数理解析研究所講究録 1215 巻 2001 年 94-101

Short-Run Trade Surplus Creation of a Domestic Competition Policy

Makoto Yano*
Keio University
April 2001

1. Introduction

Many policy makers seem to have accepted as fact the proposition that a country's suppression of domestic market competition, *i.e.*, competition in the market for non-tradables such as wholesale and retail services, can result in a surplus on that country's trade account. On this basis, for example, the U.S. has long urged Japan to promote domestic competition as a means of reducing the U.S. trade deficit with Japan.[1] Several questions arise in relation to this proposition. First, can the proposition be proved in a rigorous economic framework? Even if it can be, should this concern the trading partners of countries adopting anti-competitive domestic policies? After all, trade deficits and surpluses are simply reflections of borrowing and lending between countries and should, therefore, present no problem so long as countries make decisions rationally. Besides, don't anti-competitive domestic policies harm primarily domestic consumers in countries adopting such policies? If so, why is it that a trade-surplus country like Japan faces such strong pressures from trading partners to promote domestic market competition?

Given these questions, it is important to investigate the effect of a country's suppression of domestic market competition on trade balance and welfare. This study, in particular, reports the most basic result on trade balance. That is, a small country's suppression of domestic market competition tends to shift its position on trade balance in the surplus direction in the short run. A full analysis of the model can be found in Yano (2001).

2. Model

Assume, as in the Sanyal-Jones model, there are only one non-tradable consumption good C and one tradable middle product M; the markets for C and M, respectively, may be called *domestic* and *world markets.* A country can become a net exporter of M in a particular period by running a trade surplus. In that good C is a non-tradable and produced from good M and labor, sector C may be thought of as the service sector including, among others, wholesalers and retailers. Call the period between time $t-1$ and time t period t. The market opens and

[1] See, for example, the final report of the Structural Impediments Initiative (SII) talks held between Japan and the U.S. in 1989 and 1990. Many Japanese policy makers also agree with this view, as is shown in the highly influential Maekawa Report (submitted to the Prime Minister of Japan, 1986).

clears at time $t = 0, 1, ...$ As discussed in the Introduction, this setting is fairly natural for the purpose of this study.

Assume that the behavior of a country's consumers can be described by that of a representative agent. As is well known, this agent may be identified with the present generation of the country's consumers who are altruistic towards the subsequent generations (Barro, 1974). The home country's period-wise utility function is $\mathrm{v}(c_t, \ell_t) = u(c_t) + v(\ell_t)$, where c_t and ℓ_t are the aggregate consumption demands for good C and leisure, respectively, at time t. This utility function is adopted so that a separation of the good-C price from its marginal cost may actually have a distortionary effect; in the general equilibrium setting, no distortionary effect would be created if utility function v were to depend only on c_t.

The intertemporal preference is $U = \sum_{t=1}^{\infty} \rho^{t-1}\mathrm{v}(c_t, \ell_t)$, where $0 < \rho < 1$. Denote by p_t the present value price of good C at time t and by w_t that of leisure (*i.e.*, the wage rate) at time t. The representative agent is constrained by wealth constraint $\sum_{t=1}^{\infty}(p_t c_t + w_t \ell_t) = W$; wealth W will be explicitly defined below. The representative agent maximizes $\sum_{t=1}^{\infty} \rho^{t-1}\mathrm{v}(c_t, \ell_t)$ subject to the wealth constraint. The first order conditions of this optimization are

$$\rho^{t-1}u'(c_t) = \gamma p_t \text{ and } \rho^{t-1}v'(\ell_t) = \gamma w_t, \tag{2.1}$$

where γ is the associated Lagrangean multiplier.

Let q_t be the present-value price of middle product M at time t. In order to produce output, each sector uses the middle product and labor. Middle product input must be made one period before outputs are produced. In each sector, the technology of an individual firm is described by a standard neoclassical production function that does not vary across firms. Thus, the marginal cost of an individual firm is constant and equal to $MC_{it} = a_{Yit}q_{t-1} + a_{Lit}w_t$, $i = M, C$, where (a_{Yit}, a_{Lit}) is the cost-minimizing combination of good-M and labor inputs to produce one unit of output, given w_t/q_{t-1}. The market for M is perfectly competitive. Thus, the profit maximization of an individual good-M producer implies that the output price, q_t, is equal to the marginal cost, MC_{Mt}; *i.e.*,

