Keynes' Metaphor of the Newspaper Competition: A Model

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Abstract

Keynes' *General Theory* provides an interesting metaphor for asset markets: they are like newspaper competitions where contestants have to pick up the six prettiest faces from a hundred photographs, and the prize would go to one whose choice is closest to the average preferences. Keynes did not explicitly formalise the metaphor but his observations about the bond market and the speculative demand for money are closely related to this vision of asset markets.

Our paper develops a class of decision rules from the suggestions in the *General Theory* and Keynes' *QJE*(1937) paper, and introduces a concept of 'equilibrium guess' which was not explicit in the newspaper competition idea. Using them we model a bond market which shows that the 'newspaper competition' amounts to endogenous determination of asset quality, and is capable of producing familiar Keynesian features: (i) demand for money develops infinite elasticity as interest rate approaches a low critical value; (ii) a shock to expected interest rate when the current rate is small, can lead to mass flight into money; and (iii) the more unanimous the market opinion, the more unstable the market, and the more difficult it is for monetary policy to be effective.

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1. Introduction

Keynes reasoned that because agents want to keep investments as liquid as possible, it is more important for them to follow the opinion of the market than study its fundamentals. The *General Theory* uses an interesting metaphor in this context: investment ".. may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole; … " (Keynes, 1973, p156).

Guessing the market opinion, added to his observation that fundamentals themselves are not drawn from static probability distributions, has well-known implications for asset markets in Keynes' theory. These implications are taken seriously in Keynesian traditions, where they constitute important elements of the environment of discourse. New Keynesians conclude that tracking of market opinion leads to less than 'rational' response to any change in fundamentals (Phelps, 1983). This observation is used not only as a critique of rational expectation but also as an assumption in asset market models, e.g. Pemberton(1988). A number of influential works have studied such muted response to fundamentals in various asset markets and used them for further theorisation, e.g. Mankiw and Summers (1984), Mors and Mayer (1985), Goodhart (1987). Keynes had a more detailed discussion of the theme in a subsequent article in *QJE* (Keynes, 1937). This discussion has inspired a number of important post-Keynesian formulations, e.g. Minsky(1982), Davidson (1991).

Though its implications are regarded seriously, there has not been any attempt to model the newspaper competition metaphor explicitly. Our paper develops a simple model. We faced two difficulties in this task. The first is that the suggestions in the *General Theory* and the *QJE* paper are about what market expectations are based on; they do not provide any unique rule of expectation formation. So we first developed a set of restrictions on such rules implied by the features explicitly discussed in the *General Theory* and the *QJE* paper. This gave us a large class of rules, from which we chose the simplest member.

The second difficulty is that, presented as a one-shot guessing exercise, the metaphor does not provide a concept of equilibrium guess. An equilibrium concept is not necessary for a metaphor intended to describe what market valuations are made of. But in an asset market model we have to provide agents with both a substance to anchor their opinions and a way to come to peace with their own opinions at some stage. To embed a notion of equilibrium guess into the proceedings, we propose a repetitive process of guessing the market until the process converges. An agent builds her assessment of risk of the asset by finding out how the market is currently treating it. This assessment leads to her decision to buy or not to buy, a decision that alters others' assessment of the asset. The sequence of these disequilibrium trades terminates when all individuals' assessments get consistent with overall market trade. The latter is the equilibrium trade at the given price. Given the initial expectations with which agents start, we can describe the demand for the asset as a function of its price. The metaphor is thus interpreted to suggest that (i) asset quality (riskiness in this context) is endogenously formed in a market economy, and (ii) the emergence of an equilibrium quality is a dynamic process and therefore subject to dynamic complications.

