy variable for 1988		0.0586***
		(0.0154)
Dummy variable for 2000	0.0139***	
	(0.0042)	
Test Summary		
Sigma	0.00316542	0.00633112
Residual Sum of Squares	0.000100199097	0.000440913627
R-squared	0.996609	0.961336
F-test	172.9 **	17.09 **
log-likelihood	135.838	115.094
DW	1.97	2.06
No. of observations	28	28
No. of parameters	18	17
AR 1-1 test:	F(1,9) =0.00044494 (0.9836)	F(1,10) = 0.034660 (0.8560)
ARCH 1-1 test:	F(1,8) = 0.98419 (0.3502)	F(1,9) = 1.2253 (0.2970)
Normality test:	Chi^2(2) = 1.5405 (0.4629)	Chi^2(2) = 1.1258 (0.5696)
RESET test	: F(1,9) = 4.5926 (0.0607)	F(1,10) =1.3083e-005 (0.9972)

* Levels of significance: *** 1%; ** 5%; * 10%.
* Standard errors are in brackets.

adjustment to the long-run equilibrium private sector employment is higher (28%) than the speed of adjustment to the long-run public sector employment (13%). This implies that while it would approximately take the private sector employment 3.6 years to go back to equilibrium after a shock to the system, it would take the public sector employment double that period (7.7 years).

Several dummy variables were also included in the short-run models to capture the impact of various shocks on employment in the public and private sectors. The dummy variable for 1977 has a positive and significant effect on employment in both public and private sectors, an indication of the effect of the 1976 coffee boom on employment in the two sectors. The dummy variables for 1983 and 1988 have a positive effect on employment in the private sector probably indicating recovery of the sector from the 1982 coup attempt and effect of the mini coffee boom of 1986. The dummy variables for 1984 and 1986 have a negative effect on employment in the public sector, while the dummy for 2000 has a positive effect on employment.

6. Conclusion

Minimum wage in Kenya, like in other countries, has been used to guard the welfare of the low skilled worker from falling and to protect workers from exploitation due to low pay. However, minimum wage may restrict employment by increasing the wage bill and, consequently, costs of production. Whereas minimum wage law has been in place in Kenya for quite some time, research on the impact of minimum wage on employment is limited. This paper uses time series data to analyze the impact of minimum wage on employment in the formal private and public sectors in Kenya. An error correction model is used to analyse the long-run and short-run effect of minimum wage on employment.

The results show that minimum wage has a significant negative effect on employment in the formal public sector, both in the short-run and long-run. However, in the private sector, minimum wage has a positive significant effect on employment in the long-run but has no effect on employment in the short-run. Increase in real average wage has a negative effect on employment in the private sector. The results also show that both negative and positive shocks on the economy have an impact on employment. Short-run disturbances feed into the long-run employment path. The results imply that it is the cumulative effect of minimum wage that has an impact on employment. Thus, limiting the frequency of adjusting minimum wage upwards, such as changing minimum wage after two years instead of every year, as is the practice in Kenya, can help minimize the negative impact of minimum wage on employment.

