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Molana, Hassan; Zhang, Junxi

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Market Structure and
Fiscal Policy Effectiveness

Hassan Molana

and

Junxi Zhang

Market Structure and Fiscal Policy Effectiveness[*]

Hassan Molana[**]   and   Junxi Zhang[**]

University of Dundee   University of Hong Kong

Abstract

In a monopolistic competition macromodel with endogenous market structure, the fiscal multiplier is shown to consist of two components. One component depicts the response of output to a fiscal expansion through the conventional channels that disregard the role of market imperfections and a second one captures the effect of both firms' market power and the policy induced change in the market structure. The latter effect – which is missing from the existing studies – is shown to be quite crucial in raising the fiscal multiplier even above unity, and also in improving consumers' welfare when the labour market is competitive.

Keywords: imperfect competition; monopoly power; fiscal multiplier; welfare

JEL Classification No: E6; H3

I. Introduction

It is now well established that an aggregate demand stimulating fiscal expansion is more likely to raise output when firms possess a certain degree of monopoly or market power which enables them to set their price level above their marginal cost. But while it is generally agreed that the size of fiscal multiplier depends, to a great extent, on firms' monopoly or market power, little attention is devoted to exploring the interaction between fiscal policy and the firms' ability to mark up their price. This is because the studies in this area have either assumed a fixed market structure, e.g. an oligopolistic goods market with a given number of firms and ad hoc barriers to entry, or disregarded a channel through which a change in total output could affect the markup – see, for example, Dixon (1987), Mankiw (1988) and Molana and Moutos (1992) for the former and Startz (1989) and Dixon and Lawler (1996) for the latter[1]. To appreciate this important channel, we note that if a fiscal intervention is effective in raising the level of output permanently, its impact on the market structure should also be permanent. In these existing models which consider symmetric equilibrium with identical firms, the latter impact usually takes one of two forms: *i)* the number of firms remains intact but the size of each firm's market grows, as in Dixon, Mankiw or the short-run cases in Startz and Dixon and Lawler; *ii)* the number of firms and the level of output adjust proportionally, so there are more firms but each firm's market share is unaffected, as in the long-run cases in Startz and Dixon and Lawler. In all cases, however, firms' monopoly or market power is assumed to be unaffected by these changes.

In this paper we propose a more general framework which allows for a firm's market power to both affect and be affected by fiscal policy. To explain the relevance of allowing

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[1] See the discussions in Heijdra *et al* (1998), Silvestre (1993) and Dixon and Rankin (1995) on the fiscal multiplier in models with monopolistic competition.

for such a two-way causation, it is helpful to decompose the long-run fiscal multiplier into two distinct components. One component depicts the response of output to a fiscal expansion through the conventional channels that disregard the role of market imperfections. This is then adjusted by a second component that captures the effect of both firms' market power and the policy-induced change in the market structure. To be more precise, let us measure firms' market power by their ability to mark up their prices over their marginal costs. Denoting output, government expenditure and markup by Y, G and μ, respectively, the above explanation suggests a decomposition of the multiplier as $dY / dG = \overline{M}\left(1 + m(\mu, d\mu / dG)\right)$, where $\overline{M}$ is a fixed parameter and m is a function which captures the role of imperfect competition and depends on both the level of markup as well as the way markup is affected by a change in G. Provided that $m(1, 0)=0$ holds, $\overline{M}$ represents the conventional component of the multiplier which would be obtained in the extreme case of perfect competition, that is as $\mu \to 1$ and $\partial\mu / \partial G \to 0$. We stress that here m is assumed to depend on both the level of markup **and** its policy induced change. But the latter factor has been completely ignored in the existing studies which assume that μ remains unaffected when the government expenditure is raised and therefore set $d\mu/dG=0$.

In this paper we argue that the assumption of a constant markup does not conform with the perception that has led to the introduction of goods market imperfections to macroeconomic models, especially when government purchases are filtered through the goods market; μ is a measure of market imperfection which is expected to decline as the market size is expanded and competition intensified. We also show that this assumption is likely to result in a serious omission that has considerable consequences for the size of the fiscal multiplier. To do so, in Section II we develop a model of imperfect competition with

endogenous goods market structure, which we then use in Section III to derive an expression for the multiplier in a way that the two distinct effects of a fiscal expansion on output are explicitly dichotomised as described above. It is shown that, if private and public expenditures are not perfect substitutes, the fiscal multiplier is positive and the contribution of the effect due to changes in market structure can in fact be quite significant, raising the multiplier above unity. In Section IV we analyse the welfare effect of a fiscal expansion and show that the existence of the additional market structure effect can in fact play a crucial role in improving consumers' welfare when the labour market is competitive. Section V concludes the paper.

II. The Model

The model is similar in spirit to standard macromodels that introduce goods market imperfections. It replaces total output with a constant elasticity of substitution (CES) quantity index for a horizontally differentiated product and assumes that each firm enjoys a monopoly power in the production of a single brand (see Blanchard and Kiyotaki, 1987, for an example and Matsuyama, 1995, for further details). As in most other studies in this area, the model portrays a simple market economy comprising three types of agents; households, firms and a government. The distinguishing feature of the model is in endogenising the elasticity of substitution between the varieties of the differentiated product. Thus, unlike the existing models of monopolistic competition in which the elasticity of substitution between (the horizontally differentiated) product varieties – and hence firms' markup – is constant, we endogenise the markup by allowing the elasticity of substitution to rise as the range of goods is extended. Finally, although the model is based on an intertemporal structure, the analysis will be focused on the long-run equilibrium and the short-run implications of the model will not be explored in this paper.

