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Demand Elasticity and Fiscal Policy

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Abstract: In this paper we study the transmission mechanism of …scal policy based on possible changes in the elasticity of demand. These are obtained by assuming that …rms face a balance of public and private demands, each characterized by di¤erent price elasticity. We show that in this set-up there exists a range of the technological conditions under which …scal policy is expansionary, independently of the pro- or counter-cyclical nature of its impact on the desired mark-up.

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1 Introduction

In recent years, both the real business cycle and the New Keynesian literature have devoted a great attention towards studying the e¤ectiveness of …scal policy in a ‡exible price environment.[1] While real business cycle theorists have concentrated upon the intertemporal substitution e¤ects on labour supply - an increase in public expenditure raises the interest rate and makes current income more attractive than future income - New Keynesians have identi…ed two transmission mechanisms in which the assumption of imperfect competition plays indeed the crucial role. The …rst mechanism relies on the multiplier e¤ects of a balanced budget expansion generated by monopoly pro…ts on the labour supply and consumption decisions (Dixon (1987), Mankiw (1988), Startz (1989)). The second works through the possibility that …scal policy actually a¤ect the …rms' market power (Pagano (1990), Jacobsen and Schultz (1994)) - by changing the desired price-over-marginal-cost ratio, …scal policy may induce an increase in the …rms' desired level of employment at any real wage.

The aim of this paper is to investigate the technological and demand conditions under which this latter transmission mechanism is actually e¤ective. It is a standard tenet of the literature in this …eld that an increase in public demand is expansionary when it is associated to a reduction in the desired mark-up, at any level of output. Indeed, under decreasing returns, an increase in the demand elasticity, which reduces the desired price-over-cost margin for any level of output, increases the desired amount of employment at any real wage. This amounts to saying that a downward sloping labour demand curve shifts outwards and the equilibrium employment increases (Lindbeck and Snower (1994), Dixon and Rankin (1994)). This e¤ectiveness result has been extended by D'Aspremont et al. (1995), who show that …scal policy can be expansionary also under increasing returns, provided that it reinforces, rather than counteracts, the …rms' market power - if the labour demand schedule is positively sloped, it is a decrease in demand elasticity, a widening of the price-cost margin, which is required to induce …rms to expand employment at any real wage.

In this paper we develop a microfounded macroeconomic model with monopolistic competition, in which the …rms' market power depends on the relative weight of the public and private components of aggregate demand - a situation which arises whenever …rms face both a public and a private demand for their products, characterized by di¤erent price elasticities. Clearly,

[1] For an assessment of the real business cycle approach to this issue, see Plosser (1989); the contributions in the New Keynesian perspective are reviewed in Silvestre (1993, 1995), Dixon and Rankin (1994) and Benassi et al. (1994).

in this case a …scal expansion causes an overall increase (decrease) in the demand elasticity at any level of output if public demand is more (less) elastic than private demand.

This simple framework allows us to extend the range of situations in which …scal policy has a positive impact on employment and output, as compared with those identi…ed in the existing literature. In particular, we show that there exists a range of technological conditions - from moderately decreasing to moderately increasing returns, including the constant case - in which …scal policy is expansionary, independently of the sign of its impact e¤ect on demand elasticity. The economic intuition behind this result is in the 'derived' nature of the labour demand (price-setting) schedule: since it is based on the equality between the marginal revenue product of labour and the real wage, its being positively or negatively sloped depends, under imperfect competition, not only on labour marginal productivity, but also on the behaviour of demand elasticity along the …rms' product demand function. This latter e¤ect may actually dominate the technological one, inducing an e¤ect of 'slope reversal' (Gali, 1994b, p.749). In this framework, the same conditions on structural parameters, which guarantee that a …scal expansion increases or decreases the elasticity of demand, may generate a reversal of the slope of the labour demand schedule, in the direction required for the policy to be expansionary

Our discussion is organized as follows. In section II we develop our basic model. Section III is devoted to the analysis of the e¤ectiveness of …scal policy through the transmission mechanism based on elasticity and the composition of demand. We provide also a quantitative and qualitative evaluation of the behaviour of the …scal multiplier derived in this set-up. Some remarks and conclusions are gathered in section IV.

