RESEARCH SEMINAR IN INTERNATIONAL ECONOMICS

Gerald R. Ford School of Public Policy
The University of Michigan
Ann Arbor, Michigan 48109-1220

Discussion Paper No. 541

Can Export Taxation Counter Monopsony Power?

Alan V. Deardorff
University of Michigan

Indira Rajaraman
National Institute of Public Finance and Policy

June 2005

Recent RSIE Discussion Papers are available on the World Wide Web at:
http://www. fordschool.umich.edu/rsie/workingpapers/wp.html

June 2005

Can Export Taxation Counter Monopsony Power?

Alan V. Deardorff
University of Michigan
Ann Arbor, MI, USA

Indira Rajaraman
National Institute of Public Finance and Policy
New Delhi, India

Abstract:

This paper explores the implications for trade policy of buyer concentration in markets for primary commodity exports of developing countries. Simple partial equilibrium models of monopsony and oligopsony show that the best available policy for the exporting country may be to tax exports so as to extract some of the profits of the monopsonist, even though doing so actually worsens the distortion caused by the buyer's market power. The paper also explores the general equilibrium implications of these results for factor markets and for patterns of trade.

JEL Numbers: F12, F13, H21

Keywords: commodity exports, monopsony, oligopsony, optimal export tax

Corresponding author: alandear@umich.edu

I. Introduction

This paper explores the implications for trade policy of buyer concentration in markets for primary commodity exports of developing countries. This was the case in colonial times for countries whose trade was delegated by a foreign colonial power to a single trading company such as the British East India Company. But it has become relevant again today with the markets for primary product exports of developing countries increasingly dominated by small numbers of multinational buyers. Section II presents evidence of the trend towards small numbers of dominant buyers for two primary commodities, cocoa and coffee, as an outcome of mutually reinforcing political economy and technological forces. We use simple partial equilibrium models in section III, first for monopsony and then for oligopsony, to show that the best available policy for the exporting country may be to tax exports so as to extract some of the profits of the monopsonist, even though doing so may actually worsen the distortion caused by the buyer's market power. Section IV turns to models of general equilibrium to determine the broader implications of these results for factor markets and for patterns of trade. Section V concludes.

The argument here for use of an export tax is very much analogous to the argument for using an import tariff when confronting a foreign exporting monopoly or oligopoly. As argued by Brander and Spencer (1981), a country that imports from a monopoly seller can use a "rent-extracting tariff" to appropriate part of the monopolist's profit and make itself better of, as a country, by doing so. The argument here is exactly the same, but for what a country sells rather than for what it buys. Like the rent-extracting tariff, the argument here is also, in a sense, similar to the even older "optimal

tariff" argument of trade theory (Johnson, 1954), in which a large country can use a tariff to alter its terms of trade in its favor. Here the country is not large enough to influence world prices, but it is by definition large enough relative to its monopsonist buyer to influence the price that the buyer pays. And it is this price, not the world price, that enters its terms of trade.

II. Buyer Concentration

The trend towards buyer market power is an outcome of two forces. One was the closure in producing countries of state-controlled buying agencies, which offered guaranteed minimum prices with buying quotas. This resulted in increased risk and uncertainty for producers. The second was expanded scales of operation at the manufacturing end, which led to manufacturers of the final product spinning off their primary processing capacity. This led in turn to a few large scale primary processors capturing production at source, to meet the volume and timing requirements of the final product manufacturers (Kieffer, 2000) with simultaneous technological developments in processing enabling pooling of raw material of varying qualities and therefore larger scales of operation. The two forces mutually reinforced the trend towards a few-buyer, many-seller market. There is documented, but unsystematic, evidence across many primary commodities of "growing asymmetry in the value chain – between the fragmentation at the producing end of these chains, and the concentration at the buying and retail ends" (Kousari, 2005: 3).