In models of Keynesian lineage equilibria are affected by the state of long term expectations. The connection is usually shown by comparative statics. A shift in behavioural functions incorporating expectation alters the macroeconomic equilibrium. Though comparative static explanation is often suggested by Keynes' writings, it is not the only possible suggestion. His discussion of instability from speculative demand (Keynes, 1973, p 172) hints at the market for money failing to reach an equilibrium following an expectation shock, rather than a shift in equilibrium. When the newspaper competition is embedded with a notion of equilibrium guess and asset demand is defined as we suggested above, demand acquires an implicitly dynamic content. It is defined only if the processes of guessing the market opinion and their feedbacks on demand converge. A change in expectation parameters can destabilise this dynamics and an asset market may be subject to instability on this account too. Our model demonstrates expectation-related instability both from comparative static shifts and dynamic failures.

Though the newspaper competition metaphor was used to describe asset markets in general, the domain where Keynes followed it through to derive some analytical conclusions is the analysis of bond markets and the speculative demand for money (Chapter 13, *General Theory*). Conclusions from Chapter 13 famously include the possibility of the liquidity trap. This chapter also provides the interesting conclusion that while agents seek conformity with the average opinion, the stability of the system depends on the dispersion of opinions. To stay close to this discussion, we have developed our model in the context of a bond market.

The specification of the model closely follows the *Treatise* (Keynes, 1971, chapter 15) because the same specification was carried through into the *General Theory*. Agents have a certain amount of zero-interest deposits which they use for buying bonds when opportune, so that the speculative demand for money is the complement of the demand for bonds. When in this environment we use an expectation formation rule based on the newspaper competition metaphor, the model produces several familiar Keynesian features. We show that the demand for money approaches infinite elasticity as the interest rate approaches a critical small value. Secondly, a turn to bearishness can land the economy in a liquidity trap due to a failure of dynamics. We also show "that the stability of the system and its sensitiveness to changes in the quantity of money” are “dependent on the existence of a *variety* of opinion about what is uncertain” (Keynes, 1973, p.172).

The rest of the paper is organised as follows. Section 2 develops a class of rules of expectation formation from the features explicitly mentioned by Keynes. Using a simple rule from this class Section 3 develops the basic model of bond trading and the speculative demand for money. We show that very low expectations about future interest rate can produce certain badly behaved money demand functions. These functions are shown to create a number of problems in later sections. Section 4 presents the dynamic properties of the model. Section 5 shows that the demand for money tends to become infinitely elastic at low interest rates if interest rate expectation is low. Section 6 shows the possibility of a dynamic failure of the bond market after an expectation shock, leading to a mass flight into money holding. Finally section 7 explores the relation between the stability of the market and the unanimity or variety of opinion.

2. Formation of Expectations

The model environment is that of the *Treatise*. The focus is on the speculative component of the demand for money. Agents hold this money in non-earning savings deposits and use it to buy bonds if price and expected capital gain are attractive. There is only one type of bonds which promises to pay 1 unit of income per period and it carries no default risk. Correspondingly there is only one rate of interest *r*, and price of bonds $P = \frac{1}{r}$. An agent buys a bond if the return plus expected capital gain is non-negative. Thus an agent who expects bond price to be *p* one period later, would buy a bond at price *P* if $p\text{-}P\text{+}1 \geq 0$.

To proceed further, we need a rule by which *p* is determined. The rule should take into account the features that explicitly appeared in Keynes’ discussion. Those features however do not define a unique rule but a class of rules. We will first characterise the class and then choose one from it that has straightforward intuitive meaning and is simple to handle analytically.

While the *General Theory* provides the philosophy of expectation formation, the details appear in the *QJE* paper and the *Treatise*. Two explicit statements from the *QJE* paper restrict the class of rules significantly:

(i) “Knowing that our own individual judgement is worthless, we endeavour to fall back on the judgement of the rest of the world, which is perhaps better informed.” (Keynes, 1937)

(ii) ‘We assume that the existing state of opinion as expressed in prices and the character of existing output is based on a correct summing up of future prospects, so that we can accept it as such unless and until something new and relevant comes into the picture.” (Keynes, 1937)

The so-called ‘individual judgements’ in (i) are the priors which agents do not have much faith in, and would like to update using “the existing state of opinion as expressed in prices and the character of existing output” suggested in (ii). Let q denote the prior ‘individual judgement’ of an agent about the future price of bonds and X a market variable that agents trust as “a correct summing up of future prospects”. A general characterisation of p is then given by $p_t = f(q, X_{t-1})$, $f_1 > 0$, where t is a subscript denoting periods. Further, if X is a variable that moves up with “future prospects”, then $f_2 > 0$.

