

行政院國家科學委員會專題研究計畫成果報告

計畫名稱：一個含交易外部性的開放性總體模型

An Open Macroeconomic Model with Transaction Externalities : Some Fiscal Policy Analysis

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一、中文摘要：

本文建立一個不完全競爭的開放性總體模型。模型中含交易外部性。我們探討了一些重要的議題。

Abstract :

This paper develops an open macro economic model with imperfect competition, and incorporating transaction externalities. We have investigated some important issues.

二、計畫緣由與目的：

Fiscal policy effectiveness has been an important issue in both the close macro economy literature as well as the open macro economy literature. In this paper we investigate the following issues in an open economy model with transaction externalities in both the perfectly competitive framework as well as the monopolistically competitive framework : the issue of fiscal policy effectiveness in an open economy versus that in a closed economy; and the issue of fiscal policy effectiveness under different exchange rate regimes. We shall review the literature for the first issue. In traditional models without microfoundations, it has been shown that in both the close and open economies, multiplier is affected by income leakage through savings. In addition, the multiplier of policy effects in an open economy is smaller than that in a closed economy, since the open economy has an extra income leakage from domestic goods and services to foreign output in the presence of foreign trade.

Examples are Williamson (1983, p.144), Caves et al. (1990, p.387). In a recent study Chan et al. (1993) provided microfoundation and reinvestigate this issue in a monopolistic competitive framework. They found that the profit rates of the monopolistic firms and marginal propensity to leisure play important roles in determining whether the conventional belief holds true.

The second issue is an interesting issue and have been investigated by many authors. More ancient authors include Fleming (1962), Sohmen (1967), and Purvis (1979), etc. More recently, this issue has been explored by Helpman (1988) and Dixon (1994).

Recently there is an upsurge of investigations of different open macro issues using imperfectly competitive models, examples are Obstfeld and Rogoff (1995), Krugman (1995) and Agenor and Montiel (1996).

Although some open macro issues have been investigated in the setting of one imperfection, namely in the imperfectly competitive framework, (as reviewed above), the contributions of trading or transaction externalities to fiscal policies have been completely neglected.

We note that both kinds of imperfections are believed to exist in the economy, hence the analysis of the fiscal multiplier taking into account only one of them do not provide a complete picture. The purpose of this paper is to analyse the two above mentioned issues in a model characterized by both monopolistic competition and trading externalities. We investigate the contributions of (i) transaction

externalities by themselves and, (ii) interactions of firms' monopoly profits and transaction externalities, to fiscal effectiveness in the open economy.

Our model has microfoundations and agent's maximization behaviors are explicitly formulated in the model. Following the New Keynesian tradition, in our model, all prices and wages are completely flexible.

Our study involves a synthesis of (1) the literature on macro monopolistic competition models, (2) the literature on search or transaction externalities (a form of external increasing returns) and (3) the literature on open economy fiscal policy effectiveness. The literature on macro monopolistic competition models include Blanchard and Kiyotaki (1987), Cooper and John (1988), Hart (1982), Manning (1990), Pagano (1990), among others. The literature on search or transaction externalities models include Cooper and John (1988), Diamond (1982), Mankiw and Romer (1991), and Suzuki (1996) among others.

三、結果與討論

This section of the paper lays out the microeconomic underpinnings of the model. The open economy under investigation is assumed to be small in the sense that it cannot affect foreign price levels. Domestic production is completely specialized to a composite final good, part of which is consumed domestically and part of which is exported. Domestic consumers have access to both domestic goods and imported goods. Furthermore, all goods and services are assumed to be normal.