2 The basic set-up

We consider a simple monetary economy where households, …rms and the government interact in the goods, labour and money market. The labour market is assumed to be competitive, while …rms are monopolistic competitors in the goods market. Output is a composite good, made of n varieties. Each variety is supplied by a single …rm, by means of labour only. We adopt a short run perspective, by taking the number of …rms (varieties) as given. Both households and the government demand output, though the public and private demands faced by any …rm are characterized by di¤erent demand elasticities.

2.1 The Households' Behaviour

We assume that the economy is populated by a large number of identical households, so that their aggregate behaviour can be formalized in terms of a single representative competitive household. Its objective function U is defined over consumption of the composite good, C, real money balances, M/P, and labour supply, L. We shall refer to a convenient, explicit, formulation of this utility function, which satisfies the usual concavity and differentiability properties: in order to rule out any income effect on labour supply, we assume that U is additively separable with respect to labour, and homogeneous of degree one in consumption and real money balances. Moreover, we assume that utility is linear in labour and that aggregate consumption is a CES function of the consumption of n varieties of output, C_i, $i = 1, 2, \ldots, n$:

$$U\left(C; \frac{M}{P}; L\right) = C^{\beta}\left(\frac{M}{P}\right)^{1-\beta} - \theta L; \qquad 0 < \beta < 1 \qquad (1)$$

$$C = n^{\frac{1}{1-\rho}}\left[\sum_{i=1} C_i^{\frac{\rho-1}{\rho}}\right]^{\frac{\rho}{\rho-1}}; \qquad \rho > 1 \qquad (2)$$

where θ is the constant marginal disutility of labour, and ρ is the household's elasticity of substitution between any two varieties.[2] The price P of the consumption bundle (output) is given, consistently with the structure of the household's preferences, by the following function of the prices of the n varieties:

$$P = \left[\frac{1}{n}\sum_{i=1} P_i^{(1-\rho)}\right]^{\frac{1}{1-\rho}}. \qquad (3)$$

The household maximizes (1) subject to the budget constraint:

$$\sum_{i=1} P_i C_i + M = WL + \Pi - Z + \overline{M};$$

where WL is nominal labour income, Π denotes nominal profits, Z taxes in nominal terms and $\overline{M}$ the initial endowment of money.

[2] As noticed by Heijdra and van der Ploeg (1996), this standard macroeconomic formulation of the CES sub-utility function rules out the possibility that the number of varieties affect the household's marginal utility. By using a different normalization, these authors identify a preference-for-variety channel for fiscal policy to be effective.

Given the definitions (2) and (3), the solution to the household's maximization problem generates the following demand for variety i:

$$C_i = \left(\frac{P_i}{P}\right)^{-\rho} \frac{C}{n}; \tag{4}$$

and optimal values for C, M, and L, which satisfy:

$$PC = \beta\left[WL + \Pi - Z + \overline{M}\right]; \tag{5}$$

$$M = (1-\beta)\left[WL + \Pi - Z + \overline{M}\right]; \tag{6}$$

$$\frac{W}{P} = \frac{\theta}{\beta^{\beta}(1-\beta)^{(1-\beta)}} \equiv \nu; \qquad \text{if} \quad L < \overline{L} \tag{7}$$

$$L = \overline{L}; \qquad \text{if} \quad \frac{W}{P} > \frac{\theta}{\beta^{\beta}(1-\beta)^{(1-\beta)}}; \tag{7 bis}$$

where $\overline{L}$ is the total endowment of labour time. Notice that the labour supply function takes a reversed L shape, being horizontal at the reservation wage ν, for $L < \overline{L}$:

