This equation is generally called the *price-setting* (PS) *schedule*. It shows the relation between the firms' desired level of employment and the real wage at the firms' symmetric optimum. To close our macro model we notice that under symmetry,

$$Y = n\widetilde{Y} = n\widetilde{L}^{\alpha}. \tag{10'}$$

By using (5), aggregate demand is

$$Y^d = C + G = \beta\left(Y - T + \frac{\overline{M}}{P}\right) + G, \tag{16}$$

where T denotes real taxes. Equations (7-7bis), (10'), (15) and (16) determine the equilibrium levels of L, Y, W/P, P, given the exogenous policy variables M, G and T. Notice that, were the relative price elasticity of public and private demand equal, $\gamma = \rho$, then the system would exhibit the standard dichotomy property associated with full wage and price flexibility: equations (7), (10') and (15) would determine L, Y, and W/P, independently of the demand variables M, G and T.[7] The essence of the elasticity transmission mechanism, however, is that if $\gamma \neq \rho$, then the real policy variable G actually enters the price-setting rule; it may therefore affect output and employment by changing the firms' desired mark-up.

3 The elasticity transmission mechanism and the properties of technology

It is clear from the above that the key equation of the model is the price-setting schedule (15). Provided an equilibrium exists at $L < \overline{L}$, an increase in employment might occur, if an increase in public expenditure induces the firms to employ a greater amount of labour at the reservation wage ν. Figure 1 shows that this requires an upward shift of the PS schedule through a reduction in the desired price-over-cost margin when the PS schedule is downward sloping, and a downward shift of the curve *via* an increase in the desired mark-up when the PS is upward sloping.

This suggests that preliminary to any study of the pro- or counter-cyclical impact of public expenditure on the desired mark-up, is the analysis of the slope of the PS schedule.

INSERT FIGURE 1 ABOUT HERE

3.1 The slope of the PS schedule

First, we notice that equation (14) con be written as:

$$\epsilon\left(\widetilde{G}, \widetilde{L}\right) = \rho + (\gamma - \rho)\frac{\widetilde{G}}{\widetilde{L}^{\alpha}},$$

[7] We recall that the structure of the household's preferences is such that any effect on the labour supply is ruled out.

where we stress the dependence of ϵ on $\widetilde{G}$ and $\widetilde{L}$, generated by the difference in the elasticities of public and private demands. We denote now with $r\left(\widetilde{G},\widetilde{L}\right)$ the firm's real marginal revenue under symmetry or, in other terms, the inverse of the equilibrium mark-up of price over marginal costs:[8]

$$r\left(\widetilde{G},\widetilde{L}\right)=\left(1-\frac{1}{\epsilon\left(\widetilde{G},\widetilde{L}\right)}\right).$$

This allows us to reformulate conveniently the PS schedule as:

$$\omega=\frac{W}{P}=\alpha\widetilde{L}^{\alpha-1}r\left(\widetilde{G},\widetilde{L}\right), \tag{17}$$

and the elasticity of ω with respect to $\widetilde{L}$ is

$$\frac{d\omega}{d\widetilde{L}}\frac{\widetilde{L}}{\omega}=(\alpha-1)+\eta_{r\widetilde{L}}\left(\widetilde{G},\widetilde{L}\right),$$

where $\eta_{r\widetilde{L}}\left(\widetilde{G},\widetilde{L}\right)=\left(-\alpha\left(\gamma-\rho\right)\widetilde{G}/\widetilde{L}^{\alpha}\right)/\epsilon\left(\epsilon-1\right)$ is the elasticity of the real marginal revenue with respect to labour.

Notice that the elasticity of the price-setting schedule is the sum of the elasticity of the marginal productivity of labour function and the elasticity of the real marginal revenue with respect to labour. Should r be constant (which is the case when $\gamma=\rho$), the latter would be zero, and the elasticity of the PS curve would depend on the returns to scale only. But in this set-up r is not a constant; rather, it depends on $\widetilde{G}$ and $\widetilde{L}$, the sign of these relations depending on the sign of $(\gamma-\rho)$. Therefore the quantitative and qualitative behaviour of the elasticity of the PS schedule for different values of $\widetilde{L}$ depends not only on the returns to scale, but also on $\widetilde{G}$ and the difference between the elasticity of public and private demand.