To characterise the distribution of q over agents, note that it is necessary that it is not identical for all agents. The newspaper competition is trivial if q is identical. In an asset market, if q is identical then market demand or price does not provide any additional information[1]. Accordingly we assume that q is distributed in $\left\{\underline{q}, \overline{q}\right\}$ where $\underline{q}$ and $\overline{q}$ are both positive. For analytical convenience we will assume that agents arranged in the ascending order of q form a unit mass in $\left\{\underline{q}, \overline{q}\right\}$ with uniform density δ. An agent with prior q will be referred to as agent q.

A further restriction on $f(q, X_{t-1})$ arises from the *Treatise*. Discussing the sequence of events when security price is rising, Keynes observes that not all agents are equally influenced by the prevailing opinion. To quote, “… in proportion as the prevailing opinion comes to seem unreasonable to more cautious people, the ‘other view’ will tend to develop, with the result of an increase in the ‘bear’ position…” . Thus more cautious agents (smaller q) are less impressed by movements in X than others. This feature of expectation is vital for explaining the development of the ‘other view’ or a turn in the market, and we add $f_{12} = f_{21} > 0$ to the list of restrictions.

Together these restrictions yield a class of rules $S = \{p_t \mid p_t = f(q, X_{t-1}), f_1>0, f_2>0, f_{12}>0\}$. We will use a simple rule from this class:

$$p_t = q(1+\alpha X_{t-1}), \alpha > 0 \qquad (1)$$

Clearly rule (1) belongs to S. It implies a process of revision of q based on X, where the amount of revision is smaller for ‘more cautious people’.

Finally for X_t we will use the value of bond trade in period t, denoted by V_t. Hence the expectation rule (1) is written as

$$p_t = q(1+\alpha V_{t-1}), \alpha > 0 \qquad (2)$$

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[1] Given his view that there is no *objective* knowledge of the future, Keynes took a non-zero variance of q for granted. We perhaps need to add a further assumption that there is no compulsion or convention that forces everyone to have or behave as if they have the same prior.

3. Bond trading and the speculative demand for money

We assume that all agents have equal amount of endowment[2] normalised to 1 so that endowments held by all agents together is $\delta(\overline{q}-\underline{q})$. Since the mass of agents is 1 by construction, total endowments $\delta(\overline{q}-\underline{q})$ =1.

Let M be the demand for time deposits. Since agents either buy bonds with their money or hold it as savings deposit, we have

$$M = 1 - V \tag{3}$$

When the price of bonds is P an agent spends all her money on bonds if

$$1 + p_t - P = q + \alpha q V_{t-1} + 1 - P \geq 0 \tag{4}$$

Otherwise the agent keeps all her money in deposits. Let q_{lt} denote the lowest q for which (4) holds, i.e. $q_{lt} + \alpha q_{lt} V_{t-1} + 1 - P = 0$. Then only those agents whose priors are q_{lt} or higher will buy bonds, and total value of bond trade, V_t, is $\delta(\overline{q} - q_{lt})$.

This trade need not be the equilibrium trade at price P. To define equilibrium trade, consider a sequence of periods starting when P is announced. Equilibrium trade is attained only when a period is reached in which there is no further updating of expectations so that trade does not change in the absence of price change or expectation shocks.

Definition: Equilibrium bond trade at price P is $V(P) = \delta(\overline{q} - q)$, where

$$q + \alpha q \delta(\overline{q} - q) + 1 - P = 0 \tag{5}$$

Rewriting (5) in terms of V, and writing ρ for $1/\delta$, we get the trade function

$$P = -\alpha\rho V^2 + V(\alpha\overline{q} - \rho) + 1 + \overline{q} \tag{6}$$

Remark 1: The trade function would shift if there is a change in $\overline{q}$, which is the prior of agents most bullish about bonds. Alternatively, write $\underline{r} = \dfrac{1}{\overline{q}}$, and note that it is the lowest expectation about interest rate. Hence the trade function shifts if there is a change in the most pessimistic interest expectation of the market. Since M = 1 –V, these remarks apply to the speculative demand for money as well.