3

Households

The representative household's problem is to choose paths of its consumption and labour supply to maximise the lifetime utility,

$$U = \int_0^\infty e^{-\rho t} u\big(C^e(t), L(t)\big) dt ,\qquad (1)$$

where ρ is the subjective rate of time preference, t is the time index, C^e denotes the *effective* consumption and L is labour supply. The instantaneous utility function is given by

$$u(C^e, L) = \frac{\big((C^e)^\alpha \cdot (1-L)^{1-\alpha}\big)^{1-s}}{1-s} ; \quad s < 1; \quad 0 < \alpha < 1,\qquad (2)$$

where the time index t is suppressed hereafter and labour supply endowment is normalised to unity. Following Aschauer (1985), the effective consumption is defined as a composite good consisting of private and public consumption, denoted by C and G respectively, as follows

$$C^e = C + \theta G ; \quad \theta \le 1,\qquad (3)$$

where θ is a constant parameter. While a positive θ may be interpreted as a measure of substitutability between private and public consumption, i.e. each unit of G is equivalent to θ units of C, the possibility of a negative θ should not be excluded[2].

The household's budget constraint is given by

$$\dot{K} = (r - \delta)K + wL + V - T - C ,\qquad (4)$$

where w is the wage rate, V is the profit share accrued to the household (firms are assumed to be owned by the household), T is a lump-sum tax paid to the government and K is

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[2] As pointed out by an anonymous referee, there is an inconsistency in this definition of *effective* consumption; $\theta < 0$ implies that G is *'consumption bad'* rather than a complement since it yields negative marginal utility and hence the consumer needs to raise C to compensate for this negative externality. Karras (1994) provides international evidence on θ which shows that for some countries it may in fact be negative. See also Kuehlwein (1998) and Graham (1995) for further evidence from the USA on specific spending categories. Molana and Moutos (1989) and Zhang (1998) discuss other theoretical implications.

physical capital which is the only asset in the economy. Capital changes at rate $\dot{K}$ and earns interest r but depreciates at a constant rate δ.

The household's optimisation problem is to choose C, L, and K to maximise (1) subject to (2)-(4). The current-value Hamiltonian is

$$H = \frac{\left((C+\theta G)^{\alpha} \cdot (1-L)^{1-\alpha}\right)^{1-s}}{1-s} + \zeta\left((r-\delta)K + wL + V - T - C\right),$$

where ζ is the costate variable. The first order conditions, corresponding to C, L, and K, respectively, are

$$\alpha(C+\theta G)^{\alpha(1-s)-1}(1-L)^{(1-\alpha)(1-s)} = \zeta, \tag{5}$$

$$(1-\alpha)(C+\theta G)^{\alpha(1-s)}(1-L)^{(1-\alpha)(1-s)-1} = \zeta w, \tag{6}$$

$$\dot{\zeta} = \zeta(\rho + \delta - r). \tag{7}$$

Equations (5) and (6) imply

$$\left(\frac{1-\alpha}{\alpha}\right)\left(\frac{C+\theta G}{1-L}\right) = w, \tag{8}$$

and $\dot{K} = 0$ and $\dot{\zeta} = 0$ hold in a steady-state equilibrium. Using the latter, (7) implies the well-known result that in equilibrium the rate of interest on savings should be sufficient to cover the cost of postponing consumption and maintaining the capital stock, namely

$$r = \rho + \delta. \tag{9}$$

Firms and the Goods Market

The description of the goods market outlined below closely follows from Galí (1995). The production aspect of the model is therefore divided into two stages relating to a continuum of intermediate goods which are used to process a final good.

The final good

There is a final good that can be used for private and public consumption, *C* and *G*, or for capital accumulation *K*. This good is assumed to be produced and sold under perfect competition and for simplicity we approximate the mass of competitive producers by a single representative firm. The production technology uses a continuum of inputs and obeys the CES production function

$$Y = \left(n^{-(1-1/\mu(n))} \int_0^n \left(y_j \right)^{1/\mu(n)} dj \right)^{\mu(n)}, \tag{10}$$

where *Y* is the quantity of the final good, y_j denotes the quantity of the intermediate goods – or inputs – indexed $j \in [0,\ n]$, and $\mu : R_+ \rightarrow R_+$ is assumed to be a continuously differentiable function such that[3]

$$\frac{d\mu(n)}{dn} = \mu'(n) < 0; \quad lim_{n \rightarrow 0}\ \mu(n) = \overline{\mu} > 1; \quad lim_{n \rightarrow \infty}\ \mu(n) = 1. \tag{11}$$

In the rest of the paper we shall suppress *n* and simply use μ in place of $\mu(n)$.