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Appendix

Appendix Table 1: Correlation results

		Natural logarithm Private sector employment	Natural logarithm Public sector employment	Natural logarithim Total labourforce	Natural logarithm of real minimum wage	Natural logarithm of real private sector wage	Natural logarithm of real public sector wage	Natural logarithm of real gross national product
Natural logarithm Private sector employment	Pearson Correlation	1	.805**	.996**	-.395*	.491**	-.071	.245
	Sig. (2-tailed)	.	.000	.000	.023	.004	.694	.169
Natural logarithm Public sector employment	Pearson Correlation	.805**	1	.836**	-.772**	.066	-.474**	-.135
	Sig. (2-tailed)	.000	.	.000	.000	.716	.005	.452
Natural logarithim Total labour force	Pearson Correlation	.996**	.836**	1	-.432*	.477**	-.092	.244
	Sig. (2-tailed)	.000	.000	.	.012	.005	.609	.172
Natural logarithm of real minimum wage	Pearson Correlation	-.395*	-.772**	-.432*	1	.431*	.768**	.393*
	Sig. (2-tailed)	.023	.000	.012	.	.012	.000	.024
Natural logarithm of real private sector wage	Pearson Correlation	.491**	.066	.477**	.431*	1	.816**	.781**
	Sig. (2-tailed)	.004	.716	.005	.012	.	.000	.000
Natural logarithm of real public sector wage	Pearson Correlation	-.071	-.474**	-.092	.768**	.816**	1	.709**
	Sig. (2-tailed)	.694	.005	.609	.000	.000	.	.000
Natural logarithm of real gross national product	Pearson Correlation	.245	-.135	.244	.393*	.781**	.709**	1
	Sig. (2-tailed)	.169	.452	.172	.024	.000	.000	.

Appendix Table 2: General short-run employment model results

	Public	Private
DLPUSE_1	0.0708	
	(0.09215)	
DLPUSE_2	0.0032	
	(0.04418)	
DLPRSE_1		-0.1583*
		(-0.1583)
DLPRSE_2		0.5967 ***
		(0.596668)
Constant	-0.0317***	0.1855***
	(0.00543)	*(0.185547)*
DLTLF	0.5634***	0.5631***
	(0.06294)	*(0.563072)*
DLTLF_1	0.0605	0.2898**
	(0.05802)	*(0.289824)*
DLTLF_2	0.4348***	-0.0012
	(0.06519)	*(-0.001184)*
DLRMW	0.0105	-0.0530
	(0.01194)	*(-0.0529763)*
DLRMW_1	-0.1339***	-0.0617*
	(0.01515)	*(-0.0616861)*
DLRMW_2	-0.0520***	0.0802***
	(0.0122)	*(0.0801814)*
DLRPUSW	-0.0337 **	
	(0.01037)	
DLRPUSW_1	0.1154***	
	(0.01385)	
DLRPUSW_2	-0.0292	
	(0.01618)	
DLRPRSW		-0.0368
		(-0.036757)
DLRPRSW_1		0.0169
		(0.0169147)
DLRPRSW_2		-0.1390***
		(-0.13899)
DLRGDP	0.2949***	0.0715
	(0.02252)	*(0.071486)*
DLRGDP_1	0.2556***	0.0881**
	(0.02388)	*(0.0881105)*
DLRGDP_2	0.0236	-0.0878**
	(0.03462)	*(-0.087843)*
$ECTpub_{t-1}$	-0.1190***	
	(0.01655)	
$ECTpriv_{t-1}$		-0.1537***
		(-0.153695)
Dummy variable for 1977	0.0528 ***	0.0885***
	(0.004527)	*(0.0885141)*
Dummy variable for 1983		0.0402***
		(0.0402461)
Dummy variable for 1984	-0.0389***	
	(0.005102)	
Dummy variable for 1986	-0.0366***	
	(0.006536)	

Dummy variable for 1988		0.0323**
		(0.0322966)
Dummy variable for 2000	0.0153**	
	(0.004893)	
Test Summary		
Sigma	0.00341185	0.00693231
Residual Sum of Squares	9.31258863e-005	0.00043251286
R-squared	0.996849	0.962073
F-test	33.2	12.68
	(0.000)**	(0.000)**
log-likelihood	136.862	115.363
DW	1.87	2.07
No. of observations	28	28
No. of parameters	20	19
AR 1-1 test:	F(1,7) = 0.016791	F(1,8) = 0.032728
	(0.9005)	(0.8609)
ARCH 1-1 test:	F(1,6) = 0.52764	F(1,7) = 1.3188
	(0.4950)	(0.2885)
Normality test:	Chi^2(2) = 1.1464	Chi^2(2) = 1.3019
	(0.5637)	(0.5215)
RESET test	F(1,7) = 2.9413	F(1,8) = 0.021291
	(0.1301)	(0.8876)

* Levels of significance: *** 1%; ** 5%; * 10%.
* Standard errors are in brackets.

