THE EFFECT OF MINIMUM WAGE ON EMPLOYMENT IN MALTA

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Abstract. This study analyses the relationship between the effect of changes in the national minimum wage on labour demand, measured by aggregate hired employment, using data pertaining to Malta for 1975-2013. The findings indicate that employment is influenced by changes in GDP, by the average wage rates and by technology, and that there is a positive relationship between the average wage rate and the minimum wage rate. This implies that employment is negatively related to the minimum wage, via the latter’s effect on the average wage rate. The study concludes that, the estimated elasticities of labour demand with respect to the minimum wage rate are -0.18 in the short run and -0.66 in the long run, everything else remaining constant. A major implication of this finding is that while increases in minimum wage have positive social implications it may also have negative effects on employment and these two considerations should be taken into account in minimum wage policy.

Introduction

There is considerable debate on the effect of the imposition of a national minimum wage on employment. Views on the minimum wage are various but can be grouped under two headings. The neo-classical view argues that if the minimum wage is set above the equilibrium wage rate, the result would be deficient demand unemployment. By contrast, advocates of a wage floor postulate that a minimum standard of living is imperative in safeguarding human capital in terms of health and strength, and these lead to higher productivity.

The effects of minimum wage legislation on employment have been widely examined in economic literature. The effects on aggregate employment were first discussed in Stigler (1946: 361), who adopted the neo-classical...
position that “the higher the minimum wage, the greater will be the number of covered workers who are discharged.” Neumark and Wascher (2008) demonstrated that an arbitrary minimum wage above equilibrium has two side-effects. First, both cost of production and price of output increase, and quantity demanded falls, which leads to an output gap. Second, a minimum wage induces firms to substitute capital for labour creating a disemployment effect. By contrast, economists of the Keynesian school of thought (Herr et al., 2009) considered the minimum wage as a “nominal anchor” which prevents deflation circumstances in the real economy.

Early studies mainly used time-series methods and typically found that a 1% increase in minimum wage reduced employment by 0.1% to 0.3% (Brown et al., 1982; Brown, 1988). These conclusions were challenged by Card and Krueger (1995a, 1995b) on methodological considerations as well as on empirical results. A well-known study by Card and Krueger (1994) classifies states that changed the minimum wage as the treatment group whilst other states which were left unexposed to the treatment are set as the control variables. The assumption is that changes in employment in the control groups only reflected fluctuating economic conditions. Treatment groups, however, were affected both by similar economic conditions and by the change in the minimum wage legislation. By comparing changes in employment in both groups, they netted out the effects of changes in economic conditions and determined the effect of minimum wage on employment. The authors concluded that a minimum wage increase may not have had any adverse employment effects.

An alternative method for analysing effects of minimum wage on employment is by using pooled cross-section or longitudinal data. These studies produce weaker evidence on the impact of minimum wage than time-series studies. By way of example Comola and Mello (2011: 81) observed that “in many cross-sectional studies the estimated employment elasticity of the minimum wage is statistically insignificant." Card and Krueger (1995a) consider these results reliable, nevertheless, as they allow for greater variation in relative minimum wage rates across employees, employers, or regions.

The literature is therefore ambiguous and no hard and fast conclusions can be drawn from studies on this subject (Stewart, 2004). As Lemos (2004: 219)
states “there is no consensus on the direction and size of the effect on employment.”

There has not been much research on the impact of the minimum wage on employment in Malta. This is surprising considering that the minimum wage covers all Maltese workers and it has been consistently argued by employers’ associations that any wage increases beyond productivity gains would threaten Malta’s competitiveness (Malta Chamber, 2013; Malta Employers’ Association, 2009). In contrast, it was recently suggested by Caritas Malta in Farrugia et al., (2012) that an increase in the minimum wage rate by 13.8% is warranted, as the prevailing rate was too low to cover the cost of living of low income families.

Given this disagreement, as well as the current economic climate, this article discusses the extent to which minimum wage affects employment in Malta. In this study, the hypothesis to be tested is that an increase in minimum wage negatively affects employment, keeping all other things constant.