At any point in time the firm uses the available range [*0, n*] of inputs and the technology described in (10) to maximise its profits

$$\Pi_Y = Y - \int_0^n p_j y_j dj, \tag{12}$$

where p_j is price of input indexed *j,* and given that the firm is price taker, the price level for the final good is set to unity by normalisation. Letting $\varepsilon(n) = \mu / (\mu - 1)$ and defining

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[3] As it will become clear below, the negative relationship between μ and *n* is somewhat exogenous and arises from the correspondence between the μ and ε – the elasticity of substitution between intermediate goods – where ε is assumed to rise as the range of inputs, *n*, expands. Nevertheless, the results derived later do not hinge on the particular mechanism that generates such a relationship. As recognised by Galí (1995), any other choice of technologies, preferences, and market structure that preserved the required property would also give rise to a similar outcome.

$$E \equiv \int_0^n p_j y_j dj \qquad \text{and} \qquad P \equiv \left((1/n) \int_0^n (p_j)^{1-\varepsilon(n)} dj \right)^{1/(1-\varepsilon(n))},$$

it is straightforward to show that the above maximisation implies the following input demand functions for all $j \in [0, n]$,

$$y_j = \left(\frac{p_j}{P} \right)^{-\varepsilon(n)} \left(\frac{E/P}{n} \right). \tag{13}$$

Two points are worth noting. First, substituting for y_j from (13) into (10) implies $Y=E/P$. Thus (12) can be written as $\Pi_Y = ((1/P)-1)E$. Given that by construction the final good is produced under price taking – perfect competition – condition, P is taken as given and the constant returns to scale property insures that the zero profit condition is satisfied and $\Pi_Y = 0$, which implies $P=1$ and $Y=E$. As a result, (13) is equivalent to

$$y_j = p_j^{-\varepsilon(n)} \left(\frac{Y}{n} \right). \tag{13'}$$

Second, as it is clear from (13), $\varepsilon(n)$ is the elasticity of substitution among inputs whose properties follow from (11), namely

$$\frac{d\varepsilon(n)}{dn} = \varepsilon'(n) > 0; \quad lim_{n\to 0} \, \varepsilon(n) = \overline{\varepsilon} > 1; \quad lim_{n\to\infty} \, \varepsilon(n) \to \infty. \tag{14}$$

In other words, as the range of the inputs expands the distinction between them reduces and they approach to perfect substitutes.

Intermediate goods

The market for intermediate goods is characterised by a standard monopolistic competition structure comprising a continuum of firms each producing a differentiated good which is indexed $j \in [0, n]$ and is used as an input by the final good producer as described above. Each firm uses an increasing returns to scale technology

$$y_j = A(k_j)^{\beta} (\ell_j)^{1-\beta} - \phi, \tag{15}$$

where y is the quantity of output, k and ℓ are variable inputs denoting the quantity of capital and labour respectively, $A>0$ and $0\leq \beta<1$ are constant parameters and ϕ is the quantity of fixed input (assumed to be identical for intermediate good producers) which is required before positive output is obtained. Thus, firm j's profit is

$$\pi_j = p_j y_j - w\ell_j - rk_j . \tag{16}$$

At any point in time, each firm chooses ℓ and k to maximise its profit subject to demand in (13') and production function in (15). The first order conditions are $\partial\pi_j / \partial\ell_j = 0$ and $\partial\pi_j / \partial k_j = 0$ which, taking account of the relevant restrictions, can be written as

$$\left(\frac{1-\beta}{\mu}\right)\left(\frac{p_j(y_j+\phi)}{\ell_j}\right)=w ,$$

$$\left(\frac{\beta}{\mu}\right)\left(\frac{p_j(y_j+\phi)}{k_j}\right)=r .$$

These conditions show clearly that $\mu>1$ acts as the markup factor. That is, unlike a price taker firm which operates at the level where the marginal product and the marginal cost of each factor of production are equal, the monopolistically competitive firm uses μ to mark up the value of marginal product of each factor of production above its marginal cost.

Under symmetry (identical firms), in equilibrium we have, for all $j\in[0, n]$, $p_j = P = 1$,

$y_j = Y/n$, $\ell_j = L/n$, $k_j = K/n$, and $\pi_j = \Pi/n$ where $L=\int_0^n \ell_j dj$, $K=\int_0^n k_j dj$, and

$\Pi = \int_0^n \pi_j dj$. Making use of these, the above first order conditions are rewritten in terms of the aggregate variables as follows

$$\left(\frac{1-\beta}{\mu}\right)\left(\frac{Y+n\phi}{L}\right)=w , \tag{17}$$

8

$$\left(\frac{\beta}{\mu}\right)\left(\frac{Y+n\phi}{K}\right)=r, \tag{18}$$

which can be used to determine the aggregate non-profit – or factor – income,

$$wL+rK=\frac{Y+n\phi}{\mu}. \tag{19}$$

Finally, aggregating (16) gives the profit income $\Pi = Y - wL - rK$, which using (19) implies

$$\Pi = \frac{(\mu-1)Y-\phi n}{\mu}. \tag{20}$$

III. General Equilibrium and the Effects of a Fiscal Expansion

The long-run equilibrium condition for the intermediate good industry, implied by the free entry assumption, is given by the zero profit condition. In other words, n adjusts to ensure that $\Pi=0$. Therefore, imposing this on (20) yields

$$\frac{Y}{n}=\frac{\phi}{\mu-1}, \tag{21}$$

which shows how each firm's optimal long-run scale of production depends on its markup. Equations (21) and (19) show the equivalence between total factor income and output, $wL+rK=Y$.

