

The Two Recent Major Developments in the Macroeconomic Theory

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The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back.

General Theory (Chapter 24)

John Maynard Keynes

I. Introduction

Today, almost a half century after the publication of the "General Theory" by Keynes, the economic profession is still far from reaching an agreement on a universally acceptable theory to deal with the problem of inflation and unemployment. During the turbulent last fifty years both the Keynesian and the Neoclassical doctrines have gone through some dramatic ebbs and flows.

Recently, there has been a Neoclassical resurgence in the form of Monetarism and the Rational Expectation Hypothesis and a Keynesian resurgence in the form of Disequilibrium Analysis.

The purpose of this study is to briefly survey the two most significant and latest development in the macroeconomic theory -- The Rational Expectation Hypothesis and the Disequilibrium Theory. The debate between

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the Keynesians and the Neoclassicists on these latest forms is an on going one, yet there has been enough work completed for us to examine those insights that have been provided by these studies.

Since limitation of space does not permit comprehensive coverage of the literature, our discussion centers around only a few basic contributions in each area of the theoretical development.

The survey starts with a discussion of the Rational Expectations Hypothesis (Section II) which is followed by a discussion of the Disequilibrium Analysis (Section III). A summary and some conclusions are given in Section IV.

II. The Rational Expectations Hypothesis (REH)¹⁾

A. A Brief History:

In order to fully appreciate the historical significance of the Rational Expectations Hypothesis (REH), it is necessary to discuss, briefly, Monetarism which posed a serious challenge to the Keynesians prior to the emergence of REH. Monetarism which was founded almost singlehandedly by Milton Friedman (1968, 1969, 1970)²⁾ was in a sense a modern day revival of the Neoclassical doctrine. Monetarists emphasize the superiority of the money supply over fiscal stimulus as an effective tool for government policy. Keynesians, by contrast, argue that both changes in government expenditure and money are effective and that in some special situation (i. e., liquidity trap), fiscal policy is more effective. Monetarists contend that monetary policy has a short-run effect on real output, but that in long run equilibrium where the expected rate of inflation equals the actual rate of inflation, monetary policy can no longer affect real economic variables. In the long run the impact of a change in the money supply will be completely absorbed into increases in the price level.

On the other hand, the Monetarists' contention regarding the impotence

1) For other surveys of the literature on Rational Expectations Hypothesis, see Sijben (1980), Gordon (1976), Kantor (1979) and Santomero and Seater (1970).

2) Certainly, we cannot disparage the contribution of E. Phelps (1967).

of fiscal policy stems from the supposition that government expenditures through fiscal policy will "crowd out" private investment activities. That is, expenditure by the public sector will merely divert resources from the private sector bringing about no net stimulus to the aggregate economy. This "crowd out" hypothesis bestows an advantage to monetary policy. Nonetheless, monetarist goes one step further by contending, in the long run, even money is neutral.

Until the work of Friedman, the Phillips curve was considered as a generally applicable framework to deal with the division of nominal income between the price level and real output. Friedman was the first to state that there is no permanent trade-off between inflation and unemployment. Friedman pointed out that deviation in the actual rate of unemployment from the natural rate occurs as long as the expected price level lags behind the actual level. This is because nominal income is evaluated in terms of current actual prices by the employer and in terms of expected prices by the workers. In equilibrium, however, the expected price (by the workers) will catch up with the actual at which point the actual rate of unemployment will be once again equal to the natural rate of unemployment.

It is not difficult to see the significance of its policy implication. The Natural Rate Hypothesis (NRH) has completely shattered the existing framework of optimum stabilization policy. The policy makers are no longer permitted the choice of an optimum point on a stable Phillips curve because the Phillips curve is no longer relevant.

What NRH really means is that monetary growth could not cause a deviation in actual unemployment from the natural rate without a continuously accelerating inflation or deflation. Nonetheless, the NRH allows the monetary authority to bring about temporary deviations of the actual unemployment rate from the natural rate if it can accomplish a temporary deviation of the actual rate of inflation from the expected rate of inflation.

However before long, NRH was upstaged by another theory which puts forth even a stronger proposition that if expectations are rational, then even in the short run, stabilization policy will be ineffective.

B. The Rational Expectations Hypothesis (REH)

REH owes its birth to John F. Muth [1960, 1961]. However, applications of his idea did not start until the publication of a highly influential series of papers by Lucas (1972, 1973, 1975) Sargent (1973, 1976) and Sargent and Wallace (1975, 1976), with later extensions by Barro (1976).³⁾

Muth's seminal paper was a revolution in the theory of construction of expectations regarding economic variables by extrapolating past observed values. The earlier established tradition built up expectations simply by extrapolating only past observed values of the economic variable concerned. Thus it was possible for economic agents to be consistently wrong -- a possibility ruled out by the Rational Expectation Hypothesis. The latter contends that economic agents take into consideration, all the relevant available information that can influence the variable that is being forecast.