2.2 The Government

The composite output produced in the economy is consumed not only by the private sector, but also by the government, which entirely finances its expenditure with lump-sum taxation. In modelling the government behaviour, we follow Dixon and Lawler (1996) and Heijdra (1998) by assuming that the government sets public consumption of the composite good in real terms, and behaves competitively on the goods market. The main additional assumption we introduce in this paper concerns the public sector's preferences between varieties, which we assume to be different from those of the private sector. In particular, public consumption is defined as the following CES function of the n varieties:

$$G = n^{\frac{1}{1-\gamma}} \left[\sum_{i=1}^{n} G_i^{\frac{\gamma-1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}; \qquad \gamma > 1$$

where γ is the government's elasticity of substitution. Once a level of public expenditure G has been chosen, the government chooses the quantity of each good G_i, in order to minimize nominal expenditure, consistently with that level of G. Therefore we have the following dual problem:

$$\text{Min} \sum_{i=1}^{n} P_{iG} G_i$$

$$\text{subject to } \; n^{\frac{1}{1-\gamma}} \left[\sum_{i=1}^{n} G_i^{\frac{\gamma-1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}} = G,$$

where P_{iG} is the price paid by the government for good i (which in principle might differ from that paid by the private sector). The solution for each G_i is the following (hicksian) demand function

$$G_i = \left(\frac{P_{iG}}{P_G}\right)^{-\gamma} \frac{G}{n}; \tag{8}$$

where P_G is the aggregate price index defined consistently with the government's preferences:[3]

$$P_G = \left[\frac{1}{n} \sum_{i=1}^{n} P_{iG}^{(1-\gamma)}\right]^{\frac{1}{1-\gamma}}.$$

2.3 The firms

On the production side, we assume that n monopolistically competitive firms produce, by means of labour only, the n goods that enter the private and public consumption bundles. Though each firm i produces a single good, Y_i, which is an imperfect substitute of all the others, we assume that the production function is identical for all goods and given by:

$$Y_i = L_i^{\alpha}; \qquad \alpha > 0 \tag{9}$$

where L_i is the amount of labour employed by firm i. We do not impose *a priori* any further restriction on the parameter α, which determines the prevailing returns to scale.[4]

[3] It can be checked that the solutions (8) and the price index P_G are such that by substituting them into the government objective function $\sum_{i=1}^{n} P_{iG} G_i$, we obtain $\sum_{i=1}^{n} P_{iG} G_i = P_G G$.

[4] The possibility of conceiving increasing returns as increasing returns to labour only might be questioned. Here, as in Manning (1990) and D'Aspremont et al. (1995), it should be clearly considered as a simplifying assumption.

On the basis of the optimal household's and government's decisions, we can write the following demand function faced by firm i:

$$Y_i^d = C_i + G_i = \left(\frac{P_i}{P}\right)^{-\rho}\frac{C}{n} + \left(\frac{P_{iG}}{P_G}\right)^{-\gamma}\frac{G}{n}. \tag{10}$$

Notice that two relative prices appear in (10), P_i/P and P_{iG}/P_G. However, we assume that firms are not able to discriminate between the private and the public sector, so that the price charged must be the same and $P_i = P_{iG}$, for all i. Since the market is characterized by monopolistic competition, each firm chooses this price in order to maximize nominal profits, given the demand function (10), the production function (9), and the aggregate price indexes, P and P_G. The nominal wage is taken as given, under the assumption of perfect competition on the labour market. The restriction that both γ and ρ - which turn to be also the elasticity of public and private demand for good i with respect to its relative price - be greater than one guarantees that the firm's optimization problem is well-defined for any composition of demand.

Profit maximization entails the following first order condition:[5]

$$P_i\left(1-\frac{1}{\epsilon_i}\right) = \frac{W}{\alpha L_i^{(\alpha-1)}}, \tag{11}$$

where $\epsilon_i = \rho + (\gamma - \rho)\, G_i/Y_i^d$ is the price elasticity of firm i's demand. The latter is a weighted average of the elasticity of private and public demand, where the weights are the share of each component on total demand.[6] Notice that the definition of ϵ_i makes it clear that, though private and public demand are isoelastic, the elasticity of the overall demand schedule faced by firm i is not constant.