The value of $\overline{q}$ not only shifts the trade and money demand functions, but also has a bearing on the shape of the functions. We state this in the following proposition.

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[2] The more realistic assumption that agents have different endowments does not change the qualitative results, but makes the mathematics cumbersome.

Proposition 1: Let a demand function for money[3] be called 'well behaved' if $\frac{dM}{dr}$ <0 for all r in the domain of r and 'badly behaved' otherwise. Then, for $\bar{q} \le \frac{\rho}{\alpha}$ the demand function is well behaved and it is badly behaved otherwise.

From (6) we have

$$V = \frac{1}{2\alpha\rho}[(\alpha\bar{q} - \rho) \pm \{(\alpha\bar{q} - \rho)^2 - 4\alpha\rho(P - \bar{q} - 1)\}^{1/2}] \tag{7}$$

Real solutions for V exist for all P in $0 \le P \le \frac{(\alpha\bar{q} + \rho)^2}{4\alpha\rho} + 1 \equiv \bar{P}$. However there is a smallest P>0, call it $\underline{P}$, at which all endowments are converted to bonds, i.e. V = 1 at P = $\underline{P}$. It follows from (6) that $\underline{P} = 1 + (1+\alpha)(\bar{q} - \rho) = 1 + (1+\alpha)\underline{q}$ >0. Hence the domain of P for our discussion is $\{\underline{P}, \bar{P}\}$.

- If $\bar{q} \le \frac{\rho}{\alpha}$, then from (7) V has only one positive solution in $\left\{\underline{P}, \bar{q} + 1 < \bar{P}\right\}$, namely

  $$\frac{1}{2\alpha\rho}[(\alpha\bar{q} - \rho) + \{(\alpha\bar{q} - \rho)^2 - 4\alpha\rho(P - \bar{q} - 1)\}^{1/2}] \tag{8}$$

  It follows that $\frac{dV}{dP} = -\left\{(\alpha\bar{q} - \rho)^2 - 4\alpha\rho(P - \bar{q} - 1)\right\}^{-1/2}$ <0 everywhere. The graph of the function is shown in figure 1a.

  Now $\frac{dM}{dr} = -\frac{1}{r^2}\frac{dM}{dP} = P^2\frac{dV}{dP}$. Hence $\frac{dM}{dr}$ <0 everywhere, and the demand for money is well behaved.

- For $\bar{q} > \frac{\rho}{\alpha}$**,** real and positive solutions exist for all P in $\left\{\underline{P}, \bar{P}\right\}$ with two distinct properties in two parts of the domain. For, $\underline{P} \le P \le 1 + \bar{q}$ there is a single positive solution V. For these solutions, $\frac{dV}{dP} = -\left\{(\alpha\bar{q} - \rho)^2 - 4\alpha\rho(P - \bar{q} - 1)\right\}^{-1/2}$ <0.

  But for $\bar{q} + 1 < P < \bar{P}$, there is a pair of distinct positive solutions as given by(7). Thus for P in $\bar{q} + 1 < P < \bar{P}$, $V(P)$ has two branches with positive and negative slopes

[3] We will avoid the adjective 'speculative' if it does not create any confusion.

respectively. At $\overline{P}$ the two branches merge and $\frac{dV}{dP} = 0$. The graph of $V(P)$ is shown in figure 1b.

Correspondingly on the demand function for money, $\frac{dM}{dr}$ <0 for $\underline{P} \leq P \leq 1 + \overline{q}$. But for $\overline{q} + 1 < P < \overline{P}$ it has two branches with a positive and a negative slope. Hence demand for money is badly behaved if $\overline{q} > \frac{\rho}{\alpha}$. ■

Remark 2: Define a critical interest rate $r_c = \frac{\alpha}{\rho}$. Using the notation $\underline{r} = \frac{1}{\overline{q}}$ introduced earlier, the demand function for money is well behaved if $\underline{r} \geq r_c$ and is badly behaved if $\underline{r} < r_c$.

