

ENDOGENOUS MARKUPS AND FISCAL POLICY

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ABSTRACT

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JEL Classification: E62, L13, L16

Keywords: Endogenous markups; Entry; Multiplier; Fiscal Policy

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ENDOGENOUS MARKUPS AND FISCAL POLICY

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Abstract

This note analyses a simple imperfectly competitive general equilibrium model where the entry mechanism generates an endogenous markup. In this second-best world fiscal policy is more effective than in Walrasian or in fixed-markup monopolistic competition models, as it produces efficiency gains through entry.

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1. INTRODUCTION

The role of imperfect competition in the transmission mechanism of fiscal policy has been analysed by several authors following the seminal paper by Hart (1982). Dixon (1987) and Mankiw (1988) demonstrated the multiplier is strictly increasing in the monopoly degree, as pure profits are generated, stimulating households' income and consequently aggregate demand. Startz (1989) introduced entry in a 'long-run' model, eliminating pure profits and, as a consequence, switching the profit-multiplier mechanism off. Dixon and Lawler (1996) showed Startz's conclusions strongly depended on the class of functionals chosen, namely constant marginal shares in the utility function. Recent developments extended the basic Dixon, Mankiw and Startz (DMS) framework: e.g., Heijdra and van der Ploeg (1996), Molana and Montagna (2000), Reinhorn (1998), and Torregrosa (1998).

However, all these models share a common *Bertrandian* flavour: they use Dixit and Stiglitz (1977) monopolistic competition as the basic market structure¹. Given the CES sub-utility function assumed, each firm faces a constant-elasticity demand function, hence the markup is also constant. This assumption is not consistent with the evidence presented in Galí (1995b), Martins and Scarpetta (1999), and Rotemberg and Woodford (1995b) that support the hypothesis of counter-cyclical markups.

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¹ Dixon (1987) and Hart (1982) are exceptions where the flavour is mainly *Cournotian*, but entry is not considered.

Rotemberg and Woodford (1991, 1995) and Galí (1994a, 1994b, 1995), *inter alia*, produced dynamic general equilibrium models with endogenous markups. However, they were not especially concerned with fiscal policy effectiveness. Wu and Zhang (2000) assumed monopolistic producers are large at the economy level therefore considering the feedback effects of their own prices on aggregate price and quantity indices. However, the endogenous markup disappears for a large number of goods in the economy.

In this paper I use a *Cournotian Monopolistic Competition* framework, following d'Aspremont et al. (1997), generating an endogenous markup when entry means more firms *per* industry. Here, fiscal policy produces an aggregate demand externality as it stimulates entry, pushing the markup downwards, and introducing efficiency gains in the economy.

2. THE MODEL

I use the basic structure of the DMS framework, and Mankiw's notation wherever possible. This is a closed economy populated by a large number of identical households, consuming n (a large number of) imperfect substitutes and supplying labour, which is the only input.

2.1. The representative household

Households maximise a *Cobb-Douglas* utility function given by $U=C^\alpha.(1-L)^{1-\alpha}$, where C is a CES consumption basket, L represents labour supply for a unit time endowment, and $0<\alpha<1$. For sake of simplicity, I assume there is no love for variety in consumption, hence the sub-utility function is given by

$$C = n^{\frac{1}{1-\sigma}} \cdot \left[\sum_{j=1}^n (c_j)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \quad (1)$$

where c_j stands for households' consumption of variety $j=1,\dots,n$, and $\sigma>1$ is the elasticity of substitution². The aggregate consumption good C is chosen to be the *numéraire*, so P , the appropriate cost-of-living index, is normalised to unity³. The budget constraint is given by

$$\sum_{j=1}^n p_j \cdot c_j = w \cdot L + \Pi - T, \quad (2)$$

where w represents the wage rate, Π stands for profit income, and T is a lump-sum tax. The optimisation problem is solved in the usual two-stage procedure: (i) the demand for aggregate consumption and the labour supply are derived, maximising utility given the duality condition $\sum_{j=1}^n p_j \cdot c_j = P \cdot C$:

$$C = \alpha \cdot (w \cdot L + \Pi - T), \quad (3)$$

$$L = \alpha \cdot 1 - (1 - \alpha) \cdot \frac{\Pi - T}{w}, \quad (4)$$

(ii) demand functions for each good are derived, minimising expenditure in it

$$c_j = (p_j)^{-\sigma} \cdot \frac{C}{n}. \quad (5)$$

2.2. The government

I assume government has the same preferences for varieties as the households, its expenditure, G , is pure waste, and it is financed by the above-mentioned lump-sum tax levied on households.

2.3. Firms

The production sector is composed by n identical industries, each one producing a differentiated good. The number of industries is assumed to be large enough to rule out feedback effects from the macroeconomic level. Thus, macroeconomic variables are taken as given by firms. Each industry is composed by $m \geq 1$ identical producers. I assume firms compete over quantities with other firms in the same industry (intra-industrial *Cournot* competition), and they compete over prices with firms in other industries (inter-industrial *Bertrand* competition). This set of conjectures corresponds

² A weaker condition than $\sigma > 1$ would be sufficient to ensure the existence of a unique equilibrium in this model.

³ This price index is given by $P = \left[\frac{1}{n} \cdot \sum_{j=1}^n (p_j)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}$, where p_j stands for the price of good j .

to *Cournotian Monopolistic Competition* (CMC) and it nests *Monopolistic Competition* (MC) as a special case where $m=1$. Firms are labelled such that industry $j=1, \dots, n$ is composed by producers from $(j-1).m+1$ to $j.m$.

Production technologies are identical in all industries and they are given by $y_i + \Phi = 1.L_i$, where $y_i \geq 0$ represents the output of firm i , $\Phi \geq 0$ is a fixed cost, and L_i its labour input. The representative firm maximises its profits given by $\pi_i = p_j \cdot y_i - w.L_i$, subject to the (i) production function; (ii) the ‘objective’ market demand function given by $Y_j = (p_j)^{-\sigma} \cdot Y/n$, where Y_j represents demand for variety j , and $Y = C + G$ stands for aggregate demand; and (iii) the market-clearing condition given by $Y_j = \sum_{i=(j-1).m+1}^{j.m} y_i$. In an intra-industry symmetric equilibrium the condition equalising marginal revenue to marginal cost is given by

$$p_j \cdot \left(1 - \frac{1}{\sigma \cdot m} \right) = w, \quad (6)$$

and given an inter-industry symmetric equilibrium prices are equal for all varieties, i.e., $p_j = P = 1, \forall j = 1, \dots, n$.

2.4. Macroeconomic equilibrium

The macroeconomic model is closed when: (i) aggregate output equals aggregate demand, i.e., $\sum_{j=1}^n p_j \cdot \sum_{i=(j-1).m+1}^{j.m} y_i = P \cdot Y$; ⁴ (ii) total profit income is given by $\Pi = \sum_{i=1}^{j.m} \pi_i$; and (iii) labour supply equals labour demand, i.e., $L = \sum_{i=1}^{j.m} L_i$.

2.5. Entry

Let us assume now that firms are free to enter or leave the market in order to eliminate pure profits. Since profits depend on the level of aggregate demand (or output), there is a single value for Y that generates $\pi_i = 0$, given m and n

$$Y = (\sigma \cdot m - 1) \cdot \Phi \cdot n \cdot m. \quad (7)$$

Simultaneously, the macroeconomic equilibrium under a free-entry regime is given by the following condition

$$Y = (1 - \alpha) \cdot G + \alpha \cdot \frac{\sigma \cdot m - 1}{\sigma \cdot m}. \quad (8)$$

⁴ In a model with differentiated products, (nominal) aggregate output is given by (nominal) value added created in all industries.