The abolition of state-run marketing boards has been a standard condition attached to structural adjustment programmes of the IMF and the World Bank (WTO,

2003:4; Fitter and Kaplinsky, 2001: 78). The market for cocoa in Cote d'Ivoire, the largest producer, is judged to have returned, after a forty-five year hiatus, to the practices of the colonial period, with the dismantling in 1999 of the Caisse de Stabilisation, the cocoa marketing board, in response to persistent pressure (Losch, 2002: 213). The commodity boards were seen as non-transparently taxing farmers. But with the removal of guaranteed minimum prices, and the affordable credit that guaranteed prices enabled, this opened the door to control by international trading companies. The cocoa market is dominated by three firms today, Archer Daniels Midland (ADM), Barry-Callebaut and Cargill, with a roughly two-third combined share of global purchasing. Concentration in coffee is somewhat less marked, with the top ten firms accounting for two-thirds of global purchases of the bean (Fitter and Kaplinsky, 2001: 79), but it goes back further in time. The four-firm concentration ratio for coffee in 1963 is estimated to have been at 52 percent (McLaren, 1996:3). The International Coffee Agreement, which ended in 1989, came into existence in 1962, paradoxically through lobbying by the primary processor oligopoly. McLaren, 1996, explains the paradox as a solution to the time consistency problem between the high sunk costs and a long gestation period before the crop matures, and the inability of the oligopsony to offer a credible price commitment without the limitations of a formal agreement. The buyer concentration itself is ascribed to economies of scale in primary processing of the coffee bean, and to the justified fear by potential entrants of predatory eviction by entrenched processors (Hilke and Nelson, 1989: 222).

Although the evidence points to oligopsony rather than pure monopsony, it is likely that market segmentation leads to the producers in any single country confronting

one rather than more than one buyer. Even where there is more than one buyer active in a market, there is some evidence, for coffee, of buyer collusion on the purchase price. The objective evidence in support of this is that while the coefficient of variation in the price of coffee traded on the New York Coffee Exchange has gone up sharply since 1985, the spread of coffee purchase prices in the ten major exporting countries has fallen over the same period (Fitter and Kaplinsky, 2001: 78). Earlier evidence of output price manipulation is provided in Hilke and Nelson (1989).

III. Partial Equilibrium

The basic partial equilibrium model is shown in Figure 1. The country is small and faces a fixed world price, P^W, of its export, which it supplies with the supply curve S_X. If it were able to export to the world market directly under perfect competition, it would export the quantity X^C. However, access to the world market is obtainable only by selling to one or more foreign firms that act as intermediaries between the domestic and world markets. We first assume that there is a single such firm, thus a monopsonist, and then consider a larger but fixed number of firms, forming an oligopsony.

Monopsony

If there is a single monopsonist firm, its profit maximization problem is illustrated in the figure. The monopsonist is assumed to have market power only in buying the good from this country, not in selling it on the world market. Thus its marginal revenue from additional purchases of the good from this country is simply the world price, P^W. However its marginal cost is not the price it pays for the country's export, since it faces

the upward sloping supply curve and, if it expands its purchases, must pay a higher price not just for the marginal unit but for all infra-marginal ones as well. In the familiar manner of a monopoly seller, but reversed, it faces a marginal cost curve that is higher than the supply curve and, in the linear case shown, is simply half the distance from the vertical axis to that supply curve.[1]

The monopsonist then maximizes profit by buying the country's export at the quantity that equates this marginal cost to the world price, X^M. By doing so it pushes down the price it must pay the country below the world price, causing a loss of producer surplus for the exporting country. The form this loss will take depends on the internal market structure of the country, which we will explore further when we look at general equilibrium in the next section. Suffice it to say that it is likely to include a fall in wages for workers in the country. There is also, of course, a dead-weight loss from the market distortion caused by the monopsonist, since the loss of producer surplus is larger than the profit earned by the monopsonist.

Now consider the policy options of the exporting country. The first-best allocation of resources from the world's perspective would be for the country to produce and sell X^C. But the obvious way to achieve that would be for the country to subsidize exports, and if it did so the foreign monopsonist would add the entire subsidy to its profit which would exceed the gain to domestic producers. The country would only lose. More effective, if it could be done, would be to impose a price floor on the monopsonist, preventing it from purchasing the good from domestic suppliers anything lower than a set price, despite their willingness to sell. If that could be enforced at a price below P^W but

[1] That is, with a linear supply curve, $p = a + bX$, total cost is $C = aX + bX^2$ and marginal cost is $MC = dC/dX = a + 2bX$, the graph of which has the same intercept as the supply curve and twice the slope.

close to it, the country would gain. Unfortunately, getting that price right, and enforcing it, is likely to be prohibitively difficult.