In the steady state equilibrium $\dot{K} = 0$ and $V=\Pi+\Pi_Y = 0$ and the government budget constraint is balanced, hence $T = G$. Substituting these and (19') into equation (4) gives

$$Y = C + \delta K + G, \tag{22}$$

which describes the final good market equilibrium condition, or simply the national accounts identity: the right-hand-side comprises the components of the long-run aggregate demand – private consumption, replacement investment and the government expenditure – while the left-hand-side is the quantity of final output.

Two other equilibrium conditions are obtained from (8) and (17), and (9) and (18), respectively, namely

$$\left(\frac{1-\alpha}{\alpha}\right)\left(\frac{C+\theta G}{1-L}\right)=(1-\beta)\left(\frac{Y}{L}\right),\tag{23}$$

$$\beta\left(\frac{Y}{K}\right)=\rho+\delta.\tag{24}$$

Finally, aggregating (15) and making use of (21) to eliminate the parameter ϕ, we obtain the aggregate production function in the long-run,

$$Y=(A/\mu)K^{\beta}L^{1-\beta}.\tag{25}$$

Given the relation between μ and n as described in (11), we now have a system of five equations, (21)-(25), in five endogenous variables, Y, L, K, C, and n. But since a specific functional form for $\mu(n)$ is not imposed, we first solve (22)-(25) for Y, L, K, and C in terms of μ and G, and then introduce (21) and take account of the impact of n on μ. The solutions for C, L and K are[4]

$$C=\left(\frac{\lambda\gamma}{1+\lambda}\right)\mu^{-1/(1-\beta)}+\left(\frac{(1-\theta)\lambda}{1+\lambda}-1\right)G,\tag{26}$$

$$L=\frac{1}{1+\lambda}+\left(\frac{(1-\theta)G}{(1+\lambda)\gamma}\right)\mu^{1/(1-\beta)},\tag{27}$$

$$K=\left(\frac{\eta\gamma}{1+\lambda}\right)\mu^{-1/(1-\beta)}+\left(\frac{(1-\theta)\eta}{1+\lambda}\right)G,\tag{28}$$

where

$$\gamma=\frac{\alpha(1-\beta)(\rho+\delta)}{(1-\alpha)}\cdot\left(\frac{\beta^{\beta}A}{\rho+\delta}\right)^{1/(1-\beta)},\tag{29}$$

$$\lambda=\frac{(1-\alpha)(\rho+(1-\beta)\delta)}{\alpha(1-\beta)(\rho+\delta)},\tag{30}$$

$$\eta = \frac{(1-\alpha)\beta}{\alpha(1-\beta)(\rho+\delta)}. \tag{31}$$

Equations (26)-(28) are *'quasi-reduced form'* equations which can be used to show the role of endogenising the markup, μ. When μ is treated as a constant parameter, the effect of a change in G on C, L, and K is unambiguous and is identical to the existing results in the literature; a rise in public spending reduces private consumption[5] and intensifies the utilisation of both factors of production. But as we shall see below, within our framework a fiscal expansion reduces μ. This is because by raising the aggregate demand for the final good a rise in G gives rise to a profit-making opportunity in the intermediate goods sector and stimulates new entry which expands the mass of firms but reduces their market power. As a result, the effect of a fiscal expansion on private consumption and factors of production is altered once the market structure effect of a rise in G is taken into account. As it can be easily verified from equations (26)-(28), allowing μ to be negatively affected by G reduces the impact of a fiscal expansion on C and L, and intensifies the utilisation of K. The policy effectiveness results are therefore likely to differ significantly once the assumption of a fixed markup is relaxed.

Effects of Policy on Market Structure

Before solving for output and deriving the expression for the fiscal multiplier, it is helpful to pay some attention to the free-entry/zero-profit condition in (21), and use it to clarify an important point of concern. Suppose that firms' monopoly power in the intermediate sector, μ, is exogenously fixed and hence is independent of the size of the input range, or

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[4] Algebraic details underlying all the derivations throughout the paper are available from the authors on request.

[5] This will definitely follow if $0 \leq \theta < 1$, which may be imposed for comparability.

the corresponding mass of firms, *n*. In this case, $\mu'(n)=0$, and if a policy is effective in raising aggregate output it must do so by invoking new entry without affecting the firms' size. This is because, as implied by (21), when μ is constant *Y* and *n* change proportionately so as to keep *Y/n* constant. Now suppose that firms' monopoly power is inversely related to *n*. This is likely to be the case since as the range of goods is expanded the elasticity of substitution between them also increases simply because they become closer substitutes. As a result, firms are likely to face a reduction in their market (monopoly) power, hence $\mu'(n)<0$ as in (11). In such circumstances, if a fiscal expansion is effective and raises both *Y* and *n*, it follows from (21) that *Y/n* should also rise. Therefore, the new (symmetric) equilibrium will be characterised by a bigger mass of *weaker* or *more competitive* firms each supplying a larger quantity of output. This rise in supply follows from the fact that as firms' lose their market power they are forced to set lower prices which in turn implies a rise in quantity. An interesting implication of this result is that a successful fiscal intervention will also raise the degree of competition in the goods market. Or, put differently, provided that government consumption is filtered through the goods market, a relatively larger public sector will induce, rather than discourage, a higher level of competition between firms. Furthermore, given that such a policy also reduces firms' ability to mark up, it is also likely to have desirable welfare implications through raising consumer surplus[6].