$$q_t = a_{YMt}q_{t-1} + a_{LMt}w_t. \tag{2.2}$$

In the market for C, the government can control the degree of competition. By the degree of competition, I mean the extent of a separation between the marginal cost of each individual producer of C from the price of C. This idea is formalized by the assumption that each individual good-C producer of period t perceives its marginal revenue as $MR_{Ct} = (1 - \mu/\varepsilon_t)p_t$, where $\varepsilon_t = -\frac{u'(c_t)}{u''(c_t)c_t}$ may be thought of as an elasticity of demand obtained from (2.1) for a constant γ. Parameter μ, $0 \leq \mu < 1$, reflects the monopolistic power that an individual good-C producer possesses; $\mu = 0$ implies that the market is perfectly competitive, while $\mu = 1$ corresponds to the limit case in which the market is purely monopolistic. The government controls μ, which I call the *degree of domestic imperfect competition.*[2] The profit maximization of an individual good-C producer implies that the marginal revenue, MR_{Ct}, is equal to the marginal cost, MC_{Ct}; *i.e.*,

$$\left(1 - \frac{\mu}{\varepsilon_t}\right) p_t = a_{YCt} q_{t-1} + a_{LCt} w_t. \tag{2.3}$$

Behind this setting, it is possible to think of an underlying process of Cournot-Nash competition among the good-C producers of each period. For this purpose, think of μ as the inverse of the number of good-C producers that the government allows to operate. Then, it is possible to demonstrate that if each producer perceives that the effect of a change in the price of good C in a particular period, p_t, on the marginal utility of wealth, γ, is negligible, its marginal revenue is equal to MR_{Ct}. It is also possible to think of $\tau = \mu/\varepsilon_t$ as the rate of distortion imposed by the standard distortionary policy such as a consumption tax. In this sense, my results are not limited to domestic competition policies but can cover broader distortionary policies that might be imposed on non-tradables markets.

Assume that the home country owns one unit of labor, which can be either consumed by the consumers as leisure or used by sectors M and C as input. Let y_t, $t = 1, 2, ...$, is the output level of good M at time t. The full employment condition in the labor market can be written down as

$$a_{LMt} y_t + a_{LCt} c_t + \ell_t = 1. \tag{2.4}$$

Let x_{t-1}, $t = 1, 2, ...$, be the home country's aggregate demand for middle product M at time $t - 1$, which breaks down into the input demand of sector M, $a_{YMt} y_t$,

[2] A government can, and do, influence the degree of competition in its domestic market, for example, by setting up artificial entry barriers into particular industries; artificially segmenting markets into multiple sections; changing the intensity with which antitrust laws are enforced; and allowing and/or directing trade associations to play cartel-like roles. Since the mid-1980s, Japan has been criticized for the use of such policy tools (Johnson, 1982, Prestowitz, 1988, and Tyson, 1993). On the U.S. side, the revision of anti-trust enforcement in the 1980s is often viewed as a reaction to the Japanese industrial policy.

and that of sector C, $a_{YCt}c_t$; *i.e.*,

$$x_{t-1} = a_{YMt}y_t + a_{YCt}c_t. \tag{2.5}$$

At $t = 0$, the home country is endowed with a fixed amount of good M and a historically determined foreign credit, $\overline{C}$. The home country's wealth at $t = 0$, W, consists of foreign credit $\overline{C}$, the sum of present values of good-M and good-C endowments, $q_0\overline{y}_0 + \sum_{t=1}^{\infty} w_t$, and the sum of present values of monopolistic profits, $\sum_{t=1}^{\infty} \frac{\mu}{\varepsilon_t} p_t c_t$. Thus, the representative consumer's wealth constraint can be written as

$$\sum_{t=1}^{\infty}(p_t c_t + w_t \ell_t) = \overline{C} + q_0\overline{y}_0 + \sum_{t=1}^{\infty} w_t + \sum_{t=1}^{\infty} \frac{\mu}{\varepsilon_t} p_t c_t \; (= W). \tag{2.6}$$

