New Stock Market Model

by Brian Thomas
bthom@earthlink.net

1. Expectation-Price Line.

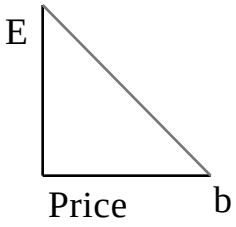
Buyers and potential buyers of stock are divided into two categories, Investors and Speculators. 'Investor' will only be capitalized when referring to this categorization. All buyers base their decisions on expectations of future gain. Buyers differ on what they base these expectations on. Investors have a Target Price in mind when they consider a stock. A Target Price is a price at which one believes the stock will be trading for at some later date. Investors make their decisions through relative comparisons of the current price to the Target Price. The time frame is irrelevant if you express all other data using the same date at which you expect the stock to be worth x at. Speculators lack a Target Price and their expectations for future gain are directly proportional to the absolute price of the stock. This results in behavior which amplifies trends.

A simple test: a stock you are following, but have not bought has risen 10 points. Do you now feel the stock is less or more attractive? If you find the stock less attractive then you are an Investor. Buyers who base expectations on relative comparisons to a Target Price will consider the stock less attractive. The distance to the T.P. has shrunk, thus reducing expectation for future gain. If you find the stock more attractive then you are classified as a Speculator. The test is the same for a price decline. An Investor will now find the stock more attractive, a Speculator less. This test best describes how the terms 'Investor' and 'Speculator' will be used.

These two groupings are not permanent identities, but instead states which anyone can fall in and out of. The investing public as a whole can also fall in and out of these states. The expected gain from a stock is given in percentage terms and is stated as ‘E’. The formula for an Investor is E = (Target Price / Current Price) - 1. Below are the relationships of Expectation to stock price as graphed. For Investors the E-Price line ends at the Target Price and is asymptotic with the Y axis, though it is not drawn that way. The Speculator E-Price line has no end, Expectation starts at zero and continues upward.

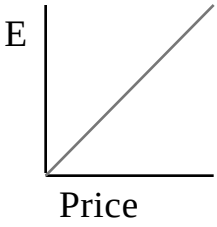
The Price line at the bottom of the Expectation-Price graph is incremented as i / Shares Outstanding with i starting at zero and continuing upward. Stock splits will be reflected in i / S.O. and will leave the model whole and unchanged. When the model is referring to the entire market S.O. will refer to the entire number of shares.

Figure 1



- b = Target Price

-Investor-



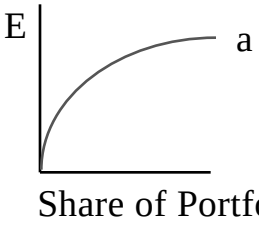
- There is no Target Price.

-Speculator-

This relationship is for either a stock, a group of stocks, or the entire market. Whatever Expectation is stated in terms of determines the scope. Expectation can be that of an individual for the entire market, or the public's Expectation for one issue.

2. Expectation-Money Line.

Figure 2

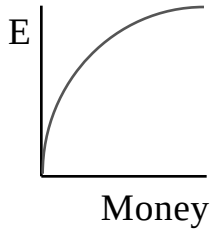


- 'a' represents the relationship between E for an individual stock and its share of the portfolio. When E is zero the stock is not held. 'a' ends at the point where 100% of the portfolio is in this one stock. The balance is in the rest of the stocks held. The shape of the curve can be inferred from marginal utility and the need to minimize variance in order to maximize expected utility.

variance in order to maximize expected utility.

The relationship of Expectation to share of portfolio can also be seen as the relationship of Expectation to money entering the market as a whole, or the market for that one stock. In a manner parallel to E-Price the E-Money relationship can be for one stock or for the market depending on what Expectation is stated in terms of. The E-Money line is related to the funds available to the investor and his expectations for the stock or market as a whole. The relationship works in reverse as well, when Expectation declines the curve will represent the amount withdrawn.

