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NOMINAL WAGE FLEXIBILITY IN A PARTLY-UNIONIZED ECONOMY*

by
HUW DIXON†
University of York

I INTRODUCTION

This paper explores equilibrium wage determination in an economy where labour markets may differ—some may be unionized, some competitive and some with rigid wages. In practice, no economy has completely uniform labour markets and it is an important question to ask how the different types of market might interact to influence the macroeconomic properties of the economy. This paper concentrates on the response of nominal wages to demand changes. As we shall see, what happens in the unionized sector depends very much on what is happening in the other sectors, because of inherently intersectoral effects. In representative sector macro models (Blanchard and Kiyotaki, 1987; Dixon, 1987; *inter alia*), these effects will not be present since nominal and real wages (and prices) will be uniform across sectors. The main importance of the results is that the economy can display a whole range of *macroeconomic* behaviour from Classical to Keynesian, depending on the precise *microeconomic* structure of the economy.

It is useful to distinguish between real and nominal wage rigidity. *Nominal* wage rigidity occurs when wages respond to neither the general price level nor the level of demand; *real* rigidity occurs when wages respond to the price level, but not demand. The interaction of different types of rigidity (or their absence) across sectors leads to interesting and surprising results (see Ball and Romer, 1990, who illustrate this point in a different model). This is because, in addition to the direct partial equilibrium effects of a demand change on wages in a particular sector, there are the indirect general equilibrium effects. These intersectoral effects include changes in the cost of living, and changes in relative prices which can alter budget shares and elasticities. As we shall see, these indirect effects can be crucial.

In the unionized sectors, there are several "syndicates" which influence wages by restricting employment, as in Hart (1982). Real wages depend upon the number of unions, the disutility of labour and the elasticity of labour demand. In the rigid sectors, there is complete nominal wage and price

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rigidity (which may be interpreted as a traded-goods sector in a small open economy, as in Dixon, 1990). In the competitive sectors, we consider two cases: first, one where real wages equal the disutility of labour; secondly, one where there is a binding sectoral employment constraint or capacity bottleneck so that nominal wages adjust to maintain a fixed level of output and employment. The results we obtain indicate that the precise structure of the economy, or indeed of household preferences, can give rise to a whole range of macroeconomic responses ranging from the Keynesian to the Classical.

In Section III, we consider an economy with some unionized and rigid sectors, and possibly a competitive labour market with real wages equal to the disutility of labour. In this case, the nominal rigidity of wages and prices in the rigid sector infects the rest of the economy, in the sense that nominal wages in the competitive and unionized sectors become pegged to the rigid sector price. This complete nominal rigidity gives rise to typical Keynesian features: an expansion in nominal demand gives rise to a Pareto-improving increase in output and employment (Proposition 1). The presence of unions is essential in generating the Pareto improvement, since it generates a mark-up of real wages over the disutility of labour, hence leading to a net increase in utility as output increases. In complete contrast to this is the case with no rigid sectors, and where the competitive sector faces a bottleneck, with nominal wages adjusting to maintain fixed output and employment (the sectoral "Natural Rate"). Here the macroeconomy as a whole possesses a Natural Rate, and money is neutral—the behaviour of the unionized sector is determined by the competitive sector (Proposition 2).

In between these two benchmark cases we consider the general case with unionized, rigid, and competitive sectors which have binding sectoral constraints. The response of unionized and competitive wages to an increase in nominal demand depends on complicated feedbacks and intersectoral effects. In Section V, we adopt particular functional forms for household preferences which restrict these effects and give clear results. With Cobb-Douglas preferences, the responsiveness of unionized wages depends upon the relative sizes of the other sectors (not their absolute sizes *per se*). *Even in this restrictive case (since budget shares and elasticities are constant), the economy can display behaviour between the Classical and Keynesian benchmark cases of the previous sections.* With CES preferences, the responsiveness of wages to demand changes is influenced by the degree to which goods are gross substitutes/complements. The general lesson to be drawn from this paper is that in a heterogeneous economy, the macroeconomic properties of the economy will depend on the precise structure of the economy and household preferences.