Let us therefore investigate how in this model a fiscal expansion affects the market structure captured by the size of the interval *[0,n]* containing the mass of firms and their market power μ. It can be shown that in the steady-state equilibrium, *n*, μ and *G* are related to each other by the following relationship

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[6] There will be no implications for producer surplus since entry completely erodes profits.

$$\frac{\phi n}{\mu - 1} = \frac{\sigma_1}{\mu^{1/(1-\beta)}} + \sigma_2 G, \tag{32}$$

where $\sigma_1 = \gamma(\lambda + \delta\eta)/(1+\lambda) > 0$, and $\sigma_2 = (1-\theta)(\lambda + \delta\eta)/(1+\lambda) > 0$. The left-hand-side of (32) can be interpreted as the supply of Y which satisfies the zero profit condition in (21), and the right-hand-side expression is simply the demand for Y obtained by substituting in (22) for C and K from (26) and (28), respectively.

Totally differentiating (32) yields

$$\frac{dn}{dG} = \sigma_2 \left(\frac{\phi}{\mu - 1} - \mu' \left(\frac{\phi n}{(\mu - 1)^2} - \frac{\sigma_1}{(1-\beta)\mu^{1+1/(1-\beta)}} \right) \right)^{-1},$$

whose sign is determined by

$$\frac{\phi n}{(\mu - 1)^2} - \frac{\sigma_1}{(1-\beta)\mu^{1+1/(1-\beta)}},$$

which, using (32), can be expressed as folows

$$\frac{\phi n}{(\mu - 1)^2} - \frac{\sigma_1}{(1-\beta)\mu^{1+1/(1-\beta)}} = \frac{(1-\beta\mu)\sigma_1}{(1-\beta)(\mu - 1)\mu^{1+1/(1-\beta)}} + \frac{\sigma_2 G}{\mu - 1},$$

which is definitely positive if $\mu \leq 1/\beta$. Thus, given that $\mu' = d\mu / dn < 0$, it follows that $dn/dG \geq 0$ holds as long as $\mu \leq 1/\beta$ and $\theta \leq 1$ where the latter ensures $\sigma_2 \geq 0$. As a result, $d\mu / dG = \mu'(dn / dG) \leq 0$ also definitely holds if $\beta < 1/\mu$ and $\theta \leq 1$. Finally, note that $d\mu/dG = dn/dG = 0$ when $\theta = 1$.

It is useful to illustrate the relationship between n and G – and hence μ and G – by means of a simple graph depicting the two sides of equation (32). In Figure 1 below we have drawn the right-hand-side and the left-hand-side of equation (32) and labelled them as Y^D and Y^S, respectively. Both Y^S and Y^D are upward sloping since their first derivatives with respect to n are positive. Given that $Y^D \to Y_L^D = \sigma_1 \bar{\mu}^{-1/(1-\beta)} + \sigma_2 G$ and $Y^S \to 0$ as

$n \to 0$, and that $Y^D \to Y_U^D = \sigma_1 + \sigma_2 G$ and $Y^S \to \infty$ as $n \to \infty$, a unique equilibrium exists if Y^S is everywhere steeper than Y^D. The sufficient condition for this can be shown to be $\mu \leq 1/\beta$ which is the condition required for $dn/dG > 0$, and is in fact satisfied by empirically plausible values of μ and β used by other studies[7]. Because a rise in G shifts Y^D up but leaves Y^S unaffected, n, and hence $\mu(n)$, ought to change so as to restore the equality between Y^D and Y^S. This requires n to rise, and hence $\mu(n)$ to fall, until $Y^D = Y^S$ is achieved which establishes that, $dn/dG > 0$ and $d\mu/dG < 0$.

