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Comparative Advantage Under Monopoly: A Note On the Role of Market Power

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Comparative Advantage Under Monopoly: A Note On the Role of Market Power*

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Abstract

We argue that it is the number of agents holding market power, rather than the presence of market power itself, that may force Ricardian economies into autarchy. We apply the concepts of monopoly equilibrium by Baldwin (1948) to the model of Cordella and Gabszewicz (1997) to show that, differently from the oligopoly case, trade always arises at a monopoly equilibrium whereas autarchy is never an outcome. As a consequence, monopoly Pareto-dominates oligopoly.

Keywords: Comparative advantage, Market power, Monopoly, Oligopoly.

JEL Codes: F10, D42

1 Introduction

The Ricardian principle of comparative advantage is a cornerstone of classical trade theory. Absent any impediment to trade, countries specialize in the production of the good for which they enjoy a comparative advantage. As a consequence, competitive economies achieve productive efficiency and potential gains from trade are exploited.

Cordella and Gabszewicz (1997) - CG henceforth - pose the interesting question about "whether, and the extent to which, the use of market power by economic agents on the world market would alter the prediction of the Ricardian theory" (CG, p. 334). The answer they provide is positive: market power may drastically affect the Ricardian outcomes. Indeed, in their insightful paper, CG demonstrate that in a wide class of Ricardian economies where all of the agents are endowed with market power, autarchy is *the only* outcome to be expected. Their result is even more striking since they build up their model in such a manner to generate the highest incentives for agents to trade.

This note complements the answer provided by CG, by analyzing the extreme case in which all the market power is concentrated in one agent only, namely, a monopolist. We will apply

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the monopoly equilibrium concepts introduced by Baldwin (1948) to argue that in the class of Ricardian economies identified by CG, the monopoly equilibria always feature trade, whereas autarchy is never an outcome. As a consequence, the monopoly equilibrium Pareto-dominates the oligopoly one. On this basis, we maintain that *it is not market power by itself that may be an impediment to trade, rather it is the number of agents holding market power that may force Ricardian economies into autarchy.* Stated differently, the distribution of market power matters to determine the trade vs. autarchy outcome. In our example, when market power is concentrated in one agent, the economic outcome is more efficient than when it is evenly distributed among (few) agents.

Section 2 presents the basic example, Section 3 discusses some generalizations and concludes.

2 Model and Equilibrium

The Model

Consider two countries, with one agent in each, denote these agents M and C. There are two consumption goods, 1 and 2. Each agent is endowed with a unit quantity of labor which is the only input for the production of the goods. Technologies are linear, the production frontier for agent i is described by the locus $\left\{\frac{y^i}{a_1^i}, \frac{(1-y^i)}{a_2^i} | y^i \in [0,1]\right\}$, where a_l^i is the labor input used by agent $i \in \{M, C\}$ to produce one unit of good $l \in \{1,2\}$, and y_l^i is the quantity of labor assigned by agent i to the production that good. Like CG, we assume the following.

(1) Agent M has a comparative advantage in the production of good 1: $\frac{a_1^M}{a_2^M} < \frac{a_1^C}{a_2^C}$.

(2) Agent M has an absolute advantage in the production of good 1 and agent C in the production of good 2: $0 < a_1^M < a_1^C$ and $0 < a_2^C < a_2^M$.

(3) Each agent is only interested in the good for which he has a comparative *disadvantage*: $U^M(x_1, x_2) = x_2$, $U^C(x_1, x_2) = x_1$, where $U^i(\cdot)$ is the utility function of agent i, $i \in \{M, C\}$, and x_l, $l \in \{1,2\}$ is the quantity of good l consumed.

Assumptions (1)-(3) guarantee the greatest incentives to trade. Indeed, at the unique competitive equilibrium of this model, each agent completely specializes according to comparative advantage, and the amounts produced are fully exchanged at the relative prices $\frac{p_1^*}{p_2^*} = \frac{a_1^M}{a_2^C}$. This results in the competitive utility levels $U^M(\cdot) = \frac{1}{a_2^C}$ and $U^C(\cdot) = \frac{1}{a_1^M}$, see Figure 1(a).

By applying CG's *oligopoly equilibrium* (CG, page 339) to this example it is easy to show that the only expected outcome is autarchy. Each agent produces for self-consumption the good in which it has a comparative *disadvantage* only, and the potential gains from trade are therefore unexploited, see Figure 1(b). The intuition, in this two-agent example, is straightforward. For any quantity of good 2 offered by the C-agent, the M-agent has a strategic incentive to increase its utility by reducing the supply of good 1 and therefore increase the consumption of good 2. Symmetrically, the same holds for the C-agent.[1]

[1]This result is a special case of CG's Proposition 2, p. 343.