II The Model

There are n sectors and H households in the economy, who have one unit of labour which they supply with a fixed disutility of θ and initial money balances of M^0. They can either supply one unit of labour (the employed) or none (the unemployed). There are n produced goods **X**, and (non-produced) money M in the economy. The households have the following preference over **X** and real money balances:

$$(u(\mathbf{X}))^c(M/P)^{1-c} \tag{1}$$

where u is a symmetric homothetic sub-utility function, and P a price index derived below. This form of the utility function implies that a proportion, c, of income is "spent" on goods (c is the marginal propensity to consume) and $(1-c)$ is "saved" (to accumulate money balances). This is a generalization of Dixon (1987) in which u is Cobb-Douglas, and Blanchard and Kiyotaki (1987) in which u is CES.

Since preferences over **X** are homothetic, we can express them in the familiar form of expenditure function:

$$e(\mathbf{P}, u) = b(\mathbf{P}).u \tag{2}$$

where **P** is the n-vector of prices P_i of produced goods. b is, of course, homogeneous of degree 1 in **P**, and can be interpreted as the true "cost-of-living" index for consumption goods. b is normalized so that if all prices are the same $P_i = p'$ then $b = P'$. If we define K as total expenditure on produced goods, and K_i as total expenditure on good i, we have:

$$K_i = \alpha_i(\mathbf{P}).K \tag{3}$$

where budget share α_i is homogeneous of degree 0 in **P**. Since preferences u are symmetric, if prices are equal then $\alpha_i = 1/n$. Note that:

$$\alpha_i = P_i.\frac{b_i}{b} \tag{4}$$

where b_i is the derivative of b w.r.t. P_i. Hence the Marshallian demands can be written:

$$X_i(\mathbf{P}, K) = \frac{b_i}{b}K = \alpha_i K/P_i \tag{5}$$

Since preferences over outputs and real balances (1) are Cobb-Douglas, total expenditure on outputs K is a linear function of total income $(K+M^0)$, $K = c(K+M^0)$, so that:

$$K = \frac{c}{1-c}M^0 \tag{6}$$

which is the standard macroeconomic relationship determining nominal national income from the income-expenditure relationship. Household income consists of earnings from employment and initial money balances (there are no profits—see below).

Firms

Firms in each sector have identical constant returns technologies and, for simplicity, output is normalized to equal employment in that sector N_i:

$$N_i = X_i \tag{7}$$

Each output market is perfectly competitive, so that price equals marginal cost, which equals the sectoral nominal wage w_i:

$$P_i = w_i \tag{8}$$

Since there are no profits in this economy, total wage income in sector i is equal to total expenditure on sector i:

$$w_i N_i = P_i X_i = K_i \tag{9}$$

The Demand for Labour

Total nominal income in the economy consists of initial money balances, M^0, plus the flow component of labour income, $\Sigma_{i=1}^{n} K_i = K$. A proportion, c, of this is divided between the n outputs (3). Given that we have assumed competitive product markets with $P_i = w_i$, we can express budget shares as a function of $\mathbf{w}$, $\alpha_i(\mathbf{w})$. The demand for labour in a particular sector, i, is then:

$$N_i = \alpha_i(\mathbf{w}) \,.\, K/w_i \tag{10}$$

This defines the "objective" demand for labour in sector i as a function of $\mathbf{w}$. Actual employment may differ from (10) if there is full employment at the macroeconomic or sectoral level. We will assume throughout the paper that there is unemployment at the macroeconomic level.

Equilibrium in the Unionized Sectors

Of the n sectors, a proportion $(1-d)$ unionized, with wage w_i; of the dn non-unionized sectors, a proportion Ψ rigid with fixed wages and prices f, and $(1-\Psi)$ are "competitive" with wages z. The n-vector of wages will therefore sometimes be partitioned and represented by (w, f, z).