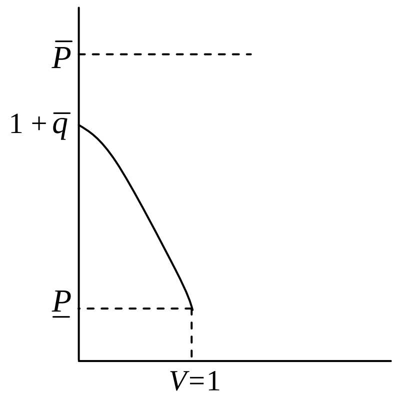

Figure 1a: $\overline{q} \leq \frac{\rho}{\alpha}$

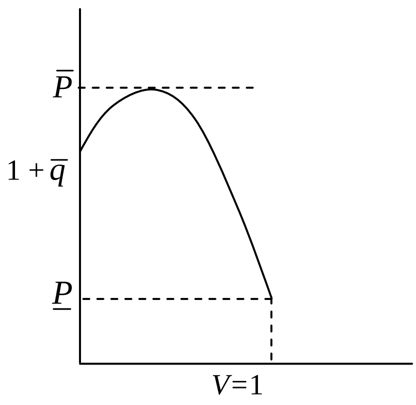

Figure 1b: $\overline{q} > \frac{\rho}{\alpha}$

4. Dynamics of demand

We need to examine how, if at all, the equilibrium trade defined in (5)is attained for a given P. The lowest prior for bond purchasers, q_{lt}, is given by

$$q_{lt} + \alpha q_{lt} V_{t-1} + 1 - P = 0 \qquad (9)$$

Using $V_t = \delta(\overline{q} - q_{lt})$ we rewrite(9) in terms of V

$$V_t \rho(1 + \alpha V_{t-1}) - \alpha \overline{q} V_{t-1} + P - 1 = 0 \qquad (10)$$

In equilibrium, V_t = $V_{t\text{-}1}$ = V, and (10) gives $P = -\alpha\rho V^2 + V(\alpha\overline{q} - \rho) + 1 + \overline{q}$, which is the same as equation (6).

Case 1: $\overline{q} \le \dfrac{\rho}{\alpha}$ or $\underline{r} \ge r_c$. Equation (6) has a unique positive solution everywhere between $\underline{P}$ and $1+\overline{q}$, and the solution $V > \dfrac{\alpha\overline{q}-\rho}{2\alpha\rho}$ [see equation(7)].

Now from(10), $\dfrac{dV_t}{dV_{t-1}} = \dfrac{\alpha\overline{q}-\alpha\rho V}{\rho+\alpha\rho V}$ which is <1 if $V > \dfrac{\alpha\overline{q}-\rho}{2\alpha\rho}$. It follows that (10) is necessarily stable if the demand for money is 'well behaved'.

Given M = 1- V, the demand for money is unique for r between $\dfrac{1}{\underline{P}}$ and $\dfrac{1}{1+\overline{q}}$. Convergence of V ensures the convergence of M. A change in r in its domain leads M to its new equilibrium value.

Case 2: $\overline{q} > \dfrac{\rho}{\alpha}$ or $\underline{r} < r_c$. There are two sub-domains with different properties. If P < 1+$\overline{q}$, equation (6) has one solution, and equation (10) converges to this solution as in *Case 1*. However for P > 1+$\overline{q}$, (6) has two positive solutions V_1 and V_2. Let $V_1 < V_2$. Then from(7), $V_1 < \dfrac{\alpha\overline{q}-\rho}{2\alpha\rho}$ while $V_2 > \dfrac{\alpha\overline{q}-\rho}{2\alpha\rho}$. It follows that at V_1, $\dfrac{dV_t}{dV_{t-1}} = \dfrac{\alpha\overline{q}-\alpha\rho V_1}{\rho+\alpha\rho V_1}$ >1 while at V_2, $\dfrac{dV_t}{dV_{t-1}} = \dfrac{\alpha\overline{q}-\alpha\rho V_2}{\rho+\alpha\rho V_2}$ <1, implying that only the negatively sloped branch is stable. The dynamics of V for the sub-domains are shown in Figure 2.