In particular, the PS schedule will be upward or downward sloping according to the sign of $(\alpha-1)+\eta_{r\widetilde{L}}\left(\widetilde{G},\widetilde{L}\right)$. As for the latter, $(\alpha-1)$ is obviously negative under decreasing returns to scale and positive under increasing returns; $\eta_{r\widetilde{L}}\left(\widetilde{G},\widetilde{L}\right)$ is negative if $\gamma>\rho$, i.e. if the elasticity of public demand is greater than the elasticity of private demand, and positive in the opposite case. Therefore the PS is unambiguously downward sloping if $\gamma>\rho$, and returns to scale are non-increasing; it is unambiguously upward sloping if $\gamma<\rho$, and returns to scale are non-decreasing.

However, the interaction between the technological and elasticity effect on the shape of the PS may be such that, for given $\widetilde{G}$, we may observe a downward sloping PS curve with (moderately) increasing returns, provided that public demand is more elastic than private demand to such an extent that the mark-up factor strongly decreases as $\widetilde{L}$ decreases, thus increasing $\widetilde{G}/\widetilde{L}^{\alpha}$. Similarly, we may observe an upward sloping PS curve with (moderately) decreasing returns, provided that public demand is less elastic than private demand to such an extent that the mark-up factor strongly increases as $\widetilde{L}$ decreases, thus increasing $\widetilde{G}/\widetilde{L}^{\alpha}$

[8] Notice that $(1-r)$ is the Lerner index of monopoly power.

We may conclude that, if the mark-up is very sensitive to the composition of demand, the sign of the firms' desired employment-real wage relation may depend on the properties of the demand side of the model. Needless to say, in the case of constant returns to scale, frequently referred to in the literature, the shape of the PS curve is entirely determined by the behaviour of the real marginal revenue.

3.2 The effects of fiscal policy

We now study the comparative statics of our macro-model, by concentrating upon changes in public demand. We notice that the sub-system (7-7bis) and (17) is sufficient to evaluate the effectiveness of G on employment. In particular, we now want to derive explicitly an employment multiplier, which the properties of the model make it more convenient to formulate in terms of elasticity.

Assume again that an equilibrium obtains at $L^* = n\widetilde{L^*} < \overline{L}$.[9] Clearly, at this equilibrium,

$$F\left(\widetilde{G}, \widetilde{L}^*\right) = \alpha \left(\widetilde{L}^*\right)^{\alpha-1} r\left(\widetilde{G}, \widetilde{L}^*\right) - \nu = 0,$$

implicit differentiation of which gives:

$$\frac{d\widetilde{L^*}}{d\widetilde{G}} = -\frac{\dfrac{\partial F}{d\widetilde{G}}}{\dfrac{\partial F}{\partial\widetilde{L^*}}} = -\frac{\dfrac{\omega}{\widetilde{G}}\eta_{r\widetilde{G}}}{\dfrac{\omega}{\widetilde{L^*}}\left[(\alpha-1)+\eta_{r\widetilde{L}}\right]}, \tag{18}$$

where $\eta_{r\widetilde{G}} = \left((\gamma-\rho)\,\widetilde{G}/\widetilde{L}^{\alpha}\right)/\epsilon\,(\epsilon-1)$

By using the definition of $\eta_{r\widetilde{L}}$, we can reformulate (18) in terms of elasticity:

$$\eta_{\widetilde{L}\widetilde{G}} = \frac{d\widetilde{L^*}}{d\widetilde{G}}\frac{\widetilde{G}}{\widetilde{L^*}} = -\frac{\eta_{r\widetilde{G}}}{(\alpha-1)-\alpha\eta_{r\widetilde{G}}} = \frac{\eta_{r\widetilde{G}}}{(1-\alpha)+\alpha\eta_{r\widetilde{G}}}. \tag{19}$$

Again, the sign of this expression depends on the interaction between the returns to scale and the mark-up behaviour. Indeed, equilibrium employment will react positively to an increase in $\widetilde{G}$, if the numerator and the denominator of (19) are either both positive, or both negative. This allows to establish the following propositions.