In each unionized sector, there are r unions $k = 1 \ldots r$ who act as Hartian "syndicates" controlling the supply of labour (Hart, 1982). The economy is "large" in the sense of Dixon (1991), in that agents in the economy treat the general price level P as fixed. I assume that each union's objective function is the product of employment and the real wage minus the disutility of labour: the familiar total "surplus" of those employed over the unemployed. This can be derived by assuming that the union maximizes the expected utility of workers with random lay-offs if we interpret (1) as a risk-neutral Neumann-Morgenstern utility function. Wages in sector i are determined by the "objective" demand curve (10), treating the prices in other sectors as given.

The k^{th} union in sector i therefore chooses N_{ik} to solve:

$$\max_{N_{ik}} N_{ik}\left[\left[\frac{w_i}{P}\right]-\theta\right] \tag{11a}$$

$$\text{s.t.} \quad w_i = \alpha_i(\mathbf{w}) \,.\, K/\Sigma_j N_{ij} \tag{11b}$$

It seems most natural to treat the general price index P as the true cost-of-living index $b(\mathbf{P})$ (indeed, this is implied if we interpret (11b) as arising from the union maximizing the expected utility of its members). We also assume that there is a Nash-equilibrium in the industry, so that each union treats the unemployment decision of the other unions in its own sector as given. In the case of a monopoly union, where $r = 1$, we can also interpret the union behaviour as setting the nominal wage w_i and firms as choosing employment.

In a symmetric Nash-equilibrium[1] in sector i, we have from the first-order conditions to (11):[2]

$$\frac{w_i}{b(\mathbf{w})} = \frac{r \,.\, \varepsilon_i(\mathbf{w})}{r \,.\, \varepsilon_i(\mathbf{w}) - 1} \,.\, \theta \tag{12}$$

where ε_i is the (sectoral) elasticity of the labour demand function (10):

$$\varepsilon_i(\mathbf{w}) = -\frac{w_i}{N_i} \,.\, \frac{\partial N_i}{\partial w_i}$$

From the second-order conditions, we require $r \,.\, \varepsilon > 1$. Since preferences are homothetic, $\varepsilon_i(\mathbf{w})$ is homogeneous of degree 0 in prices/wages $\mathbf{w}$. In effect, sectoral elasticities depend only on relative prices and are unaffected by income and nominal prices.

Competitive and Rigid Sectors

Of the dn non-unionized sectors, a proportion ψ are rigid and $(1-\psi)$ are competitive. In the rigid sector, we assume that wages and prices are fixed in nominal terms, being treated as exogenous in this paper, with $w_i = P_i = f$. This can be conceived of in different ways: f could be the price set by a

[1]Certainly, non-symmetric and multiple equilibria are possible, even under our assumptions. However, very strong assumptions would need to be made to guarantee uniqueness and rule out non-symmetric equilibria. If an equilibrium exists, then for Cobb-Douglas and CES preferences it is unique and symmetric.

[2]To derive (12), note that:

$$\frac{\partial U_{ik}}{\partial N_{ik}} = \left(\frac{W_i}{b} - \theta\right) + \frac{N_{ik}}{b}\frac{\partial W_i}{\partial N_{ik}} = 0$$

so that: $\frac{W_i}{b}\left(1 - \frac{N_{ik}}{N_i} \,.\, \frac{1}{\varepsilon_i}\right) = \theta$, with $N_{ik}/N_i = 1/r$ by symmetry.

nationalized or regulated industry, or the price of a traded good in an open economy (as in Dixon, 1990). Alternatively, f can be thought of as a minimum wage set by law. This paper remains agnostic as to the precise cause of nominal rigidity and merely imposes the participation constraint $f/b \leqslant \theta$, with output being demand determined.