(a) Key Assumptions

The Rational Expectation Hypothesis is characterized by the following features:

(i) By "rational" it is meant that economic agents make use of all the relevant information about the factors that may affect the variable being predicted. The rationality is considered as a precondition for the optimal prediction of the variable concerned.

(ii) While economic agents are not aware of the actual value of the variables being predicted, they act as if they are aware of its means and variances, hence the objective distribution of the economic variables. This implies that agents build up the precise mathematical expected rate of inflation conditioned upon all information available to them in a specific market.

(iii) Rational economic agents must have expectations that are unbiased estimator of the actual economic process being anticipated. The expected value can only differ from the corresponding outcomes of the model by the size of the forecasting errors which are themselves independent of the variables generating the prediction including past errors. Forecasting errors

3) For empirical studies on the REH, see Barro (1977), Froyen and Waud (1980) Hanson (1980) Fernandez (1977) and Cukierman and Wachtel (1979).

in one period lead to a reformulation of expectations for the [next period so that the subjective predictions will not diverge systematically from those of the true values of the relevant variables. Thus the errors in expectations must be random with mean zero.

(iv) The expectations are not only extrapolated from the past, but they also incorporate the rules of economic policy used in decision-making by the governmental authorities. In this framework the policy actions or the reactions of the decision-making authorities are treated as endogenous to the model.

(v) It is also postulated that perfect competition prevails in all markets. This implies that wage and price adjustment lead to the immediate elimination of market disequilibria through the Walrasian tatonnement process. In this situation the actual value will coincide with the expected value thereby maintaining a continuous equilibrium.

(vi) In addition, the usual Neoclassical assumption of an absence of the money illusion and the costlessness of collecting and interpreting information are also assumed.

In an important sense, the advent of Rational Expectations Hypothesis was inevitable in view of the inherent shortcoming of the adaptive-expectational hypothesis (that preceded REH) which when used resulted in consistent underestimation or overestimation of the actual rate of inflation.

(b) Adaptive Expectations Hypothesis (as a predecessor of REH)

Under the adaptive expectation analysis (or, error-learning hypothesis) economic agents operating in an uncertain economic situation, base their inflationary expectations on a weighted sum of the actual rate of inflation in the past. The adjustment process whereby the expected rate of inflation is extrapolated exclusively from the past information, can be expressed as,

$$\pi_t^* - \pi_{t-1}^* = \lambda (\pi_{t-1} - \pi_{t-1}^*) \quad 0 < \lambda < 1 \quad (1)$$

where π^* is expected rate of inflation while π denotes actual rate.

From (1) we obtain

$$\pi_t^* = \lambda \pi_{t-1} + (1 - \lambda) \pi_{t-1}^* \quad (2)$$

By substituting π_{t-1}^* in (2) we get a geometric progression which indicates

that the expected rate of inflation is a weighted sum of all past inflation.

$$\pi_t^* = \lambda \sum_{i=1}^{\infty} (1-\lambda)^{i-1} \pi_{t-i}, \quad 0 < \lambda < 1 \quad (3)$$

where weights $\lambda, \lambda(1-\lambda), \lambda(1-\lambda)^2$ sum to one.

If the weights decrease rapidly ($\lambda \rightarrow 1$), it means that economic agents have a "short memory", so the latest rate of inflation dominates in the formulation of expectations. On the other hand if $\lambda \rightarrow 0$, the rates of past inflation dominate the current expectation of inflation.

The basic problem with this adaptive expectation scheme which depends exclusively on the past is that first, it may lead to irrational forecasting behavior and secondly it may result in systematically inaccurate (over or under) estimation.

In contrast to the adaptive expectations hypothesis if the expectation of inflation is "rational" we have drastically different results and policy implications.

(c) The REH Model

Let us begin with the Friedman-Phelps version of Phillips curve.

$$P_t = P_t^e - \beta(U_t - U_t^*) + \beta\gamma_t^s \quad (4)$$

which implies

$$U_t = U_t^* - 1/\beta(P_t - P_t^e) + \gamma_t^s \quad (5)$$

That is, the unemployment rate depends on, among others, a random term γ_t^s with $E(\gamma_t^s) = 0$ which represents unanticipated change in productivity and hours of work.