Proposition 1 *If the elasticity of public demand is greater than the elasticity of private demand, $\gamma > \rho$, then a fiscal expansion increases the equilibrium level of employment iff $\eta_{r\widetilde{G}} > (\alpha-1)/\alpha$.*

Indeed, if $\gamma > \rho$, the numerator of (19) is positive and a fiscal expansion shifts the PS schedule upwards in the $(\widetilde{L}, \omega)$ plane. For employment to increase following this shift, the PS schedule must be negatively sloped (the denominator of (19) must be positive). This is always verified for non-increasing returns, but can also be consistent with increasing returns, provided that the marginal revenue is sufficiently sensitive to the composition of demand and returns are not too increasing, $\eta_{r\widetilde{G}} > (\alpha-1)/\alpha$.

[9] Were the PS schedule non-monotone, multiple underemployment equilibria could arise.

Proposition 2 *If the elasticity of public demand is lower than the elasticity of private demand, $\gamma < \rho$, then a fiscal expansion increases the equilibrium level of employment iff $\eta_{r\widetilde{G}} < (\alpha - 1)/\alpha$.*

If $\gamma < \rho$, the numerator of (19) is negative and a fiscal expansion shifts the PS schedule downwards in the $(\widetilde{L}, \omega)$ plane. For employment to increase following this shift, the PS schedule must be positively sloped (the denominator of (19) must be negative). This is always verified for non-decreasing returns, but can also be consistent with decreasing returns, provided that the marginal revenue is sufficiently sensitive to the composition of demand and returns are not too decreasing, $\left|\eta_{r\widetilde{G}}\right| > |(\alpha - 1)/\alpha|$.

This result allows extending the range of situations in which expansionary fiscal policy actually increases employment and output, as compared with those previously established in the literature. According to the standard tenet (Silvestre 1995, p.326), under decreasing returns an increase in public expenditure is expansionary only if public demand is more elastic than private demand, hence reduces the desired mark-up at the initial equilibrium. Similarly, under increasing returns a fiscal expansion should reduce the overall elasticity of demand (public demand must be less elastic than private demand in our framework). Our basic point is that a decrease in the desired mark-up at the initial equilibrium is required when the PS is negatively sloped, but the latter situation may not coincide with decreasing returns. Similarly, an increase in the desired mark-up is not required under increasing returns, but when the PS schedule is positively sloped.[10]

In particular, when the elasticity effect works through the composition of demand, a positive difference in the elasticity of public and private demand, which shrinks the mark-up at the initial equilibrium following a fiscal expansion, bends downward the slope of the PS curve, and may generate a downward sloping PS curve even in the presence of increasing returns. The reverse is true when public consumption is less elastic than private consumption: the impact effect is an increase of the mark-up, and this turns out to be expansionary not only under increasing returns, but also under (moderately) decreasing ones, through the same 'reversal of the slope' phenomenon. Moreover, simple inspection of (19) shows that under constant returns fiscal policy is unambiguously expansionary, independently of its giving a pro- or counter-cyclical impulse to demand elasticity.

We can therefore establish that there exists a range of values, around one, of the technological parameter α - the extension of which depends on the share of public demand on aggregate demand - such that an increase in public expenditure is associated to an increase in employment and output, independently of the direction of change of the elasticity of demand.

Finally, it may be interesting to evaluate the size of the elasticity multiplier (19). Clearly, under constant returns, $\eta_{\widetilde{L}\widetilde{G}} = 1$: a percentage increase in public consumption implies an identical percentage increase in employment and output. As far as the other situations in which the multiplier is positive are concerned, we may establish the following proposition.