A. The consumer's problem

We assume that individuals' preferences take the form of Stone-Geary utility over goods and leisure. A consumer sells part, n , of his labor endowment, n^* . He buys a group of domestic goods c which is comprised of m types: $c_i, i = 1, \dots, m$. He buys a group of imported goods C^* which is comprised of m^* types: $c_i^*, i = 1, 2, \dots, m^*$. The individual has CES subutility over varieties of domestic and

imported goods with a common constant elasticity of substitution e ($e > 1$). Each household's problem is to choose c_i, c_i^* and n to maximize its utility.

$$\max_{c_i, c_i^*, n} u = a \ln(c - c_0) + g \ln(c^* - c_0^*) + b \ln(n^* - n - n_0)$$

$$\text{subject to} \quad \sum_{i=1}^m p_i c_i + \sum_{i=1}^{m^*} p_i^* c_i^* = wl + p\rho$$

$$\text{where} \quad c = m^{1/(1-e)} \left(\sum_{i=1}^m c_i^{(e-1)/e} \right)^{e/(e-1)}$$

$$c^* = m^{*1/(1-e)} \left(\sum_{i=1}^{m^*} c_i^{*(e-1)/e} \right)^{e/(e-1)}, \quad a + b + g = 1$$

The Stone-Geary utility function is defined for $c > c_0$, $c^* > c_0^*$, and $n < (n^* - n_0)$,

where c_0, c_0^* and n_0 are subsistence requirements. p_i, p_i^* and w denote respectively price of c_i, c_i^* and nominal wage. p and p^* denote nominal price level, as defined below. The individual's share of aggregate nominal profits is $p\pi$. Solving the above problem for the consumer, we obtain his demand function for each good,

$$c_i = \left(\frac{p_i}{p} \right)^{-e} \frac{c}{m}, \quad \text{where} \quad p = \left(\frac{1}{m} \sum_{i=1}^m p_i^{1-e} \right)^{1/(1-e)}$$

$$c_i^* = \left(\frac{p_i^*}{p^*} \right)^{-e} \frac{c^*}{m^*}, \quad \text{where} \quad p^* = \left(\frac{1}{m^*} \sum_{i=1}^{m^*} p_i^{*1-e} \right)^{1/(1-e)}$$

and the subutilities and labor supply,

$$c = \frac{\sum_{i=1}^m p_i c_i}{p} = c_0 + a \cdot \frac{v}{p}$$

$$c^* = \frac{\sum_{i=1}^{m^*} p_i^* c_i^*}{p^*} = c_0^* + g \cdot \frac{v}{p^*}$$

$$n = (n^* - n_0) - b \frac{v}{w}$$

where

$$v = wn^* + p\rho - pc_0 - p^*c_0^* - wn_0$$

and v may be called the nominal full income.

B. The firm's problem

The economy is made up of m identical imperfectly competitive firms, each firm producing a particular variety of goods. Buying and selling commodities involve transaction costs. These transaction costs

involve externalities.

We assume that transaction costs are incurred in the form of output used up. We let $\lambda(Q)$ denote per unit selling cost faced by a firm where Q is aggregate output per capita. We assume that $\lambda'(Q) < 0$, namely that the trade technology exhibits increasing returns to scale.

The sale for one of the firms is given by $y_i = a[(1-b)n_i]/(1+\lambda(Q))$. Each firm i chooses price p_i to maximize profit $\rho_i = p_i y_i - w n_i$ subject to technology and the demand for its variety $m C_i$. The first order condition is :

$$p = f w [1 + \lambda(Q) / a(1-b)] \text{ where } f = e / (e - 1).$$

C. Symmetric General Equilibrium

The demand for domestic output arises from domestic consumption on domestic goods C , and foreign imports (or our exports) in terms of domestic goods qM^* , where M^* is real foreign demand for domestic goods and is taken as given by this small open economy, and $q = p^*/p$ is terms of trade. The equilibrium condition for the domestic output market is $Y = C + qM^*$. In addition, the equilibrium condition gives rise to