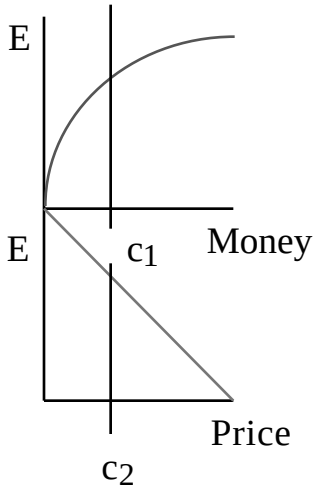
Figure 3



- The E-Money line starts at zero and ends at the funds limit for the investor. The line is the same for Investors and Speculators. The Money line at the bottom is marked in the same increments i as the Price line, absent the division by S.O..

Both graphs combined generate price. The sheer quantity of money in the market, divided by the number of shares outstanding(S.O.) determines Price (P = M / S.O.). Money is in turn determined by Expectation, which is determined by Price. This is undeniably circular, and it would be pointless to posit a starting point among the relationships.

Figure 4



- The E-M line determines the quantity of money in the market and is at c_1.
- Price = M / S.O. or c_1 / S.O.
- c_1 / S.O. = c_2
- c_1 = Market Capitalization
- c_2 = Market Price

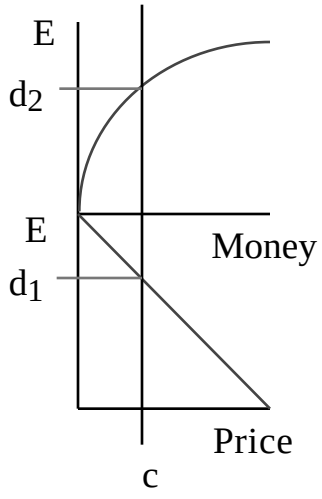
- E = F(P)
- M = F(E)
- Price = F(M)

Price is a function of Money and the price of an individual stock or the value of the entire market is found below the quantity of money given by the E-M line. The E-Money line is almost synonymous with market capitalization, but is not called that since it also measures the quantity of money moving in and out of a market in a price shift. C_1 and c_2 will be drawn as one line c.

3. Interaction and equilibrium between the E-P line and the E-M line.

The market for a stock or for all stocks will find equilibrium at the price which equalizes the expectation for gain in both graphs. This specific equilibrium will not last long as underlying factors constantly change. As factors constantly change Price will move to new equilibria.

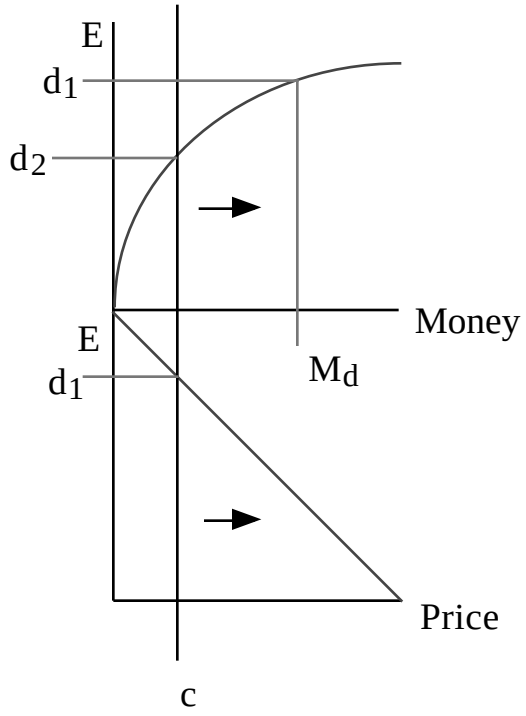
Figure 5



- Price is at c.
- E is determined by the E-Price line and is at d_1. D_2 represents the E level necessary to maintain Price at c.
- Where $d_1 = d_2$ Price will be maintained and the market will be at equilibrium.
- $d_1 = d_2$ at c
- Price = M / S.O.
- E = (Target Price / Price) - 1
- M = F(E)

