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Income distribution, efficiency and rationing

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ABSTRACT

This paper studies the impacts of income distribution on the efficiency of trade mechanism and rationing of agents who are priced out of trade in a dynamic search model with two-sided asymmetric information. Buyers and sellers have asymmetric information about valuations and incomes respectively. In such a frictional environment, the effects of several variants of changes in income distribution on efficiency of trading mechanism and the population of rationed buyers and sellers are elaborated.

1. Introduction

The main objective of this paper is to address the impacts of income distribution on the efficiency of the trading mechanism and the population of rationed buyers and sellers in a decentralized market under asymmetric information in an infinite horizon.

There is a large body of work that uses decentralized matching models to analyze frictional exchange. They mainly have focused on characterizing and elaborating the efficiency properties of equilibria in decentralized matching with search frictions. For example, Mortensen (1982), and Hosios (1990) analyze efficiency properties of markets with homogeneous buyers and sellers; Shimer and Smith (2001) search efficiency properties for models with discounting and heterogenous agents. Some studies have also focused on whether the equilibria converge to an efficient, competitive market, as search frictions gets smaller. For a homogeneous good, Rubinstein and Wolinsky (1985), Gale (1987) and Mortensen and Wright (2002) explore convergence to a competitive equilibrium under complete information. Atakan (2007) and Satterthwaite and Shneyerov (2007) extend the analysis to the two-sided incomplete information case.

In a similar structure to dynamic and two-sided incomplete information models (e.g., see Wolinsky, 1990; Blouin and Serrano, 2001; Atakan, 2007; Satterthwaite and Shneyerov, 2007), we draw an attention into a different and crucial subject: the linkage between income distribution and trade mechanism.

While early growth models in the post-Keynesian tradition were strongly concerned with distributional issues (see, in particular, Kalecki, 1954; Kaldor, 1956), subsequent new classical theoretical developments removed distribution from the set of macroeconomic issues of interest. The distribution of income was viewed as a passive outcome of aggregate dynamics and market interactions, and little attention was paid to feedback effects from distribution into growth and other macroeconomic phenomena. Despite that, there have been some, if not many, studies in the literature in recent years, which search the macroeconomic repercussions of income distribution deriving from microfounded analysis. However, these studies have rather discussed the effects of income distribution on households' behavior and growth performance (e.g., see Benabou, 1996; Gottshalk and Smeeding, 1997; Aghion et al., 1999; Krueger and Perri, 2006). This paper aims at contributing to this literature by exploring the relationship between income distribution, efficiency and rationing.

There has been a rise in inequality in the distribution of income in many, although not all, countries in recent decades (see Sala-i-Martin, 2002; Atkinson, 2003; Gottschalk and Smeeding, 2000). This disturbing rise of income inequality also makes examining the linkage between income distribution and other related subjects more vital. Drawing attention to the effects of changes in the distribution of income, although in a restricted subject like trading mechanism, is also one of objectives of this paper.

We build a model to address the questions concerning the relationship between income distribution and trade mechanism in a decentralized market with two-sided incomplete information over an infinite horizon. In this market, every seller is endowed with one unit of the traded good and has a valuation about his good. This value is private information to her; to other traders it is an independent

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random variable with distribution. Similarly, every buyer seeks to purchase one unit of the good and has a certain income flow (endowment). His income is private information to her; to others it is an independent random variable. In terms of referring to the source of asymmetry, the closest study to this study, as far as we know, is Edmond and Veldkamp's study (2006), but rather in a different context.

It is assumed that an indivisible and homogeneous durable good is traded in a search market where potential heterogeneous buyers are randomly matched with potential heterogeneous sellers. The matches are anonymous, i.e., no trader knows the history of any trader with whom she happens to be matched. After two agents are paired, the seller makes a price offer. The strategy of a buyer mapping her income (endowment) into her threshold price given her incomplete information about the valuation of a seller is either a decision not to enter or accept or reject when she is matched with a seller. Similarly the strategy of a seller mapping her valuation into her critical price given her incomplete information about a buyer's income level is either a decision not to enter or to offer her price. If two matched agents agree on the terms of the transaction, they exchange the good and leave the market, then two traders of identical types replace them. This means that the distribution of buyers' income and sellers' valuations in the market remains constant. Thus we restrict attention to stationary equilibrium where the stock of traders is constant over time even though the composition of active and inactive (rationed) traders changes. However if they disagree, they stay in the market to be rematched.