This paper is organised as follows. Following this introduction, the study briefly presents the most important features of the system of the minimum wage, while Section 3 presents an appraisal of views amongst social partners in Malta. Section 4 discusses some methodological issues and the estimation procedure. Section 5 estimates the impact of minimum wage on employment in Malta over the period 1975 to 2013, while the last section concludes with a number of policy implications.

The System of Minimum Wage in Malta

The national minimum wage was introduced on December 2, 1974, through the Conditions of Employment (Regulation) Act, commonly known as CERA, with the aim of “ensuring an equitable distribution of income...[and]...narrowing the wide differences between income earners” (Development Plan for Malta 1973-1980 Supplement, 1977: 14). CERA was responsible for the provision of minimum conditions in various sectors (Greenland, 2012). There were earlier attempts at imposing a minimum wage in the Maltese industrial sectors such as the Stevedores and Port Workers Ordinance of 1939 and the Factories Ordinance of 1940.
(Baldacchino, 2011). Between 1974 and 1976, the national minimum wage varied by approximately 20% between male and female workers until the ‘equal pay for equal work’ policy was introduced in 1976 which ended minimum gender pay discrimination.

The statutory national and sectoral minimum wage generally increases annually, and is announced in the Government Budget Speech of each year. It is an amount over and above the increases stipulated by collective agreements, taking effect every January 1 of the following year (Attard, 2010). The adjustment is currently based on a system, labelled Cost of Living Adjustment (COLA) which was agreed upon in December 1990, between employer organisations, unions, and Government. The COLA is calculated on the basis of a twelve-month moving average inflation rate as at September multiplied by the base wage, where the official index of inflation is the Retail Price Index. The base wage represents a wage level agreed upon in 1990 and which has since then been augmented annually by the COLA.

One characteristic of the COLA, is that, unlike other forms of wage indexation observed in European countries, compensation is granted by a flat amount, independent of the wage level, rather than a percentage indexation. Hence, the percentage increase of wage is smaller at higher wage levels relative to the base wage.¹

Figure 1 illustrates how minimum wage in Malta, measured in nominal terms, changed since 1974. The national minimum wage has gone up from €23.29 per week in 1974 to €162.19 per week in 2013. The only uninterrupted period where a contraction in real terms was registered is 1981-1989. The COLA agreement of the early 1990s led to moderate increases. In the period 2000 to 2013 the nominal minimum wage increased at about 3% per annum.

¹ The National Agreement on Industrial Relations provides for opt-out clauses from giving the COLA in times of restructuring or competitiveness challenges. Examples include prolonged recession, decline in private sector employment, and unanticipated inflation. This agreement also stipulates that opt-out clauses apply at micro level. Such clauses allow a certain degree of wage flexibility at enterprise level when most needed.
Figure 2 shows the relationship between the minimum wage and the average wage rate in Malta, calculated as the year-over-year percentage change for both variables.

A measure, which takes into account the relative changes of minimum wage to average wage, is the Kaitz Index. The Index is calculated by dividing minimum wage by average wage. The Index was applied to Maltese data as shown in Figure 3. It can be seen that for the sub-period
1974 to 1981 the Index was relatively stable, hovering around 0.58, while over the sub-period 1983 to 1986, there was a slight deterioration in the Index. The Index decreased sharply between 1987 and 1989 given that changes in minimum wage were negative while the average wage experienced strong positive changes, such that the estimated value at the end of year 1989 was 0.52. It is noteworthy that the Kaitz Index generally deteriorated thereafter. In fact the Index fell to 0.40 in 2013.

