

## **Comment on E. Dierker and B. Grodal, “Modelling Policy Issues in a World of Imperfect Competition”**

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### *Imperfect Competition in General Equilibrium*

Preferences and beliefs are characteristics of individuals; equilibrium is a consistent profile of optimal actions; this is the case in the theory of general competitive equilibrium and, also, in non-cooperative game theory.

Firms are not optimizing agents with the required preferences and beliefs; they act on behalf of individuals — in particular, shareholders; this is also the case for other aggregate bodies, such as governments or labor unions.

The actions of firms are unambiguous when the interests of shareholders coincide; in a competitive economy with a complete system of markets they do: shareholders, who may differ in their preferences, even their beliefs, but who optimize under one, overall budget constraint, agree that the firm should maximize profit. The information necessary for the firm to implement the unanimous choice of the shareholders is available in the market; it consists of the prices of commodities and only that; no information on the characteristics of shareholders is necessary; prices aggregate the diverse preferences and beliefs of shareholders.

The fundamental role played by prices at a competitive equilibrium is not matched by an appropriate specification of the formation of prices; the specification of the model of general competitive equilibrium is agnostic on this issue.

Models of imperfect competition assign the role of setting prices to the optimizing agents in the model, who, thus, perceive their market power: competition is imperfect.

Non-cooperative market games assign price setting to individuals. The specification of markets as non-cooperative games offers the advantage of a complete description of economic activity at or out of equilibrium, which

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may be a disadvantage for the modelling of complex and partly understood situations.

Market oriented models of imperfect competition assign the role of setting prices to firms; since firms are not optimizing agents, the criterion that guides their production and pricing decisions must be derived from the preferences and beliefs of individuals. After firms,  $j$ , have made their production decisions,  $y^j$ , competitive equilibrium prices,  $p$ , are formed and individuals,  $i$ , exchange commodities and consume,  $x^i$

$$(\dots, y^j, \dots) \rightarrow p, (\dots, x^i, \dots).$$

Firms decide on their production plans; they know the production decisions of other firms and, to some extent, the dependence of equilibrium prices and allocations of consumption plans on the allocation of production plans — in particular, their production plan.

The specification of a decision criterion for firms encounters three problems:

- i) shareholders may not agree on their preferences over allocations of consumption plans;
- ii) there may be multiple equilibrium allocations of consumption plans associated with an allocation of production plans;
- iii) full knowledge of the equilibrium correspondence, which maps allocations of production plans to competitive equilibrium prices and allocations of consumption plans, is rather demanding.

In order to economize on the informational requirements of the decision criterion, one is led to consider criteria that employ the equilibrium prices of commodities, but not the equilibrium allocations of consumption plans that are associated with an allocation of production plans. The profits or market values of firms,  $py^j$ , are a natural candidate; but this leads to a conundrum: competitive equilibrium does not determine the level of prices; if  $p(\dots, y^j, \dots)$  are competitive equilibrium prices associated with the allocation of production plans  $(\dots, y^j, \dots)$ , so are  $k(\dots, y^j, \dots)$   $p(\dots, y^j, \dots)$ , for any  $k(\dots, y^j, \dots) > 0$ . For the profit criterion to be well defined, a normalization rule is necessary.

Arbitrary normalization rules may prevent the existence of equilibria; or, they may implement arbitrary allocations at equilibrium. Alternatively, the normalization rule which uses as price index the index derived from the aggregate consumption of the shareholders of a firm guarantees that no deviation by the firm would allow an increase in the aggregate consumption of its shareholders; see Dierker and Grodal (1996).

Monetary policy determines, possibly, the level of prices; it can be seen as a normalization rule. In perfectly competitive markets, the normalization rule and, hence, monetary policy, do not affect the allocation of

resources at equilibrium; when competition is imperfect and firms maximize profits, this is not the case. This raises the question of effective and optimal monetary policy under imperfect competition.

As with imperfectly competitive markets, the decision criteria of firms are not evident when the asset market is incomplete. The difficulties encountered in specifying a decision criterion for firms when the asset market is incomplete parallel the difficulties encountered with imperfect competition. In both cases, normalizations matter. A comparison is of interest and may lead to interesting conclusions on the effectiveness and optimality of monetary policy.