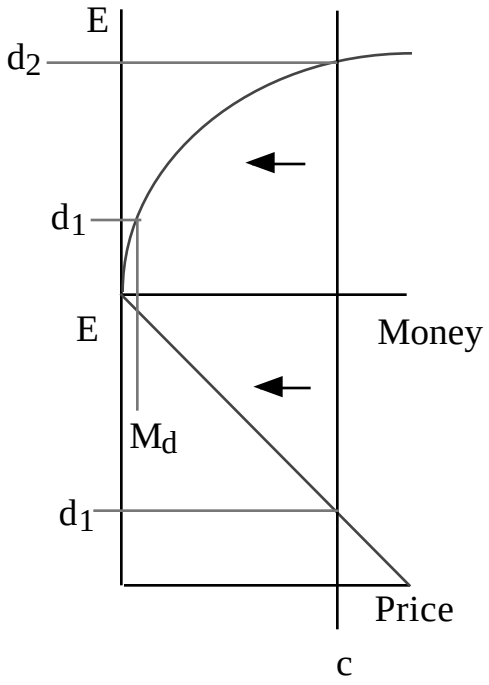
Should Price be above or below the equilibrium Investor behavior will always move Price towards the equilibrium point. This tendency toward equilibrium brings a measure of stability to price movements.

Figure 6



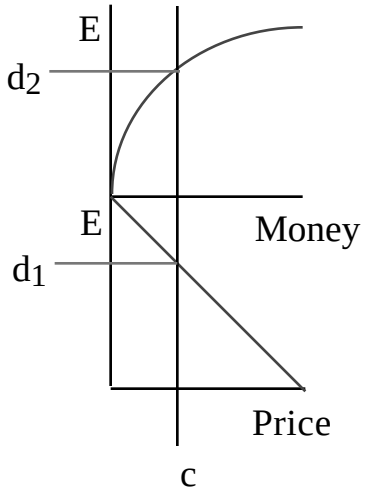
- Price has fallen below the equilibrium to c. E is determined from the E-Price line and is at d_1. D_2 is the E level necessary to maintain the price at c.
- $d_1 \neq d_2$
- Money is determined by the E-M line and is at M_d.
- Price will equal M / S.O.. At M_d the money entering the market will raise Price past c.
- Expectations and Price are not coordinated at c and the market will quickly move away from this point.

Figure 7



- Price has risen above the equilibrium to c.
- $d_1 \neq d_2$
- Money = M_d
- The Money at M_d cannot support the Price at c and Price must fall.

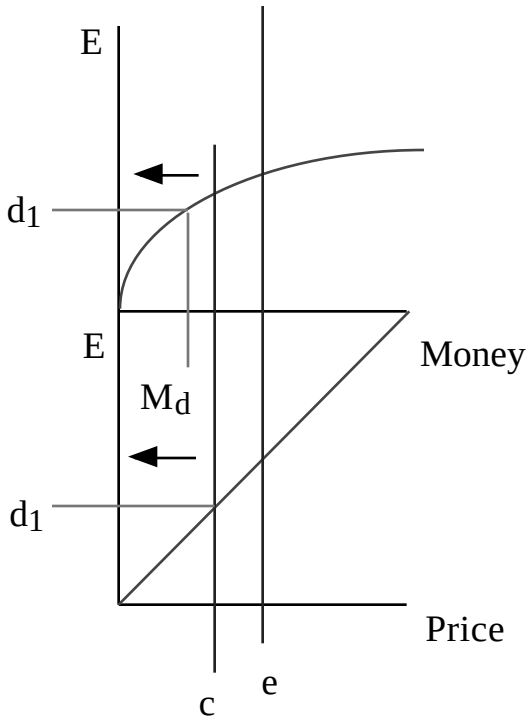
Figure 8



- Equilibrium can only be found where $d_1 = d_2$. This Price will last as long as the underlying factors last, which will not be any length of time at all. Factors will constantly change and Price will constantly chase the new equilibrium points.