**Figure 3**

Kaitz Index, Applied to Maltese Wage Data (1974-2013)

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**Appraisal of Views amongst Social Partners**

According to Eurostat, between 2006 and 2012 relative poverty, defined as persons with a household equivalent income that is less than 60 per cent of the national median equivalised disposable income, has increased by 3.6 percentage points. Against this background, Caritas Malta published a report in 2012, entitled ‘A Minimum Budget for a Decent Living’ arguing that low-income families were struggling to survive. This study estimated that the minimum survival income for a decent standard of living was approximately short by 23% for the average household on minimum wage of one breadwinner. Earlier, Abela and Tabone (2008: 67) had dubbed the Maltese minimum wage as “poverty wage.” The Caritas Malta study stimulated a national debate and was discussed in the Malta Council for
Economic and Social Development (MCESD Meeting 186, 2012) which is an institution seeking to attain consensus amongst trade unions, employers’ associations, and the Government (known in Malta as the social partners). Considerations relating to equity were expressed, suggesting that an upward adjustment would alleviate relative poverty, especially for the working poor (see Farrugia et al., 2012). The objections to this possibility included that raising minimum wage would have adverse effects on Malta’s competitiveness. Particularly, it was asserted that raising the minimum wage would lead to inflationary pressures, would cause unemployment and would generate an increase of underground employment (Malta Employers’ Association, 2012a, 2012b).

As observed by Debono and Rizzo (2009), social partners tend to agree that the national minimum wage is fundamental to ensure a minimum standard of living. However, in arguments relating to minimum wage increases, the main concern amongst social partners and governments has always been related to competitiveness, given that Malta is highly dependent on exports. Another area of concern relates to the automatic granting of minimum wage increases, based on the RPI. Employers contend that wage rates should be topped only if these are matched by productivity increases, and any increments beyond productivity gains jeopardize Malta’s competitiveness (Malta Employers’ Association, 2009; Malta Chamber, 2013). In contrast, unions support automatic increases given across the board, contending that the purchasing power of minimum wage earners should be maintained.

**Methodology**

The methodological framework proposed in this study is based on a three-step approach. First, the elasticity of labour demand with respect to the average wage rate is estimated from a labour demand equation derived from the C.E.S. production function. In the second step, the elasticity of the average wage rate to the minimum wage rate is estimated from an equation linking the two variables. In the final step, the product of the elasticities derived from the first and second steps is used to estimate the elasticity of minimum wage with respect to employment.
Specification of Labour Demand

The approach used in this study is to use the marginal productivity condition of the C.E.S. production function in order to derive a labour demand equation. A detailed explanation of this methodology is given in Briguglio, (1984; 1985).

The C.E.S. production function can be expressed as:

\[ Y = e^{rt} [bL^{-\rho} + (1-b)K^{-\rho}]^{-\psi/\rho} \]  

(1)

In Equation (1) \( Y \) is output (value added), \( L \) is labour units, \( K \) is capital units, and \( e^{rt} \) is a time trend, assumed to capture the state of technology. From this equation, the labour marginal product equation can be derived as follows:

\[ \frac{\partial L}{\partial Y} = vb e^{rt-p/\psi} L^{-1/(1+p)} Y^{(1+p)/\psi} \]  

(2)

Setting \( \partial L/\partial Y \) equal to \( W \), as is normally assumed in marginal product equations, Equation (2) can be rearranged so as to have labour (\( L \)) as the subject of the equation as follows:

\[ L = vb^{1/(1+p)} e^{r(t-p/\psi)(1+p)} W^{1/(1+p)} Y^{(1+p)/\psi}/(1+p) \]  

(3)

which when transformed into natural logarithms can be expressed as follows:

\[ \ln L = a_0 + a_1 \ln W + a_2 \ln Y + a_3 t \]  

(4)

where \( L \) represents the units of labour to produce a given output (\( Y \)) at the wage rate (\( W \)) at a given technological level (\( t \)). The alpha coefficients have the same values as the exponents in Equation (3).

