A Note on Disequilibrium Dynamics

INTRODUCTION:

The classical market clearing model, first expounded by Walras and later developed by Arrow, Debreu and Hahn, purports to make precise Adam Smith's "invisible hand" showing how there is "[a] remarkable degree of coherence among vast numbers of individuals and seemingly separate decisions about the buying and selling of commodities".

In these equilibrium models, which I will call Walrasian, price taking agents recieve explicit price signals which are sufficient to generate (notional) demands and supplies. A vector of prices, then, will exist at which markets will be cleared; demand equals supply. At this equilibrium point, the non-existence of demand or supply constraints implies that the value of actual transactions is equal to the value of (notional) demands and supplies expressed. On a more general level, in an economy with n goods, the n dimensional equilibrium price vector ensures (by Walras' law) that the sum of excess demands is zero.

Several assumptions of this model, however, appear to be intuitively misleading, if not entirely wrong. If we accept that all agents take prices parametrically, thus leaving no room for any rational decisions with regard to prices as there is to quantities, Arrow points out that there will be no-one left to make a decision on the price. This effectively implies that agents make no use of the quantity signals sent to the markets because they can buy or sell as much as they want at the going price. The existence of cyclical variations in inventories and the fact that some firms in a recession seem to be in as "involuntary" a situation as the workers it must lay off, is sufficient justification that quantity signals do play a crucial role in the decision making process.

Perhaps the most controversial assumption is that of full price and wage flexibility. In reality the existence of information assymetries, liquidity constraints, price and wage "floors" (downward inflexibilities) and Keynes' marginal efficiency and expectations traps, which combine to create institutional constraints in the price adjustment process, provide powerful evidence against fully flexible prices and wages in favour of market rigidities. In all models, the cost of changing the present status quo with regard to prices and wages is regarded as a sufficient barrier against instantaneous price adjustment such that, at least for some interval it is more realistic to regard those variables as fixed and concentrate instead on quantity adjustments. This appears to be the justification for the Hicksian Fix-Price method.

Disequilibrium economics, then, tries to generalise the concept of Walrasian equilibrium by dropping the assumption of axiomatic market clearing and introducing more realistic price determination mechanisms ranging from full rigidity to full flexibility. Quantity signals are introduced and adjustment to equilibrium is achieved through price and quantity movements.In any case, "perpetuating the hypothesis of clearing markets (only) preserves the principle of conservatism and respect for the classical model", and any other justification is hard to find.

Keynes was the first to introduce the concept of quantity adjustments in equilibrium. He sought to alter the state of classical microeconomics with regard to real world macroeconomics. Patinkin drew a very clear distinction between Walrasian demand and supply and its constrained counterpart by showing how a firm would react if it could not sell all of its notional output. In particular, labour demand was shown to be a function of expected sales. Clower extended this by describing the spillover effect of disequilibrium in one market to another. Barro and Grossman then combined the works of Patinkin and Clower to generate the first fix-price model with quantity adjustments. In particular they demonstrated that the level of employment and the real wage may not always be inversely related. Yet another important development came from Leijonhufvud who

introduced information constraints and coordination problems into the trading process. Finally the more recent work of Benassy, Dreze and Negishi, have made more precise the non-Walrasian models of equilibrium by introducing important microanalysis.

There is an alternative response to traditional classical economics which assumes that markets are always in equilibrium i.e. instantaneous leaps back to equilibrium after any disturbance. These "Lucas-Sargent" models are essentially tatonnement processes where disequilibrium only occurs if demanders and suppliers face the 'wrong' price (false prices). If this occurs they will instantaneously try to recontract for goods and factors by changing prices. Is it reasonable to assume instantaneous market clearing? Well, only if one of the next two possible assumptions can be made.

(1) Buyers and sellers are omniscient in their knowledge about the world and their initial price/wage offer is the required market clearing or competitive equilibrium offer. Equally the institutions through which market offers and trades are made, must be immediately and effectively responsive.

(2) We could redefine equilibrium as disequilibrium (or vice versa). In this case however, we would only be studying disequilibrium economics under a different name.

The rational response to all of this is to regard disequilibrium economics as the more realistic interpretation of the real world and to try to model this.

NON WALRASIAN MARKETS WITH QUANTITY SIGNALS:

The following is a variant on Benassy's "non-clearing model". Consider an economy with a number of demanders and suppliers. Effective demand and supply by agent i for product v are d^*_{iv} and s^*_{iv} respectively. These do not necessarily match on any market.

However, regardless of 'effective' aggregates, on any market, actual transacted demand must equal actual transacted supply.

$$d\sim_{iv} = s\sim_{iv}$$

Therefore,

$$_i\Sigma d\sim_{iv} = {}_i\Sigma s\sim_{iv} \qquad \text{for all } v \qquad (\text{"}_i\Sigma\text{" means summed over all i.})$$

Because some demands and supplies cannot be satisfied, we need to introduce some rationing process.