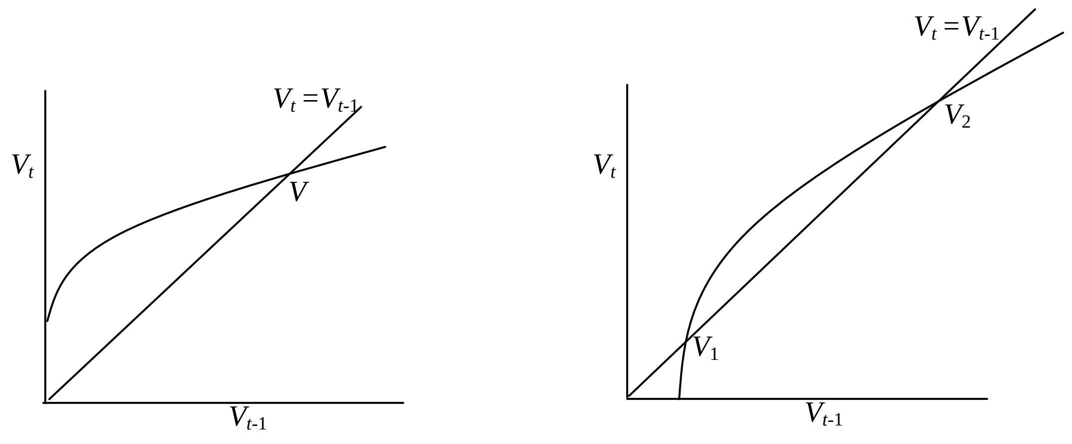

Figure 2a: P < 1+$\overline{q}$,

Figure 2b: P > 1+$\overline{q}$,

Thus if $\overline{q} \le \dfrac{\rho}{\alpha}$ i.e. $\underline{r} \ge r_c$, demand for money is well-behaved in the sense that after a shock in interest rate or bond price, demand converges to a new equilibrium.

If $\overline{q} > \dfrac{\rho}{\alpha}$ i.e. $\underline{r} < r_c$ the downward sloping branch $V_2(P)$ to the right of $\overline{P}$ in figure 1b is stable and represents the market trade in bonds. When P changes, trade moves along this branch. Correspondingly, as r changes the demand for money moves to a new equilibrium demand along a negatively sloped demand curve. Ordinarily, the unstable branch plays little role because the market can not stabilise on any point on the unstable branch.

However when P is close to $\overline{P}$ the unstable branch can create two types of difficulties for bond trading and the demand for money. They are discussed in the following two sections.

5. Interest Elasticity of Money and the Liquidity Trap

The first of these problems is that the badly behaved demand function tends to approach infinite elasticity as P approaches $\overline{P}$.

Recall that $V_2(P) = \dfrac{1}{2\alpha\rho}[(\alpha\overline{q} - \rho) + \{(\alpha\overline{q} - \rho)^2 - 4\alpha\rho(P - \overline{q} - 1)\}^{1/2}]$, so that

$\dfrac{dV_2}{dP} = -\left\{(\alpha\overline{q} - \rho)^2 - 4\alpha\rho(P - \overline{q} - 1)\right\}^{-1/2}$ <0. Now since $\overline{P} = \dfrac{(\alpha\overline{q} + \rho)^2}{4\alpha\rho} + 1$, as $P \to \overline{P}$,

$\left\{(\alpha\overline{q} - \rho)^2 - 4\alpha\rho(P - \overline{q} - 1)\right\} \to 0$ and $\dfrac{dV_2}{dP} \to -\infty$.