Equation (3) assumes full adjustment of labour demand to wage rates, output and technology. Due to various factors, including the cost of hiring and firing labour, employees may not be discharged as fast as is technically desirable when output falls, and therefore engagement of employees when output increases after a decline may be lower than technically warranted.
In econometrics, such a possibility is called partial adjustment and can be incorporated in the equation as follows:

\[ L^o - L^o_{-1} = \lambda (L - L^o_{-1}) \]  

(5)

where \( L^o \) and \( L^o_{-1} \) are the observed labour demand at the current period and at the previous period respectively, while \( L \) is the technically desired labour demand at the current period (which is not observed). Equation (5) is arranged as follows:

\[ L = \frac{L^o}{\lambda} - \frac{(1-\lambda)}{\lambda} L^o_{-1} \]  

(6)

Replacing \( L \) by \( L^o \), and rearranging, we obtain the following equation:

\[ \ln L^o = \lambda a_0 + \lambda a_1 \ln W + \lambda a_2 \ln Y + \lambda a_3 t + (1- \lambda)L^o_{-1} \]  

(7)

The partial adjustment coefficient, \( \lambda \), is expected to have positive value not exceeding unity. The adjustment would be full if \( \lambda = 1 \), in which case Equation (7) would be identical to Equation (4). Partial adjustment implies that \( \lambda \) is a positive fraction.

The coefficient on the wage rate, \( a_1 \), measures the elasticity of substitution, which is the responsiveness of percentage change in factor proportions brought about by percentage change in factors’ relative prices. This parameter has important implications for policy-makers as its magnitude sheds light on the extent to which wage policy measures can succeed in influencing factor proportions. For example, if the elasticity of substitution is close to zero, it is implied that an increase in wage rate is unlikely to induce firms to substitute labour for capital.

Another parameter that is of special interest is the output elasticity of labour demand, measured by \( a_2 \). This quantifies the responsiveness of labour demand to output whereby an expansion of output by a firm is expected to favourably affect labour demand.

In Equations (4) and (7), \( a_1 \) and \( a_1\lambda \) measure the long-run and the short-run elasticity of substitution, respectively, with the former coefficient assuming full technical adjustment of labour demand and the latter assuming partial adjustment of labour demand in the short run.
Similarly, the estimates of \( a_2 \) and \( a_2\lambda \) measure the short-run and the long-run elasticity of labour demand with respect to output, respectively. This implies that if the coefficient on \( \ln L_{-1} \), which is \( 1-\lambda \), is found not to be different from to zero, \( \lambda \) would be equal to unity, in which case it can be assumed that there is full-adjustment of labour demand in response to a change in wage rates and to output; indicating that the short-run and long-run labour demand equations coincide.

**Relationship between average wage and minimum wage**

This study adopts a simple and intuitive approach relating to the link between the average wage rate with the minimum wage rate as follows:

\[
\ln W = \tau_0 + \tau_1 \ln M
\]  

(8)

where \( W \) is the average wage rate at the current period and \( M \) represents the minimum wage rate at the same period. It is assumed, that the minimum wage has an effect on the average wage during the same year – an assumption based on the observations shown in Figure 2, above. The parameter \( \tau_1 \) measures the elasticity of average wage rate with respect to the minimum wage and is expected to be a positive fraction. In line with the arguments put forward by Koutsogeorgopoulou (1994) and Bazem and Martin (1991), it is assumed that an increase in minimum wage causes an upward push on average wage.

**Estimation Procedure**

Equation (7), which expresses the labour demand function, was estimated using data pertaining to the Maltese labour market for the period 1975 to 2013. In Equation (7) both \( W \) and \( Y \) were expressed in real terms using the GDP deflator. The time trend variable \( t \) was measured as 1,2, …\( T \), where \( T \) is the number of years between 1975 and 2013, as is normally done when estimating growth rates using logarithmic equations. Equation (7) was also augmented by a dummy variable, \( D \), reflecting structural shifts that occurred in 1981 and 1988. 1981 was characterised by the international recession and unusually high inflation rates, while 1988 was characterised by high electoral uncertainty following a change in government from Labour to Nationalist, following 17 years of Labour governments.
In Equation (7), it is expected that the coefficients on $\ln W$ and on $t$ take negative values while that on $\ln Y$ takes a positive value.

Equation (8) expresses the relationship between the average wage and the minimum wage. In this equation, the coefficient on $\ln M$ is expected to be positive. The equation was estimated using Maltese data, where both wage rates were again measured in real terms.