Figure 1. Effect on the Market Structure, n and μ, of a Rise in Government Expenditure, G.
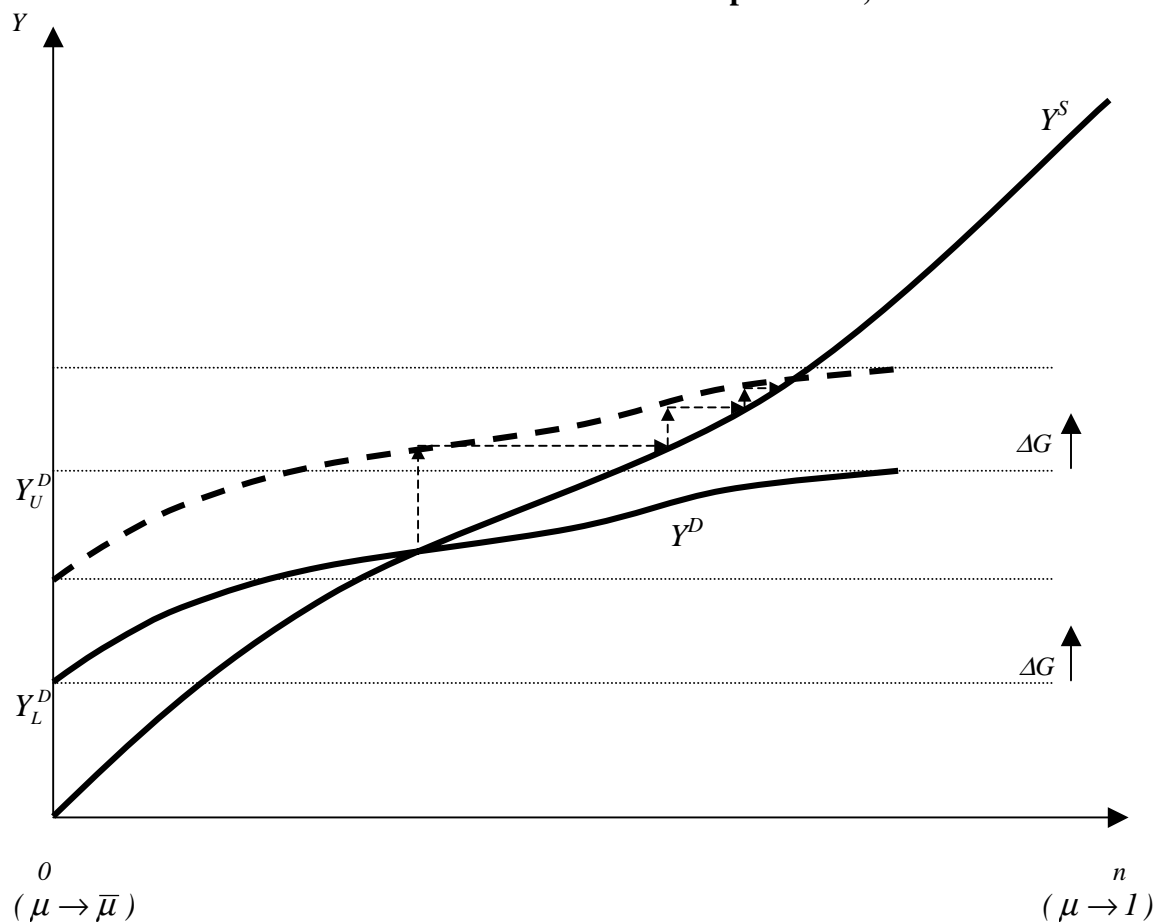
The result that a fiscal expansion leads to a larger participation in the intermediate goods sector is highly intuitive. A rise in government spending generates an opportunity of profit-making for the incumbent firms in the intermediate sector. This stimulates new entry and induces the incumbents to raise their output, as a result of which demand for factors of production, i.e. labour and capital, rises. When the markup factor is determined endogenously, entry intensifies competition and weakens firms' market power. This reduction in firms' ability to mark up their costs enhances their supply and induces further increases in factor demands, hence giving rise to a *'Keynesian type'* second round multiplier effect through generating additional factor income. It is therefore conceivable that the policy impacts in this model are stronger than those obtained in models which treat the markup factor as a fixed parameter and hence eliminate the possibility of such second round effects.

Effects of Policy on Output

The solution for *Y* can be obtained by substituting for *C* and *K* from (26) and (28) into (22),

$$Y = \left(\frac{\lambda + \delta \eta}{1 + \lambda} \right) \left(\gamma \mu^{-1/(1-\beta)} + (1-\theta)G \right), \tag{33}$$

which shows clearly why endogenising μ can make a significant difference in policy effectiveness since a rise in *G* will have a direct impact on *Y* as well as an indirect effect through reducing μ. The output multiplier can be written as

$$\frac{dY}{dG} = \overline{M} \left[1 - \overline{m} \cdot \frac{d\mu}{dG} \right] > 0, \tag{34}$$

where

$$\overline{m} = \frac{\gamma}{(1-\beta)(1-\theta)\mu^{1+1/(1-\beta)}} > 0, \tag{35}$$

$$\overline{M} = \frac{(\lambda + \delta\eta)(1-\theta)}{1+\lambda} > 0. \tag{36}$$

Equation (34) substantiates the claim made in the introduction that the output multiplier can be explicitly decomposed into two components consisting of a *'conventional'* part $\overline{M}$, and an adjustment factor given by the term in square brackets. As can be seen from (36), $\overline{M}$ does not involve any element related to the market structure and would in fact be the total multiplier if the policy did not induce any changes in firms' market power, i.e. if $d\mu/dG = 0$. In other words, either a perfectly competitive goods market or an exogenously fixed markup will cause the second term to disappear, implying $dY/dG = \overline{M}$. However, the adjustment factor modifies the multiplier for the market structure effects when a rise in G induces a change in firms' market power. It is important to stress here that the adjustment part itself also consists of two explicit factors. First, there is $d\mu/dG$ which is clearly the dominating, or the crucial, factor since the adjustment effect vanishes as $d\mu/dG \rightarrow 0$. The effect of this is however scaled by the second factor, $\overline{m}$, which depends negatively on the extent of firms' market power, μ.