Monopoly equilibrium

Baldwin (1948) analyzes the trade equilibrium conditions of a two-agent economy in the cases of (i) "monopoly", (ii) "discriminating monopoly" and (iii) "pure competition". We will apply concepts $(i)-(ii)$ to this model to find its monopoly equilibria.[2] To avoid confusion with the general concept of monopoly equilibrium we will refer to Baldwin (1948) "monopoly" as "pure monopoly". The "pure monopolist" (p-monopolist, henceforth) sets prices for the two commodities and lets the competitive agent choose production and consumption according to utility maximization. The "discriminating monopolist" (d-monopolist) makes a take-it-or-leave-it exchange offer to the comparative agent, that decides whether to accept it or not to trade. In the rest of the paper, let agent M be the monopolist.

(i) Pure Monopoly

The p-monopolist proposes a price vector, say $[\bar{p}_1, \bar{p}_2] \in \mathbb{R}^2_+$, or, equivalently, relative prices $\frac{\bar{p}_1}{\bar{p}_2} \equiv \bar{p}$, and lets agent C react to these prices. Three cases may occur.

(a) For all $\bar{p} > \frac{a_1^C}{a_2^C}$, the competitive agent fully specializes in the production of good 1, and demands the same quantity of good 1 for consumption.

(b) For $\bar{p} = \frac{a_1^C}{a_2^C}$, the competitive agent is indifferent among producing any plan on its frontier, and demands a quantity $\frac{1}{a_1^C}$ of good 1.

(c) For all $\bar{p} < \frac{a_1^C}{a_2^C}$, the competitive agent fully specializes in the production of good 2 and demands a quantity $\frac{\bar{p}}{a_2^C} > \frac{1}{a_1^C}$ of good 1.

The p-monopolist sets $\bar{p}$ to obtain the highest possible quantity of good 2 in exchange for the least quantity of good 1. Thus, we can exclude all relative prices of case (c), because for all these prices agent C offers the same quantity of good 2, in exchange for a quantity of good 1 which is the larger the lower $\bar{p}$ is. Similarly, all relative prices of case (b) are not an optimal choice for the p-monopolist, since at all these prices agent C does not produce good 2. The only alternative left to the p-monopolist is to set $\bar{p} = \frac{a_1^C}{a_2^C} \equiv \bar{p}^*$, which is its optimal choice. Indeed, at $\bar{p}^*$, agent C is indifferent among all production plans on its production frontier, and demands exactly $\frac{1}{a_1^C}$ units of good 1 for consumption. Thus, the p-monopolist maximizes its utility by allocating a quantity of labor $\bar{y}^M = \frac{a_1^M}{a_1^C}$ to the production of good 1, so as to meet the demand of agent C at $\bar{p}^*$ and obtain in exchange from this agent its full production of good 2. The p-monopolist, therefore, is left with $1 - \frac{a_1^M}{a_1^C}$ units of labor to produce good 2 for self-consumption, resulting in a quantity equal to $\frac{a_1^M}{a_1^c a_2^M}$. Any other labor allocation for the p-monopolist is not optimal, since either it reduces the quantity of good 2 for self consumption, without increasing the quantity of good 1 obtained from agent C (if $y^M > \bar{y}^M$), or it cannot buy all of the good 2 produced by agent C at $\bar{p}^*$. The utility reached by the p-monopolist is $U^{M*} = \frac{1}{a_2^C} + \frac{a_1^M}{a_1^C a_2^M}$, which is larger than the autarchic one, while agent C enjoys its autarchic utility. This rules out the possibility that the p-monopolist chooses not to trade. Thus, the only pure monopoly equilibrium of this model features trade.

[2] In our case, these concepts lead to the same equilibrium outcome, but this needs not to hold in general, see Baldwin (1948).