If the expectation is "rational" in the sense of Muth (1961), then

$$P_t^e = E(P_t / I_{t-1}) \quad (6)$$

where E is the expectation operator and P_t^e is an unbiased predictor of actual inflation P_t given all the information available one period ago, say I_{t-1} .

$$P_t - P_t^e = P_t - E(P_t / I_{t-1}) = \varepsilon_t \quad (7)$$

where the current prediction error ε_t is uncorrelated with past errors and other known information.

If, the rate of inflation is related to the rate of growth of money (m_t),

$$P_t = m_t + \gamma_t^d \quad (8)$$

where r_t^d is a random variable representing demand shift variable, then the rationally expected rate of inflation would be

$$P_t^e = m_t^e \quad (9)$$

Suppose that an anticyclical monetary growth rate policy follows a simple proportional feedback control rule, then,

$$m_t = \lambda_0 + \lambda_1 (U_{t-1} - U_{t-1}^n) + r_t^m \quad (10)$$

where λ_0 denotes a constant money growth rate. Equation (10) means that the growth of m depends on the autonomous component λ_0 , the deviation of actual rate of unemployment from the natural rate and a random element r_t^m . This random term represents a surprise engineered by the policy makers. Then, the public's expected rate of money growth is

$$m_t^e = \lambda_0 + \lambda_1 (U_{t-1} - U_{t-1}^n) \quad (11)$$

The unpredictable portion of money growth is obtained from (10) and (11)

$$m_t - m_t^e = r_t^m \quad (12)$$

combining (8), (9) and (12),

$$P_t - P_t^e = m_t - m_t^e + r_t^d = r_t^m + r_t^d \quad (13)$$

If Equation (13) is substituted into Equation (5), we obtain

$$U_t = U_t^n - \frac{1}{\beta} (r_t^m + r_t^d) + r_t^e \quad (14)$$

Notice that in Equation (14) m_t does not enter into the determination of U_t , while r_t^m does, we can conclude that monetary authority cannot cause even a temporary change in U_t unless it changes the money supply in an unpredictable manner through its manipulation of r_t^m . Systematic monetary policy rule has no impact on the real economic variable because the behavior is already incorporated completely into I_{t-1} .

The monetary authority may accomplish a change in r_t^m only in a transitional period, but it will have no lasting effect on output or unemployment. However, it is difficult to consider these "surprises" as a reliable basis for an active stabilization policy.

C. The REH Literature

The conventional Phillips curve hypothesis posits that real output-

inflation tradeoffs arises from relatively stable structural features of the economy and are thus independent of the nature of the aggregate demand policy pursued. But Lucas (1973) has shown that the positive association is only a temporary phenomena which arises from suppliers' misinterpretation of the general price movements for relative price changes. Lucas argues that the rational agents' decisions depend on relative prices only, yet they do not have enough information to distinguish relative from general price movement. The suppliers' (of labor services and goods) response to a price change depends on their past experience with the portion of a price change in their specific market that typically represents a relative demand shift for their good or service as opposed to a change in relative prices. The suppliers will be less responsive to wage price changes as the variance (σ^2) of the general price level increases relative to the variance (τ^2) of the market specific price level. As the variance of the general price level relative to the variance of the market specific price increases, the less economic agents will be "fooled" into misinterpreting the general price level change as a change in relative prices. As it happens, the short-run Phillips curve becomes increasingly steep.

The crux of Lucas's idea can be condensed into his estimating equations.

$$y_{ct} = -\pi\delta + \pi\Delta X_t + \lambda y_{ct-1}$$

$$\Delta P_t = -\beta + (1-\pi)\Delta X_t + \pi\Delta X_{t-1} - \lambda\Delta y_{ct-1}$$

where y_{ct} is the cyclical component of the real output, ΔX_t is the unanticipated change in nominal income while δ is the anticipated mean of a sequence of ΔX_t . π measures the effect of demand shift on real output.

Since the magnitude of π depends on the degree of "fooling" suppliers,

$$\pi = \frac{\tau^2\gamma}{\sigma^2 + \tau^2(1+\gamma)}$$

It is inversely related to σ^2 and positively to τ^2 . His empirical results support this basic hypothesis. This is how Lucas's approach parts company with the conventional Phillips curve approach.

Sargent-Wallace(1975) have shown that Friedman's constant growth rule of the money supply is not inferior to the Keynesian feedback rule, and that combining the NRH with REH gives rise to a strong policy

implication for the NRH. In their system there is no feedback rule that the authority can employ to fool the public. The authority cannot expect to exploit the Phillips curve even for one period.

Barro(1976) argues that the authority's objective function should be to minimize the gap between actual and full information output. In this respect Barro's criterion for monetary policy differs from that of Sargent and Wallace.

Barro shows that if monetary authority has an informational advantage it can affect the economy with active policy. However, he shows that stability could be best achieved simply by giving the public the better information rather than surprising them. This is his main contribution.