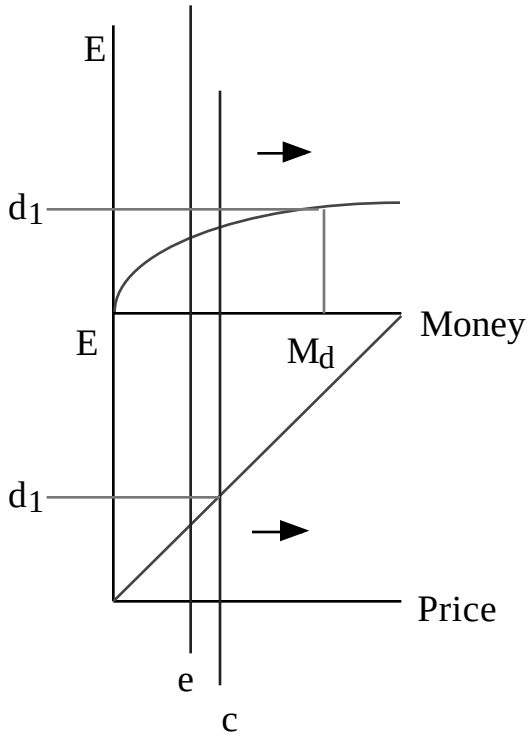
Unlike Investors, Speculators will not chase new equilibrium points, instead any position outside of equilibrium will drive Speculators to the two end points on the E-M line. Should Price be at a point below equilibrium it will fall to zero, the beginning of the E-M line. Should Price be above the equilibrium it will rise to the point where funds are exhausted, the end of the E-M line. This is in contrast to the behavior of Investors who will always seek to return to the equilibrium should they be above or below. This assumes Speculators will remain Speculators as their behavior drives prices to lows or highs that seem unreasonable. While this is possible it is more likely that most investors will not remain Speculators for long. The most important point is not the movement to the two end points, but rather that movement will always be away from any equilibrium. This will bring instability and wild price swings.

Figure 9



- Price is at c. The equilibrium point is at e.
- M_d cannot support the Price at c and Price must fall. At any point to the left of e Price would similarly have to fall.
- At any point to the left of the equilibrium point Price will move downward and continue downward until the underlying factors change or zero is reached.

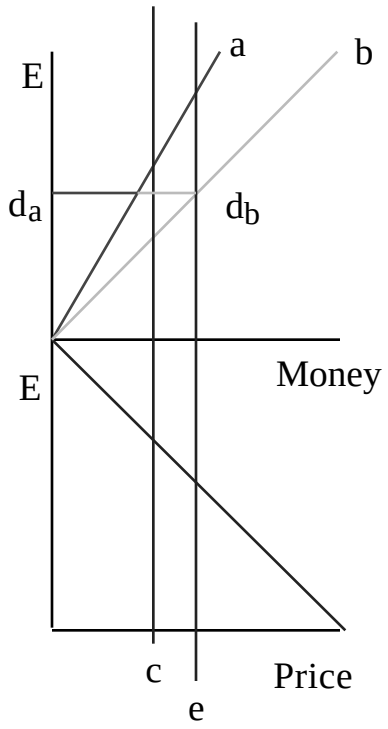
Figure 10



- Price is at c. The equilibrium point is e.
- M_d is more than is necessary to support Price at c. Price will rise.
- Any point to the right of e would produce the same result. As Price rises Speculator behavior will cause it to continue to rise until buyers are out of funds or they move to another state and stop behaving as Speculators.

Previously lines were drawn as aggregates for the entire market. Lines may also be disaggregated.

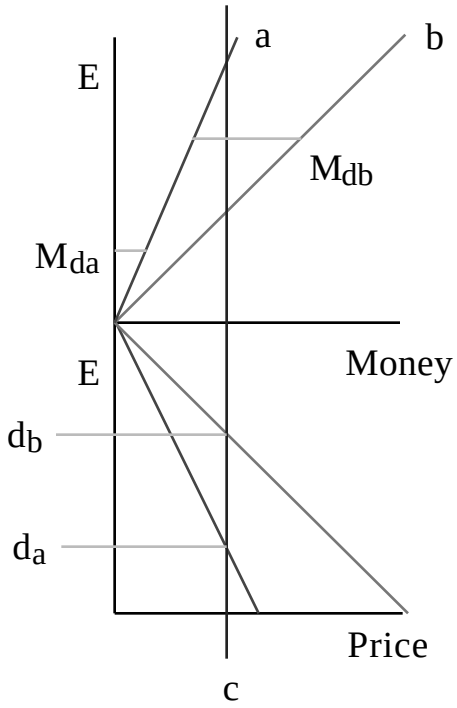
Figure 11



note - In this and the next graph the E-M lines are drawn straight in order to make demonstration clearer.