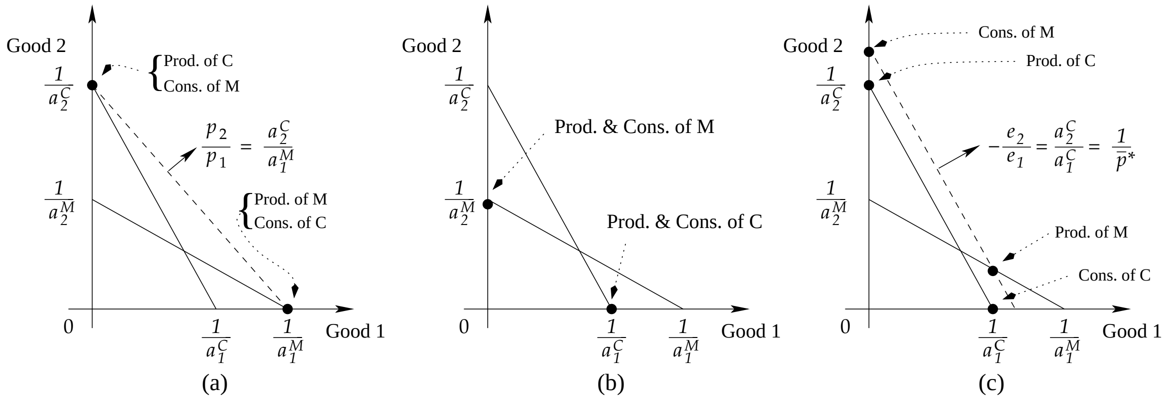

Figure 1: Competitive (a), Autarkic/Oligopoly (b) and Monopoly (c) equilibria

(ii) Discriminating Monopoly

When an agent acts as a d-monopolist it "[makes] an all-or-none offer, and the other country, [...], reacts in the best way to the given amounts and prices" (Baldwin, 1948, p. 756). Let $E = [e_1, e_2] \in \mathbb{R}^2$ be the *exchange vector* proposed by the d-monopolist to the C-agent. Its elements are the quantities the d-monopolist demands to agent C, negative values represent a quantity offered. The d-monopolist seeks to obtain the largest amount of good 2 in exchange for the least quantity of good 1 that makes agent C accept the deal. This quantity is $\frac{1}{a_1^C}$, the production for autarchic consumption by the C-agent. In fact, any lower quantity of good 1 in exchange for a positive quantity of good 2 would not make agent C willing to trade, whereas any larger quantity could be reduced and being still compatible with exchange. In return for this quantity, the d-monopolist can demand any combination of goods 1 and 2 on the production frontier of agent C. Thus, it will demand the quantity $\frac{1}{a_2^C}$ of good 2. Accordingly, the exchange vector proposed is $E^{DM} = [-\frac{1}{a_1^C}, \frac{1}{a_2^C}] \equiv E^{DM*}$, which is accepted by the C-agent, that sets $y^C = 0$. Like in the pure monopoly case, the d-monopolist is left with $1 - \frac{a_1^M}{a_1^C}$ units of labor for the production of good 2 for self consumption. The competitive agent enjoys its autarchic utility level, while the d-monopolist reaches a utility level $U^{DM*} = \frac{1}{a_2^C} + \frac{a_1^M}{a_1^C a_2^M}$. No other exchange vector (including the autarchic one $E = [0, 0]$) provides the d-monopolist with a utility level equal or larger, therefore at the only discriminating monopoly equilibrium of this model agents trade. Finally, notice that E^{DM*} implicitly defines the terms of trade in the discriminating monopoly case, which are $\frac{a_1^C}{a_2^C}$ and clearly coincide with $\bar{p}^*$.

In general, the autarchic outcome of strategic interaction follows from the failure of agents holding market power to coordinate their actions. Under monopoly, this coordination role is taken up by the monopolist, that acts as a self-interested Walrasian auctioneer. Figure 1(c) depicts monopoly equilibria.

3 Discussion and Conclusion

Both monopoly equilibrium concepts applied to our example point to the same result. When market power is concentrated in one agent only, trade always arises at equilibrium, while autarchy never does. This result can be generalized in several directions. First, imagine that the distribution of comparative advantages is the same as in this paper, but agent C (agent M) enjoys absolute advantages in the production of both goods. Agent M will still propose an exchange with relative (explicit or implicit) prices equal to the slope of the production frontier of agent C. In this case, agent M (agent C) will fully specialize according to comparative advantage, whereas agent C (agent M) will specialize only partially. Second, assume that the monopolist faces a competitive fringe of identical agents. In this case, it will still exploit its market power to govern the allocation of resources. The volume of trade will depend on the production possibilities of the monopolist relative to that of the fringe. If the monopolist enjoys an absolute production advantage *with respect to the whole fringe* it will manipulate the terms of trade to induce the competitive fringe to specialize according to comparative advantage, and buy all of its production of good 2. By contrast, if the monopolist's production possibilities do not allow for absorbing all the production of the competitive fringe, the monopolist may decide to trade with a fraction of it only, or to trade with all C-agents, but in such a way to induce an individual partial specialization. In any case, specialization according comparative advantage, either partial or total, will emerge at equilibrium.

Finally, notice that the monopoly equilibrium outcome is Pareto-efficient, since the M-agent's utility level is larger than the competitive one. Thus, to concentrate all the market power in one agent restores Pareto efficiency with respect to the situation where market power is uniformly distributed among (few) agents.

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