Cukierman-Wachtel's(1979) specific contribution is to point out, by building a theory of differential expectations within a rational expectation framework, that a positive relationship exists between the divergence of views about the future rate of inflation and the variance of aggregate demand shocks. They have examined whether there are some systematic relationships between the variance of expectations across people and the variance of aggregate demand and of the rate of inflation in the general level of prices. So, the extent to which people will differ in their forecasts of inflation will increase with the overall macroeconomic uncertainty about the rate of inflation.

The major significance of the introduction of the rational expectations mechanism to the macroeconomic framework arises from the fact that the formulation of inflation expectation, made endogenous to the model, reflects the optimal behavior of economic agents. In this way the theory of price expectations becomes part of consumers and producers behavior, thereby providing a micro foundation to the macroeconomic theory.

In this respect, REH is superior to the adaptive expectation approach which tends to generate irrational expectations and can be consistently wrong. REH assumes rational behavior of the public which results in a change of the parameters of the economic models whenever there is a change in economic policy. This is in contrast with the traditional macro economic approach which uses constant behavioral parameters in macroe-

conometric models as if economic agents do not adjust their expectations even when they imply biased forecasts.⁴⁾

D. Critiques of R.E.H.

Revolutionary though it may be, the Rational Expectations Hypothesis is not without its critics.

The major assumption of the REH is that economic agents have at their disposal all the relevant information, and that they utilize it efficiently in forming expectations about inflation. However, critics, including Benjamin Friedman [1979], point out that REH is not clear as to how the information is gathered and how it is interpreted nor how the expectation is formed from the available information. REH supposition that all the information is available at the time of the forming of the expectations implies that people have full knowledge of the economic structure and its processes.

Furthermore, REH states that economic agents are capable of using available information to formulate objective, unbiased conditional expectations of the predicted variables. This is clearly an unrealistic assumption. Information has cost and many economic agents cannot afford the costly information, and without relevant information, an accurate forecast is not possible. Even the availability of full information itself does not guarantee correct interpretation of it. Moreover, each economic agent has a different interpretation of the given information thus attaching quite different significance to the same information.

A second major criticism questions the possibility of the convergence toward a rational expectation equilibrium. Shiller (1978) raises a question: if a model changes, thereby rendering the rational expectations mechanism no longer rational, will a new expectations mechanism be found by individuals? Furthermore, after the impact on the economy of this new expectation mechanism is felt, will it turn out to be rational? If it does, would it occur in a short period of time?

REH assumed that if a change in policy occurs in one period, expecta-

4) The work by McCallum (1978) and McCallum and Whitaker (1974) also deserve attention.

tions are corrected fully by the start of the next period. If the length of this "period" is defined to be the time required for full expectational adjustment to occur, then REH may be inferring a long-run period consisting of several short-run disequilibrium. REH like Neoclassical models tends to ignore these short-run periods which are of considerable importance.

The REH assumption of perfect flexibility of prices and money wages which implies an instantaneous adjustment toward an equilibrium price through Walrasian tatonnement process has failed to reflect the real world situation. In an uncertain world, wage-price contract is a common phenomena. Fischer (1977) argued that even in the world of rational expectations where the policy may be fully anticipated, the wage price contract can bring about a temporary rigidity which tends to endow monetary policy with a stabilizing capacity.

Modigliani [1977] has asserted that the greatest flaw of the REH is its inconsistency with empirical evidence which has shown frequent and persistent deviation of unemployment from the natural rate. Sargent countered this by arguing that the natural rate has moved over the period. However, Hall [1975] argues that if the natural rate moves occasionally then REH should explain this movement itself.

III. The Disequilibrium Approach

A. Background

One of the post-Keynesian developments in macroeconomics which sought to reconcile the Keynesian model with the Neoclassical model is called the Neoclassical-Keynesian Synthesis.⁵⁾ The Synthesis combines the Keynesian income-expenditure approach with the Neoclassical notion of general competitive equilibrium. The synthesis is an attempt to provide a microeconomic foundation to a macroeconomic behavior. First, it shows that both the liquidity preference and the consumption function can be derived from the model of individual utility maximization principle and the

5) See Harris (1981) for an excellent treatment of the Neoclassical-Keynesian Synthesis.

investment function, from the profit maximization principle. Second, it brings about a full employment equilibrium by introducing the Pigou Effect to the Keynesian models. That is, price flexibility combined with wealth effect will ensure a full employment equilibrium. Third, the assumption of price flexibility in turn leads to the neutrality of money -- a Neoclassical result that is contrary to the Keynesian conclusion. As we can see from above, this particular way of combining the Keynesian model with the Neoclassical assumptions has all but deprived the Keynesian model of its original feature while making the model yield a result which is basically that of the Walrasian tatonnement process.