It is worth highlighting the difference between the multiplier in (34) and its counterpart derived under the assumption of an exogenously fixed markup. For instance, the multiplier derived in Mankiw (1988) can be written as the following convergent sum,

$$\frac{dY}{dG} = (1-\alpha^*)\left[1 + \left((\alpha^*\mu^*) + (\alpha^*\mu^*)^2 + (\alpha^*\mu^*)^3 + \cdots\right)\right] > 0, \tag{37}$$

where α^* and μ^* are similar to α and μ above. More precisely, α^* is the taste parameter in the utility function $u = \alpha^* \ln(C) + (1-\alpha^*)\ln(1-L)$ which corresponds to (2) with $\theta = 0$ and $s = 1$, and μ^* is a measure similar to μ but is scaled such that $\mu^* \in (0,1)$ whereas

$\mu \in (1, \overline{\mu})^8$. Thus, in perfect competition (37) approaches its minimum value $(1 - \alpha^*)$ which is identical to $\overline{M}$ in (36) evaluated at $\alpha = \alpha^*$, $\theta = 0$ and $\beta = 0$ where the latter is imposed for comparability since there is no capital in Mankiw's model[9]. But while the multipliers in (34) and (37) are very similar at the lower limit – i.e. when $\mu^* \to 0$ and $\mu \to 1$; $d\mu / dG = 0$ – there are two main discrepancies between them. First, unlike Mankiw's multiplier which is a positive and monotonic function of the markup μ^*, (34) does not necessarily imply a positive relationship between the multiplier and μ. This result, which undermines the claim that the inefficiency due to the existence of market power strengthens the effectiveness of fiscal policy, has already been discussed in the literature (see Dixon and Lawler, 1996, and Torregrosa, 1998). Second, unlike (37) which has an upper limit of unity that is obtained as $\mu^* \to 1$, the multiplier in (34) can exceed unity if the magnitude of $[d\mu / dG] / \mu = (\mu' / \mu)(dn / dG)$ is sufficiently large. One important consequence of the latter point is that the balanced budget fiscal multiplier is unambiguously larger, the more responsive is the entry and competition process to an exogenous change in aggregate demand.

To further appreciate the underlying intuition for the above result, we compare it to the long-run multiplier obtained by Startz (1989). He uses a similar model of monopolistic competition and defines the markup factor μ identical to that used in this paper. But he treats μ as a constant parameter, excludes capital – hence $\beta = 0$ – and postulates a Stone-Geary utility function $u = \alpha_c \ln(C - C_o) + \alpha_g \ln(G - G_o) + (1 - \alpha_c - \alpha_g) \ln(1 - L - L_o)$, where α_g fulfils a similar role as θ. He illustrates that in the long-run when entry is allowed

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[8] Mankiw (1988) defines μ^* as *(1 – marginal cost/price)*. Hence the relationship between μ and μ^* may be approximated by $\mu^* = [\overline{\mu} / \mu][(\mu - 1) / (\overline{\mu} - 1)]$ where $\overline{\mu}$ is the upper limit of μ, as described in (11). We are grateful to the referee who attracted our attention to this point.

to erode all profits there is always a crowding out which reduces the multiplier below unity, to $dY/dG = (1-\alpha_c - \alpha_g)/(1-\alpha_g)$. To obtain the equivalent to this multiplier from our model, we let $\beta=0$ and $d\mu/dG=0$ in (34). These imply $dY/dG = \overline{M} = (1-\alpha)(1-\theta)$ which is definitely less than unity but positive. However, unlike Startz's model, the present model allows for generating the so-called *'Keynesian type second round effects'* even in the absence of a profit multiplier (on which Dixon, Mankiw and Startz rely), as described at the end of previous sub-section, which could in fact fully compensate for the crowding out and raise the long-run multiplier above unity.

IV. Welfare Effects of a Fiscal Expansion

Although the impact of a fiscal expansion on output may be positive and relatively large, it remains unclear whether or not this effect improves consumers' welfare. This is because a larger output may not necessarily imply a larger private consumption, but it is more likely to entail a higher labour supply, and the latter will reduce utility when leisure appears as an argument in the utility function and the labour market is competitive.

 To derive the welfare effect of the policy, in this section we briefly examine how the level of the representative household's lifetime utility is affected by a change in government expenditure. The long-run welfare effect of the policy therefore is measured by *du/dG*. Thus, differentiating equations (2), (26) and (27) with respect to *G* and solving them for *du/dG* we obtain

$$\frac{du}{dG} \propto \alpha(1+\lambda)\left(\theta+\frac{C}{G}\right)\left(\frac{\varepsilon_{(\mu;G)}}{1-\beta}\right)+(1-\theta)\left(\frac{\varepsilon_{(\mu;G)}}{1-\beta}-1\right), \tag{38}$$

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[9] As pointed out by an anonymous referee, since there is no capital in Mankiw's model, setting $\beta=0$ in (36) implies $\overline{M} = 1-\alpha$.

where $\varepsilon_{(\mu;G)} = -(G/\mu)(d\mu/dG) > 0$ is the elasticity of μ with respect to G. Clearly, the benchmark case characterised by $d\mu/dG = 0$ implies a welfare loss. But if $d\mu/dG < 0$, an expansionary fiscal policy can lead to a positive welfare effect when $\varepsilon_{(\mu;G)}$ becomes sufficiently large. Thus, a more elastic response of firms' market power with respect to changes in demand and a larger elasticity of output with respect to capital, β, can result in a positive welfare effect.