In the $(1-\psi)dn$ competitive sectors, we consider two alternative wage mechanisms. First, with perfect labour mobility and unlimited capacity, the real wage equals the disutility of labour:

$$\frac{z}{b(w,f,z)} = \theta \tag{13}$$

Secondly, we consider the case where labour is immobile and there is a binding sectoral employment constraint, so that output and employment in this sector are fixed at a "Natural Rate" of h. The reasons for the sectoral capacity constraint might be due to limited sector-specific skills, or limited physical capacity. In this case, the nominal wage z adjusts to equate demand with supply h:

$$z = \alpha_z(w,f,z) \,.\, K/h \tag{14}$$

If the sectoral employment bottleneck were not binding, (13) would again be the appropriate equilibrium condition.

III Equilibrium with Keynesian Features

Having outlined the microeconomic structure of the economy, we will turn to the macroeconomic properties of the economy. We will first consider the case of an economy with some unionized rigid sectors ($d < 1, n\psi d \leqslant 1$) and where the competitive sectors are characterized by perfect labour mobility and unlimited capacity. In this case, the equilibrium in the economy (w^*, z^*, f) is characterized by the two equations:

$$\frac{w}{b(w,f,z)} = \frac{r\,.\,\varepsilon(w,z,f)}{r\,.\,\varepsilon(w,z,f)-1}\,.\,\theta \tag{15a}$$

$$\frac{z}{b(w,f,z)} = \theta \tag{15b}$$

where for convenience we have dropped the i subscript on ε, which is the elasticity in the (representative) unionized sector. Note that we are assuming that there is not full employment, so that output and employment are determined *via* the labour demand functions (10). The unemployment might be viewed as involuntary, since all the unemployed would strictly prefer to work in the unionized sector, even though they are indifferent between unemployment and working in the competitive sector. The economy characterized by (15) behaves in a very "Keynesian" way:

Proposition 1: If an equilibrium (w^*, z^*) exists and there is unemployment, given (f, M^0), then:

(a) *Nominal Rigidity*: Nominal wages (w^*, z^*) are unaffected by M^0.
(b) *Pegging*: Let $\lambda > 0$. Then for λf, $(\lambda w^*, \lambda z^*)$ is an equilibrium.
(c) An increase in the nominal money supply leads to a *Pareto improvement*.

Proof: Taking each part separately:

(a) M^0 does not enter into the equations (15) defining equilibrium (recall that we are assuming that there is not full employment).
(b) To verify that (w, z) become pegged to f, note that (15) are homogeneous of degree 0 in (w, f, z).
(c) Since nominal wages and prices are rigid (from (a) and (b)), an increase in nominal national income K will increase output and employment in each sector *via* (10). In the unionized sector, since the real wage exceeds the disutility of labour, the utility of those becoming employed increases. In the competitive sector, the real wage of those becoming employed just compensates for the disutility of work. In the rigid sector, the utility of those becoming employed will not decrease since $f/b \leqslant \theta$. In addition, all those who receive the additional money will become better off, since nominal prices and wages are fixed. No one becomes worse off. Q.E.D.

This result is very powerful. Whatever the level of the money supply M^0 (provided that there is not full employment), the *equilibrium* nominal wages