The Neoclassical-Keynesian Synthesis is basically an equilibrium system whereas the Keynesian system is a disequilibrium system in which widespread involuntary unemployment can persist indefinitely without any inherent tendency towards recovery. In the final analysis, the interpretation of Keynesian scheme embodied in the Neoclassical-Keynesian Synthesis is at odds with the central theme of the General Theory. Those who shared the same view with Keynes that unemployment is more real than a full employment equilibrium found neither the Neoclassical nor the Synthesis to be suitable for analysis of the macroeconomy. They sought to explain unemployment through a disequilibrium model rather than through the Walrasian tatonnement process. These so called New Keynesian attempts are often labeled as the Disequilibrium Approach as opposed to the General Equilibrium Theory.

B. Earlier Development of the Disequilibrium Approach

Patinkin(1965) and Clower(1965) were the first to depart from the Walrasian method and their pioneering work together with that of Leijonhufvud(1968) have given impetus to the search for a non-Walrasian system more appropriate for the analysis of disequilibrium.

The main features of the disequilibrium-type theory are as follows :

First, it assumes quantity adjustments rather than price adjustments (or the quantities adjusting more quickly than prices) in the transactions occurring under non-market-clearing(non-Walrasian) conditions. Second,

from the first, it follows that, since trade takes place at disequilibrium prices, firms selling goods and household selling labor confront quantitative constraints. In this case, their effective demands (Keynesian) can be less than their notional demands (Walrasian). Clower's dual-decision hypothesis posits that: the individual first makes utility-maximizing decisions subject to the usual (Neoclassical) constraint of real wage and the return on nonhuman assets based on the notional supply of labor and demand for goods. They then find that the actual magnitude is less than the notional amount, they will recalculate their demand for goods to decide on their own effective demands subject to the new constraint.

The significance of Clower's elucidation of the dual decision hypothesis is that it leads to an explanation of the disequilibrium in the labor and the goods markets that underlies Keynesian effective demand. Observing the symmetrical nature of the Patinkin model and Clower model, Barro and Grossman (1971, 1976) combined the two to produce a full model of disequilibrium.

Using the Hicksian fixed price method, they examined the determination of output and employment in a situation of excess supply and excess demand in the commodity and labor market.

They showed that when excess supply exists in both markets, employment of output are both demand-determined. In this excess supply situation the firm will not be able to sell its notional supply (y^s). That is, the actual demand-determined sales y is less than y^s , and the profit maximization problem becomes simply that of selecting the minimum quantity of labor necessary to produce y . Profit maximization now implies

$$x^{D'} = F^{-1}(y)$$

Where $x^{D'}$ denotes effective demand for labor. Since $y < y^s$, the effective demand for labor is independent of the real wage. The household is also unable to sell its notional labor supply x^s or obtain notional labor income ($w x^s$). Labor income ($w x + \pi$) is no longer a choice variable which is maximized, but is exogeneously given. The household is only able to obtain the quantity of actual employment x , where $x < x^s$.

The household maximizes

$$U(x, y^{D'}, \frac{M}{P} + m^{D'})$$

$$s.t. \pi + wx = y^{D'} + m^{D'}$$

where $y^{D'}$ and $m^{D'}$ are effective demands for commodities, and additional money balances, respectively.

The intersection of the $x^{D'}$ and $y^{D'}$ loci determines the values for x and y . This is to be compared with the full employment equilibrium represented by the intersection of y^s and x^s .

The uniqueness of this approach is that it shows that unemployment is not caused by the too high a real wage, therefore, reduction of real wage is not the solution. Instead, the real cause of the problem is the fall in commodity demand caused by the high prices. It is this involuntary unemployment that prevents individuals from selling their desired amount of labor, and this concept of involuntary unemployment captures the essential element of the Keynesian model.

On the other hand, when excess demand exists in both markets such that $x < x^D$, the firm's objective function is

$$\pi = y^{s'} - wx$$

$$s.t. y = F(x)$$

The problem is to produce as much outputs as possible with the available labor. If the household is faced with excess demand for commodities such that $y < y^D$, then the household has to choose between forced saving (in Neoclassical sense) or substituting leisure for the unobtainable commodities by curtailing the labor supply or the combination of the two.

In this case, the utility maximization implies

$$x^{s'} = x^{s'}(w, \frac{M}{P}, \pi, y)$$

and

$$m^{D'} = m^{D'}(w, \frac{M}{P}, \pi, y),$$

where $x^{s'}$ denotes effective supply of labor. The values of actual employment(x) and output(y) is determined by the intersection of $y^{s'}$ and $x^{s'}$. The novelty of this approach is that the possibility of reduced labor supply is caused by excess demand for commodities.