Define, $z^*_{iv} = d^*_{iv} - s^*_{iv}$, $\quad z\sim_{iv} = d\sim_{iv} - s\sim_{iv}$

where z^*_{iv} is effective net purchases and $z\sim_{iv}$ is actual net purchases.

But, $\quad z\sim_{iv} = f_{iv}(z^*_{iv}, \ldots\ldots\ldots, z^*_{nv}) \qquad i = 1, \ldots\ldots\ldots, n$

s.t.

$$_i\Sigma f_{iv}(z^*_{iv}, \ldots\ldots\ldots, z^*_{nv}) = 0$$

Actual net purchases by any agents are a function of effective net purchases on that market by all other agents, and the sum of actual net purchases by all agents in commodity v equal to zero.

From all of this, we can examine three fundamental properties of the disequilibruim process.

(1) Voluntary exchange: This means that no-one on any market can be forced to trade any more than he or she wants.

$$d\sim_{iv} \le d^*_{iv} \quad , \quad s\sim_{iv} \le s^*_{iv}$$

or $\quad z\sim_{iv} \cdot z^*_{iv} \ge o \quad , \quad |z\sim_{iv}| \le |z^*_{iv}|$

That is, an agent is either unrationed, $z\sim_{iv} = z^*_{iv}$, or is trading less than he wants.

(2) Non-Manipulability: A rationing scheme is non- manipulable if an agent, when rationed, cannot increase the level of his transactions by increasing his level of demand or supply. Rationing which satisfy both non- manipulability and voluntary exchange, can be expressed as;

$$d\sim_{iv} = \min(d^*_{iv}, d\dagger_{iv})$$
$$s\sim_{iv} = \min(s^*_{iv}, s\dagger_{iv})$$

where $d\dagger_{iv}$, $s\dagger_{iv}$ are the upper bounds to demand and supply i.e. the

"quantity constraints" that each agent receives.

$$d\dagger_{iv} = \phi_{iv}(z^*_{iv},.....,z^*_{nv})$$
$$s\dagger_{iv} = \phi_{iv}(z^*_{iv},.....,z^*_{nv}) \qquad i = 1,.....,n$$

The demand and supply constraints are functions of the demands and supplies expressed by the other agents on the market.The suppliers recieve quantity signals from the demanders which are used to generate the upper bound on output. Likewise the demanders recieve quantity signals from supplicrs.

(2) Market Efficiency : We should not find both rationed demanders and rationed suppliers on the same market at the same time. This is not a necessary property. It implies that if both demanders and suppliers are rationed, they would be able to organise some exchange whereby at least one of them would no longer be rationed but both would be better off ,in a Pareto sense. Only the agents on the long side of the market will not be able to realise their transactions.

The rationing scheme will only be efficient or frictionless , if the difference between effective net purchases and actual net purchases has the same sign for all agents.

$$(z^*_{iv} - z\sim_{iv})(z^*_{jv} - z\sim_{jv}) \geq 0 \qquad \text{for all } i,j \quad i \neq j$$

If we did get a case where $z^*_{iv} - z\sim_{iv} > 0$, $z^*_{jv} - z\sim_{jv} < 0$, agent j would sell some of v to agent i and both would move towards their demand preferences.

If there is aggregate excess demand for v, no agent could be supplying less than he wants to. If there is aggregate excess supply, no agent could be demanding less than he wants to.

$$_j\Sigma z^*_{iv} \geq 0 \text{ implies } z\sim_{iv} \leq z^*_{iv} \qquad \text{for all } i$$
$$_j\Sigma z^*_{jv} \leq 0 \text{ implies } z\sim_{iv} \geq z^*_{iv} \qquad \text{for all } i$$

Therefore

$$_j\Sigma z^*_{jv} = 0 \text{ implies } z\sim_{iv} = z^*_{iv} \qquad \text{for all } i$$

Combining market efficiency and voluntary exchange, we get the "short-side rule" ; agents on the short side will realise their effective demands.

$$(_j\Sigma z^*_{jv}).\, z^*_{iv} \leq 0 \text{ implies } z\sim_{iv} = z^*_{iv} \qquad \text{for all } i$$

CONCLUSION:

In this essay, I have sought to describe several properties of the dynamic disequilibrium adjustment process by assuming that prices are not always fully flexible and that, as a result, quantities must adjust to bring about equilibrium. Disequilibrium Economics then, generalises traditional Walrasian economics by 'sacking' the auctioneer and, consequently, the assumption of automatic market-clearing. The implication of all of this is that any policy tool will only be effective and efficient if the particular state of the economy is conducive to the nature of the policy tool.

Disequilibrium dynamics in imperfect markets is a far more plausible interpretation of real world macroeconomics than traditional classical "statics". High unemployment rates, excess capacity and surplus stocks demonstrate the existence of the ubiquitous 'quantity constraints' on any market.Given the practical relevance of economics, any theory which seeks to approximate more closely to the real world should have a higher chance of offering a better policy prescription if it is set in a disequilibrium framework.

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