The information structure adopted prevents some bilateral meetings from taking place. Hence there is the costly delay in the process of finding trading partners, which is ignored in the standard theory of perfectly competitive markets. Equilibrium exhibits frictions because all possible bilateral contacts do not take place. In such an environment, a seller's and a buyer's concern is not only the price at which a good can be sold or bought, but also the likelihood of this transaction actually taking place or the waiting period until it is effective. That costs agents since time is costly due to the fact that agents discount future utilities. The existence of such a friction leads sellers to commit to lower prices or buyers to accept higher prices than they would do otherwise. An optimal pricing strategy of both agents will thus involve the attempt to strike the right balance between conflicting objectives. And since search in the model is undirected, there is no competition among sellers in the sense that for a seller, lowering the price only improves the acceptability of her commodity and has no impact on other sellers' payoffs. A price set by a seller will not influence trade probability (the probability of successful matching) of other sellers, i.e., there is no externality in this sense.

This paper discusses two main issues in a market whose main framework is roughly described above. Firstly, we search for the relationship between income distribution and the efficiency of the decentralized market. We argue how the changes in income distribution relate to the changes in efficiency of trade, which is denoted by the probability of trade. Trade probability – or the probability of a successful match – is defined as the total expected volume of trade divided by the active population of sellers, i.e., "the effective trade volume". The trade probability hence captures both the volume of trade (numerator) and the flux dynamics of agents who enter and exit the market (denominator). Or more explicitly it shows how successful trading mechanism is at carrying out right matches.

Secondly, we discuss the relationship between income distribution and the population of rationed agents, i.e., those who are priced out of trade. Walrasian analysis that treats supply and demand in terms of "stocks" of agents in the market at time t is inappropriate for models of the type considered in this paper. Instead, we treat supply and demand in terms of "flows" into the market at time t as in Binmore and Herrero (1988). The flow of buyers and sellers into the market is a function of their reservation prices. Hence exit and entry is endogenous.

We find out some important results in this study. Some of them are as follows. First of all, any change in the mean or dispersion of income of buyers affects the efficiency of the decentralized trading mechanism. Income distribution plays a role of market imperfections, i.e., creating uncertainty effect, in addition to its classical price and demand effects. Nevertheless how efficiency is affected by income distribution depends on the relative strengths of the uncertainty effect (change in matching probability following a change in income distribution), demand effect (change in purchasing power due to a change in income distribution) and price effect (a change in prices induced by a change in income distribution).

If there is an increase in the average income of buyers following a positive shock or any change in tax or income transfer policy that benefits buyers evenly, the efficiency of trading mechanism increases as long as the positive demand effect is larger than negative uncertainty and price effects. The effect of any change in income dispersion between the poor and wealthy buyers on efficiency also depends on the magnitudes of these three factors. However, in this case, the uncertainty effect is stronger than the case in which only the mean of income of buyers changes. This mainly arises from the fact that an increase in income polarization increases a negative externality, i.e., a fall in matching probability. Therefore, it can be elucidated that more dispersed income distribution leads to less efficiency than an increase in average income of buyers.

Another important result that relates to efficiency is that improving the conditions of buyers with lower incomes may provide a better functioning of trade mechanism. This mainly stems from the fact that while the contraction of the range of buyers' income decreases information friction that a seller is faced with, it does not activate other effects, thus demand and price effects.

The paper also shows that a change in the income distribution of buyers influences the population of rationed (inactive) buyers and sellers in the market. It seems that an improvement in the welfare of all buyers leads less buyers and sellers to be rationed, i.e., more traders participate in the trade. However, while the more dispersed income distribution among buyers causes less sellers to be rationed, its impact on the population of rationed buyers depends on some conditions. Furthermore if the income of buyers with low income is raised, it is apparent that more poor buyers are pushed into playing field. However, this does not create an incentive for inactive sellers to participate in the active trade due to no rise in prices.

Rationing, especially of buyers, is also important in terms of equity. Note that buyers are priced out of the market involuntarily even though they want to remain in the market. However, sellers are rationed from trade much more voluntarily because the valuations they attribute to their goods are high enough; hence it is just not rational for such sellers to remain in the market. Hence rationing of buyers rather than that of sellers can be addressed in terms of equity. Less rationed buyers can be regarded as more equitable trade.

These results are important from two perspectives. Firstly, they are useful to understand how selective welfare and tax policies can be used to improve the trade mechanism. Secondly, they help us to understand the channels through which probable external shocks on income distribution affect trading mechanism in a frictional environment. Several studies show that income dispersion may change along with business cycles (e.g. Caballero and Hammour, 1994; Rampini, 2004; Lustig and Van Nieuwerburgh, 2005). Hence, a contribution to understanding to the link between trade mechanism and income dispersion in a realistic environment can also help policy makers for appropriate redistributive policies to minimize welfare losses during business cycles.

The rest of the paper is organized as follows: The model is presented in Section 2. In Section 3, we characterize the market equilibrium. Section 4 introduces some cases of changes in income