2.4 The symmetric macroeconomic equilibrium

Since all firms face identical demand functions and are subject to the same technological constraint, their optimal price must be the same. This also implies that under symmetry the two price indexes, P and P_G, coincide:

$$P_G = P. \tag{12}$$

Therefore, all firms face the same level of private consumption, the same level of public consumption, and a fortiori the same level and composition of

[5] Since we have imposed no restrictions on technology, we specify the following requirement for the second order conditions to be satisfied at the optimal solution: $\frac{1}{\alpha} > 1 - \frac{1}{\epsilon_i}$.

[6] Gali (1994a) studies a model where the two components of aggregate demand characterized by different elasticity are private consumption and investment.

demand. This implies that the elasticity of demand in the firm's symmetric equilibrium can be written as:

$$\varepsilon_i = \varepsilon = \eta + (\gamma - \eta)\frac{\tilde{G}}{\tilde{Y}^d}; \tag{13}$$

where we denote with $\tilde{}$ the per capita value of the relevant variable, and $\tilde{Y}^d = \tilde{C} + \tilde{G}$. Moreover, under symmetry each firm employs $1/n$ of total employment; therefore, by using (12) and (13), we rewrite (11) as:

$$\frac{W}{P} = \alpha \tilde{L}^{\alpha-1}\left(1 - \frac{1}{\varepsilon}\right) = \alpha \tilde{L}^{\alpha-1}\left[1 - \left(\eta + (\gamma - \eta)\frac{\tilde{G}}{\tilde{Y}^d}\right)^{-1}\right]. \tag{14}$$

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,

$$Y = n\tilde{Y} = n\tilde{L}^{\alpha}. \tag{9'}$$

By using (5), aggregate demand is

$$Y^d = C + G = \beta\left(Y - T + \frac{\bar{M}}{P}\right) + G; \tag{15}$$

where T denotes real taxes. Equations (7-7bis), (9'), (14) and (15) 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, $\gamma = \eta$, then the system would exhibit the standard dichotomy property associated with full wage and price flexibility: equations (7), (9') and (14) 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 $\gamma \neq \eta$, 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 (14). Provided an equilibrium exists at $L < \bar{L}$, then an

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

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 ω. Figure 1 shows that this requires a reduction in the desired price-over-cost margin when the PS schedule is downward sloping and an increase in that margin 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.

3.1 The slope of the PS schedule

First, we notice that equation (13) con be written as:

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

where we stress the dependence of ϵ on $\tilde{G}$ and $\tilde{L}$, generated by the difference in the elasticities of public and private demands. We denote now with $r\left(\tilde{G}; \tilde{L}\right)$ the firm's real marginal revenue under symmetry:[8]

$$r\left(\tilde{G}; \tilde{L}\right) = \left(1 - \frac{1}{\epsilon\left(\tilde{G}; \tilde{L}\right)}\right):$$

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

This allows us to conveniently reformulate the PS schedule as:

$$\omega = \frac{W}{P} = \alpha L^{\alpha-1} r\left(G; L\right); \tag{16}$$

the elasticity of which is

$$\frac{d\omega}{dL}\frac{L}{\omega} = (\alpha - 1) + \eta_{rL}\left(G; L\right);$$

where $\eta_{rL}\left(G; L\right) = \left(-\alpha(\gamma - \rho) G/L^{\alpha}\right)/\epsilon(\epsilon - 1)$ 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 G and 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 L depends not only on the returns to scale, but also on 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 $(\alpha - 1) + \eta_{rL}\left(G; L\right)$. As for the latter, $(\alpha - 1)$ is obviously negative under decreasing returns to scale and positive under increasing returns; $\eta_{rL}\left(G; L\right)$ 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 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 L decreases, thus increasing G/L^{α}. 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 L decreases, thus increasing G/L^{α}