The policy we examine instead is an export tax. Set at a level t per unit of the good, this reduces the net benefit to the monopsonist from sales on the world market to P^W–t, as shown, and causes it to *reduce* its purchases of the country's export. Therefore it moves the market further away from the optimum at X^C. However, if the tax is not too large, then the gain to the country in tax revenue, shown as the cross-hatched area between the two prices, must be smaller than the loss in producer surplus to suppliers, shown as the shaded area to the left of the supply curve. This is possible because the loss of monopsonist profit is even larger. In effect, the exporting country has taxed and thus expropriated a part of those profits.

Oligopsony

Suppose now that there are N identical buyers of the product engaged in Cournot competition in the domestic market. They are price takers as sellers on the world market, as above, where they get the price P^W minus an export tax t. Let the domestic supply function be

$$P = a + bX \tag{1}$$

so that supply to the world market at price P^W, if it were direct, competitive, and tax-free would be

$$X^C = (P^W - a)/b \tag{2}$$

Each of the N buying firms sets a quantity of the good, x, that it buys on the domestic market, paying the price that clears that market $P(x) = a + bNx$. However, in

standard Cournot fashion, in selecting x each firm takes as given the purchases of all other buyers, denoted X_{-1}. Thus it chooses x to maximize

$$\pi = \{(P^W - t) - [a + b(X_{-1} + x)]\}x \tag{3}$$

This maximization yields

$$x = (P^W - t - a - bX_{-1})/2b \tag{4}$$

From which, since $X_{-1} = (N-1)x$, we get the following quantities and price in the oligopsony equilibrium:

$$x^O = (P^W - t - a)/(N+1)b \tag{5}$$

$$X^O = Nx^O = \frac{N}{N+1}\frac{(P^W - t - a)}{b} = \frac{N}{N+1}\left(X^C - \frac{t}{b}\right) \tag{6}$$

$$P^O = a + bX^O = \frac{1}{N+1}a + \frac{N}{N+1}(P^W - t) \tag{7}$$

Relative to the competitive, untaxed equilibrium, producer surplus, S, is changed by

$$\begin{aligned}
\Delta S &= -\int_{P^O}^{P^C} S_X(P)dP = -\int_{P^O}^{P^C}[(P-a)/b]dP = -\left[P^2/2b - aP/b\right]_{P^O}^{P^C} \\
&= -(1/2b)\left[P^{C\,2} - 2aP^C - P^{O\,2} + 2aP^O\right] \\
&= -(1/2b)\left[-2a(P^C - P^O) + (P^{C\,2} - P^{O\,2})\right] \\
&= -(1/2b)\left[-2a(P^C - P^O) + (P^C - P^O)(P^C + P^O)\right] \\
&= -(P^C - P^O)[(P^C + P^O)/2 - a]/b
\end{aligned} \tag{8}$$

which is, of course, negative. Relative to the same benchmark, government revenue from the tax is

$$\Delta R = tX^O \tag{9}$$

The country's welfare, W, is changed by

$$\Delta W = \Delta S + \Delta R \tag{10}$$

Of interest is the effect on this of changing the tax, t, which affects ΔS through P^O (see the second line of (8)) and affects ΔR through t itself and X^O:

$$\frac{d\Delta W}{dt} = \frac{d\Delta S}{dt} + \frac{d\Delta R}{dt} = \left[\left((P^O - a)/b\right)\frac{dP^O}{dt}\right] + \left[X^O + t\frac{dX^O}{dt}\right] \tag{11}$$