- The E-M line can be broken into constituent groups. Consider 'a' to be the original state with c as the original equilibrium price. Due to public notice a new group of investors becomes aware of the stock. Their E-M line is 'b'. The equilibrium moves to e. The horizontal lines (d_a , d_b) represent the amount invested by each respective group.
- The two groups share the same Target Price. When two groups share the same T.P. their d_x lines will be at the same height and equilibrium can be found using the furthermost E-M line.

Figure 12



- The E-Price lines can also be broken into constituent groups. Each group can also be considered an individual.
- The M_d lines represent the amount of money invested by each group.
- Money = M_{da} + M_{db}

4. Market Crashes.

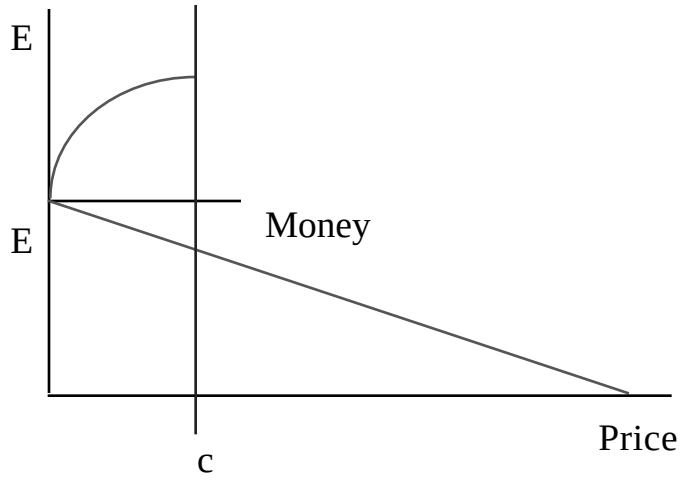
There is a finite quantity of money available for investment in any given time frame. The amount of money that can be brought to bear increases with time. By definition, if this limit is reached then there is no money available for purchase. At this point a price collapse to zero is inevitable. More realistically if the market is close to the funds limit and a large quantity of stock is offered for sale, the small amount of money available ensures a drastically reduced price will be necessary for the exchange.

The funds limit represents the total amount of money that can be moved into the market, and the maximum price possible. This limit inherently involves a time reference. It is obvious that given enough time all the transferable assets in the world could be moved, making the idea of reaching the funds limit unreasonable. However in one minute, or several minutes the amount of money that can be moved is quite small. Should this smaller limit be approached a price collapse becomes a reasonable proposition.

Buying stock is not necessary and is dependent on factors related to the market. In contrast someone will always find it necessary to sell stock to liquidate and use for other purposes. There will always be a family emergency etc. making selling necessary for someone, somewhere. There is a constant, minimum level of selling which is immune from market factors. There is no complimentary logic that someone, somewhere must always need to buy.

A price collapse or market crash is dependent on the market being close to the funds limit. As the market approaches the funds limit the amount of money that may be offered is continuing to decline, while the quantity of shares that may be offered is unaffected. The question then becomes how does the market approach this limit.