Combining (7) and (8) we obtain a reduced form for the zero-profit condition, given by $h(n,m,G)=0$, where, using the implicit-function theorem, it is easy to see that $\partial h/\partial n < 0$, $\partial h/\partial m < 0$,⁵ and $\partial h/\partial G > 0$. Thus, there are not enough equations to determine all the endogenous variables in the model. This indeterminacy is depicted in Figure 1. If we depart from point A, for $G_1 > G_0$, entry can lead to a situation with more industries (point B), more firms *per* industry (point C), or a combination of both (somewhere on BC), all on the same isoprofit schedule⁶.

[INSERT FIGURE 1 HERE]

For sake of simplicity I analyse both extreme situations in alternative: in case I entry leads to more industries (n is endogenous) and the number of firms is always the same as in MC models; in case II entry leads to more firms *per* industry (m is endogenous) and the number of industries is fixed⁷.

3. THE MULTIPLIER

The free-entry multiplier, in this model, is given by

$$\frac{dY^*}{dG} = (1 - \alpha) + \alpha \cdot \frac{dw^*}{dm^*} \cdot \frac{dm^*}{dG}, \quad (9)$$

where asterisks denote equilibrium values for the variables. Given equation (6), $dw^*/dm^* = 1/[\sigma \cdot (m^*)^2] > 0$, i.e., an exogenous increase in m reduces the markup, expanding labour demand, and the real wage increases as a consequence. Furthermore, this effect decreases when more competition is introduced either at the intra-industry level (a larger value for m) or at the inter-industry level (a larger value for σ). In the Walrasian case (i.e., when $\sigma \rightarrow \infty$ and/or $m^* \rightarrow \infty$)⁸, $dw^*/dm^* = 0$.

In case I (n is endogenous), $dm^*/dG = 0$, i.e., the markup is fixed and so is the wage rate. Thus, fiscal policy stimulates output, but there is no difference between the CMC and the Walrasian multipliers, both given by $1 - \alpha$. This is the main result in Startz (1989): once the profit mechanism is switched off, government expenditure partially crowds out private consumption in the same way, despite the markup level.

⁵ Assuming $n^* > \alpha / [(m^*)^2 \cdot \Phi \cdot \sigma \cdot (2 \cdot \sigma \cdot m^* - 1)]$. This condition is verified even for small values of n^* . Imposing $G=0$ in the initial steady state, the condition is transformed into $n^* > \alpha \cdot \sigma / \Phi$, and $\Phi < 1$ in order to obtain $m^* = \sqrt{\alpha \cdot \sigma \cdot n \cdot \Phi} / (\sigma \cdot n \cdot \Phi) \geq 1$.

⁶ I will treat n and m as continuous variables, despite the fact they are integers in reality. Of course this is only a simplifying assumption and one can interpret these numbers as averages.

⁷ The implications of full endogeneity are analysed in a companion paper, Costa and Dixon (2001).

⁸ Of course $\Phi = 0$ in the Walrasian case, to rule out increasing returns.

In case II (m is endogenous), it is easy to recognise fiscal policy induces more firms *per* industry

$$\left. \frac{dm^*}{dG} \right|_{\text{Case II}} = \frac{(1-\alpha) \cdot \sigma \cdot (m^*)^2}{n^* \cdot \Phi \cdot \sigma \cdot (m^*)^2 \cdot (2 \cdot \sigma \cdot m^* - 1) - \alpha} > 0. \quad (10)$$

Here, when government expenditure stimulates aggregate demand, profits increase and more firms enter existing industries. Consequently, intra-industry competition increases, the markup decreases, and extra wage income induces another round of the multiplier. Entry generates an aggregate demand externality, as it induces efficiency gains in the economy. It is easy to notice that $\alpha \cdot dw^*/dG$, the efficiency gain, is decreasing in both σ and m . Thus, it is a decreasing function of the monopoly degree in the economy⁹. In this case, free entry does not eliminate the difference between the CMC and the Walrasian multiplier, and this difference is strictly increasing in the level of market power, as it happens in “short-run” models.