Differentiating (7) and (8), using (7) and (2), this becomes

$$\begin{aligned}
\frac{d\Delta W}{dt} &= \left[\left((P^O - a)/b\right)\frac{d}{dt}\left(\frac{1}{N+1}a + \frac{N}{N+1}(P^W - t)\right)\right] \\
&\quad + \left[X^O + t\frac{d}{dt}\left(\frac{N}{N+1}\frac{(P^W - t - a)}{b}\right)\right] \\
&= \left[X^O\left(\frac{-N}{N+1}\right)\right] + \left[X^O - \frac{N}{N+1}\left(\frac{t}{b}\right)\right] \\
&= \frac{1}{N+1}X^O - \frac{N}{N+1}\left(\frac{t}{b}\right) \\
&= \frac{1}{N+1}\frac{N}{N+1}\left(X^C - \frac{t}{b}\right) - \frac{N}{N+1}\left(\frac{t}{b}\right) \\
&= \frac{N}{(N+1)^2}\left[X^C - (N+2)t/b\right]
\end{aligned} \tag{12}$$

From this it is clear that, if $t = 0$ then $d\Delta W/dt > 0$, so that a positive tax is necessarily beneficial for the exporting country. The optimal level of this tax is found by setting $d\Delta W/dt = 0$, from which

$$\hat{t} = \frac{bX^C}{N+2} = \frac{P^W - a}{N+2} \tag{13}$$

Thus the optimal tax goes to zero as the number of firms in the oligopsony goes to infinity.

Note that this solution also characterizes the monopsony case, for which N=1. In that case, (13) says that the optimal export tax is equal to one third of the gap between the world price and the price at which the country would just begin to supply a positive

quantity. The optimal tax is smaller for an oligopsony, equal to one fourth of this gap when there are two buyers, one fifth when there are three, and so on.

IV. General Equilibrium

The analysis above was done in partial equilibrium, but a simple general equilibrium model would behave essentially the same. Suppose that the exporting country is able to produce two goods: a numeraire import good, *Y*, and the export good *X*. Suppose also that these are produced using labor, *L*, which is mobile between the industries, plus two specific factors, which are not: capital, *K*, in industry *Y*; and a natural resource, *T*, in *X*. Then with conventional neoclassical production functions in both industries, the country's supply of good *X* will depend positively on its price relative to the numeraire, *Y*. The analysis of section III can be reinterpreted as applying to this general equilibrium model without modification.

Figure 2 illustrates, under the additional assumption that the country consumes only good *Y*, so that it can be used to measure its well-being.

Production possibilities are shown by the curve Y_0X_0. Downward sloping straight lines indicate, by their slopes (in absolute value) the several relative prices of *X* that we have discussed: the world price, P^W, at which the country would under competition produce at *C* and achieve income Y^C; the lower price P^M paid by an untaxed monopsonist, at which the country produces at *M* and earns the lower income Y^M; and the even lower price P^{TD} that prevails in the domestic economy when the monopsonist is taxed, and production takes place at *T*. Earned income then is even lower, but it is augmented by the

tariff revenue, R, yielding an income Y^T, since the monopsonist actually pays to the country (not to private sellers) the higher price P^{TM} that is inclusive of the tariff.

The main contribution that the general equilibrium model provides, then, is to suggest implications beyond the export industry, implications that are familiar from the literature on the specific-factors model.[2] For example, by depressing the domestic price of X below the world price, the monopsonist (or oligopsonist) in this specific-factors model reduces the real return to the natural resource, increases the real return to capital, and has an ambiguous effect on the real wage of labor, pushing a larger fraction of the labor force into the numeraire manufacturing sector. This might perhaps be viewed as beneficial, by promoting industry, but given the country's assumed comparative advantage in good X, it definitely suffers a static welfare loss (from Y^C to Y^M in the figure).

The optimal export tax pushes the domestic price of X even further down, and increases each of the effects just mentioned except the welfare loss. That is, the returns to the natural resource fall even more due to the tax, while the return to capital rises even more. But the revenue from the tax recaptures part of the static welfare loss. Presumably this revenue could be allocated as desired by the country's government, perhaps to compensate the owners of the natural resource.

V. Conclusion

Developing countries facing a single or few-buyer market for primary commodity exports suffer a loss of producer surplus due to a reduction of price and quantity exported relative to the free market outcome. Any countervailing power they may once have

[2] See just about any text on international trade, such as Krugman and Obstfeld (2003, ch. 3).

exercised through state-run marketing boards has gone with the abolition of those boards, a standard condition attached to structural adjustment programmes of the IMF and the World Bank. This has atomised producers, at a time when buyer concentration was increasing, with technological developments favoring larger scales of operation.