Let $\underline{R} = \dfrac{1}{\overline{P}} > 0$. Then as P approaches $\overline{P}$ from below, r approaches $\underline{R}$ from above. Hence $\dfrac{dM}{dr} = P^2 \dfrac{dV}{dP} \to -\infty$ as r approaches $\underline{R}$ from above. These observations are summarised in the following proposition.

Proposition 2: There is a critical interest rate $\underline{R}$ >0 such that the elasticity of demand for speculative deposits approaches infinity as interest rate approaches $\underline{R}$.

Proposition 2 illustrates Keynes' observation that "…circumstances can develop in which even a large increase in the quantity of money may exert a comparatively small influence on the rate of interest." (Keynes, 1973, p 172). Textbooks typically illustrate this with a horizontal segment on the *LM* curve. If an equilibrium happens to be on this segment then an increase in money supply fails to shift the *IS-LM* equilibrium.

6. Expectation Shock and the Liquidity Trap

The possibility of a liquidity trap is usually attributed to the demand for money developing very large elasticity at low interest rates. In that sense Proposition 2 suggests a liquidity trap.

However a liquidity trap may also arise from unstable dynamics. The demand for money may tend to increase indefinitely failing to converge to an equilibrium value after an expectation shock.

The situation can arise if there is a positive shock to $\bar{q}$ when *P* is close to $\bar{P}$ on a badly behaved trade function. Let $\bar{q} > \frac{\rho}{\alpha}$, so that the trade function is badly behaved. Figure 3 shows a typical curve labelled as curve *V*. Consider a point (*V*(*P*), *P*) on the stable part of the curve where price is close to $\bar{P}$ and $V(P) = V(\bar{P}) + \Delta$, Δ a small positive quantity. Now imagine that $\bar{q}$ goes up from $\bar{q}$ to $\bar{q} + \varepsilon$, ε>0 following an expectation shock. The shock will result in a new trade function.

Let the new function be $V_1(P)$. It will have the following features. First, $\bar{q} + \varepsilon > \frac{\rho}{\alpha}$, so the new function is also badly behaved. Second, $\bar{P} = \frac{(\alpha\bar{q} + \rho)^2}{4\alpha\rho} + 1$, so the new function will have a higher peak, say, $\bar{P}_1$. Third, from equation(7), $V(\bar{P}) = \frac{\alpha\bar{q} - \rho}{2\alpha\rho}$. Hence $V_1(\bar{P}_1) > V(\bar{P})$. The new function is labelled as curve V_1 in the diagram.

Starting from the existing trade $V(P)$, the market now has to establish a new equilibrium amount of trade on curve 2 at the existing price *P*. Suppose ε is large enough so that $V_1(\bar{P}_1) > V(P)$. In that case starting from the existing value of trade the market can not converge to the stable equilibrium solution on the new function. In the diagram, the existing value of trade on the new function is at B and the stable equilibrium at price *P* is at *A*. Starting from B, trade would begin falling and approach zero.

A sufficient condition for this is

$V_1(\bar{P}_1) > V(P)$

or, $V_1(\bar{P}_1) > V(\bar{P}) + \Delta$

or, $\frac{\alpha(\bar{q} + \varepsilon) - \rho}{2\alpha\rho} > \frac{\alpha\bar{q} - \rho}{2\alpha\rho} + \Delta$, which simplifies to $\varepsilon > 2\rho\Delta$.

Clearly, for any given Δ >0, there is a corresponding ε >0 that satisfies this condition.

We may now note that as $V \to 0, M \to 1$. Using the previous notations $\underline{R} = \frac{1}{\bar{P}}$ and $\underline{r} = \frac{1}{\bar{q}}$, we can state the following proposition.

Proposition 3: When the interest rate is $\underline{R}+\eta$, η a small positive quantity, there exists $\mu(\eta) > 0$ such that a fall in expectation $\underline{r}$ to $\underline{r}-\mu$ leads to increase in the demand for money till M approaches 1.

