PRODUCTIVE PUBLIC EXPENDITURE AND IMPERFECT COMPETITION

WITH ENDOGENOUS PRICE MARKUP: COMMENT

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ABSTRACT

In a recent article Chen et al. (2005) analyse the role of government expenditure in an imperfectly competitive static model, introducing a government-expenditure externality through the production function. Our purpose in the present paper is to argue that the claim from the authors that their model generates an endogenous markup is in our view incorrect. We argue that their model does not contain an endogenous markup, but a fixed one and that their claim is based upon an incorrect interpretation of what is the marginal cost in their own model.

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WITH ENDOGENOUS PRICE MARKUP: COMMENT

by Luís F. Costa[*] and Nuno Palma[†]

In a recent article Chen et al. (2005) analyse the role of government expenditure in an imperfectly competitive static model, introducing a government-expenditure externality through the production function. Our purpose in the present paper is to argue that the claim from the authors that their model generates an endogenous markup is in our view incorrect. We argue that their model does not contain an endogenous markup, but a fixed one and that their claim is based upon an incorrect interpretation of what is the marginal cost in their own model.

1. Introduction

In a recent article in Oxford Economic Papers, Chen et al. (2005) analyse the role of government expenditure in an imperfectly competitive static model, following the Dixon (1987), Mankiw (1988), and Startz (1989) approach, but introducing a government-expenditure externality through the production function. The authors claim this gives rise to an endogenous "(…) 'markup,' which is used to measure the degree of monopoly" - Chen et al. (2005), p. 527. The purpose of this paper is to

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argue that their model does not contain an endogenous markup, but a fixed one, and that their claim is based upon an incorrect interpretation of what is the marginal cost in their own model.

Section 2 presents the markup definitions used in the literature and discusses the importance of a variable markup. Section 3 presents the micro-foundations of the original paper and compare their markup measure with the standard ones. Section 4 concludes.

2. Markup Definitions and Usage

When firms have the power to set prices facing downward-sloping demand curves, monopoly (market) power can be measured by the wedge between the marginal cost of production (MC) and the price paid by the buyer (p), wedge that the seller can keep to him/herself.

In order to quantify it, there are two main measures of market power in the literature:

- the Lerner index, more popular in the IO literature, that is defined as $\lambda = (p - MC)/p \in [0, 1]$;

- the price-cost wedge, used more often in the Macroeconomics literature, that is defined as $z = p/MC \in [1, +\infty]$.

Both measures are connected by the monotonic relationship $\lambda = 1 - 1/z$, and a larger value for either λ or z implies a higher degree of monopoly power.

As noticed by Barro and Tenreyro (2006):

From the standpoint of generating fluctuations in aggregate economic activity, movements in markups – reflecting shifts in the extent of competition – work similarly to the technological disturbances usually stressed in real business cycles (RBC) models.

For an excellent survey on the importance of endogenous markups in macroeconomics see Rotemberg and Woodford (1999).

However, markup fluctuations are not the only source of endogenous variability in the overall efficiency level in the economy available in the macroeconomic literature. Several types of externality also affect 'observed' total (private) factor productivity, as measured by the Solow residual, and they are not due to fluctuations in market power.

3. Micro-Foundations and Markup in Chen et al. (2005)

The original article here discussed presents a closed economy populated by n - a large number of - Dixit and Stiglitz (1977) monopolistic producers, each one using the following technology to generate a differentiated product variety:

$$(1) \qquad y_i = f\left(L_i, G\right) , \qquad\qquad i = 1, 2, \ldots, n$$

where y_i represents the output of firm i, L_i is its labour input, and G is government expenditure (on infrastructure). Here, firm i obtains its labour in a competitive labour market at a wage rate w, and G is a public good available to all firms a zero price. Furthermore, we know that $f_L > 0, f_{LL} < 0, f_G > 0, f_{GG} < 0$, and $f_{LG} \gtreqless 0$, where $f_u = \partial f / \partial u$

and $f_{uv} = \partial^2 f / (\partial u \partial v)$, with $u, v = L, G$. Thus, government expenditure works as a positive externality in production as it is a non-rival non-excludable input for firms.