An export tax levied by the producing country is one possible corrective. This reduces the quantity exported even further, but offers a way by which the exporting country can expropriate a part of the profits of the monopsonist/oligopsonist.

The paper demonstrates in a simple model that the optimal tax is equal to one-third of the gap between the world price and price at which the country would just begin to supply a positive quantity. The optimal tax is smaller for an oligopsony, equal to one fourth of this gap when there are two buyers, one fifth when there are three, and so on.

The general equilibrium results of an export tax show reduced returns to the specific factor in the commodity export sector, but the revenue from the tax recaptures part of the static welfare loss from movement of non-specific factors away from the sector with comparative advantage.

Futures markets and/or enforceable forward contracts, as correctives to buyer opportunism, typically do not have a time horizon long enough to match the gestation period to crop maturity for perennials. Other possible alternatives to an export tax are restoration of international commodity agreements or commodity marketing boards. Until that happens, an optimal tax by the exporting country yields a share of the profits of the buying monopsony/oligopsony. For developing countries principally reliant on one or a few primary commodity exports, this could make all the difference between meeting, or failing to meet, the millennium development goals.

References:

Brander, James and Barbara Spencer, 1981. "Tariffs and the Extraction of Foreign Monopoly Rents under Potential Entry," *Canadian Journal of Economics* 14:3 (August); 371-389.

Fitter, Robert and Raphael Kaplinsky, 2001. "Who Gains from Product Rents as the Coffee Market Becomes More Differentiated?" *IDS Bulletin*, 32; 69-82.

Hilke, John C. and Philip B. Nelson, 1989. "Strategic Behaviour and Attempted Monopolisation: The Coffee (General Foods) Case", in John E. Kwoka and Lawrence J. White, *The Antitrust Revolution*, Scott Foresman.

Johnson, Harry G., 1954. "Optimum Tariffs and Retaliation," *Review of Economic Studies* 21, pp. 142 153.

Kieffer, G.-A., 2000. "Cargill Relance la Guerre du Cacao en Cote d'Ivoire." *La Tribune*, 11 November.

Kousari, Kamran, 2005. "Competition Policy and the Global Coffee and Cocoa Value Chains." (UNCTAD; mimeo).

Krugman, Paul and Maurice Obstfeld, 2003. *International Economics*, 6th edition, New York: Addison-Wesley-Longman.

Losch, Bruno 2002. "Global Restructuring and Liberalization: Côte d'Ivoire and the End of the International Cocoa Market?" *Journal of Agrarian Change*, 2:2 (April); 206-227.

McLaren, John, 1996. "Why Did Big Coffee Seek Regulation? A Study in Transaction Costs Economics." (Columbia University; mimeo).

World Trade Organization, 2003. *Non-Paper on the Need for Urgent Action in WTO to Deal With the Crisis Situation Created by the Long-term Trend Towards Decline in Prices of Primary Commodities to the Trade and Development of Developing Countries Which Are Heavily Dependent on Their Exports.* WT/COMTD/W/113, 19 May 2003, Communication from Kenya Uganda and Tanzania.