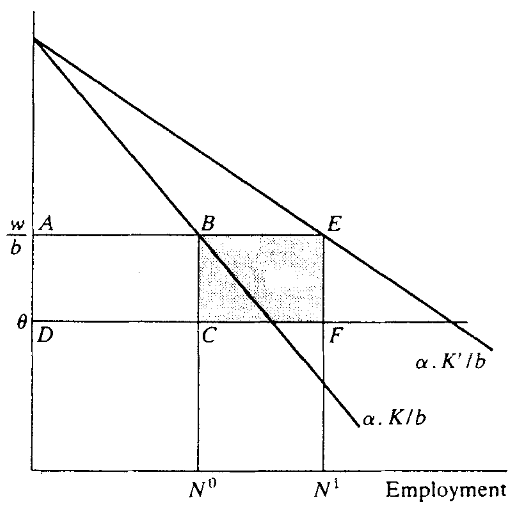

FIG. 1
A Pareto-improving Increase in Demand

(w^*, z^*) in unionized and competitive sectors become "pegged" to the rigid sector wage/price, in the sense that the equilibrium equations (15) determine only *relative* prices $(z/f, w/f)$. This gives rise to part (a) and (c) of the proposition almost as a corrolary. Since equilibrium wages become pegged to those in the rigid sector, this leads to *nominal wage rigidity* in the unionized and competitive sectors, with wages being invariant to changes in the money supply. Aggregate demand equation (6) states that nominal national income is proportionate to the money supply: since nominal wages and prices are fixed, a money-induced increase in nominal national income K will feed through entirely into an increase in the output of all three sectors. Part (c) draws on the crucial distinction between the welfare properties of unionized and competitive sectors in this scenario. In unionized markets, the real wage is a mark-up on the disutility of labour, so that a demand-induced increase in employment raises the total surplus. This is depicted in Fig. 1, where the increase in M^0 causes employment to rise by $N^1 - N^0$, increasing surplus from $ABCD$ to $AEFD$ (the gain being the shaded rectangle). This Pareto improvement is only possible because of the presence of unions: under perfect competition, there is no surplus ($z/b = \theta$), so that the utility of additional output is exactly offset by the disutility of labour.

Note that the *size* of the rigid sector makes no difference to the validity of Proposition 1, so long as there is at least *one* rigid sector ($n\psi d \leqslant 1$). The nominal wage rigidity of the rigid sector is highly infectious: even a small amount of rigidity will have a significant effect on the economy. This extreme result is, of course, sensitive to the assumptions (notably a constant disutility of labour and constant returns to scale in production). However, it does illustrate the general point that from a macroeconomic perspective, *one does not need to assume universal wage/price rigidity as in fix-price models to generate Keynesian results.*

IV Equilibrium with Classical Features

Consider an economy with no rigid sector ($\psi = 0$) and competitive sectors with labour immobility and a binding sectoral employment constraint. As we shall demonstrate, this economy is "Classical" in the sense that the Classical dichotomy holds, money is neutral, and there is a "Natural Rate". With no rigid sector, equilibrium in the unionized and competitive labour markets is given by:

$$\frac{w}{b(w,z)} \cdot \frac{r \,.\, \varepsilon(w,z)}{r \,.\, \varepsilon(w,z) - 1} = \theta \tag{16a}$$

$$z = \alpha_z(w,z) \,.\, K/h \tag{16b}$$

Compared to the Keynesian case (15), there are two differences. First, there is no rigid sector to tie down wages (as in Proposition 1(b)). Secondly, the level of nominal aggregate demand enters into (16b) to determine *nominal* wages z, rather than the disutility of labour to determine *real* wages. The Classical features of the economy are captured in a statement of the Classical dichotomy in terms of homogeneity:

Proposition 2: Let $\lambda > 0$, $\psi = 0$. If (w^*, z^*) is an equilibrium given M^0, then $(\lambda w^*, \lambda z^*)$ is an equilibrium given λM^0.

Proof: Multiply equation (16a) by $b(w, z)$, so that both equations are homogeneous of degree 1 in (w, z, M^0). Q.E.D.

The homogeneity of the macroeconomic system in (w, z, M^0) results from the interaction of the two sectors with different mechanisms of wage determination. In contrast to the Keynesian case, where nominal wages become pegged to the rigid sector wage, in this Classical scenario, with the combination of a competitive sector with a binding sectoral employment constraint and a unionized sector with real wages, a mark-up over the disutility of labour leads to flexible prices and a fixed output in both sectors. This illustrates the crucial point: *how the unionized labour markets eventually respond to an increase in demand depends on the precise structure of the economy*. As a consequence of the "Natural Rate" property of the economy, there are no welfare effects of a change in the money supply, in complete contrast to Proposition 1(c).