## **Reference**

Dierker, E. and Grodal, B.: The price normalization problem in imperfect competition and the objective of the firm. WP 9616, Department of Economics, University of Vienna, 1996.

## **Comment on E. Dierker and B. Grodal, “Modelling Policy Issues in a World of Imperfect Competition”**

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The paper by Egbert Dierker and Birgit Grodal is a challenging one. As a piece of economic theory it is a nice example of the fine “Copenhagen tradition” in mathematical economics. This tradition has always excelled in detailed and rigorous analysis; this paper makes no exception to these standards.

The twofold goal of the paper is to offer a systematic perspective and propose a resolution to an old challenge in general equilibrium theory. The issue concerns the proper objective of the firm under imperfect competition. As is well known, general equilibrium models with imperfect competition can face fundamental problems, when one moves to more general frameworks than the simple models that have been used in much of the applied and partial equilibrium literature.

In earlier work it has been found that the notion of profit maximization is not well founded for many such models. Only in special cases can it be justified. At a general level the problem concerns both existence and number of equilibria. This issue can have serious consequences, as the set of equilibria can change dramatically in conjunction with the choice of the normalization or, using standard jargon, the choice of the unit of account.

We are accustomed to thinking that the choice of measuring rod is not of great economic significance, but this paper and the related literature suggest that this is not so. Taken literally, it would say, for example, that by itself creation of the Euro could dramatically alter the economic outcome in Europe because of different prices indices and so on.<sup>1</sup> Another example is the choice of invoicing currencies in international trade deals. If the problem in the paper is a real one, then these invoicing choices could have dramatic consequences.

The paper and the associated technical literature do not stop at illustrations of the problem. This is indeed as it should be. Many of us probably

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<sup>1</sup>I am taking some liberties in this illustration, since the models in the paper are not monetary economies.

venture as a first guess that the choice of the unit of measurement does not, in itself, create major economic changes. In other words, we do not believe in the "unit of account" illusion in steady state or static settings. (Here I am leaving out the more sophisticated dynamic stories based on imperfect information, etc.)

The paper cites some instances where the choice of the numéraire has been shown to have major consequences for the equilibria in some international trade models. Luckily enough, some other models in the applied literature seem to have a consumption and ownership structure fitting the special cases, where profit maximization is justified. For example, in a trade model, consumers in a country may consume only (varieties of) products from other countries and have initially only labor. While the developers and users of these models may be relieved, the progress of applied economics is such that more general applied models will probably be developed in the future. Then the constructive results in the paper may be helpful.

The paper suggests as the resolution that shareholders' wealth maximization is a well-justified objective function for firms operating under imperfect competition. The analysis provides a precise formulation of this and considers its relationship to profit and surplus concepts arguing that e.g. the surplus maximization works as an alternative, but only under very special assumptions.

I have no comments on the technical aspects of the paper. I have two further remarks on the relationship of the resolution to other literature.

First, in the field of corporate taxation, there is a fairly sizeable literature in which, for tax reasons, the interests of the shareholders and the objective of the firm cannot be separated even under perfect competition. If I recall correctly, in this literature shareholders' wealth maximization is commonly used as the objective function for decision-making by firms. This appears to accord with the suggestion put forward by Dierker and Grodal. The potential relationship between this paper and the tax literature should perhaps be explored further in the future.

Second, the paper takes up only briefly the connection of the approach to positive models of corporate decision-making. It is shown how the median voter approach can be consistent with the approach in the paper, provided the median voter exists. There is, to my knowledge, further literature on decision-making procedures in public corporations, for example the one-share-one-vote models. Some of these lead to the median voter approach, but I believe that other models could also be contemplated. Again the relationship to that literature might be explored.

In this paper there is complete information, no uncertainty and no stock market, but generalizing the approach to incomplete markets would be of interest for future work. How much of this approach will survive when

there is uncertainty and markets are incomplete? If stock markets open, should firms maximize the wealth of those who are owners before or after stock-trading? These are usually different agents with active stock markets. What about asymmetric information? These extensions may eventually place the approach closer to some much debated topics, such as corporate governance and the market for corporate control.

To conclude, this is a fine but abstract paper. I hope that my discussion shows how this technical piece does, in fact, have some relationships to more applied areas and therefore even to policy.