Appendix Table 3: Preferred short-run employment model results

	Public	Private
DLPRSE_1		-0.147061*
		(0.07071)
DLPRSE_2		0.590691***
		(0.07795)
Constant	-0.0311117***	0.186224***
	(0.00498)	*(0.03813)*
DLTLF	0.565183***	0.5533***
	(0.05819)	*(0.09814)*
DLTLF_1	0.0830715*	0.294112**
	(0.04638)	*(0.10500)*
DLTLF_2	0.407287***	
	(0.05069)	
DLRMW	0.0110232	-0.0575221**
	(0.00986)	*(0.02436)*
DLRMW_1	-0.126623***	-0.0529676**
	(0.01098)	*(0.02261)*
DLRMW_2	-0.0581896***	0.0786561***
	(0.00858)	*(0.01730)*
DLRPUSW	-0.0362805***	
	(0.00905)	
DLRPUSW_1	0.116509***	
	(0.01195)	
DLRPUSW_2	-0.0196137*	
	(0.00977)	
DLRPRSW		-0.0303015
		(0.02843)
DLRPRSW_2		-0.130383***
		(0.02447)
DLRGDP	0.297557***	0.0724789*
	(0.01986)	*(0.03791)*
DLRGDP_1	0.26746***	0.0912311**
	(0.01677)	*(0.03425)*
DLRGDP_2	0.0437652**	-0.0895228**
	(0.01590)	*(0.02898)*
$ECTpub_{t-1}$	-0.129722***	
	(0.00494)	
$ECTpriv_{t-1}$		-0.153985***
		(0.02662)
Dummy variable for 1977	0.0516534***	0.0895999***
	(0.00544)	*(0.01102)*
Dummy variable for 1983		0.0400825***
		(0.00800)
Dummy variable for 1984	-0.0388492***	
	(0.00409)	
Dummy variable for 1986	-0.0373683***	
	(0.00448)	

Dummy variable for 1988		0.0326209*** *(0.00895)*
Dummy variable for 2000	0.0139058*** *(0.00423)*	
Test Summary		
Sigma	0.00316542	0.00633112
Residual Sum of Squares	0.000100199097	0.000440913627
R-squared	0.996609	0.961336
F-test	172.9 [0.000]**	17.09 [0.000]**
log-likelihood	135.838	115.094
DW	1.97	2.06
No. of observations	28	28
No. of parameters	18	17
AR 1-1 test:	F(1,9) =0.00044494 (0.9836)	F(1,10) = 0.034660 (0.8560)
ARCH 1-1 test:	F(1,8) = 0.98419 (0.3502)	F(1,9) = 1.2253 (0.2970)
Normality test:	Chi^2(2) = 1.5405 (0.4629)	Chi^2(2) = 1.1258 (0.5696)
RESET test	F(1,9) = 4.5926 (0.0607)	F(1,10) =1.3083e-005 (0.9972)

* Levels of significance: *** 1%; ** 5%; * 10%.
* Standard errors are in brackets.

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Manda D K, Kimalu P K, Nafula N N, Kimani D N, Nyaga R K, Mutua J, Mwabu G and Kimenyi M S (2003). *Costs and benefits of eliminating child labour in Kenya*. KIPPRA Working Paper No. 10, Nairobi: Kenya Institute for Public Policy Research and Analysis.

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Onsomu, E, Ngware, M and Manda, D K (2007), *Skills needs, availability and competitiveness: A case for Kenya*. KIPPRA Discussion Paper No. 70, Nairobi: Kenya Institute for Public Policy Research and Analysis.

Employment outcomes and export orientation of firms in Kenya's manufacturing sector (forthcoming)