4. CONCLUSIONS

The endogenous markup hypothesis has been ignored in traditional static general equilibrium models with imperfectly competitive goods markets. Considering the possibility of entry in existing industries produces efficiency gains enhancing the effectiveness of fiscal policy.

Even when entry eliminates profits, fiscal policy is shown to be more effective under *Cournotian Monopolistic Competition* than in the Walrasian case, when the number of firms *per* industry responds to the aggregate demand stimulus. More intra-industry competition leads to a smaller markup, larger real wages, and it launches another round of the multiplier.

This possibility is consistent with the evidence on counter-cyclical markups and points towards the necessity of studying the crossed effects between fiscal and industrial policies.

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⁹ The *Lerner* index is given by $1/(\sigma \cdot m^*)$.

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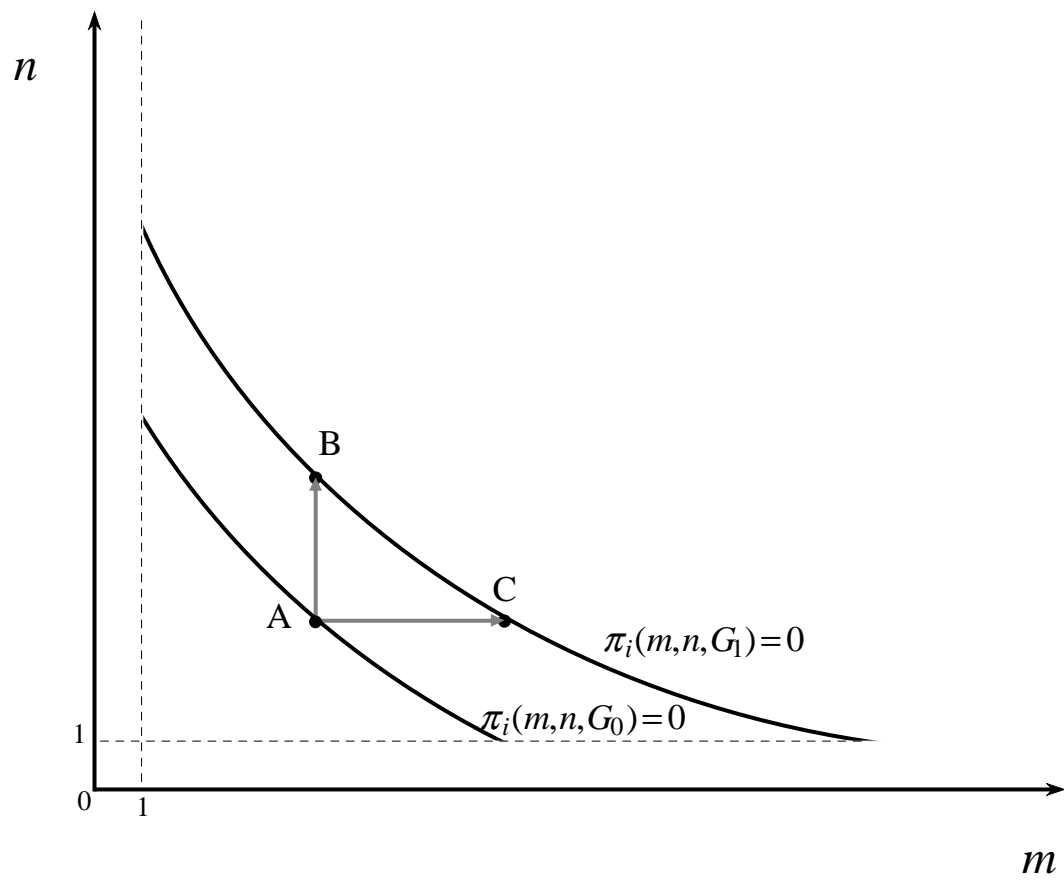


FIG. 1: THE ZERO-PROFIT CONDITION AND ENTRY