V. Conclusion

A fiscal expansion can stimulate aggregate demand through raising the demand facing incumbent firms as well as invoking new entry. It is therefore likely that when the goods market is imperfectly competitive the ensuing equilibrium – achieved after the economy has experienced a rise in the government expenditure – can be characterised by a different structure of market share and/or monopoly power. This paper is motivated by the useful information that could be gained from decomposing the fiscal multiplier into components that reflect distinct aspects of the policy effects. In particular, one component depicts the response of output to a fiscal expansion through the conventional channels that disregard the role of market imperfections. This is then adjusted by a second component that captures the effect of both firms' market power as well as the policy-induced change in the market structure. It is shown that such a decomposition of the output multiplier can be established within a macromodel of monopolistic competition that allows the elasticity of substitution among the product varieties to rise as the product range is extended. It is found that, when the market structure is endogenised in this way, the market structure effect can play a crucial role in policy effectiveness with regard to both output/employment and welfare effects associated with a fiscal expansion.

Finally, a comparison between the fiscal expansion effect described above and the impact of other positive exogenous shocks – e.g. a technological shock captured by a change in *A* in equation (15) – presents itself as an interesting extension of the analysis provided in this paper[10].

References

Aschauer, D.A. (1985), Fiscal policy and aggregate demand, *American Economic Review*, 75, 117-127.

Blanchard,O. and Kiyotaki, N. (1987), Monopolistic Competition and the Effects of Aggregate Demand, *American Economic Review*, 77, 647-66.

Dixon, H. (1987), A simple model of imperfect competition with Walrasian features, *Oxford Economic Papers*, 39, 134-60.

Dixon, H. and Lawler, P. (1996), Imperfect competition and the fiscal multiplier, *Scandinavian Journal of Economics*, 98, 219-231.

Dixon, H. and Rankin, N. (1995), *The new macroeconomics; imperfect competition and policy effectiveness*, Cambridge University Press, Cambridge.

Galí, J. (1995), Product diversity, endogenous markups, and development traps, *Journal of Monetary Economics*, 36, 39-63.

Graham, F. (1995), Government debt, government spending, and private-sector behaviour; comment, *American Economic Review*, 85, 1348-56.

Heijdra, B.J., Ligthart, J.E. and van der Ploeg, F (1998), Fiscal policy, distortionary taxation, and direct crowding out under monopolistic competition, *Oxford Economic Papers*, 50, 79-88.

Karras, G. (1994), Government spending and private consumption: some international evidence, *Journal of Money, Credit and Banking*, 26, 9-22.

Kuehlwein, M. (1998), Evidence on the substitutability between government purchases and consumer spending within specific spending categories, *Economics Letters*, 58, 325-329.

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[10] For instance, such a comparison would help answering interesting questions in connection with the effectiveness of a stabilisation policy which seeks to offset the impact of exogenous disturbances. We are grateful to the referee who attracted our attention to this point.

Lucas, R.E. (1988), On the mechanics of economic development, *Journal of Monetary Economics*, 22, 3-42.

Mankiw, N.G. (1988), Imperfect competition and the Keynesian Cross, *Economics Letters*, 26, 7-13.

Matsuyama, K. (1995), Complementarities and cumulative processes in models of monopolistic competition, *Journal of Economic Literature*, 33, 701-729.

Molana, H. and Moutos, T. (1989), Useful government expenditure in a simple model of imperfect competition, in Reider, U., Gessner, P., Peyerimhoff, A. and Radermacher, F.J. (eds), *Methods of Operations Research, 63*, Verlag Anton Hain, Frankfurt am Main, 174-184.

Molana, H. and Moutos, T. (1992), A note on taxation, imperfect competition and the balanced budget multiplier, *Oxford Economic Papers*, 44, 68-74.

Morrison, C.C. (1990), Market power, economic profitability and productivity growth measurement: an integrated structural approach, NBER Working Paper No. 3355, NBER.

Norrbin, S.C. (1993), The relation between price and marginal cost in U.S. industry: a contradiction, *Journal of Political Economy*, 101, 1149-66.

Roeger, W. (1995), Can imperfect competition explain the difference between primal and dual productivity measures: Estimates for U.S. manufacturing, *Journal of Political Economy*, 103, 316-30.

Rotemberg, J.J. and Woodford, M. (1994), Dynamic general equilibrium models with imperfectly competitive product markets. In T. F. Cooley, ed., *Frontiers of Business Cycle Research*, 243-93. Princeton, N.J.: Princeton University Press.

Silvestre, J. (1993), The market-power foundations of macroeconomic policy, *Journal of Economic Literature*, 31, 105-41.

Startz, R. (1989), Monopolistic competition as a foundation for Keynesian macroeconomic models, *Quarterly Journal of Economics*, 104, 737-52.

Torregrosa, R.J. (1998), On the Monotonicity of Balanced Budget Multiplier Under Imperfect Competition, *Economics Letters*, 59, 331-335.

Zhang, J. (1998), Global behaviour of a system with imperfect private-public substitutability, *Journal of Public Economics*, 67, 437-54.