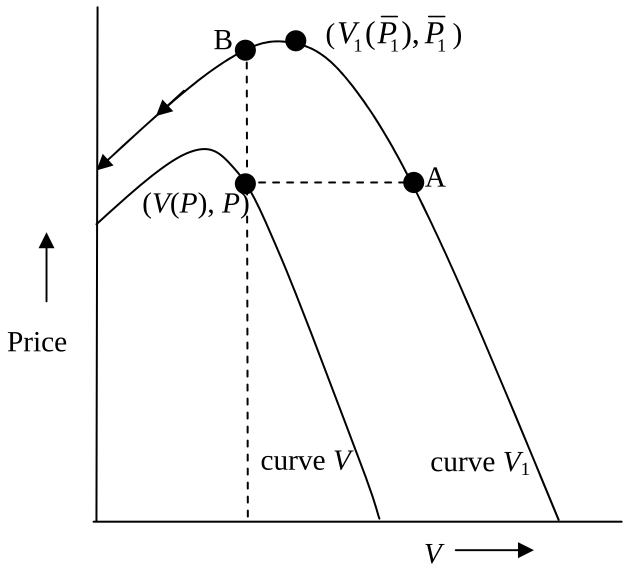

Figure 3

7. Stability and the Variety of Opinion

In a number of places Keynes commented that if market opinion is too unanimous, it leads to instability. Discussing the conditions for successful conduct of monetary policy he makes the following observation in the *General Theory*: " …opinion about the future of the rate of interest may be so unanimous that a small change in present rates may cause a mass movement into cash. It is interesting that the stability of the system and its sensitiveness to changes in the quantity of money should be so dependent on the existence of a *variety* of opinion about what is uncertain. Best of all that we should know the future. But if not, then, if we are to control the activity of the economic system by changing the quantity of money, it is important that opinions should differ."(Keynes, 1973, p 172).

This observation is true for the model developed here. Though agents have a given set of priors with a fixed distribution in $\{\underline{q}, \overline{q}\}$, the posterior expectations with which they decide to buy or abstain, change with price and are endogenously determined. At any price P, let $\underline{p}(P)$ and $\overline{p}(P)$ denote the lowest and the highest posterior expectations, given $(\underline{q}, \overline{q})$.

Define variety of opinion at price P as $v(P) = \overline{p} - \underline{p}$. Then $v(P) = (\overline{q} - \underline{q})\{1 + \alpha V(P)\}$. Note that $v' < 0$ and v approaches its minimum as $P \to \overline{P}$. Hence proposition (2) can be restated as:

Proposition $2'$: The elasticity of demand for speculative deposits approaches infinity as variety of opinion in the market approaches its minimum.

The significance of variety in the context of dynamics can be appreciated using the discussion of section 6. We had noted there that when $V = V(\overline{P}) + \Delta$, $\Delta > 0$, an expectation shock $\varepsilon > 2\rho\Delta$ is sufficient to induce a mass flight to money. At $V = V(\overline{P}) + \Delta$, let $P = \overline{P} + \sigma$, $\sigma < 0$. For given $(\underline{q}, \overline{q})$ denote the minimum value of v by v^*, so that $v^* = v(\overline{P})$. Then $v(\overline{P} + \sigma) - v^* = \alpha(\overline{q} - \underline{q})\{V(\overline{P} + \sigma) - V(\overline{P})\} = \alpha(\overline{q} - \underline{q})\Delta$.

Hence as $v(\overline{P} + \sigma) \to v^*, \Delta \to 0$ and $\varepsilon \to 0$. The closer is the variety of opinion to v^*, the smaller is the expectation shock necessary to induce a mass flight to money.

8. Conclusion

The model developed here is one possible rendering and does not claim exegetic authenticity. We wanted to explore the effects of a decision making process based on others' decisions that was emphasised in Keynes' writings. Does that alter the working of asset markets dramatically? We conclude that such processes introduce a source of instability. Exogenous shifts in expectation parameters contribute to the volatility of economic variables. But implied in Keynes' writings and much of Post Keynesian formulations is an idea of instability rather than volatility. Instability is a dynamic problem, and this model shows that expectation formation relying on the decision of others introduces dynamic complications.

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