$$\begin{aligned} M_0 = \frac{dQ}{dC_0} \Big|_{open} &= \frac{1-a}{1-a \left\{ \left(\frac{d}{dQ} \frac{w}{p} \right) (N^* - N_0) + \frac{dp}{dQ} - \left(\frac{d}{dQ} \frac{1}{p} \right) P^* C_0 \right\} - \left(\frac{d}{dQ} \frac{1}{p} \right) P^* M^*} \\ &= \frac{1-a}{1-a \left(\frac{d}{dQ} \frac{v}{P} \right) - \left(\frac{d}{dQ} \frac{1}{P} \right) P^* M^*} \\ M_c = \frac{dQ}{dC_0} \Big|_{closed} &= \frac{1-\hat{a}}{1-\hat{a} \left\{ \frac{-a(1-t)(N^* - N_0) \lambda'(Q)}{\lambda[1 + \lambda(Q)]^2} + \left[\frac{f-1}{f} + \frac{F \lambda'(Q)}{\lambda[1 + \lambda(Q)]^2} \right] \right\}} \\ &= \frac{1-\hat{a}}{1-\hat{a} \left(\frac{d}{dQ} \frac{v}{P} \right)} \end{aligned}$$

$$\begin{aligned} \text{Hence } \frac{dQ}{dC_0} \Big|_{open} &> \frac{dQ}{dC_0} \Big|_{closed} \text{ when } a < \hat{a} \\ \frac{dQ}{dC_0} \Big|_{open} &< \frac{dQ}{dC_0} \Big|_{closed} \text{ when } a > \hat{a} \end{aligned}$$

$$\text{We have } \frac{d}{dQ} \left(\frac{P^*}{P} \right) = \frac{-a(1-b) \lambda'(Q) P^*}{\lambda[1 + \lambda(Q)]^2 w} > 0$$

Hence when $Q \uparrow$, the terms of trade deteriorates. Note that in the first case the open-economy multiplier is greater than the closed economy multiplier. This is due to the fact that there is a negative comovement between output Q and the terms of trade deteriorates through the effects of the trade

externalities. In the absence of trade externalities, this comovement disappears and the closed and open economy multiplier are identical (note that we have assumed that $a = \hat{a}$).

Note that the larger the transaction externalities the higher is the difference between the open economy multiplier and closed economy multiplier. This difference also becomes larger when the difference between import M^* and the subsistence level of imports become larger.

In this case, the co-movement of output and monopolistic profits, namely $dQ/d\pi$, gives rise to the multiplier. There is no co-movement between output and terms of trade.

In order to investigate the question of fiscal policy effectiveness under different exchange rate regimes we modify the utility function to include nominal money balances denoted N as :

$$u = a \ln(c - c_0) + g \ln(c^* - c_0^*) + b \ln(n^* - n - n_0) + \lambda \ln(N / p)$$

We resolve the problem and obtain the following results. Note that the model now incorporates monopolistic competition and transaction externalities. We first assume that the transaction externalities do not exist but monopolistic competition exist. We are interested in the effectiveness of policies under the fixed and flexible exchange rate regimes. Our main results show that under both fixed and flexible exchange rate regimes, fiscal policies have positive effects on output and these effects are identical. Monetary policies, however, are not effective under both exchange rate regimes. These results are different from the traditional analysis which assumes perfect competition. When Transaction externalities also exist, the results have to be modified. Under fixed and flexible exchange rate regimes, fiscal policies may have positive as well as negative effects on output, all depending on the extents or degrees of transaction externalities present in the economy. In the case of restricting the degree of transaction externalities, these effects are positive, and these effects are different under different exchange rate regimes. Monetary policies may or may not

be effective under different exchange rate regimes, which are also influenced greatly by the extent of transaction externalities.

四、計畫成果自評

本文建立一個不完全競爭的開放性總體模型。模型中含交易外部性。我們探討了相關文獻中公認重要的一些問題和 issues。得到一些重要的結果。這些新的結果會做成不同的政策涵義。增進我們對經濟體和政策的了解，亦有助於合宜政策的制定。本項研究計劃所得到的結果，除具政策涵義外，在學術理論上之貢獻，亦將使本研究之成果，得以發表在國內外重要學術期刊上。

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