Muellbauer and Portes(1978) introduce the buffer stock role of inven-

tories which gives a valuable insight into the nature of quantity signals in the goods market. They experiment with four alternative constraint regimes that could occur in two markets (goods and labor). Of the four alternatives, Keynesian unemployment is identified with the regime in which sellers are rationed in both markets -- $c^d < c^s$ and $1^d < 1^s$ where superscripts d and s denote notional demand and notional supply. They identified the "repressed" inflation with the constrained regime under which buyers are rationed in both market -- $c^d > c^s$ and $1^d > 1^s$. This is the case of excess demand in which the quantities traded are effective supplies.

Classical underemployment is identified with the situation in which households are on the "long" side in both markets and the firm's material demands are realized -- $c^d > c^s$, and $1^d < 1^s$. Here firms are willing to trade less than households in each market, so their notional supply and demand prevail. However, the wage is so high that firms do not find it profitable to employ more workers or sell more goods. When firms are on the long side in both markets -- $c^d < c^s$, $1^d > 1^s$ underconsumption might result. Households are willing to trade less than firms in each market. Here the wage is so low that excess supply in the goods market and excess demand in the labor market coexist.

The pioneering work in macroeconomic disequilibrium theory by Patinkin, Clower, Barro and Grossman and others, have come under some criticism. The main criticism relates to its failure to explain the causes of unemployment. For example, the theory of search behavior in the labor market developed by Alchian (1969) presents problems for the concept of involuntary unemployment and constrained utility maximization. Another problem is that these earlier models are based on the Hicksian fixed price assumption. The point of criticism is that if the price is fixed, it is natural that the *tatonnement* takes place through quantities. In this respect, some critiques argue that the earlier models were basically the same as the original Keynesian wage rigidity model. In other words, what is lacking in the disequilibrium theory is the theory of how prices in all markets are determined.

C. The Recent Development

The recent outburst of theoretical work by Benassy(1975), Grandmont (1977), Dreze(1975) Hahn(1978) and others⁶⁾ are aimed at rectifying some of the shortcomings of the earlier model. One of their specific objectives was to explain why price does not change rather than what happens if the price is rigid. They searched for a model in which prices are treated as endogenous, yet do not move to clear the markets. At the same time, they made an attempt to show that disequilibrium can occur without the assumption of exogenous price-wage rigidity.

In contrast with the earlier fixed-price model in which unemployment is the result of exogenously fixed prices, the attempt by Benassy, Hahn and others was to explain unemployment and endogenously sluggish prices simultaneously.

In the non-Walrasian scheme of price setting developed by Dreze and Benassy, agents cannot hope to sell(or buy) all they want at the going market price. Prices cannot be treated as parametric. Given this breakdown of the perfectly competitive norm, agents act as price setters as if they are operating under the monopolistic competition.

It is generally believed that Benassy was the first to formulate a general non-Walrasian model to endogenize price behavior.

Benassy's model goes as follows: it is assumed that prices are fixed initially and responses to discrepancies between supply and demand occur through quantity inducements. It holds money as the sole medium of exchange. Each firm produces only one good and sets the price of that good. There are l goods ($h=1...l$) markets. An individual i visits these l markets, and indicates to market h his net demand for good h against money \tilde{Z}_{ih} . Through transactions, agents perceive quantity constraints on their exchange. The perceived constraints from the previous exchange will affect their new demands on the subsequent markets.

Nonzero aggregate excess demand is noted as

6) See also Malinvaud (1977) who deals with a short period so that prices are fixed, and Hildenbrand and Hildenbrand (1978) and Negishi (1974).

$$\bar{Z}_h = \sum_{i=1}^n \bar{Z}_{ih} \neq 0$$

While the actual transactions \bar{Z}_{ih} which must sum to zero, i.e.,

$$\sum_{i=1}^n \bar{Z}_{ih} \equiv 0$$

In this case of aggregate excess demand a rationing scheme is necessary to link effective demands \bar{Z}_{ih} to actual transactions \bar{Z}_{ih} ,

$$\bar{Z}_{ih} = F_{ih}(\bar{Z}_{ih}, \dots, \bar{Z}_{nh})$$

$$\text{with } \sum_{i=1}^n F_{ih}(\bar{Z}_{ih}, \dots, \bar{Z}_{nh}) \equiv 0.$$

The rationing functions incorporate several stipulations, such as (a) voluntary exchange, (b) frictionless market, (c) the continuity of the F_{ih} function on effective demands.