Here, 'labour demand' for firm i can be written as

(2) $\qquad L_i = \phi(y_i, G)$, $\qquad\qquad\qquad\qquad\qquad\qquad i = 1, 2, \ldots, n$

where $\phi_1 \equiv \partial\phi/\partial y_i = 1/f_L > 0$ and $\phi_2 \equiv \partial\phi/\partial G = -f_G/f_L < 0$.

In the model produced by Chen et al. (2005), neither of the two measures mentioned above (λ or z) is used. In fact, the authors use a price-wage ratio - see equation (9) and the following line in page 527 of the original article:

(3) $\qquad \mu \equiv \dfrac{p_i}{w} = \dfrac{\sigma}{\sigma - 1} \cdot \phi_1(y_i, G) > 1$,

where σ is the price (p_i) elasticity of demand faced by producer i. We believe this approach is incorrect, as the wage rate does not correspond to the marginal cost of the model (in which case the measure used would be the price-cost wedge, which we believe the authors were trying to calculate).

We will now discuss why the marginal cost is not equivalent to the wage rate in this model. In a model where labour is the only private input acquired by firms, as in this case, total cost is given by $TC_i = w.L_i = w.\phi(y_i, G)$ and consequently the marginal cost is $MC_i = \partial TC_i/\partial y_i = w/f_L = w.\phi_1(y_i, G)$. Note that the marginal cost would only be equal to the wage rate if and only if the production function was $y_i = 1.L_i$ (no externality and unit average labour productivity).

Several additional issues need clarification at this point. First, there is no mathematical reason why μ (the reciprocal of the real wage in a symmetric equilibrium) should be bounded below by 1, with the general production function chosen. The value of ϕ_1 is expressed in units of labour per unit of good i, thus its

numerical value clearly depends on the choice of units which does not guarantee the expression is larger than unity.

Second, and most seriously, is the fact that using an appropriate markup measure we obtain $\lambda = 1/\sigma$ and $z = \sigma/(\sigma - 1)$ a fixed markup. Despite the fact that labour is the only private input, and that labour demand is affected by fiscal policy, the monopoly power is not affected by fiscal policy. This should be clear when we observe the demand function faced by firm i in equation (3) of the original article, and the market structure assumed (Dixit-Stiglitz monopolistic competition): the price elasticity of demand faced by each producer is fixed and there is no way the market share of each producer would vary under a symmetric equilibrium.

It is important to note, once again, that μ is nothing else than the reciprocal of the real wage. What the authors have in this paper is no more than a fluctuating real wage: the real wage depends positively on government expenditure in infrastructure, and nevertheless the markup remains fixed. What does vary with fiscal policy here is the marginal cost. However, this also happens (indirectly) in all general-equilibrium models, even in perfectly competitive ones. What is new in Chen et al. (2005) is the positive externality in production that may decrease the marginal cost instead of increasing it via equilibrium production and wages.

Finally, notice that μ still varies with G when $\sigma \to \infty$, i.e. when there is perfect competition. Obviously, it does not make any sense to have an endogenous markup under perfect competition. In fact, the results in Chen et al. (2005) have nothing to do with markup variation: they are driven by an externality that is closer to the effects of increasing returns to specialisation as in Devereux et al. (1996) or love for variety in

Heijdra and van der Ploeg (1996). For a model studying the effects of a really endogenous markup (entry in a Cournotian model) within the Dixon-Mankiw-Startz framework see Costa (2004).

4. Conclusion

In this comment it is shown that Chen et al. (2005) produced a model where the markup is fixed due to an incorrect identification of the marginal cost for their typical firm. Therefore, their claim that government expenditure in infrastructure affects the markup is incorrect and changes in labour efficiency are solely due to the direct effect of government expenditure on the production function (a positive externality).

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