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 (16) 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 $L^* = n\ell^* < \overline{L}$.[9] Clearly, at this equilibrium,

$$F\left(G; \ell^*\right) = \alpha \left(\ell^*\right)^{\alpha - 1} r\left(G; \ell^*\right) - \nu = 0;$$

implicit differentiation of which gives:

$$\frac{d\ell^*}{dG} = -\frac{\frac{\partial F}{\partial G}}{\frac{\partial F}{\partial \ell^*}} = -\frac{\frac{\omega}{G}\eta_{rG}}{\frac{\omega}{\ell^*}\left[(\alpha - 1) + \eta_{rG}\right]}; \tag{17}$$

where $\eta_{rG} = (\gamma - \rho) G / \ell^{\alpha/2} (\epsilon - 1)$

By using the definition of $\eta_{r\ell}$, we can reformulate (17) in terms of elasticity:

$$\eta_{\ell G} = \frac{d\ell^*}{dG}\frac{G}{\ell^*} = -\frac{\eta_{rG}}{(\alpha - 1) - \alpha\eta_{rG}} = \frac{\eta_{rG}}{(1 - \alpha) + \alpha\eta_{rG}}. \tag{18}$$

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 G, if the numerator and the denominator of (18) 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 $\eta_{rG} > (\alpha - 1)/\alpha$.

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

Indeed, if $\gamma > \rho$, the numerator of (18) is positive and a fiscal expansion shifts the PS schedule upwards in the $(\hat{e}; \omega)$ plane. For employment to increase following this shift, the PS schedule must be negatively sloped (the denominator of (18) 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, $\eta_{rG} > (\alpha - 1)/\alpha$.

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 $\eta_{rG} > |(\alpha - 1)/\alpha|$.*

If $\gamma < \rho$, the numerator of (18) is negative and a fiscal expansion shifts the PS schedule downwards in the $(\hat{e}; \omega)$ plane. For employment to increase following this shift, the PS schedule must be positively sloped (the denominator of (18) 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, $\eta_{rG} > |(\alpha - 1)/\alpha|$.

This result allows extending the range of situations in which fiscal policy turns out to be expansionary, 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, it must be less elastic than private demand under increasing returns. 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.

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 (18) 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 (18). Clearly, under constant returns, $\eta_{LG} = 1$: 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.

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

Proof. Assume $\eta_{LG} > 0$. The condition $\eta_{LG} > 1$ implies

$$\left|\eta_{rG}\right| > \left|1 - \alpha + \alpha\eta_{rG}\right|. \tag{19}$$

Consider first the case in which both η_{rG} and $1 - \alpha + \alpha\eta_{rG}$ are positive, which occurs when $\gamma > \rho$. Notice that in this case $\eta_{rG} = \frac{1}{\epsilon}\frac{(\gamma - \rho)\frac{G}{L^{\alpha}}}{(\gamma - \rho)\frac{G}{L^{\alpha}} + (\rho - 1)} > 0$ implies $\eta_{rG} < 1$. Therefore, condition (19), which collapses to $(1 - \alpha)\eta_{rG} > (1 - \alpha)$, is verified only for $\alpha > 1$.

Consider now the case in which both η_{rG} and $1 - \alpha + \alpha\eta_{rG}$ are negative, which occurs when $\gamma < \rho$. Condition (19) collapses to $(1 - \alpha)\eta_{rG} < (1 - \alpha)$, which for η_{rG} 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 Conclusions

In this paper we have highlighted the properties of a macroeconomic model with monopolistic competition, where the differentiated goods which enter the aggregate output basket are demanded and consumed by both the private and the public sector, whose preferences are different and generate different demand elasticities. In this set-up, the level of public expenditure influences the demand elasticity and the labour demand schedule, through a direct 'demand composition' effect. In particular, we have proved that an increase in public expenditure may increase output, not only (as previously established) when public demand is more elastic than private demand and returns are decreasing, or when it is less elastic and returns are increasing. There is a set of technological conditions, from moderately increasing to moderately decreasing in which fiscal policy is expansionary, independently of the way in which it alters the elasticity of demand at the initial equilibrium.