In determining the demands of agents, the most important element is their perceived constraint on the exchange possibilities in the different market. Let us suppose that in market h agents have expressed demands $\bar{Z}_{ih} (i=1 \dots n)$ and realized transactions \bar{Z}_{ih} . During the exchange process agent i will have perceived a constraint \bar{Z}_{ih} on his possible transactions. The estimation by i of Z_{ih} is based on all information including the demands expressed by other agents. The perceived constraints normally have several properties :

- (a) "objective" if he is on the "long" side
- (b) "subjective" if his effective demand is realized and perceives possibilities for more trade in the same direction and
- (c) the stronger "subjectivity" if he was on the "short" side.

Thus we have a process of quantity adjustments, in which agents revise their effective demands in light of the constraints they perceive. If we start from a set of effective demands (\bar{Z}_{ih}), they generate a set of perceived constraints Z_{ih} , hence a new set of effective demand that will be in general different from the original ones. An equilibrium will be reached when these two sets of effective demands coincide. More formally, a K-equilibrium will be a set of effective demands \bar{Z}_{ih} , perceived constraints Z_{ih} and realized transactions \bar{Z}_{ih} , such that :

$$(a) Z_{ih} = G_{ih}(\bar{Z}_{ih}, \dots, \bar{Z}_{nh})$$

(b) \tilde{Z}_{ih} is obtained by maximization of U_i

(c) $\tilde{Z}_{ih} = F_{ih}(\tilde{Z}_{1h}, \dots, \tilde{Z}_{nh})$.

Once a K-equilibrium is established, the producers (who are the monopolists) quote new prices based on the excess of effective demand \tilde{Z}_{ih} over realized transactions \bar{Z}_{ih} and this process is repeated. A K-equilibrium is efficient in the sense that, at the given set of prices, no trades involving pairs of goods can strictly improve the utility of all trades involved. Hence at this point, price setting agents see no incentive to change prices.

The process involves an intraperiod adjustment in quantities and an interperiod price adjustment once a fixed-price equilibrium has been established.

In other words, during the adjustment toward a K-equilibrium, agents may attempt to trade in excess of perceived constraints at the fixed price vector, hence no need to quote new prices. During this adjustment period, the adjustment occurs in terms of the quantities, not the price. The change in price takes place only after a K-equilibrium has been established.

According to Drazen[1980], Benassy's model is deficient in that, while he has succeeded in demonstrating the existence of a non-Walrasian equilibrium with endogenous price setting, his price setting mechanism of the model is unsatisfactory. Benassy's model was rectified by Hahn(1978) who treated price setting as an integral part of agents' attempt to "break" their constraints. Hahn assumes that the economy can have Walrasian equilibrium as well as the non-Walrasian equilibrium. In Hahn's model, agents are assumed to have "conjectures" concerning the prices they offer and the quantity signals which they receive. The class of conjectures is restricted in the following way :

(1) agents who do not encounter a quantity-constraint take the price at which they must trade as given, (2) agents who are quantity-constrained in a market conjecture that they must raise price in order to be allowed to buy more than they are buying and they must lower price in order to be allowed to sell more than they are selling. Hahn's model does not assume that the economy is intrinsically one of monopolistic competition nor does it assume that conjectures ensure a competitive equilibrium. Hahn defines

conjectural equilibrium to be the situation when a set of prices and quantity signals are such that desired trades are activated and no price change is advantageous. He assumes that if an individual does not want to trade in excess of his constraints, the conjecture price is the market price. On the other hand, a desire to break a constraint such as wishing to sell more than one's constraint implies a conjectural need to lower the price to sell more.

In contrast with the Benassy model, Hahn assumes that there is no possibility of trading in excess of one's constraints at going market prices. In Hahn's model, an agent chooses price and quantity offers to maximize his utility.

Under relatively mild assumption, Hahn derives a non-Walrasian conjectural equilibrium with only one side of the market quantity constrained in a given commodity. Like that of Benassy, in an equilibrium no price setting agent perceives an incentive to change the price he quotes. Nonetheless, the crucial difference between the two approaches is that, in Benassy's model, an individual can express demands in excess of constraints without changing prices, where as in Hahn's model the agent changes his price offer. Grandmont and Laroque [1976], using Dreze-type effective demands, also shows the existence of non-Walrasian equilibrium with price setting by firms. They argue that Keynesian temporary equilibrium model cannot exist without the assumption of monopolistic competition where the firms choose the level of output on the basis of their projected price level.

Drazen [1980] concludes that conjectural equilibrium as a model for explaining the existence of quantity constraints has great merit which deserves further research. It makes price setting endogenous, leading to simultaneous determination of price and quantities.