V THE GENERAL CASE

In this section, we generalize the Classical case to introduce rigid sectors ($\psi d > 0$) in addition to the unionized and competitive sectors with binding sectoral employment constraints. In this case, the equilibrium equations (16) become:

$$\frac{w}{b(w, z, f)} = e(w, f, z) \,.\, \theta \tag{17a}$$

$$z = \alpha_z(w, f, z) \,.\, K/h \tag{17b}$$

where $e(w, f, z) = r \,.\, \varepsilon(w, f, z)/(r \,.\, \varepsilon(w, f, z) - 1)$ is the mark-up of the unionized real wage over θ. Since ε is homogeneous of degree 1 in (w, f, z), so is $e(w, f, z)$. If we take logs of (17) and totally differentiate w.r.t. M^0, we obtain the elasticities of equilibrium wages in the unionized and competitive sectors w.r.t. M^0:

$$\frac{d \log z}{d \log M^0} = \frac{A_z + A_f - e_w}{A_z(1 + \eta_f) + A_f(1 - \eta_z) - e_w(1 - \eta_w) - \eta_z e_z} \tag{18a}$$

$$\frac{d \log w}{d \log M^0} = \frac{A_z - e_z}{A_z(1 + \eta_f) + A_f(1 - \eta_z) - e_w(1 - \eta_w) - \eta_z e_z} \tag{18b}$$

TABLE 1
COBB-DOUGLAS AND CES PREFERENCES

	Cobb-Douglas	*CES*
$u(\mathbf{X})$	$\prod_{i=1}^{n} X_i^{\frac{1}{n}}$	$\left[\Sigma X_i^{\frac{\varepsilon-1}{\varepsilon}}\right]^{\frac{\varepsilon}{\varepsilon-1}}$
$\alpha_i(\mathbf{P})$	$\frac{1}{n}$	$\frac{1}{n}\left(\frac{P_i}{b}\right)^{1-\varepsilon}$
$b(\mathbf{P})$	$\prod_{i=1}^{n} P_i^{\frac{1}{n}}$	$\left[\frac{1}{n}\Sigma P_i^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}}$

where (e_w, e_z) are the elasticities of e with respect to (w, z); (A_z, A_f) are the total budget shares of the competitive and rigid sectors ($A_z = (1-d)(1-\psi)n.\alpha_z$, $A_f = \psi(1-d).n\alpha_f$); (η_f, η_z, η_w) are the elasticities of the typical competitive sector's budget share α_z w.r.t. (f, z, w). Note that since both e and α_z are homogeneous of degree 0 in (w, f, z), $e_z + e_w + e_f = \eta_z + \eta_w + \eta_f = 0$. The expressions in (18) are rather complex, reflecting the feedbacks and interactions between wage mechanisms in the different sectors. Rather than making unintuitive restrictions to obtain clear results, we will continue the analysis using the symmetric Cobb-Douglas and CES specifications for the homothetic sub-utility function. These are given in Table 1. However, it is worth noting that under the assumption that there is no competitive sector, so that $A_z = e_z = \eta_z = \eta_f = \eta_w = 0$, we are back with the results of Proposition 1, since unionized wages become independent of M^0.

Under the assumption of Cobb-Douglas preferences, the various feedbacks and interactions between sectors are greatly simplified, since $\varepsilon_i = 1$ and budget shares are invariant w.r.t. prices $\alpha_i = 1/n$. Hence (18) becomes:

$$\frac{d\log z}{d\log M^0} = 1 \tag{19a}$$

$$\frac{d\log w}{d\log M} = \frac{A_z}{A_z + A_f} = (1-\psi) \tag{19b}$$

where ψ is the proportion of non-unionized sectors which are rigid. Competitive wages and prices are here homogeneous of degree 1 in M^0, as in the Classical case of Section IV. The responsiveness of unionized wages, however, depends on the *relative* size of the competitive and rigid sectors. The unionized wage is thus responding to two influences: the rigid sector, in which the wage/price is unresponsive to nominal demand changes, and the Classical competitive sector in which wages/prices respond proportionately to demand changes to keep output and employment fixed. Depending on the proportion of non-unionized sectors which are rigid, (19b) indicates that the macro-economy can display a whole range of behaviour from the Classical to the Keynesian as ψ varies from 0 to 1. Note that the *absolute* size of the non-unionized sectors is not relevant for (19b): d does not enter into it. All that matters is the *relative* size of the non-unionized sectors, captured by ψ.