For the model to be explicitly tractable, we adopted those well-defined formulations of preferences and technology, more frequently referred to in the literature. Moreover, 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 for the former, we believe that it is a convenient one, when the focus is on the 'labour demand' side of the model. Clearly, it is conceptually easy to embody both the labour supply and the elasticity effects in more complicated models. As for the latter, it allowed us to escape the problems of stability and multiplicity of underemployment equilibria, which could arise in the presence of two positively sloped behavioural relations on the two sides of the labour market.

We leave open the question of the empirical relevance of a transmission mechanism based on the mark-up behaviour. While some effort has been devoted to study the pro- or counter-cyclical behaviour of the mark-up, there is yet no clear evidence on whether its behaviour can be somehow linked to the composition of demand. Some empirical evaluation of the actual differences in the elasticity of the various components of demand is therefore required, before this kind of transmission mechanism can be relied upon in the overall design of macroeconomic policy.

References

[1] D'Aspremont, C., Dos Santos Ferreira, R., and Gerard-Varet, L. (1995). 'Imperfect Competition in an Overlapping Generations Model: a Case for Fiscal Policy', .Annales d'Economie et de Statistique, vol. 37/38, pp. 531-555.

[2] Benassi, C., Chirco, A. and Colombo, C. (1994). The New Keynesian Economics, Blackwell, Oxford.

[3] Dixon, H. (1987). 'A Simple Model of Imperfect Competition with Walrasian Features', Oxford Economic Papers, vol. 39, pp. 134-60.

[4] Dixon, H. and Lawler, P. (1996). 'Imperfect Competition and the Fiscal Multiplier', Scandinavian Journal of Economics, vol. 98, pp. 219-31.

[5] Dixon, H. and Rankin, N. (1994). 'Imperfect Competition and Macroeconomics: A Survey', Oxford Economic Papers, vol. 46, pp. 171-99.

[6] Gali, J. (1994a). 'Monopolistic Competition, Business Cycles, and the Composition of Aggregate Demand', Journal of Economic Theory, vol. 63, pp. 73-96.

[7] Gali, J. (1994b). 'Monopolistic Competition, Endogenous Markups, and Growth', European Economic Review, vol. 38, pp. 748-56.

[8] Heijdra, B. J. (1998). 'Fiscal Policy Multipliers: The Role of Monopolistic Competition, Scale Economies, and Intertemporal Substitution in Labour Supply', International Economic Review, vol.39, pp. 659-96.

[9] Heijdra, B. J. and van der Ploeg, F. (1996). 'Keynesian Multiplier and the Cost of Public Funds under Monopolistic Competition', Economic Journal, vol. 106, pp. 1284-96.

[10] Jacobsen, H. J. and Schultz C. (1994). 'On the E¤ectiveness of Economic Policy when Competition is Imperfect and Expectations are Rational', European Economic Review, vol. 38, pp. 305-27.

[11] Lindbeck, A. and Snower, D.J. (1994). 'How are Product Demand Changes Transmitted to the Labour Market?', Economic Journal, vol. 104, pp. 386-98.

[12] Mankiw, N. G. (1988). 'Imperfect Competition and the Keynesian Cross', Economic Letters, vol. 26, pp. 1-14.

[13] Manning, A. (1990). 'Imperfect Competition, Multiple Equilibria and Unemployment Policy', Economic Journal, vol. 100, pp. 151-62.

[14] Pagano, M. (1990). 'Imperfect Competition, Underemployment Equilibria and Fiscal Policy', Economic Journal, vol. 100, pp. 440-63.

[15] Plosser, C. (1989). 'Understanding Real Business Cycle', Journal of Economic Perspective, vol. 3, pp. 51-77.

[16] Silvestre, J. (1993). 'The Market-Power Foundation of Macroeconomic Policy', Journal of Economic Literature, vol. 31, pp. 105-41.

[17] Silvestre, J. (1995). 'Market Power in Macroeconomic Models: New Developments', Annales d'Economie et de Statistique, vol. 37/38, pp. 319-56.

[18] Startz, R. (1989). 'Monopolistic Competition as a Foundation for Keynesian Macroeconomic Models', Quarterly Journal of Economics, vol. 104, pp. 737-52.