D. Empirical Tests for Markets Disequilibrium

Constructing empirical studies to estimate models of disequilibrium is not a simple task. Therefore the existing studies have dealt only with selected markets. Fair and Jaffee [1972] estimated demand and supply of housing starts as an example of disequilibrium. The studies by Fair and

Kelejian [1974], Amemiya [1974], Goldfeld and Quandt [1975], and Maddala and Nelson [1974] investigate such special markets as housing starts, watermelon market, labor market and credit rationing in the *S&L* associations, etc.

The most commonly used estimating technique in these studies is the maximum likelihood method. Nonetheless, all previous techniques used to estimate disequilibrium have been found to be inadequate because the estimations were done on a single market model whereas the theoretical models of disequilibrium are all multimarket models in which the effect of one market "spills-over" to other markets. Therefore, the estimation of the single market model is unequipped to capture the "spill-over".

Multi-market models have been introduced by Laffont and Monfort [1980] and Ito [1981].⁷⁾ Theirs are the first efforts to reduce the gap between the theoretical model and the econometric technique.

Lastly, but not the least, Bowden [1978] also breaks new ground by departing from the previous form of the price adjustment equation. Instead of following the usual price adjustment mechanism based on the law of supply and demand, he treats the current price level as a weighted average of the last period's price level and the current equilibrium price level where the weight is to be estimated. The novelty of Bowden's approach is that this weight is used as a measure of market disequilibrium.

IV. Conclusion

The most devastating message of the REH for Keynesian policy activists is that systematic monetary (or fiscal) policy rule has no impact on real output or unemployment even in the short-run unless these policies are undertaken in an unpredictable way. Under REH, rational economic agents incorporate the behavior rule of the monetary authority in their decision making process, hence, the expected money growth will be all but dissipated into the increase in wage and price through its impact on the expected rate of inflation, thereby leaving no impact on real output and employ-

7) Ito and Ueda (1981) deal with the international comparison of credit market.

ment. In this setting, the macro disequilibrium such as the deviation of actual rate of unemployment from the natural rate occurs only when errors of prediction with respect to the expected rate of inflation is made. However, these errors are only short-lived.

Although the REH attacks Keynesian activist position, it is also an attack on its own mentor, the Monetarists which posit the short-run potency of monetary policy--that an increase in the money supply will first be expressed in a change in real GNP and then on prices. REH rejects this proposition.

The major contribution of REH is that it has strengthened the micro foundation of the macroeconomic theory. In REH, the construction of inflation expectation occurs as a part of the optimal behavior of economic agents. In this fashion, the theory of price expectations becomes an integral part of the price theory which deals with the optimization behavior of consumers and producers. However, in the process, the Rationalists undertook several suppositions such as Walrasian tatonnement process, costless information, perfect flexibility of price that are contrary to the real world.

While the Rationalists are preoccupied with the construction of their theories in the image of "perfect" world in which the full employment equilibrium (or general equilibrium) is the rule rather than exception, there has been another group of economists whose perception of the world is opposite to that of the Rationalist. For this latter group, the world is rather imperfect one in which disequilibrium is the rule rather than exception. For the advocates of the disequilibrium, the general equilibrium is a special case of the general disequilibrium while for the Rationalists, the disequilibrium is a special case of the general equilibrium analysis. The Rationalists can be designated as modern day Neoclassicists while the proponents of the disequilibrium approach are the modern day Keynesians.

No doubt that the non-Walrasian unemployment theory (disequilibrium approach) has advanced our understanding of the economic behavior in the world where prices often fail to disseminate information in an efficient way. In this non-Walrasian world, the market clearing vector of relative price is often unknown by all economic agents. In the real world, there

is no such thing as a complete set of future markets--the agents have neither a sufficient knowledge of the economic system nor sufficient computing capabilities to be able to forecast the future accurately. Moreover, it is a fact that at least some times an excess demand or an excess supply in some market is adjusted through quantity rationing. These issues have been ignored for a long time by the traditional general equilibrium theory.

The recent major contribution of the disequilibrium approach is the progress that has been made on endogenizing prices--the inflexibility of wages and prices are made endogenous to the system rather than exogenously specified. In the same vein, progress has also been made on the rationality of price setting behavior within quantity constrained models. Accordingly the disequilibrium model also deserves the same credit as the REH in that it too is based on the rational optimizing behavior on the part of the economic agents, thus bridging the gap between micro and macro economics.

The central question is if the protagonists of the two competing theories will ever converge toward a unified theory. Only time will tell. In the meantime, an important axiom has emerged from the half-century old experiences--it is that the government is no longer viewed as the *deus ex machina* in the realm of countercyclical measures. History has taught us that erratic countercyclical measures can do more harm than good.

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