As (2.1) indicates, p_t/ρ^{t-1} may be thought of as the current-value price of good C at time t. In a similar sense, q_t/ρ^{t-1} may be thought of as the current-value price of good M at time t. Thus, the current value of the home country's trade surplus at time t is equal to $s_0 = q_0(\overline{y}_0 - x_0)/\rho^{-1}$ and

$$s_t = q_t(y_t - x_t)/\rho^{t-1} \tag{2.7}$$

for $t = 1, 2, \ldots$ With this definition, the wealth constraint (2.6) can be transformed into the intertemporal external balance equation,[3]

$$\sum_{t=0}^{\infty} \rho^{t-1} s_t = -\overline{C}. \tag{2.8}$$

Equations (2.7) and (2.8) demonstrate that a country can become a net exporter (or importer), $y_t > x_t$, by running a trade surplus, $s_t > 0$ (or deficit), so long as a country satisfies wealth constraint (2.8).

Since the absolute levels of present-value prices do not matter in the general equilibrium model, the price of one good can be fixed at an arbitrary level. As seen below, it is convenient to normalize the sequence of present-value prices by setting $q_0 \equiv \rho^{-1}$. This completes the description of the model on the home country's side.

[3]By (2.2) through (2.5), it holds that $q_t y_t + (1 - \frac{\mu}{\varepsilon_t}) p_t c_t = q_{t-1} x_{t-1} + w_t(1 - \ell_t)$. This together with wealth constraint (2.6) implies (2.8).

3. Creation of a Short-Run Trade Surplus

Lwr us analyze the effect of suppression of domestic market competition on trade balance in the small-country case. This analysis is not only of interest in and of itself but also important as a foundation for the large-country analysis, which is carried out elsewhere.

Suppose that the home country is a small country, facing a given stationary world price of tradables; *i.e.*, $\widehat{q}_{t-1} = 0$ for $t = 1, 2, \ldots$ Then, the producers face the same (quasi-stationary) prices of tradable input and output in the new equilibrium as in the initial equilibrium. Thus, the wage rate must be the same as well; *i.e.*, $\widehat{w}_t = 0$ for $t = 1, 2, \ldots$[4] Since this keeps the unit cost of production unchanged, as the consumables market becomes less competitive ($d\mu > 0$), the consumables producers charge a higher, and time-invariant, price; *i.e.*, $\widehat{p}_t = d\mu/(1-\mu)$ for $t = 1, 2, \ldots$[5]

These changes in prices affects economic activities. On the production side, since $(\widehat{w_t/q_{t-1}}) = 0$, $\widehat{a}_{ijt} = 0$. As a result, by (2.4) and (2.5), changes in output levels dy_t and dc_t satisfy

$$dx_{t-1} = a_{YM}dy_t + a_{YC}dc_t \;\text{ and }\; -d\ell_t = a_{LM}dy_t + a_{LC}dc_t. \tag{3.1}$$

One the consumption side, since $\widehat{p}_t = \widehat{w}_t = 0$, it follows from (2.1) that

$$dc_t = -c[\widehat{\gamma} + d\mu/(1-\mu)] \;\text{ and }\; d\ell_t = -(1-\ell)\eta\widehat{\gamma}, \tag{3.2}$$

where $\eta \equiv -v'/[(1-\ell)v'']$. Since, as (3.2) demonstrates, the changes in c_t and ℓ_t are time-invariant, by (3.1), those in tradable output and input are also time-invariant and can be denoted as

$$dx_{t-1} = dx^s \;\text{ and }\; dy_t = dy^s, \quad t = 1, 2, \ldots \tag{3.3}$$

[4]In order to demonstrate these facts, let $\theta_M = a_{YM}/\rho$ and $\theta_C = a_{YC}/[(1-\mu)p]$, where $p = p_1$ is the good-C price at $t = 1$ in the initial equilibrium. Recall that $q_t = \rho^{t-1}$ in the initial equilibrium. Since cost minimization implies $q_{t-1}da_{Yit} + w_t da_{Lit} = 0$, $i = M, C$, as is well known (see Jones, 1965), the following relationships follow from (2.2) and (2.3).

$$A: \quad \widehat{q}_t = \theta_M\widehat{q}_{t-1} + (1-\theta_M)\widehat{w}_t \,;$$

$$B: \quad \widehat{p}_t - \frac{d\mu}{1-\mu} = \theta_C\widehat{q}_{t-1} + (1-\theta_C)\widehat{w}_t \,.$$

Since $\widehat{q}_{t-1} = 0$ for $t = 1, 2, \ldots$, it follows from equation A that $\widehat{w}_t = 0$ for $t = 1, 2, \ldots$

[5]Since $\widehat{q}_{t-1} = \widehat{w}_t = 0$ for $t = 1, 2, \ldots$, this follows from equation B of the previous footnote.