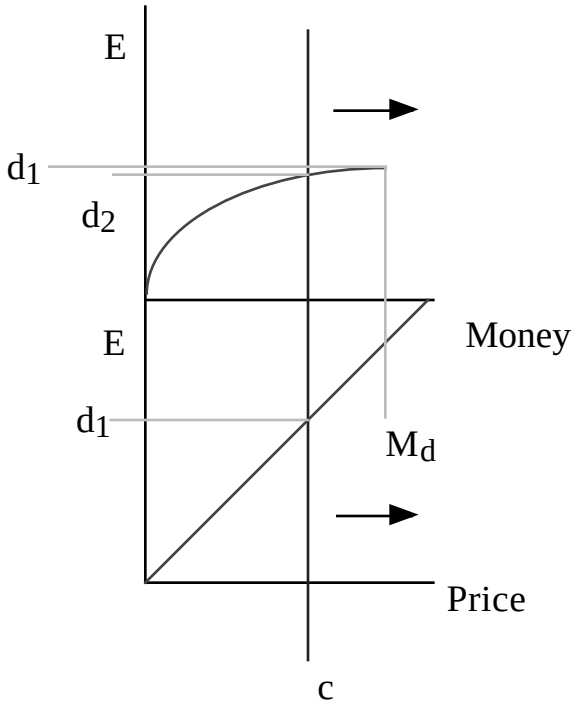
Figure 13



- This example shows Investors taking the market to the funds limit. In order to do this the Target Price must be many times greater than the maximum price possible. This is unlikely.

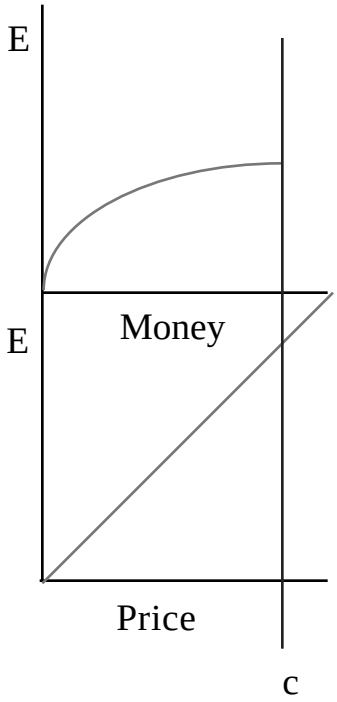
While it is inconceivable for Investors to take the market to the funds limit, it is likely for Speculators to do so, should they remain in that state for long. Remaining in that state for long is unlikely, but not so unlikely that market crashes are unheard of.

Figure 14



- The public has moved to behaving as Speculators. The Price at c is above the equilibrium. M_d is more than is necessary to support c and the price will rise.
- Price will continue to rise until the public moves to behaving as Investors or the market is taken to the funds limit.

Figure 15



- The market has been taken to the funds limit by Speculative behavior.
- At this point there is no money available for purchase and the slightest selling pressure will cause a price collapse.
- I think it is clear that anything which provides for guaranteed buying pressure, such as short contracts and the specialist system, will protect against a price collapse. Derivatives do not serve this purpose. A temporary trading halt will extend the time reference, thus expanding the funds limit and providing money for purchase.

The only real protection against a market crash is for the public to avoid behaving as Speculators and maintain the discipline of a Target Price. The contrast between Investors and Speculators is similar to the contrast between fundamental and technical analysis, though not identical. The graphs in this presentation show the entire market behaving as either Investors or Speculators in order to make demonstration easier. In reality a portion of the public will remain as Investors throughout the whole of a Speculative run up and the following crash. Maintaining the discipline of a Target Price this group will sell into the run up and then buy the shares back after the price collapse. This will result in a large transfer of wealth from one group to another.

Each market crash makes it unlikely for another to occur in the immediate future. This is because those whose thinking makes a crash more likely now have very much less money, and those whose thinking makes a crash less likely now have very much more.

Testing

Two tests quickly come to mind. Mutual fund cash reserves could be used as an approximate measure of the market's distance from the funds limit. The relative performance of well known stocks versus less well known stocks could be used as an approximate measure of the public's state (Inv. or Spec.). One could compare the trends in these numbers to trends in prices. If during run ups which have lead to a market crash the cash reserves were very low and relative performance indicated that purchases were motivated by a desire to participate unconnected to any sense of stocks being undervalued, then this would be consistent with the model.