[10] In the Appendix we discuss the relevance of the 'reversal of the slope' phenomenon by identifying the ranges of technological and demand conditions which ensure that it actually occurs.

Proposition 3 *If* $\eta_{\tilde{L}\tilde{G}} > 0$*, and* $\gamma > \rho$*, then* $\eta_{\tilde{L}\tilde{G}} < 1$ *if* $\alpha < 1$*;* $\eta_{\tilde{L}\tilde{G}} > 1$ *if* $\alpha > 1$*. If* $\eta_{\tilde{L}\tilde{G}} > 0$*, and* $\gamma < \rho$*, then* $\eta_{\tilde{L}\tilde{G}} < 1$ *if* $\alpha > 1$*;* $\eta_{\tilde{L}\tilde{G}} > 1$ *if* $\alpha < 1$*.*

Proof. Assume $\eta_{\tilde{L}\tilde{G}} > 0$. The condition $\eta_{\tilde{L}\tilde{G}} > 1$ implies

$$\left|\eta_{r\tilde{G}}\right| > \left|1 - \alpha + \alpha\eta_{r\tilde{G}}\right|. \tag{20}$$

Consider first the case in which both $\eta_{r\tilde{G}}$ and $1 - \alpha + \alpha\eta_{r\tilde{G}}$ are positive, which occurs when $\gamma > \rho$. Notice that in this case $\eta_{r\tilde{G}} = \frac{1}{\epsilon}\frac{(\gamma-\rho)\frac{\tilde{G}}{\tilde{L}^{\alpha}}}{(\gamma-\rho)\frac{\tilde{G}}{\tilde{L}^{\alpha}} + (\rho-1)} > 0$ implies $\eta_{r\tilde{G}} < 1$. Therefore, condition (20), which collapses to $(1-\alpha)\,\eta_{r\tilde{G}} > (1-\alpha)$, is verified only for $\alpha > 1$.

Consider now the case in which both $\eta_{r\tilde{G}}$ and $1 - \alpha + \alpha\eta_{r\tilde{G}}$ are negative, which occurs when $\gamma < \rho$. Condition (20) collapses to $(1-\alpha)\,\eta_{r\tilde{G}} < (1-\alpha)$, which for $\eta_{r\tilde{G}}$ negative is verified only for $\alpha < 1$. ■

The above proposition establishes that whenever a positive multiplier results from the 'slope reversal' of the PS schedule described above, the multiplier turns out to be greater than one. When a positive multiplier is obtained under the usual conditions (public demand more elastic and decreasing returns, or public demand less elastic under increasing returns), its value is lower than one.

The interesting implication of proposition 3 is that if the 'slope reversal' mechanism operates, the increase in employment and output is more than proportional to the increase in public expenditure. In this peculiar case, in the new equilibrium position the share of public demand on aggregate demand decreases - and though public demand is more (less) elastic than private demand, the new equilibrium mark-up increases (decreases). For example, in the presence of an increasing returns technology, the existence of a public component of demand more elastic than the private component (a) may bend downwards the PS schedule; (b) ensures that a fiscal expansion shift this downward sloping schedule outwards and generate a more than proportional increase in output: at the initial equilibrium the demand elasticity increases, stimulating the expansion, while at the final equilibrium the elasticity of demand actually decreases This qualitative difference between the direction of the change of the mark-up at the initial and final equilibrium positions is specific to the 'reversal of the slope' situations and does not show up in the other situations, in which the employment and output multiplier is positive.

4 Extensions

In the above discussion some simplifying hypotheses have been introduced, among which the most relevant are the absence of income effects of taxation on labour supply and the reversed-L shape of the labour supply schedule. As to the former, we believe that it is a convenient one, when the focus is on a transmission mechanism of fiscal policy based on product market competitiveness. It is conceptually easy to embody both the labour supply and the elasticity effects in more complicated models. As to the latter, it allowed us to concentrate the