In contrast, the change in trade surplus differs between $t = 0$ and $t = 1, 2, ...$, because initial endowment $\bar{y}_0$ is fixed. That is to say, since $q_t = \rho^{t-1}$ in the initial stationary equilibrium, (2.7) implies

$$ds_0 = -dx_0 \text{ and } ds_t = dy_t - dx_t, \quad t = 1, 2, ... \tag{3.4}$$

These facts give rise to the next theorem.

Theorem 1.

$$\frac{ds_0}{d\mu} = \frac{a_{YC}c(1-\ell)\eta\rho}{\{a_{YC}a_{LM}c + (\rho - a_{YM})[(1-\ell)\eta + a_{LC}c]\}(1-\mu)} > 0. \tag{3.5}$$

Proof: Since $q_t = \rho^{t-1}$ in the initial equilibrium, by (2.8), $ds_0/\rho = -\sum_{t=1}^{\infty} \rho^{t-1} ds_t$ By (3.3) and (3.4), this implies $dy^s = dx^s/\rho$. Thus, by (3.3), $dy_t = dx^s/\rho$ and $dx_{t-1} = dx^s$. By using these expressions together with (3.2), (3.1) can be transformed into a simultaneous system of equations for $\hat{\gamma}$ and dx^s. By solving this system, $ds_0 = -dx^s$ can be expressed as (3.5). Since $q_t = \rho^{t-1}$ in the initial equilibrium, by (2.2), it holds that $\rho - a_{YM} > 0$. Thus, the right-hand side of (3.5) is positive. **Q.E.D.**

Theorem 1 implies that a small country's suppression of domestic market competition can change its trade balance at $t = 0$ in the surplus direction, i.e., has a trade surplus creation effect in the short run. This result can be given a simple economic explanation, which will be discussed in the last section together with the results derived in the next section.

Proposition 1. *(short-run trade surplus creation) A small country's suppression of domestic market competition changes its trade balance at* $t = 0$ *in the surplus direction.*

References

[1] Barro, R., 1974: "Are Government Bonds Net Wealth?" *Journal of Political Economy* 82, 1095-1117.

[2] Bewley, T., 1982, "An Integration of equilibrium theory and turnpike theory," *Journal of Mathematical Economics* 10, 233-267.

[3] Johnson, C., 1982: *MITI and the Japanese Miracle*, Stanford University Press, Stanford.

[4] Jones, R., 1965: "The structure of simple general equilibrium models," *Journal Political Economy* 73, 557-572.

[5] Judd, K., 1985: "Marginal excess burden in a dynamic economy," *Economics Letters* 18, 213-216.

[6] *Maekawa Report*, 1986, Tokyo.

[7] Nishimura, K., and M. Yano, 1992, "Interlinkage in the Endogenous Real Business Cycles of International Economies," *Economic Theory* 3, 151-168.

[8] Nishimura, K., and M. Yano, 1995: "Non-linear dynamics and chaos in optimal growth: An example," *Econometrica* 63, 981-1001.

[9] Prestowitz, C. 1988: *Trading Places*, Basic Books, New York.

[10] Sanyal, K., and R. Jones, 1982: "The theory of trade in middle products," *American Economic Review* 72, 16-31.

[11] Tyson, L., 1993: *Who's Bashing Whom?* Institute for International Economics, Washington.

[12] U.S.-Japan Working Group on The Structural Impediments Initiative, 1990: *Joint Reports.*

[13] Yano, M., 1984: "The turnpike of dynamic general equilibrium paths and its insensitivity of initial conditions," *Journal of Mathematical Economics* 13, 235-254.

[14] Yano, M., 1993: "International transfers in dynamic economies," in *General Equilibrium, Growth and Trade, II: The Legacy of Lionel McKenzie*, R. Becker, M. Boldrin, R. Jones and W. Thomson, eds., Academic Press, New York.

[15] Yano, M., 2001, "Trade Imbalance and Domestic Market Competition Policy," *International Economic Review*, forthcoming.