*Equilibrium and disequilibrium assumptions*

It is pertinent here to explain the difference between equilibrium and disequilibrium in the labour market as explained in Briguglio (1984). In the real world, wage rates may not be equal to their equilibrium level and may not therefore clear the market in all periods. This means that excess supply of and excess demand for labour may exist and persist. If the labour market does not clear, it would not be correct to assume that employment measures labour demand. If there is equilibrium or excess supply in the market, the observed labour transacted in the market will actually represent labour demand, but if there is excess demand, the observed labour transacted will represent labour supply.$^2$

In addition, it is assumed that certain rate of unemployment is compatible with excess demand in line with the Phillips Curve concept, where a positive unemployment rate (termed the Natural Rate of Unemployment or the Non Accelerating Inflation Rate of Unemployment), would signify full employment. It appears from screening of Maltese data$^3$ that a 4% rate of unemployment was compatible with full employment in Malta.$^4$ It was therefore decided that observed employment was considered as representing labour demand only in periods when unemployment was 4% or higher; meaning that during these years there was market equilibrium or excess labour supply and consequently labour demand was observed.

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$^2$ This can also be explained in terms of the so-called ‘short-side’ of the labour market, where the observed employment would represent labour demand if the wage rate is above its equilibrium rate, labour supply if the wage rate is below its equilibrium rate and both supply and demand at the equilibrium wage rate.

$^3$ The unemployment rate is based on head-count computation of registered full-time unemployed data.

$^4$ For discussion on this issue see Mallia (2005).
Estimation Results

Equation (7) and Equation (8) were estimated by OLS method, for which purpose an error term was added. It is to be noted that the use of OLS relies on stochastic process being stationary as otherwise it would produce spurious regression with high $R^2$ and $t$-values that have no economic meaning. In this case, all variables were found integrated of order-one, using the Augmented Dickey-Fuller (ADF) test. To solve this problem of non-stationarity all variables were measured as first differences as the standard asymptotic assumptions would not hold with non-stationary data.

The estimates of Equation (7) are the following:

\[
\Delta \ln L^o = 0.0072 - 0.238 \Delta \ln W + 0.325 \Delta \ln Y - 0.0003t - 0.724 \Delta \ln L^{o,1} - 0.023D
\]

$t$-stats (2.24) (-3.20) (4.58) (-2.26) (4.96) (-4.69)

$R^2 = 0.79; \quad \text{Adjusted } R^2 = 0.74; \quad F \text{ statistic} = 15.99; \quad N = 27$

The results are in line with a-priori expectations and are all statistically significant at the 95% level, as indicated by the $t$-statistics.\(^5\)

The coefficients on the above equation represent short-run elasticities of labour demand with respect to output and average wage rates, allowing for partial adjustment. Thus, a 10% increase in wage rates gave rise to a decrease in labour demand of 2.38% in the short run, everything else remaining constant. Likewise, a 10% increase in output gave rise to an increase in labour demand of 3.25% in the short run, everything else remaining constant.

The long run elasticities are derived by dividing the short-run coefficients by 0.276 (that is by $\lambda$, calculated as $1 - \text{the coefficient on } \ln L^{o,1}$). The results indicate that, in the long run, for every 10% increase in real wage rates, employment tended to decrease by about 8.62%, and for every 10% increase in output, labour demand increased by about 11.78% in the long-run.

\(^5\) Equation (7) was also estimated without $t$ and the results were broadly the same.
It should be recalled that the difference between the short-run and the long-run coefficients is due to partial adjustment in the short run mostly due to the cost of hiring and firing labour.

It should be noted that labour demand has increased over time despite the fact that wage rates have also increased. One reason is that as wages were rising, output was rising too. During the study period, the negative effects of wage rates on labour demand have been more than offset by the positive effect of output, as indicated by the coefficient on these variables.