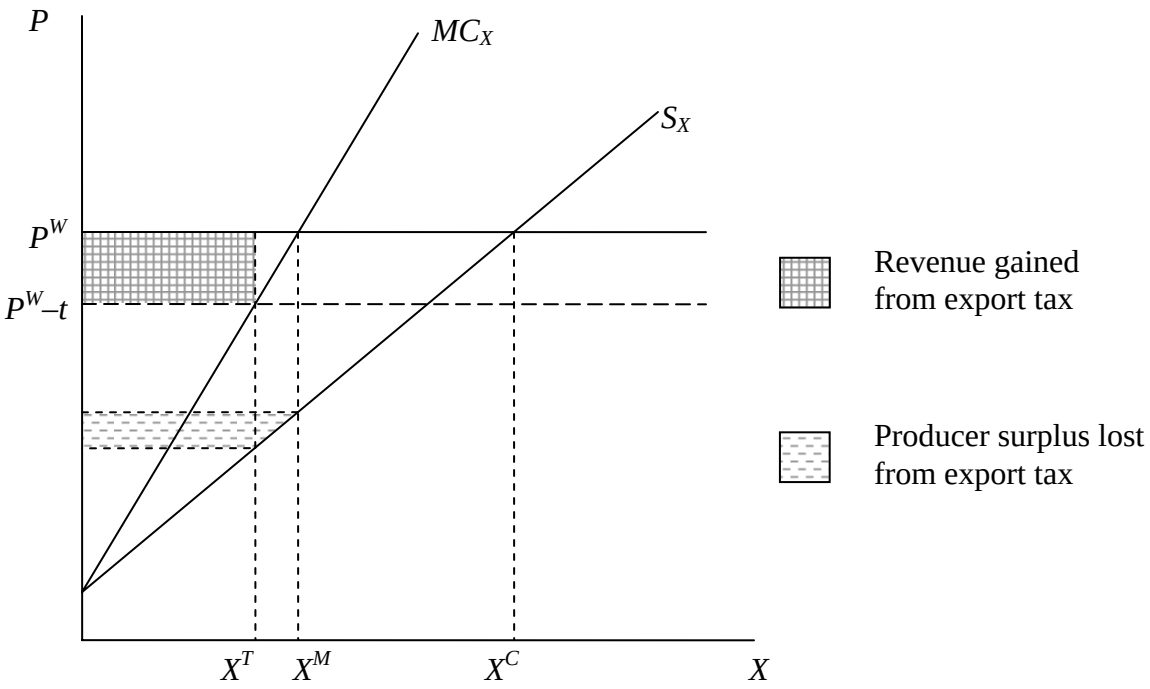

Figure 1
Exports under Competition (C), Monopsony (M), and
Monopsony with Export Tax (T)

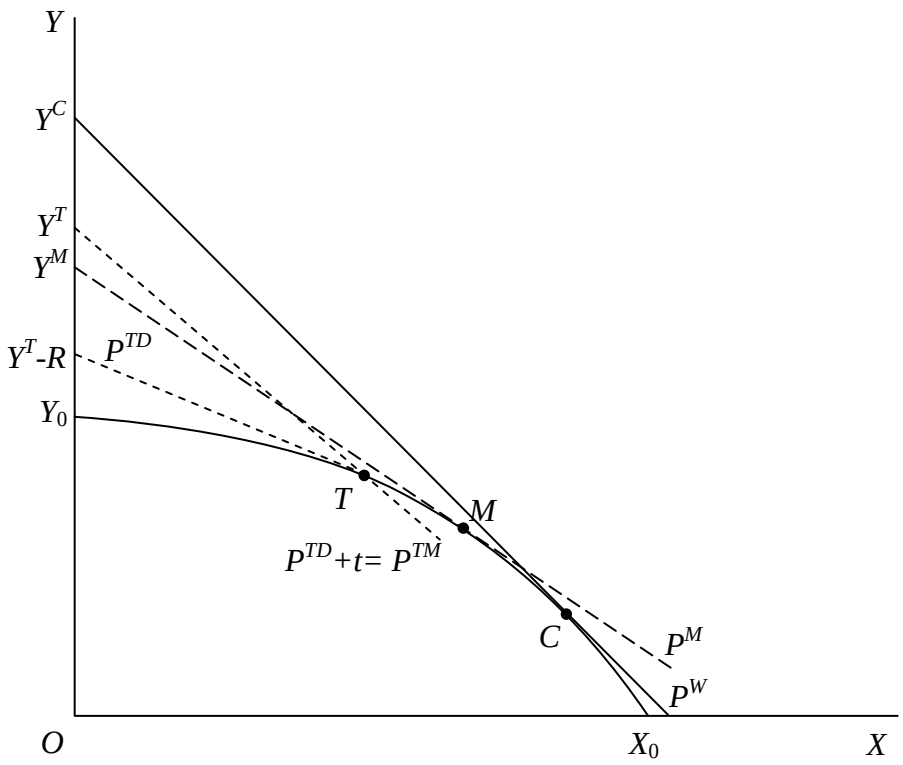

Figure 2
Exporting to, and taxing, a monopsony
in general equilibrium