Turning to CES preferences, we follow Blanchard and Kiyotaki (1987) in treating the utility parameter ε as the perceived elasticity of demand (which is a good approximation since n is large). Under CES preferences, mark-up e is constant ($e = r\varepsilon\theta/(r\varepsilon - 1)$) but budget shares vary with relative prices:

$$e_z = e_w = 0$$

$$\eta_z = (1-\varepsilon)(1-A_z)$$

$$\eta_f = -(1-\varepsilon)A_f$$

Hence:

$$\frac{d\log z}{d\log M^0} = \frac{A_z + A_f}{A_z + A_f - 2A_f A_z(1-\varepsilon)} \tag{20a}$$

$$\frac{d\log w}{d\log M^0} = \frac{A_z}{A_z + A_f - 2A_f A_z(1-\varepsilon)} \tag{20b}$$

In evaluating (20b), we must distinguish between when outputs are (gross) substitutes ($\varepsilon > 1$) and (gross) complements ($\varepsilon < 1$). First, if we turn to the case of gross substitutes, in this case the responsiveness of competitive sector wages is dampened by the presence of the rigid sector. The reasoning is really quite simple: as z responds to the increase in demand, it rises relative to w and f. Since goods are gross substitutes, this will tend to reduce the budget share of the typical competitive sector, hence reducing the increase in demand and the rise in z necessary to maintain constant output and employment. The reduction in the responsiveness of z, of course, also affects the responsiveness of unionized wages. Secondly, let us turn to the case of gross complementarity: in this case, $2A_f A_z(1-\varepsilon)$ is positive, so that the responsiveness of the competitive sector wage is *enhanced* (since the budget share of α_z increases as z rises relative to w,f): $d\log z/d\log M^0 > 1$. The responsiveness of the unionized sector will thereby be enhanced.

If we move beyond the case of Cobb-Douglas or CES preferences to the general case of homothetic preferences, then the results become more complicated. Not only will budget shares change (as in the CES case), but also the elasticity in the unionized sector as relative prices change. However, the important point to note is that even within the limitations of these two specifications of the sub-utility function we can obtain a whole range of behaviour from the Classical to Keynesian and beyond.

VI Conclusion

This paper examines the flexibility of nominal wages in an economy with heterogeneous labour markets. It turns out that the response of nominal wages to demand in the unionized sector is very sensitive to the behaviour of wages in the rest of the economy (competitive and rigid sectors). We have adopted a framework in which the equilibrium real wage in the unionized sector is a constant mark-up over the disutility of work. If there is a rigid sector but no competitive sector, then we obtain the "pegging" result that nominal wages in the unionized sector are unaffected by demand and are fixed relative to wages in the rigid sector. This result holds no matter how small the rigid sector is and it means that the behaviour of wages in the unionized sector is completely tied down by the nominal rigidity of the rigid sector. From the macroeconomic perspective, the economy will be "Keynesian" in the sense of changes in demand leading to changes in output at fixed nominal prices.

In stark contrast, we have the case where the non-unionized sector is competitive and there is immobile labour with a binding sectoral employment or capacity constraint. In this case, unionized wages become pegged to the competitive wage and vary with competitive wages in response to demand changes in order to maintain a constant level of demand. From the macroeconomic point of view, this leads to a "Natural Rate" in the sense that wages and prices respond to changes in demand, whilst output and employment are fixed. This result holds no matter how small the competitive sector is.

These two polar cases illustrate that the degree of nominal wage flexibility depends very much on the exact composition of labour markets and that the interaction of wage determination processes across sectors can be crucial. As a result, it may be misleading to look at the issue of wage flexibility from a partial equilibrium or sector-by-sector approach, since a macroeconomic general equilibrium approach is needed to capture the intersectoral cross-effects.

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