The estimates of Equation (8) relating to the average wage/minimum wage relationship indicate a positive relationship between the two variables, as shown in the following:

\[
\Delta \ln W = 0.0061 + 0.7741 \Delta \ln M
\]

<table>
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<th>t-stats</th>
<th>(2.81)</th>
<th>(6.89)</th>
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</table>

R² = 0.54; Adjusted R² = 0.53; F-statistic = 44.69; N = 39

The national minimum wage elasticity with respect to average wage is estimated to be 0.77. The sign and magnitude of the estimated coefficient agree with our a-priori expectations and is statistically significant from zero at 95% confidence interval with a t-value of 6.89.

It can be seen that the elasticity of the average-wage with respect to the minimum wage is less than unity meaning that average wage rises less-than-proportionately than the minimum wage. This is to be expected given that the change in the minimum wage is granted as a flat rate.

It should be noted that both estimated equations performed satisfactorily in terms of relevant diagnostic tests; which showed that the residuals are normally distributed and there is no evidence of heteroscedasticity and autocorrelation at 95% confidence interval respectively. Regarding multicollinearity, the correlation between exogenous variables was not found to be unduly high.

**Computing the employment-minimum wage elasticity**

Given the elasticities of employment with respect to the average wage rate and that of the average wage rates to the minimum wage rate, we derive an
estimation of effect of the minimum wage rate on employment as the product of the two elasticity estimates, which is equal to 0.18 in the short run and 0.66 in the long run.

This suggests that in the long run, a 10% increase in the minimum wage has resulted into a 6.6% decrease in employment, everything else remaining constant.

**Conclusion**

Several conclusions can be derived from estimation results produced in this study. A major implication of this finding is that an increase in the minimum wage rate would have negative effects on employment, everything else remaining constant.

However, in answer to the question as to whether the minimum wage should be increased, decreased or entirely abolished, one should look at the minimum wage from various aspects, and not just at its effect on labour demand. There are at least three other effects on a minimum wage increase namely (a) social effect; (b) consumption effect and (c) labour supply effect.

The social repercussions of increases in the minimum wage include that such increases are intended to compensate low wage earners for inflation, although this is not so for higher wage earners, given that it is granted at a flat rate. The basic idea is that minimum wage covers basic needs of the average family and a decline in its purchasing power would result in economic hardship and poverty.

The consumption effect emanates from the fact that low income earners spend a high proportion of the income on consumption, and an increase in the minimum wage rate may therefore lead to an increase in aggregate demand and therefore on the economy as a whole.

Changes in minimum wage should also be viewed from the labour supply side perspective. If there is no minimum wage adjustment labour supply might be affected negatively because low-paid market activities become
less attractive, particularly because of the small difference between social allowances and the minimum wage. Indeed, a study by the Employment and Training Corporation (ETC, 2007) found that a low benefit-wage gap is one of the main factors that discourage low-income persons in seeking employment.

References


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### Data Appendix

<table>
<thead>
<tr>
<th>Year</th>
<th>Wage and Salary Earners</th>
<th>Income from Employment</th>
<th>Gross Value Added</th>
<th>Minimum Wage</th>
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Note on the data. The units of measurement are: income from employment and gross value added in EUR millions; and minimum wage in EUR.
The definition and the sources of the data are as follows:

**Wage and Salary Earners (L')**

*Definition:* The number of wage and salary earners in full-time employment plus those in part-time employment adjusted as full-time equivalent.


**Wage Rates (W)**

*Definition:* Average employment compensation divided by the number of wage and salary earners.

*Sources of employment compensation:* COS: Various published issues of the *National Accounts* up to 1994, and electronic NSO: *News Releases* after 1994

**Output (Y)**

*Definition:* Output is measured as GDP at factor cost, measured at current prices.

*Sources:* COS: Various published issues of the *National Accounts* up to 1994, and electronic NSO: *News Releases* after 1994

**Unemployment Rate (U)**

*Definition:* The rate of unemployment is computed as $\frac{UNP}{UNP+EMP}$ where $UNP$ is a 12-month average of number of persons registering as unemployed at the current period and $EMP$ is the number of gainfully occupied persons at the current period.

GDP Deflator

Sources: COS: Various published issues of the National Accounts up to 1994, and electronic NSO: News Releases after 1994

Minimum Wage (M)

Source: Department of Industrial and Employment Relations